

9-1-2005

# Justification for Class III Permit Modification September 2005 DSS Site 1004 Operable Unit 1295 Building 6969 Septic System

Sandia National Laboratories/NM

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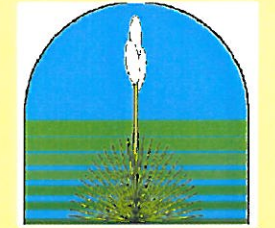


This work supported by the United States Department of Energy under contract DE-AC04-94185000.



# Drain and Septic Systems - Areas of Concern (AOCs)

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



Environmental Restoration Project

## Site History

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

AOC Number	Site Name	Location	Year Building and System Built	Year Drain or Septic System Abandoned	Years 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	1988	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	2005
1052	Bldg 803 Seepage Pit	TA-I	1957	Unknown	No septic tank at this site	NA
1078	Bldg 6640 Septic System	TA-III	1959	1991	1990-1991	Unknown (backfilled in 1991)
1079	Bldg 6643 Septic System	TA-III	1989	1991	1990-1991, 1992, 1995, 2005	2005
1080	Bldg 6644 Septic System	TA-III	1989	1991	1990-1991, 1992, 1995	1996
1081	Bldg 6650 Septic System	TA-III	1967 (southern system), Early 1960s (northern system)	1991	1990-1991, 1992, 1995	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	Late 1990s	No septic tank at this site	NA
1102	Former Bldg 889 Septic System	TA-I	Early 1950s	Early 1990s	1992-1995	Unknown (removed prior to 1999)
1104	Bldg 6595 Seepage Pit	TA-V	1966	Early 1990s	No septic tank at this site	NA
1113	Bldg 6597 Drywell	TA-V	1971	Prior to 2002	No septic tank at this site	NA
1120	Bldg 6643 Drywell	TA-III	1989	1991	No septic tank at this site	NA

## Depth to Groundwater

Depth to groundwater at these 19 AOCs is as follows:

AOC Number	Site Name	Location	Groundwater Depth (ft bgs)
276	Former Bldg 829X Silver Recovery Sump	TA-I	555
1004	Bldg 6969 Septic System	Robotic Vehicle Range	548
1031	Former Bldgs. 6589 and 6600 Septic System	TA-III	486
1034	Bldg 6710 Septic System	TA-III	470
1035	Bldg 6715 Septic System	TA-III	470
1036	Bldg 6922 Septic System	TA-III	490
1052	Bldg 803 Seepage Pit	TA-I	552
1078	Bldg 6640 Septic System	TA-III	476
1079	Bldg 6643 Septic System	TA-III	487
1080	Bldg 6644 Septic System	TA-III	480
1081	Bldg 6650 Septic System	TA-III	480
1084	Bldg 6505 Septic System	TA-III	508
1087	Bldg 6743 Seepage Pit	TA-III	461
1092	MO 228-230 Septic System	TA-III	488
1098	TA-V Plenum Rooms Drywell	TA-V	509
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 3 6, 11	None	None
1081	Bldg 6650 Septic System	2003 (north septic tank)	2002	South seepage pit 10, 12, 15, 17 North seepage pit 10, 12, 15, 17, 20, 24, 25	2002	2003
1084	Bldg 6505 Septic System	2002	2002	Drainfield 3, 8	2002	None
1087	Bldg 6743 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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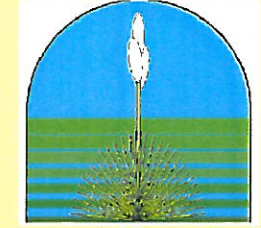
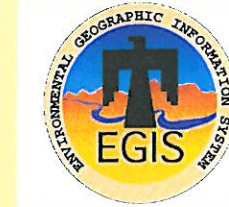


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## Drain and Septic Systems - Areas of Concern (AOCs)

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



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### 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 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 COPELs. 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 <sup>a</sup> 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 <sup>a</sup> 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 <sup>a</sup> 8.35E-7 Incremental
1052	Bldg 803 Seepage Pit	0.00	2E-6 Total
1078	Bldg 6640 Septic System	0.27	1E-5 Total <sup>a</sup> 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

<sup>a</sup>Maximum value exceeds NMED guidance for specified land-use scenario, therefore, incremental values are shown.

### For More Information Contact

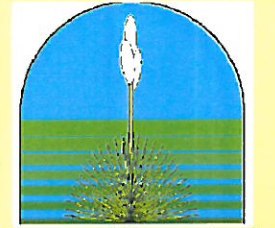
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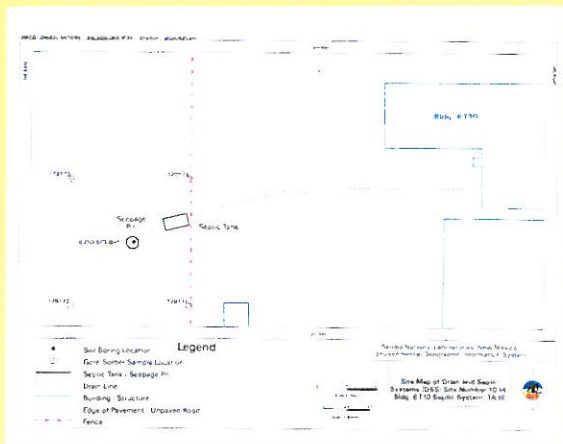
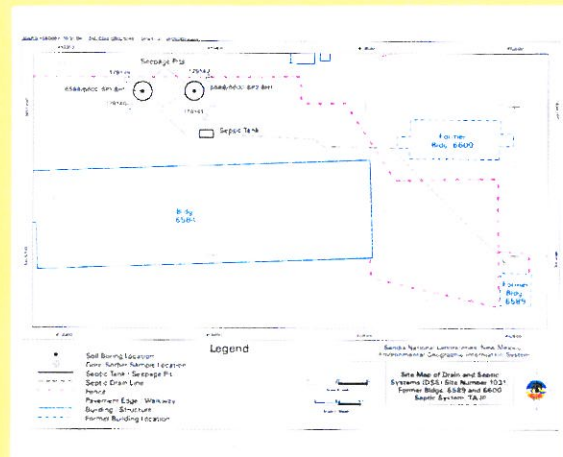
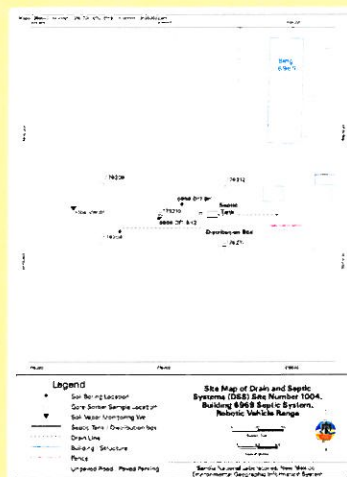
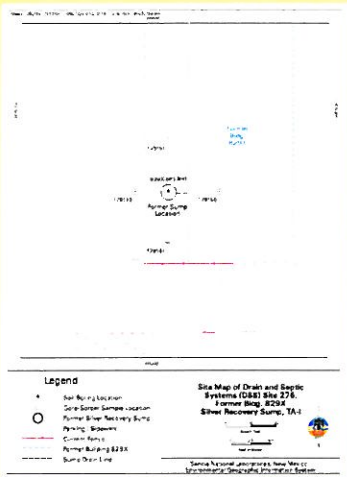


This work supported by the United States Department of Energy under contract DE-AC04-94185000.

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



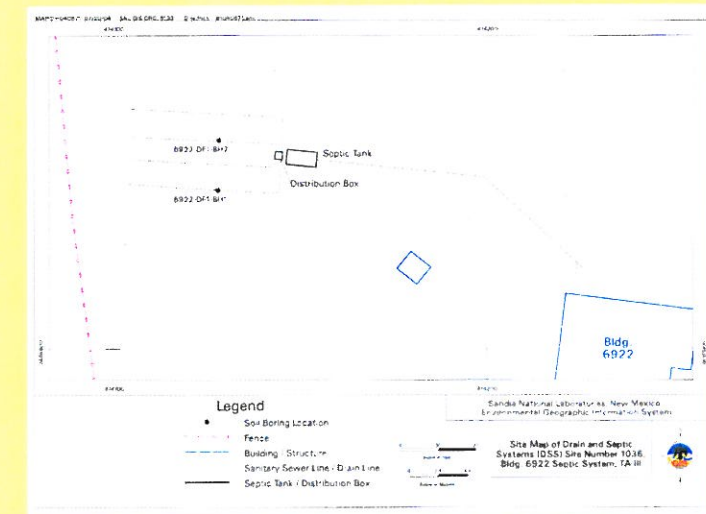
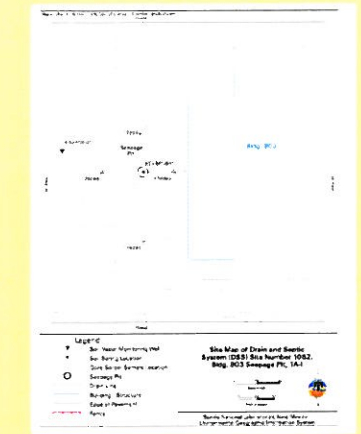
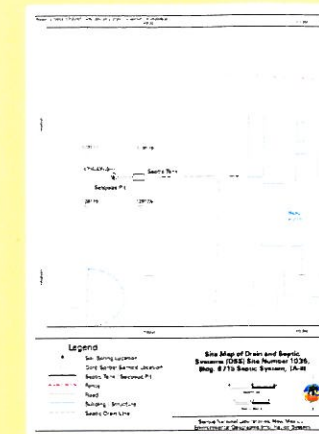
Environmental Restoration Project



Septic system demolition and backfilling.



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



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**Sandia National Laboratories**

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**Justification for Class III Permit Modification**

**September 2005**

**DSS Site 1004**

**Operable Unit 1295**

**Building 6969 Septic System**

**CAC (SWMU Assessment Report) Submitted December 2004**

**RSI Submitted March 2005**

**RSI Submitted April 2005**

**Environmental  
Restoration  
Project**



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

CAC



**National Nuclear Security Administration**

Sandia Site Office  
P.O. Box 5400  
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**DEC 1 6 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 276, 1004, 1031, 1052, 1080, 1087, 1090, 1102, and 1113 at Sandia National Laboratories, New Mexico, EPA ID No. NM5890110518. These documents are compiled as DSS Round 7 and No Further Action (NFA) Batch 25.

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)

DEC 1 6 2004

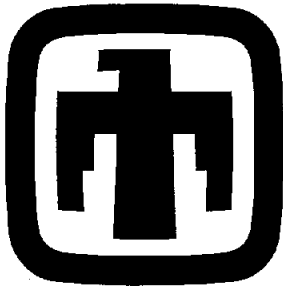
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Sandia National Laboratories/New Mexico  
Environmental Restoration Project

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**SWMU ASSESSMENT REPORT AND  
PROPOSAL FOR  
CORRECTIVE ACTION COMPLETE  
DRAIN AND SEPTIC SYSTEMS SITE 1004,  
BUILDING 6969 SEPTIC SYSTEM**

**December 2004**



United States Department of Energy  
Sandia Site Office

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- B DSS Site 1004 Soil Sample Data Validation Results
- C DSS Site 1004 Soil-Vapor Monitoring Well Analytical Results and Data Validation Report
- D DSS Site 1004 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
FLUTE™	Flexible Liner Underground Technologies
GS	Gore-Sorber™
HE	high explosive
HI	hazard index
HWB	Hazardous Waste Bureau
KAFB	Kirtland Air Force Base
MDA	minimum detectable activity
MDL	method detection limit
mrem	millirem
NFA	no further action
NMED	New Mexico Environment Department
OU	Operable Unit
PCB	polychlorinated biphenyl
ppbv	parts per billion by volume
RCRA	Resource Conservation and Recovery Act
RPSD	Radiation Protection Sample Diagnostics
SAP	Sampling and Analysis Plan
SNL/NM	Sandia National Laboratories/New Mexico
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
TA	Technical Area
TB	trip blank
TEDE	total effective dose equivalent
TOP	Technical Operating Procedure
VOC	volatile organic compound
yr	year

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## 1.0 PROJECT BACKGROUND

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

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

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

A number of additional drain systems were identified from the engineering drawings and field inspection work. It was also determined that some of the sites on the 1996 list actually contained more than one individual drain or septic system that had been combined under one four-digit site number. In order to reduce confusion, a decision was made to assign each individual system its own unique four-digit number. A new site list containing a total of 121 individual DSS sites was generated in 2000. Of these 121 sites, the NMED required environmental assessment work at a total of 61. No characterization was required at the remaining 60 sites because the sites either were found not to exist, were the responsibility of

other non-SNL/NM organizations, were already designated as individual SWMUs, or were considered by the NMED to pose no threat to human health or the environment. Subsequent backhoe excavation at DSS Site 1091 confirmed that the system did not exist, which decreased the number of DSS sites requiring characterization to 60.

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

## **2.0 DSS SITE 1004: BUILDING 6969 SEPTIC SYSTEM**

### **2.1 Summary**

The SNL/NM ER Project conducted an assessment of DSS Site 1004, the Building 6969 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 sufficiently characterized and that no significant releases of contaminants to the environment occurred via the septic system up to the time soil sampling was conducted at the site in September 2002. This report demonstrates that, based upon the sampling, the site 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.

Review and analysis of all relevant data for DSS Site 1004 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 1004 based upon sampling data demonstrating that COCs released from the site into the environment pose an acceptable level of risk.

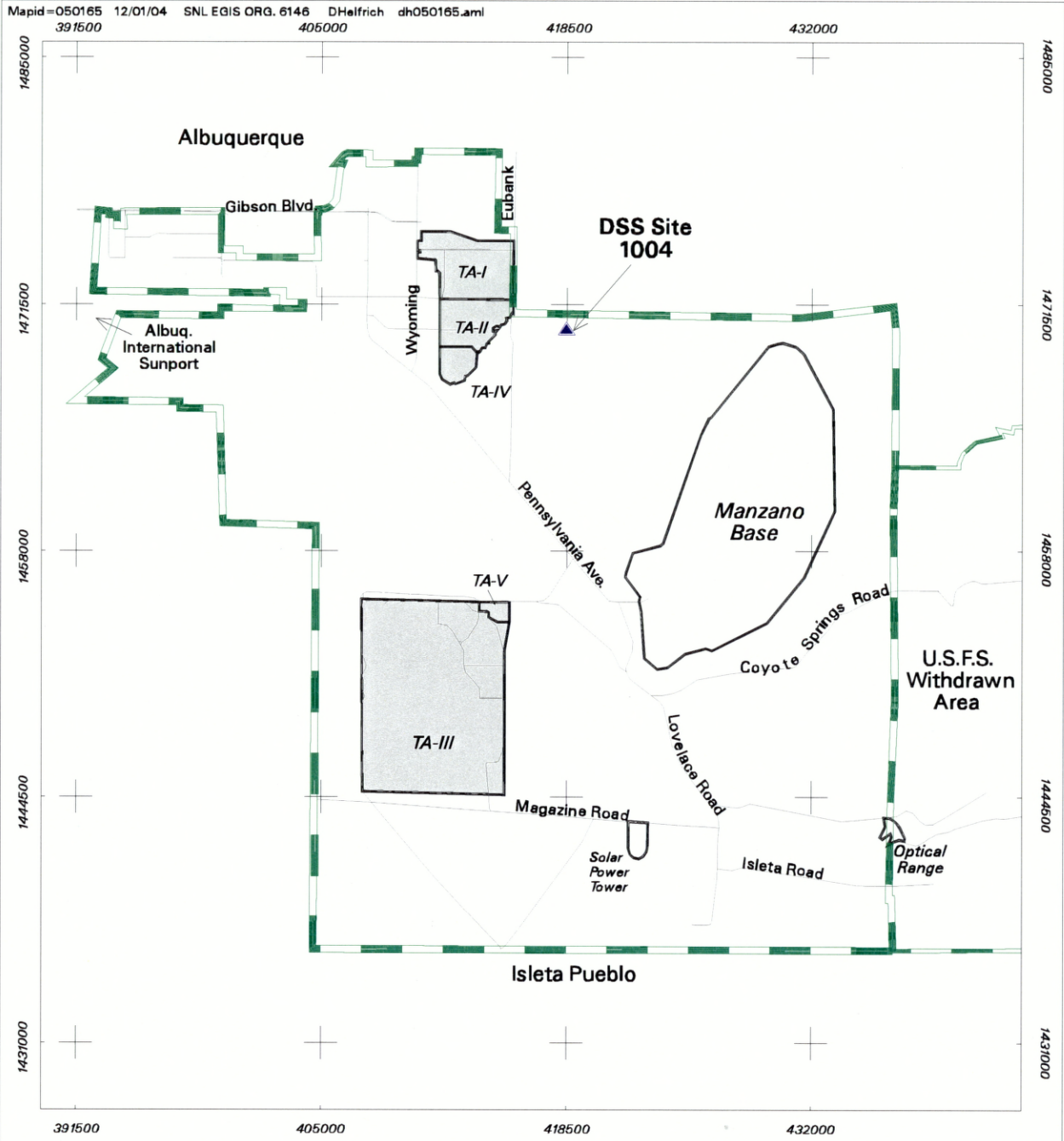
### **2.2 Site Description and Operational History**

#### **2.2.1 Site Description**

DSS Site 1004, the Building 6969 Septic System, is part of the Robotic Vehicle Range Facility located in a remote area approximately 3,200 feet east of SNL/NM Technical Area (TA)-II. DSS Site 1004 is located 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 70 feet southwest of Building 6969. The septic system consists of a 2,000-gallon septic tank and distribution box that empties to a drainfield consisting of three 65-foot-long drain lines (Figure 2.2.1-2). Construction details are based upon engineering drawings (SNL/NM March 1989), site inspections, and backhoe excavations of the system. A site inspection in September 1999 confirmed that the septic system continues to receive discharges from Building 6969.

The surface geology at DSS Site 1004 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 1004, 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

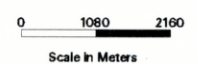
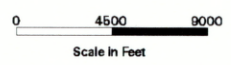
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**Legend**

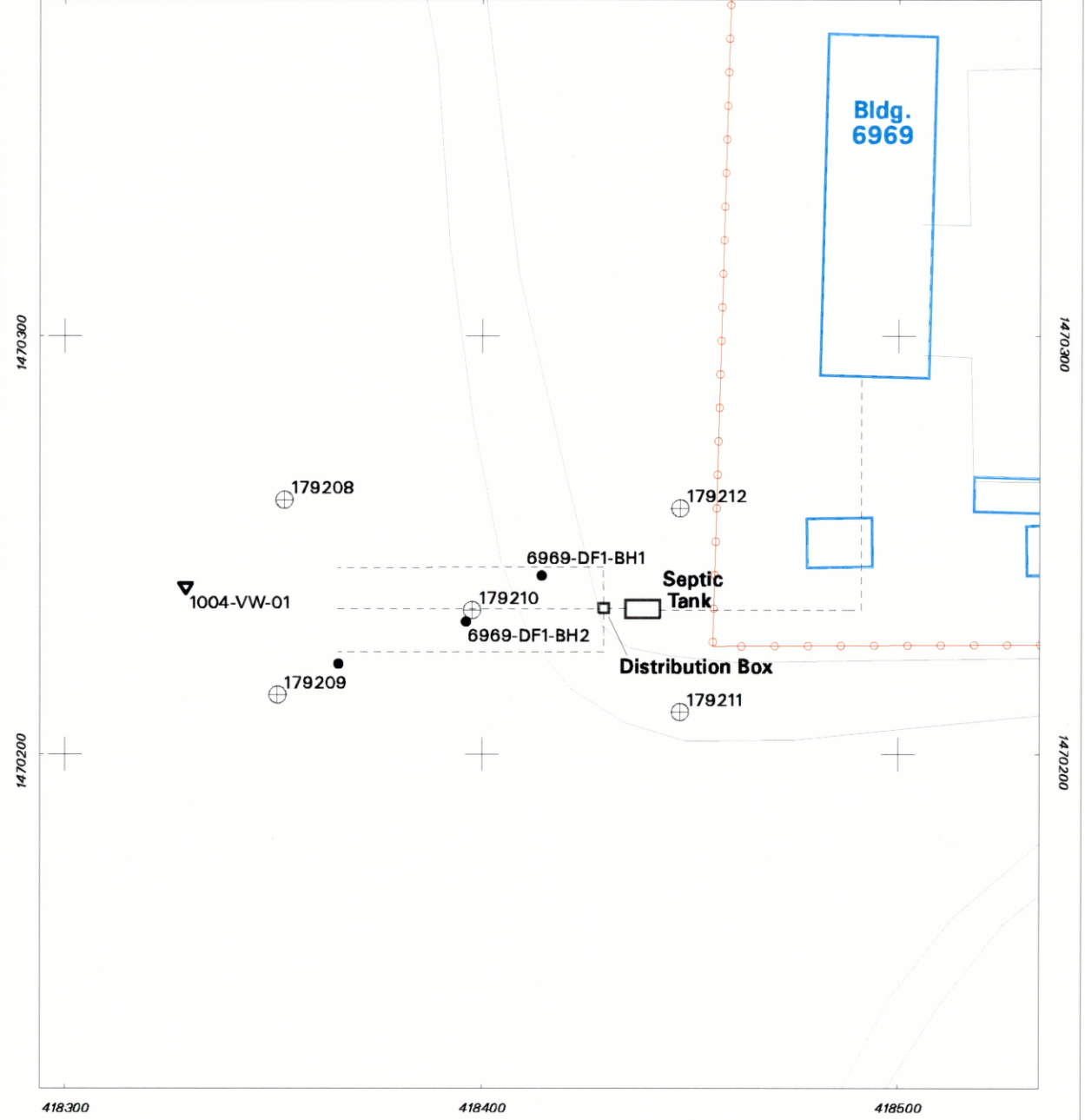
-  DSS Site 1004
-  Major Road
-  KAFB Boundary
-  USFS Withdrawn Area Boundary
-  SNL Technical Area

**Figure 2.2.2-1**  
**Location Map of Drain and Septic Systems (DSS) Site Number 1004, Bldg. 6969 Septic System, Robotic Vehicle Range**



Sandia National Laboratories, New Mexico  
 Environmental Geographic Information System

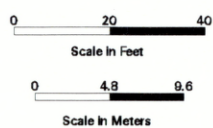




**Legend**

- Soil Boring Location
- ⊕ Gore-Sorber Sample Location
- ▼ Soil-Vapor Monitoring Well
- ▭ Septic Tank / Distribution box
- - - Drain Line
- ▭ Building / Structure
- Fence
- Unpaved Road / Paved Parking

**Figure 2.2.1-2  
 Site Map of Drain and Septic  
 Systems (DSS) Site Number 1004,  
 Building 6969 Septic System,  
 Robotic Vehicle Range**



Sandia National Laboratories, New Mexico  
 Environmental Geographic Information System

conductivities (SNL/NM March 1996). Site vegetation primarily consists of desert grasses, shrubs, and cacti.

The ground surface in the immediate area of the septic system is flat to very slightly sloping to the west, but it is also bounded on the north and south sides by west-flowing arroyos. The closest major drainage is the Tijeras Arroyo, located approximately 2,200 feet west of the site. No perennial surface-water bodies are present in the vicinity of the site. Average annual rainfall in the SNL/NM and KAFB area, as measured at Albuquerque International Sunport, is 8.1 inches (NOAA 1990). Infiltration of precipitation is almost nonexistent as virtually all of the moisture subsequently undergoes evapotranspiration. The estimates of evapotranspiration rates for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL/NM March 1996).

The site lies at an average elevation of approximately 5,473 feet above mean sea level (SNL/NM April 2003). Depth to groundwater is approximately 555 feet below ground surface (bgs) at the site. Groundwater flow is thought to be generally to the northwest in this area (SNL/NM May 2003). The nearest production wells to DSS Site 1004 are KAFB-11, approximately 200 feet to the north, and KAFB-1, approximately 2.1 miles to the northwest. The nearest groundwater monitoring well is KAFB-0315, approximately 1,000 feet south of the site.

## 2.2.2 Operational History

Available information indicates that Building 6969 was constructed in 1988 (SNL/NM March 2003) as a workshop and garage for the Robotic Vehicle Range facility, 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. A field inspection conducted in September 1999 confirmed that the septic system continues to receive discharges from Building 6969.

## 2.3 Land Use

### 2.3.1 Current Land Use

The current land use for DSS Site 1004 is industrial.

### 2.3.2 Future/Proposed Land Use

The projected future land use for DSS Site 1004 is industrial (DOE and USAF March 1996).

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## **3.0 INVESTIGATORY ACTIVITIES**

### **3.1 Summary**

Four assessment investigations have been conducted at this site. In March 2002, a backhoe was used to physically locate the buried drainfield drain lines at the site (Investigation 1). In May 2002, a passive soil-vapor survey was conducted to determine whether areas of significant volatile organic compound (VOC) contamination were present in the soil around the drainfield (Investigation 2). In September 2002, subsurface soil samples were collected from three borings drilled in the drainfield area (Investigation 3). In May and June 2003, a 150-foot-deep, active soil-vapor monitoring well was installed at DSS Site 1004. This was one of seven DSS sites selected by the NMED/HWB for additional, deep soil-vapor monitoring (Investigation 4). Investigations 2, 3, and 4 were required by the NMED/HWB to adequately characterize the site and were conducted in accordance with procedures presented in the SAP (SNL/NM October 1999) and FIP (SNL/NM November 2001) described in Chapter 1.0. These investigations are discussed in the following sections.

### **3.2 Investigation 1—Backhoe Excavation**

On March 27, 2002, a backhoe was used to determine the location, dimensions, and average depth of the DSS Site 1004 drainfield system. Backhoe excavations were carefully dug to minimize any possible damage to this still-active drainfield. The drainfield was found to have three laterals, arranged as shown on Figure 2.2.1-2, with an average drain line trench depth of 7 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.

### **3.3 Investigation 2—Passive Soil-Vapor Sampling**

In May 2002, a passive soil-vapor survey was conducted in the Building 6969 septic system area. This survey was required at this site by NMED/HWB regulators and was conducted to determine whether significant VOC contamination was present in the soil at the site.

#### **3.3.1 Passive Soil-Vapor Sampling Methodology**

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

Each GS soil-vapor sampler consists of a 1-foot-long, 0.25-inch-diameter tube of waterproof, vapor-permeable fabric containing 40 milligrams of absorbent material. At each sampling location, a 3-foot-deep by 1.5-inch-diameter borehole was drilled with the Geoprobe™. A sample identification tag and location string were attached to the GS sampler and lowered into the open borehole to a depth of 1 to 2 feet bgs. The location string was attached to a numbered

pin flag at the surface. A cork was placed in the borehole above the sampler as a seal, and the upper 1 foot of the borehole, from the cork to the ground surface, was backfilled with site soil.

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

### 3.3.2 Soil-Vapor Survey Results and Conclusions

A total of five GS passive soil-vapor samplers were placed in the drainfield area of the site (Figure 2.2.1-2). Samplers were installed at the site on May 1, 2002, and were retrieved on May 16, 2002. Sample locations are designated by the same six-digit sample number both on Figure 2.2.1-2 and in the analytical results tables presented in Annex A.

As shown in the analytical results tables in Annex A, the GS samplers were analyzed for a total of 30 individual or groups of VOCs, including trichloroethene, tetrachloroethene, cis- and trans-dichloroethene, and benzene/toluene/ethylbenzene/xylene. Low to trace-level (but quantifiable) amounts of 16 individual or groups of VOCs were detected in the GS samplers installed at this site. The analytical results indicated there were no areas of significant VOC contamination at the site that would require additional characterization.

## 3.4 Investigation 3—Soil Sampling

Once the system drain lines were located, soil sampling was conducted in accordance with the rationale and procedures in the SAP (SNL/NM October 1999) approved by the NMED. On September 20, 2002, soil samples were collected from three boreholes. Soil boring locations are shown on Figure 2.2.1-2. Figure 3.4-1 shows soil samples being collected at DSS Site 1004. A summary of the boreholes, sample depths, sample analyses, analytical methods, laboratories, and sample date is presented in Table 3.4-1.

### 3.4.1 Soil Sampling Methodology

An auger drill rig was used to sample all boreholes at two depth intervals. In 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 sample interval. Once the auger rig had reached the top of the sampling interval, a 3- or 4-foot-long by 1.5-inch inside diameter Geoprobe™ sampling tube lined with a butyl acetate (BA) sampling sleeve was inserted into the borehole and hydraulically driven downward 3 or 4 feet to fill the tube with soil.

Once the sample tube was retrieved from the borehole, the sample for VOC analysis was immediately collected by slicing off a 3- to 4-inch section from the lower end of the BA sleeve

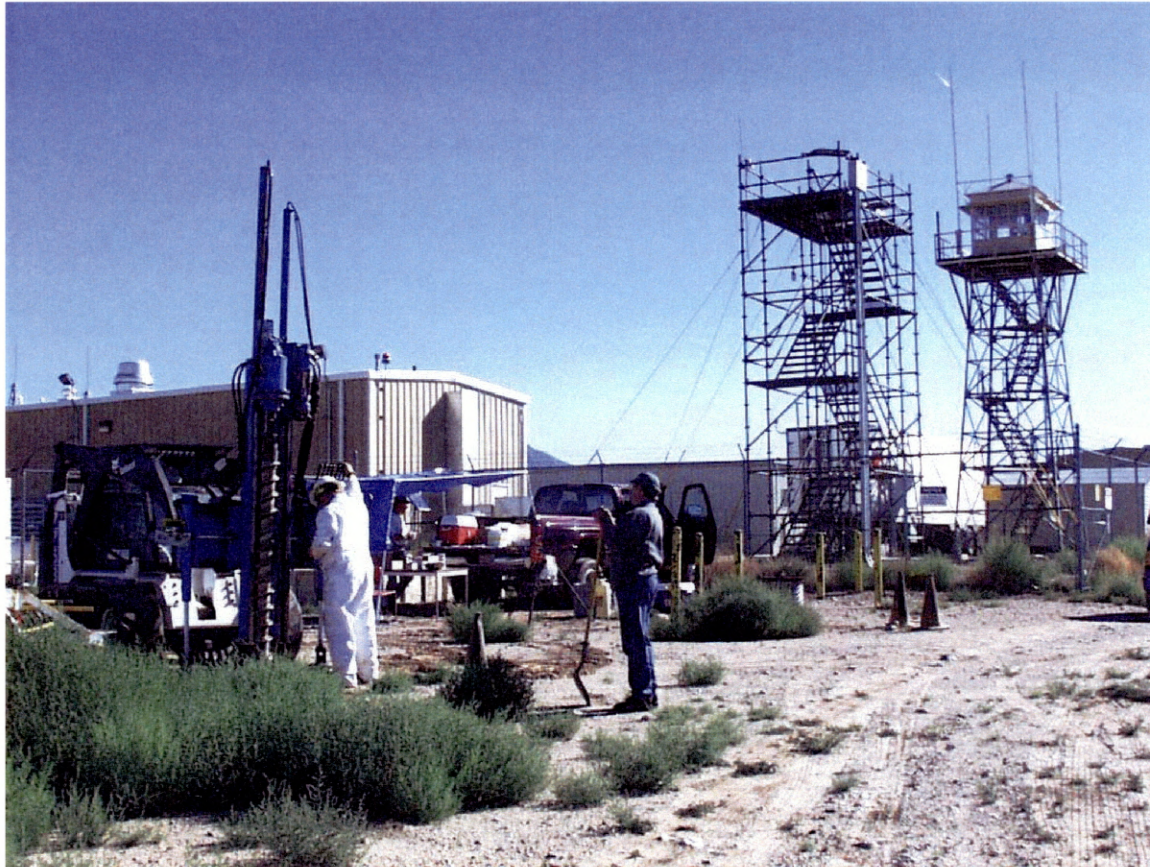


Figure 3.4-1  
Collecting soil samples with the Geoprobe™ at DSS Site 1004, Building 6969 Septic System drainfield area. View to the northeast. September 20, 2002

Table 3.4-1  
 Summary of Area Sampled, Analytical Methods, and Laboratories Used for  
 DSS Site 1004, Building 6969 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 <sup>a</sup>	Analytical Laboratory	Date Samples Collected
Drainfield	3	8, 13	6	VOCs EPA Method 8260	GEL	09-20-02
	3	8, 13	6	SVOCs EPA Method 8270	GEL	09-20-02
	3	8, 13	6	PCBs EPA Method 8082	GEL	09-20-02
	3	8, 13	6	HE Compounds EPA Method 8330	GEL	09-20-02
	3	8, 13	6	RCRA Metals EPA Methods 6000/7000	GEL	09-20-02
	3	8, 13	6	Hexavalent Chromium EPA Method 7196A	GEL	09-20-02
	3	8, 13	6	Total Cyanide EPA Method 9012A	GEL	09-20-02
	3	8, 13	6	Gamma Spectroscopy EPA Method 901.1	RPSD	09-20-02
	3	8, 13	6	Gross Alpha/Beta Activity EPA Method 900.0	GEL	09-20-02

<sup>a</sup>EPA November 1986.

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

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 1004 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. The VOC 2-butanone was detected in both the 8-foot-bgs samples from boreholes BH2 and BH3 and the 13-foot-bgs samples from boreholes BH1, BH2, and BH3. Acetone was detected in the 13-foot-bgs sample collected from borehole BH3. Toluene was detected in the 13-foot-bgs sample in BH1. Acetone and 1,2-dichloropropane were detected in the associated trip blank (TB). However, acetone is a common laboratory contaminant and because 1,2-dichloropropane was only detected in the TB, these compounds may not indicate soil contamination at this site.

#### SVOCs

Semivolatile organic compound (SVOC) analytical results for the six soil samples collected from the drainfield boreholes are summarized in Table 3.4.2-3. MDLs for the SVOC soil analyses are presented in Table 3.4.2-4. Eight SVOCs were detected in the 8-foot-bgs sample from borehole BH1, and no SVOCs were detected in any of the other borehole samples. These are common compounds found in asphalt (NPS July 1997) and probably indicate the presence of asphalt in the sample. The absence of SVOCs in the other samples at this site suggests an isolated, surface SVOC source (e.g. asphalt).

#### PCBs

Polychlorinated biphenyl (PCB) analytical results for the six soil samples collected from the 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 the soil samples collected at the site.



Table 3.4.2-1  
 Summary of DSS Site 1004, Building 6969 Septic System  
 Confirmatory Soil Sampling, VOC Analytical Results  
 September 2002  
 (Off-Site Laboratory)

Sample Attributes		VOCs (EPA Method 8260 <sup>a</sup> ) (µg/kg)				
Record Number <sup>b</sup>	ER Sample ID	Sample Depth (ft)	Acetone	2-Butanone	1,2-Dichloropropane	Toluene
605730	6969-DF1-BH1-8-S	8	ND (3.52)	ND (3.74)	ND (0.48)	ND (0.34)
605730	6969-DF1-BH1-13-S	13	ND (3.67)	10.5	ND (0.5)	<b>0.462 J (1.04)</b>
605730	6969-DF1-BH2-8-S	8	ND (3.45)	<b>4.55 J (4.9)</b>	ND (0.471)	ND (0.333)
605730	6969-DF1-BH2-13-S	13	ND (3.52)	9.26	ND (0.48)	ND (0.34)
605730	6969-DF1-BH3-8-S	8	ND (3.67)	8.54	ND (0.5)	ND (0.354)
605730	6969-DF1-BH3-13-S	13	<b>3.41 J (4.81)</b>	15.9	ND (0.462)	ND (0.327)
Quality Assurance/Quality Control Sample (µg/L)						
605730	9978/114-DW1-TB <sup>c</sup>	NA	8.93	ND (2.31)	7.66	ND (0.39)

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

<sup>a</sup>EPA November 1986.

<sup>b</sup>Analysis request/chain-of-custody record.

<sup>c</sup>ER sample ID reflects the final site for VOC samples included in this shipment.

BH = Borehole.

DF = Drainfield.

DSS = Drain and Septic Systems.

DW = Drywell.

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 1004, Building 6969 Septic System  
 Confirmatory Soil Sampling, VOC Analytical MDLs  
 September 2002  
 (Off-Site Laboratory)

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

<sup>a</sup>EPA November 1986.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

MDL = Method detection limit.

µg/kg = Microgram(s) per kilogram.

VOC = Volatile organic compound.

Table 3.4.2-3  
 Summary of DSS Site 1004, Building 6969 Septic System  
 Confirmatory Soil Sampling, SVOC Analytical Results  
 September 2002  
 (Off-Site Laboratory)

Sample Attributes		SVOCs (EPA Method 8270 <sup>a</sup> ) (µg/kg)									
Record Number <sup>b</sup>	ER Sample ID	Sample Depth (ft)	Benzo(a) pyrene	Benzo(b) fluoranthene	Benzo(g,h,i) perylene	Chrysene	Fluoranthene	Indeno(1,2,3-cd) pyrene	Phenanthrene	Pyrene	
605730	6969-DF1-BH1-8-S	8	49.7	77.5	44.3	64	67.3	33.8	26.8 J (33.3)	72.2	
605730	6969-DF1-BH1-13-S	13	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)	
605730	6969-DF1-BH2-8-S	8	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)	
605730	6969-DF1-BH2-13-S	13	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)	
605730	6969-DF1-BH3-8-S	8	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)	ND (16.7)	
605730	6969-DF1-BH3-13-S	13	ND (66.7)	ND (66.7)	ND (66.7)	ND (66.7)	ND (66.7)	ND (66.7)	ND (66.7)	ND (66.7)	

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

<sup>a</sup>EPA November 1986.

<sup>b</sup>Analysis request/chain-of-custody record.

BH = Borehole.

DF = Drainfield.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

ID = Identification.

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

MDL = Method detection limit.

µg/kg = Microgram(s) per kilogram.

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 1004, Building 6969 Septic System  
 Confirmatory Soil Sampling, SVOC Analytical MDLs  
 September 2002  
 (Off-Site Laboratory)

Analyte	EPA Method 8270 <sup>a</sup> 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
Hexachlorobenzene	20

Refer to footnotes at end of table.

Table 3.4.2-4 (Concluded)  
 Summary of DSS Site 1004, Building 6969 Septic System  
 Confirmatory Soil Sampling, SVOC Analytical MDLs  
 September 2002  
 (Off-Site Laboratory)

Analyte	EPA Method 8270 <sup>a</sup> Detection Limit ( $\mu\text{g}/\text{kg}$ )
Hexachlorobutadiene	12.7
Hexachlorocyclopentadiene	167
Hexachloroethane	22
Indeno(1,2,3-cd)pyrene	16.7
Isophorone	16
2-Methylnaphthalene	16.7
4-Methylphenol	33.3
Naphthalene	16.7
2-Nitroaniline	167
3-Nitroaniline	167
4-Nitroaniline	37
Nitrobenzene	20.3
2-Nitrophenol	17
4-Nitrophenol	167
n-Nitrosodipropylamine	22.7
Pentachlorophenol	167
Phenanthrene	16.7
Phenol	12.7
Pyrene	16.7
1,2,4-Trichlorobenzene	12.7
2,4,5-Trichloropheno	17.3
2,4,6-Trichlorophenol	27.3

<sup>a</sup>EPA 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.

SVOC = Semivolatile organic compound.

Table 3.4.2-5  
 Summary of DSS Site 1004, Building 6969 Septic System  
 Confirmatory Soil Sampling, PCB Analytical Results  
 September 2002  
 (Off-Site Laboratory)

Sample Attributes			PCBs (EPA Method 8082 <sup>a</sup> ) (µg/kg)
Record Number <sup>b</sup>	ER Sample ID	Sample Depth (ft)	
605730	6969-DF1-BH1-8-S	8	ND
605730	6969-DF1-BH1-13-S	13	ND
605730	6969-DF1-BH2-8-S	8	ND
605730	6969-DF1-BH2-13-S	13	ND
605730	6969-DF1-BH3-8-S	8	ND
605730	6969-DF1-BH3-13-S	13	ND

<sup>a</sup>EPA November 1986.

<sup>b</sup>Analysis request/chain-of-custody record.

BH = Borehole.

DF = Drainfield.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

ID = Identification.

µg/kg = Microgram(s) per kilogram.

ND = Not detected.

PCB = Polychlorinated biphenyl.

S = Soil sample.

Table 3.4.2-6  
 Summary of DSS Site 1004, Building 6969 Septic System  
 Confirmatory Soil Sampling, PCB Analytical MDLs  
 September 2002  
 (Off-Site Laboratory)

Analyte	EPA Method 8082 <sup>a</sup> 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

<sup>a</sup>EPA November 1986.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

MDL = Method detection limit.

µg/kg = Microgram(s) per kilogram.

PCB = Polychlorinated biphenyl.

### HE Compounds

High explosive (HE) compound analytical results for the six soil samples collected from the 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 the soil samples collected at the site.

### 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 drainfield boreholes are summarized in Table 3.4.2-9. MDLs for the metals in soil analyses are presented in Table 3.4.2-10. Barium was detected above the NMED-approved background in the 13-foot-bgs sample from borehole BH3 and no other metals were detected above their respective background concentrations.

### Total Cyanide

Total cyanide analytical results for the six soil samples collected from the 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 only in the 8-foot-bgs sample from borehole BH1.

### Radionuclides

Analytical results for the gamma spectroscopy analysis of the six soil samples collected from the drainfield boreholes are summarized in Table 3.4.2-13. Uranium-235 was detected above the NMED-approved background level only in the 13-foot-bgs sample from borehole BH2. In addition, the minimum detectable activity (MDA) for uranium-235 exceeded the corresponding background activity in the four other samples because the standard gamma spectroscopy count time for soil samples (6,000 seconds) was not sufficient to reach the NMED-approved background activity established for SNL/NM soils. Even though the MDA values 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 drainfield boreholes are summarized in Table 3.4.2-14. No gross alpha or beta activity was detected above the New Mexico-established background levels (Miller September 2003) in any of the samples. These results indicate no significant levels of radioactive material are present in the soil at the site.

Table 3.4.2-7  
 Summary of DSS Site 1004, Building 6969 Septic System  
 Confirmatory Soil Sampling, HE Compound Analytical Results  
 September 2002  
 (Off-Site Laboratory)

Sample Attributes			HE (EPA Method 8330 <sup>a</sup> ) (µg/kg)
Record Number <sup>b</sup>	ER Sample ID	Sample Depth (ft)	
605730	6969-DF1-BH1-8-S	8	ND
605730	6969-DF1-BH1-13-S	13	ND
605730	6969-DF1-BH2-8-S	8	ND
605730	6969-DF1-BH2-13-S	13	ND
605730	6969-DF1-BH3-8-S	8	ND
605730	6969-DF1-BH3-13-S	13	ND

<sup>a</sup>EPA November 1986.

<sup>b</sup>Analysis request/chain-of-custody record.

BH = Borehole.

DF = Drainfield.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

HE = High explosive(s).

ID = Identification.

µg/kg = Microgram(s) per kilogram.

ND = Not detected.

S = Soil sample.



Table 3.4.2-8  
 Summary of DSS Site 1004, Building 6969 Septic System  
 Confirmatory Soil Sampling, HE Compound Analytical MDLs  
 September 2002  
 (Off-Site Laboratory)

Analyte	EPA Method 8330 <sup>a</sup> Detection Limit ( $\mu\text{g}/\text{kg}$ )
2-Amino-4,6-dinitrotoluene	18.1
4-Amino-2,6-dinitrotoluene	34.1
1,3-Dinitrobenzene	34.1
2,4-Dinitrotoluene	55
2,6-Dinitrotoluene	48
HMX	48
Nitrobenzene	48
2-Nitrotoluene	24
3-Nitrotoluene	24
4-Nitrotoluene	24
RDX	48
Tetryl	22.1
1,3,5-Trinitrobenzene	29
2,4,6-Trinitrotoluene	48

<sup>a</sup>EPA November 1986.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

HE = High Explosive(s).

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

MDL = Method detection limit.

$\mu\text{g}/\text{kg}$  = 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 1004, Building 6969 Septic System  
 Confirmatory Soil Sampling, Metals Analytical Results  
 September 2002  
 (Off-Site Laboratory)

Sample Attributes		Metals (EPA Method 6000/7000/7196A) <sup>a</sup> (mg/kg)									
Record Number <sup>b</sup>	ER Sample ID	Sample Depth (ft)	Arsenic	Barium	Cadmium	Chromium	Chromium (VI)	Lead	Mercury	Selenium	Silver
605730	6969-DF1-BH1-8-S	8	3.01	161	0.267 J (0.45)	13.8	ND (0.0529 J)	7.47	0.00602 J (0.0096)	0.511 J	ND (0.0813)
605730	6969-DF1-BH1-13-S	13	3.38	163	0.258 J (0.472)	12.7	ND (0.0543 J)	7.97	0.00202 J (0.00908)	0.195 J (0.472)	ND (0.0851)
605730	6969-DF1-BH2-8-S	8	1.53	74.2	0.159 J (0.45)	6.24	0.0549 J (0.1)	3.83	0.00904	0.427 J (0.45)	ND (0.0813)
605730	6969-DF1-BH2-13-S	13	3.83	171	0.262 J (0.472)	13.4	0.0549 J (0.1)	8.43	0.00737 J (0.00901)	0.437 J (0.472)	ND (0.0851)
605730	6969-DF1-BH3-8-S	8	1.39	57.7	0.169 J (0.446)	5.81	ND (0.0544 J)	3.44	0.00214 J (0.00915)	0.345 J (0.446)	ND (0.0805)
605730	6969-DF1-BH3-13-S	13	2.77	<b>240</b>	0.187 J (0.455)	9.06	ND (0.0533 J)	5.77	0.00148 J (0.00893)	0.329 J (0.455)	ND (0.082)
Background Concentration—Tijeras Supergroup <sup>c</sup>			4.4	200	0.9	16.2	NC	11.2	<0.1	<1	<1

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

<sup>a</sup>EPA November 1986.

<sup>b</sup>Analysis request/chain-of-custody record.

<sup>c</sup>Dinwiddie September 1997.

BH = Borehole.

DF = Drainfield.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

ID = Identification.

J = 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.

NC = Not calculated

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 1004, Building 6969 Septic System  
 Confirmatory Soil Sampling, Metals Analytical MDLs  
 September 2002  
 (Off-Site Laboratory)

Analyte	EPA Method 6000/7000/7196A <sup>a</sup> Detection Limit (mg/kg)
Arsenic	0.184–0.195
Barium	0.0596–0.0629
Cadmium	0.0427–0.0451
Chromium	0.144–0.152
Chromium (VI)	0.0529–0.0544
Lead	0.253–0.268
Mercury	0.000874–0.000944
Selenium	0.145–0.153
Silver	0.0805–0.0851

<sup>a</sup>EPA November 1986.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

MDL = Method detection limit.

mg/kg = Milligram(s) per kilogram.

Table 3.4.2-11  
 Summary of DSS Site 1004, Building 6969 Septic System  
 Confirmatory Soil Sampling, Total Cyanide Analytical Results  
 September 2002  
 (Off-Site Laboratory)

Sample Attributes			Total Cyanide (EPA Method 9012A <sup>a</sup> ) (mg/kg)
Record Number <sup>b</sup>	ER Sample ID	Sample Depth (ft)	
605730	6969-DF1-BH1-8-S	8	<b>4.07</b>
605730	6969-DF1-BH1-13-S	13	ND (0.0419)
605730	6969-DF1-BH2-8-S	8	ND (0.0381)
605730	6969-DF1-BH2-13-S	13	ND (0.035)
605730	6969-DF1-BH3-8-S	8	ND (0.0381)
605730	6969-DF1-BH3-13-S	13	ND (0.035)

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

<sup>a</sup>EPA November 1986.

<sup>b</sup>Analysis request/chain-of-custody record.

BH = Borehole.

DF = Drainfield.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

ID = Identification.

MDL = Method detection limit.

mg/kg = Milligram(s) per kilogram.

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

S = Soil sample.

Table 3.4.2-12  
 Summary of DSS Site 1004, Building 6969 Septic System  
 Confirmatory Soil Sampling, Total Cyanide Analytical MDLs  
 September 2002  
 (Off-Site Laboratory)

Analyte	EPA Method 9012A <sup>a</sup> Detection Limit (mg/kg)
Total Cyanide	0.035-0.0419

<sup>a</sup>EPA November 1986.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

MDL = Method detection limit.

mg/kg = Milligram(s) per kilogram.

### 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. Acetone and 1,2-dichloropropane were detected in the TB for DSS Site 1004 (Table 3.4.2-1).

No duplicate or EB samples were collected at this site.

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

Table 3.4.2-13  
 Summary of DSS Site 1004, Building 6969 Septic System  
 Confirmatory Soil Sampling, Gamma Spectroscopy Analytical Results  
 September 2002  
 (On-Site Laboratory)

Sample Attributes		Activity (EPA Method 901.1 <sup>a</sup> ) (pCi/g)											
Record Number <sup>b</sup>	ER Sample ID	Sample Depth (ft)	Cesium-137		Thorium-232		Uranium-235		Uranium-238		Uranium-238		
			Result	Error <sup>c</sup>	Result	Error <sup>c</sup>	Result	Error <sup>c</sup>	Result	Error <sup>c</sup>	Result	Error <sup>c</sup>	
605731	6969-DF1-BH1-8-S	8	ND (0.0302)	--	0.956	0.445	<b>ND (0.235)</b>	--	ND (0.798)	--	ND (0.798)	--	
605731	6969-DF1-BH1-13-S	13	ND (0.0285)	--	1	0.474	<b>ND (0.231)</b>	--	ND (0.702)	--	ND (0.702)	--	
605731	6969-DF1-BH2-8-S	8	ND (0.0285)	--	0.882	0.411	0.166	0.181	ND (0.744)	--	ND (0.744)	--	
605731	6969-DF1-BH2-13-S	13	ND (0.0281)	--	0.966	0.445	<b>0.203</b>	0.175	ND (0.698)	--	ND (0.698)	--	
605731	6969-DF1-BH3-8-S	8	ND (0.0258)	--	0.667	0.321	<b>ND (0.202)</b>	--	ND (0.621)	--	ND (0.621)	--	
605731	6969-DF1-BH3-13-S	13	ND (0.0278)	--	0.921	0.426	<b>ND (0.219)</b>	--	ND (0.701)	--	ND (0.701)	--	
Background Activity—North Supergroup <sup>d</sup>			0.084	NA	1.54	NA	0.18	NA	1.3	NA	1.3	NA	

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

<sup>a</sup>EPA November 1986.

<sup>b</sup>Analysis request/chain-of-custody record.

<sup>c</sup>Two standard deviations about the mean detected activity.

<sup>d</sup>Dinwiddie September 1997.

BH = Borehole.

DF = Drainfield.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

ID = Identification.

MDA = Minimum detectable activity.

NA = Not applicable.

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

**ND ( )** = Not detected, but the MDA (shown in parentheses) exceeds background activity.

pCi/g = Picocurie(s) per gram.

S = Soil sample.

-- = Error not calculated for nondetect results.

Table 3.4.2-14  
 Summary of DSS Site 1004, Building 6969 Septic System  
 Confirmatory Soil Sampling, Gross Alpha/Beta Activity Analytical Results  
 September 2002  
 (Off-Site Laboratory)

Sample Attributes			Activity (EPA Method 900.0 <sup>a</sup> ) (pCi/g)			
Record Number <sup>b</sup>	ER Sample ID	Sample Depth (ft)	Gross Alpha		Gross Beta	
			Result	Error <sup>c</sup>	Result	Error <sup>c</sup>
605730	6969-DF1-BH1-8-S	8	12	3.32	19.2	1.7
605730	6969-DF1-BH1-13-S	13	9.88	2.59	17	2.59
605730	6969-DF1-BH2-8-S	8	13	2.82	20.6	2.52
605730	6969-DF1-BH2-13-S	13	14.9	3.37	22.2	2.61
605730	6969-DF1-BH3-8-S	8	12.1	2.85	22.5	2.56
605730	6969-DF1-BH3-13-S	13	8.45	2.49	20.5	2.27
Background Activity <sup>d</sup>			17.4	NA	35.4	NA

<sup>a</sup>EPA November 1986.

<sup>b</sup>Analysis request/chain-of-custody record.

<sup>c</sup>Two standard deviations about the mean detected activity.

<sup>d</sup>Miller September 2003.

BH = Borehole.

DF = Drainfield.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

ID = Identification.

NA = Not applicable.

pCi/g = Picocurie(s) per gram.

S = Soil sample.

### 3.5 Investigation 4—Active Soil-Vapor Sampling

#### 3.5.1 Active Soil-Vapor Sampling Methodology

Active soil-vapor sampling typically involves directly pumping soil-vapor from the subsurface for analysis. Vapor collection can be accomplished either by simple open-pipe systems analogous to groundwater monitoring wells screened in the interval of interest, or through sophisticated “down hole” systems with individual inlet port and collection tube sets placed at multiple sampling depths. Figure 3.5-1 shows the five collection tubes exiting the completed wellhead of the soil-vapor well installed at DSS 1004 (Figure 2.2.1-3). The extracted soil-vapor can be analyzed immediately, collected on adsorbent media, or collected into special canisters for later laboratory analysis.

#### 3.5.2 Active Soil-Vapor Sampling Results

In May 2003, as part of the DSS investigation, a Flexible Liner Underground Technologies (FLUTE™) soil-vapor monitoring well was installed at DSS Site 1004 (Figure 2.2.1-2). This vapor well was 150 feet deep and had vapor sampling ports at depths of 5, 20, 70, 100, and 150

feet bgs. After installation, subsurface conditions were allowed to equilibrate for over three months before the well was sampled on September 9, 2003. Soil-vapor samples from each of the five sampling depths were collected in special canisters and sent to an off-site laboratory for analysis. Total VOC soil-vapor concentrations ranged from a low of 1.4 parts per billion by volume (ppbv) in the 5-foot-bgs interval to a maximum of 5.1 ppbv in the 100-foot-bgs sample. The analytical results and data validation report for these samples are presented in Annex C.

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

### **3.6 Site Sampling Data Gaps**

Analytical data from the site assessment were sufficient for characterizing the nature and extent of possible COC releases. There are no further data gaps regarding characterization of DSS Site 1004.

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Figure 3.5-1

A typical FLUTE™ soil-vapor monitoring well completion showing five individual vapor sampling tubes exiting the soil-vapor monitoring well at DSS Site 1004, Building 6969 Septic System. Each tube is connected to an individual soil-vapor sampling port on the side of the FLUTE™ well. The sample ports are at depths of 5 to 150 feet bgs.



## 4.0 CONCEPTUAL SITE MODEL

The conceptual site model for DSS Site 1004, the Building 6969 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 1004 are VOCs, SVOCs, PCBs, HE compounds, RCRA metals, hexavalent chromium, cyanide, and radionuclides. Acetone, 2-butanone, and toluene were detected in the VOC samples collected at the site. Benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene were detected in the 8-foot-bgs SVOC sample from BH1. No PCBs or HE compounds were detected in any of the soil samples collected at this site. Barium was the only metal detected at concentrations above the approved maximum background concentrations for SNL/NM Tijeras Supergroup soils (Dinwiddie September 1997). Hexavalent chromium was not detected in any sample, but because it does not have a quantified background screening concentration it is unknown whether this COC exceeds background. When a metal concentration exceeded its maximum background screening value, it was considered further in the risk assessment process. Cyanide was also detected in one sample, but because it does not have a quantified background screening concentration, it is unknown whether this COC exceeds background.

Uranium-235 was detected at an activity exceeding the corresponding background level in one soil sample. In addition, the MDA values for four other uranium-235 analyses exceeded the corresponding background activity. Finally, no gross alpha/beta activity was detected above the New Mexico-established background levels.

### 4.2 Environmental Fate

Potential COCs may have been released into the vadose zone via aqueous effluent 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 555 feet bgs) most likely precludes migration of potential COCs into the groundwater system. The potential pathways to receptors include soil ingestion, dermal contact, and inhalation, which could occur as a result of receptor exposure to contaminated subsurface soil at the site. No intake routes through plant, meat, or milk ingestion are considered appropriate for either the industrial or residential land-use scenarios. Annex D provides additional discussion on the fate and transport of COCs at DSS Site 1004.

Table 4.2-1 summarizes the potential COCs for DSS Site 1004. All potential COCs were retained in the conceptual model and were evaluated in both the human health and ecological risk assessments. The current and future land use for DSS Site 1004 is industrial (DOE and USAF March 1996).

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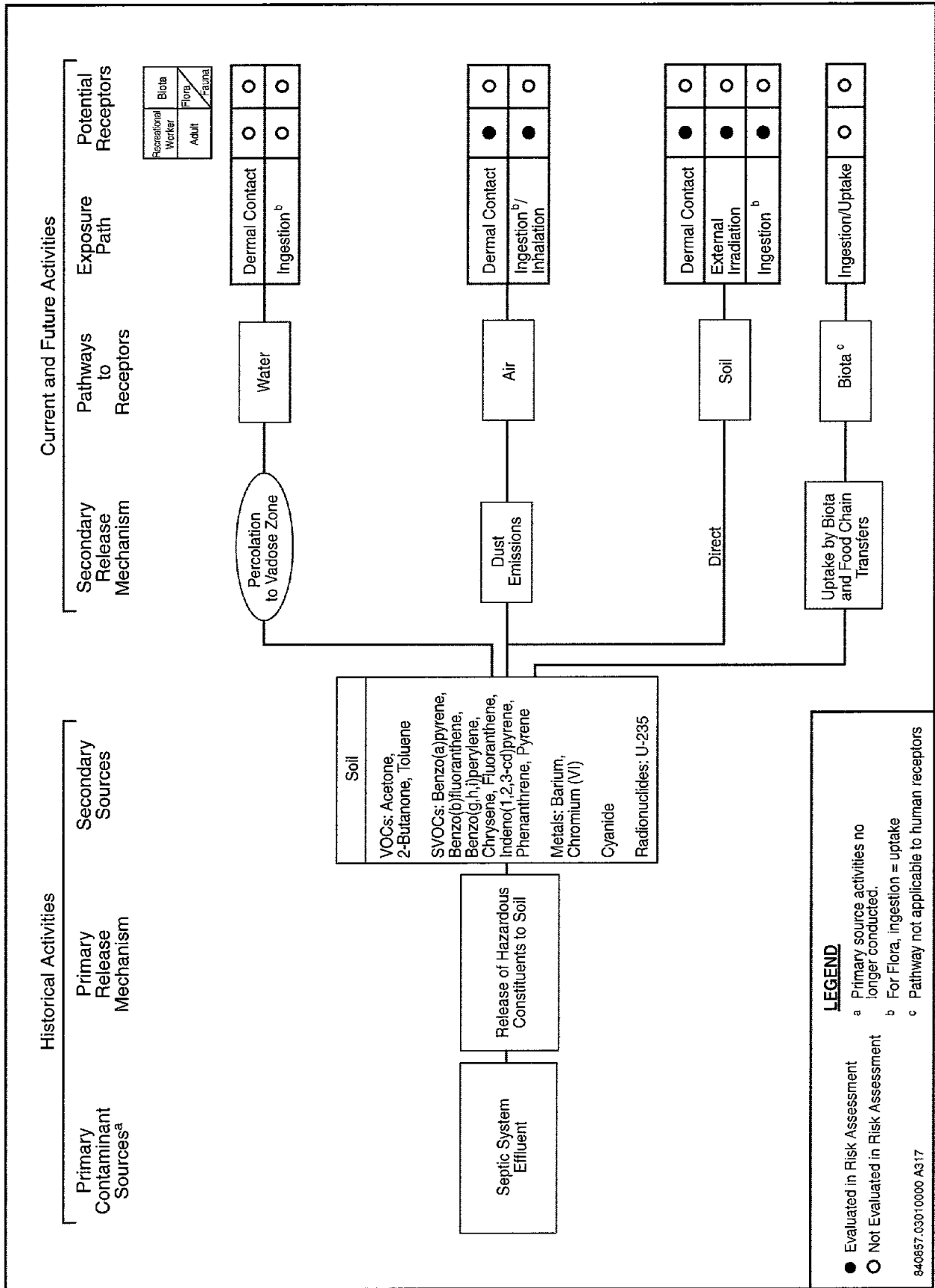


Figure 4.2-1  
 Conceptual Site Model Flow Diagram for DSS Site 1004, Building 6969 Septic System



Table 4.2-1  
Summary of Potential COCs for DSS Site 1004, Building 6969 Septic System

COC Type	Number of Samples <sup>a</sup>	COCs Detected or with Concentrations Greater than Background or Nonquantified Background	Maximum Background Limit/Tieras Supergroup <sup>b</sup> (mg/kg)	Maximum Concentration <sup>c</sup> (All Samples) (mg/kg)	Average Concentration <sup>d</sup> (mg/kg)	Number of Samples Where COCs Detected or with Concentrations Greater than Background or Nonquantified Background <sup>e</sup>
VOCs	6	Acetone	NA	0.0034 J	0.0021	1
	6	2-Butanone	NA	0.0159	0.0084	5
	6	Toluene	NA	0.0005 J	0.0002	1
SVOCs	6	Benzo(a)pyrene	NA	0.0497	0.0194	1
	6	Benzo(b)fluoranthene	NA	0.0775	0.0240	1
	6	Benzo(g,h,i)perylene	NA	0.0443	0.0185	1
	6	Chrysene	NA	0.064	0.0218	1
	6	Fluoranthene	NA	0.0673	0.0223	1
	6	Indeno(1,2,3-cd)pyrene	NA	0.0338	0.0168	1
	6	Phenanthrene	NA	0.0268 J	0.0156	1
	6	Pyrene	NA	0.0722	0.0232	1
PCBs	6	None	NA	NA	NA	None
HE Compounds	6	None	NA	NA	NA	None
RCRA Metals	6	Barium	200	240	144.5	1
Hexavalent Chromium	6	Hexavalent Chromium	NC	0.0549 J	0.0362	2
Cyanide	6	Cyanide	NC	4.07	0.6941	1
Radionuclides (pCi/g)	6	Uranium-235	0.18	ND (0.235)	NC <sup>f</sup>	5
	6	None	NA	NA	NA	None
	6	None	NA	NA	NA	None

<sup>a</sup>Number of samples includes duplicates and splits.

<sup>b</sup>Inwiddle September 1997.

<sup>c</sup>Maximum concentration is either the maximum amount detected, or for radionuclides, the greater of either the maximum detection or the maximum MDA above background.

<sup>d</sup>Average concentration includes all samples except blanks. The average is calculated as the sum of detected amounts and one-half of the MDLs for nondetected results, divided by the number of samples.

<sup>e</sup>See appropriate data table for sample locations.

<sup>f</sup>An average MDA is not calculated because of the variability in instrument counting error and the number of reported nondetected activities for gamma spectroscopy.

Table 4.2-1 (Concluded)  
 Summary of Potential COCs for DSS Site 1004, Building 6969 Septic System

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 D provides additional discussion of the exposure routes and receptors at DSS Site 1004.

### **4.3 Site Assessment**

Site assessment at DSS Site 1004 included risk assessments for both human health and ecological risk. This section briefly summarizes the site assessment results, and Annex D discusses the risk assessment performed for DSS Site 1004 in more detail.

#### **4.3.1 Summary**

The site assessment concluded that DSS Site 1004 poses no significant threat to human health under either the industrial or residential land-use scenarios. Ecological risks were found to be insignificant because no pathways exist.

#### **4.3.2 Risk Assessments**

Risk assessments were performed for both human health and ecological risk at DSS Site 1004. This section summarizes the results.

##### **4.3.2.1 Human Health**

DSS Site 1004 has been recommended for an industrial land-use scenario (DOE et. al March 1996). Because acetone, 2-butanone, toluene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, pyrene, barium, hexavalent chromium, cyanide, and uranium-235 were detected, are present above background, or had MDA values above background, it was necessary to perform a human health risk assessment analysis for the site, which included these COCs. Annex D provides a complete discussion of the risk assessment process, results, and uncertainties. The risk assessment process provides a quantitative evaluation of the potential adverse human health effects from constituents in the site's soil by calculating the hazard index (HI) and excess cancer risk for both industrial and residential land-use scenarios.

The HI calculated for the COCs at DSS Site 1004 is 0.01 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 0.01. The estimated excess cancer

risk for DSS Site 1004 is  $5E-7$  for an industrial land-use scenario. NMED guidance states that cumulative excess lifetime cancer risk must be less than  $1E-5$  (Bearzi January 2001); thus the excess cancer risk for this site is below the suggested acceptable risk value. The estimated incremental excess cancer risk is  $4.99E-7$ . Both the incremental HI and excess cancer risk are below NMED guidelines.

The HI calculated for the COCs at DSS Site 1004 is 0.08 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 0.04. The estimated excess cancer risk for DSS Site 1004 COCs is  $2E-6$  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 estimated incremental excess cancer risk is  $1.70E-6$ . Both the incremental HI and incremental excess cancer risk are below NMED guidelines.

For the radiological COCs, one of the constituents (uranium-235) was detected in one sample collected from the site and the remaining uranium-235 analyses had MDA values greater than the corresponding background values. The incremental total effective dose equivalent (TEDE) and corresponding estimated cancer risk from radiological COCs are much lower than the EPA guidance values; the estimated TEDE is  $7.9E-3$  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 estimated incremental excess cancer risk value is  $6.7E-8$  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  $2.0E-2$  mrem/yr with an associated estimated incremental excess cancer risk of  $2.0E-7$ . The guideline for this scenario is 75 mrem/yr (SNL/NM February 1998). Therefore, DSS Site 1004 is eligible for unrestricted radiological release.

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

Table 4.3.2-1  
Summation of Incremental Nonradiological and Radiological Risks from  
DSS Site 1004, Building 6969 Septic System Carcinogens

Scenario	Nonradiological Risk	Radiological Risk	Total Risk
Industrial	$4.99E-7$	$6.7E-8$	$5.7E-7$
Residential	$1.70E-6$	$2.0E-7$	$1.9E-6$

DSS = Drain and Septic Systems.

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

#### 4.3.2.2 *Ecological*

An ecological assessment that corresponds with the procedures in the EPA's Ecological Risk Assessment Guidance for Superfund (EPA 1997b) also was performed as set forth by the NMED Risk-Based Decision Tree in the "RPMP [RCRA Permits Management Program] Document Requirement Guide" (NMED March 1998). An early step in the evaluation compared COC concentrations and identified potentially bioaccumulative constituents (see Annex D, Sections IV, VII.2, and VII.2.1). This methodology also required developing a site conceptual model and a food web model, as well as selecting ecological receptors, as presented in "Predictive Ecological Risk Assessment Methodology, Environmental Restoration Program, Sandia National Laboratories, New Mexico" (IT July 1998). The risk assessment also includes the estimation of exposure and ecological risk.

All COCs at DSS Site 1004 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 1004 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 1004, a baseline ecological risk assessment is not required for the site.

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## **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 1004 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 1004. 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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## 6.0 REFERENCES

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**ANNEX A**  
**DSS Site 1004**  
**Gore-Sorber™ Passive Soil-Vapor Survey Analytical Results**



# W. L. GORE & ASSOCIATES, INC.

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

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

June 6, 2002

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

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

Dear Mr. Sanders:

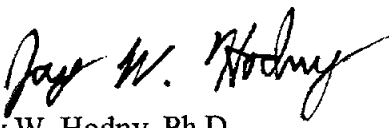
Thank you for choosing a GORE-SORBER® Screening Survey.

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

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

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

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

  
Jay W. Hodny, Ph.D.  
Associate

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

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# W. L. GORE & ASSOCIATES, INC.

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

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

1 of 6

## GORE-SORBER® Screening Survey Final Report

Non-ER Drain & Septic  
Kirtland AFB, NM

June 6, 2002

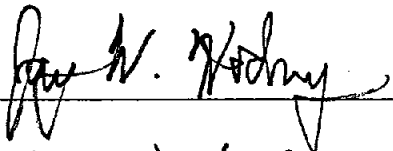


Prepared For:  
Sandia National Laboratories  
Mail Stop 0719, 1515 Eubank, SE  
Albuquerque, NM 87123

W.L. Gore & Associates, Inc.

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

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

Analytical Data Reviewed by:  
Jim E. Whetzel, Chemist

  
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**GORE-SORBER® Screening Survey  
Final Report**

**REPORT DATE:** June 6, 2002

**AUTHOR:** JWH

**SITE INFORMATION**

**Site Reference:** Non-ER Drain & Septic, Kirtland AFB, NM

**Customer Purchase Order Number:** 28518

**Gore Production Order Number:** 10960025

**Gore Site Code:** CCT, CCX

**FIELD PROCEDURES**

**# Modules shipped:** 142

**Installation Date(s):** 4/23,24,25,26,29,30/2002; 5/1,6/2002

**# Modules Installed:** 135

**Field work performed by:** Sandia National Laboratories

**Retrieval date(s):** 5/8,9,10,14,15,16,21/2002

**# Modules Retrieved:** 131

**# Modules Lost in Field:** 4

**# Modules Not Returned:** 1

**Exposure Time:** ~15 [days]

**# Trip Blanks Returned:** 3

**# Unused Modules Returned:** 3

**Date/Time Received by Gore:** 5/17/2002 @ 2:00 PM; 5/24/2002@1:30PM      **By:** MM

**Chain of Custody Form attached:** √

**Chain of Custody discrepancies:** None

**Comments:**

Modules #179227, -228, and -229 were identified as trip blanks.

Modules #179137, -138, -140, and -141 were not retrieved and considered lost from the field.

Module #179231 was not returned.

Modules #179230, 232, and -233 were returned unused.

**GORE-SORBER® Screening Survey  
Final Report**

**ANALYTICAL PROCEDURES**

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

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

**Analytical Method Quality Assurance:**

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

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

**Laboratory analysis:** thermal desorption, gas chromatography, mass selective detection

**Instrument ID:** # 2 **Chemist:** JW

**Compounds/mixtures requested:** Gore Standard VOC/SVOC Target Compounds (A1)

**Deviations from Standard Method:** None

**Comments:** Soil vapor analytes and abbreviations are tabulated in the Data Table Key (page 6). Module #179091 was returned and noted as damaged, no carbonaceous sorbents; therefore, target compound masses reported in data table cannot be compared to the mass data from the other modules directly.

Module #179101, no identification tag was returned with this module.



**GORE-SORBER® Screening Survey  
Final Report**

**DATA TABULATION**

**# CONTOUR MAPS ENCLOSED:** No contour maps were generated.

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

**General Comments:**

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

**GORE-SORBER® Screening Survey  
Final Report**

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

**Project Specific Comments:**

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

**GORE-SORBER® Screening Survey  
Final Report**

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

<b>UNITS</b>	
µg	micrograms (per sorber), reported for compounds
MDL	method detection limit
bdl	below detection limit
nd	non-detect
<b>ANALYTES</b>	
<b>BTEX</b>	combined masses of benzene, toluene, ethylbenzene and total xylenes (Gasoline Range Aromatics)
BENZ	benzene
TOL	toluene
EtBENZ	ethylbenzene
mpXYL	m-, p-xylene
oXYL	o-xylene
C11,C13&C15	combined masses of undecane, tridecane, and pentadecane (C11+C13+C15) (Diesel Range Alkanes)
UNDEC	undecane
TRIDEC	tridecane
PENTADEC	pentadecane
TMBs	combined masses of 1,3,5-trimethylbenzene and 1,2,4-trimethylbenzene
135TMB	1,3,5-trimethylbenzene
124TMB	1,2,4-trimethylbenzene
ct12DCE	cis- & trans-1,2-dichloroethene
t12DCE	trans-1,2-dichloroethene
c12DCE	cis-1,2-dichloroethene
NAPH&2-MN	combined masses of naphthalene and 2-methyl naphthalene
NAPH	naphthalene
2MeNAPH	2-methyl naphthalene
MTBE	methyl t-butyl ether
11DCA	1,1-dichloroethane
CHCl <sub>3</sub>	chloroform
111TCA	1,1,1-trichloroethane
12DCA	1,2-dichloroethane
CCl <sub>4</sub>	carbon tetrachloride
TCE	trichloroethene
OCT	octane
PCE	tetrachloroethene
CIBENZ	chlorobenzene
14DCB	1,4-dichlorobenzene
<b>BLANKS</b>	
TBn	unexposed trip blanks, travels with the exposed modules
method blank	QA/QC module, documents analytical conditions during analysis

**APPENDIX A:**

1. CHAIN OF CUSTODY
2. DATA TABLE

# GORE-SORBER® Screening Survey Chain of Custody

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



W. L. Gore & Associates, Inc., Survey Products Group

100 Chesapeake Boulevard • Elkton, Maryland 21921 • Tel: (410) 392-7600 • Fax (410) 506-4780

Instructions: Customer must complete ALL shaded cells

Customer Name: <u>SANDIA NATIONAL LABS</u>			Site Name: <u>NON-ER DRAIN+ SEPTIC</u>		
Address: <u>ACCOUNTS PAYABLE MS0154</u>			Site Address: <u>KIVL 2ND AFB, NM</u>		
<u>P.O. BOX 5130</u>			<u>KIRTLAND</u>		
<u>ALBUQUERQUE NM 87185 U.S.A.</u>			Project Manager: <u>MIKE SANDERS</u>		
Phone: <u>505-284-3303</u>			Customer Project No.:		
FAX: <u>505-284-2616</u>			Customer P.O. #: <u>28518</u> Quote #: <u>211946</u>		
Serial # of Modules Shipped			# of Modules for Installation <u>135</u> # of Trip Blanks <u>7</u>		
# 179087 - # 179144	# <u>179087</u> - # <u>179134</u>	Total Modules Shipped: <u>142</u>	Pieces		
# 179150 - # 179233	# <u>179135</u> - # <u>179136</u>	Total Modules Received: <u>142</u>	Pieces		
# - #	# <u>179139</u> - #	Total Modules Installed: <u>135</u>	Pieces		
# - #	# <u>179142</u> - # <u>179144</u>	Serial # of Trip Blanks (Client Decides) #			
# - #	# <u>179150</u> - # <u>179151</u>	# <u>179227</u>	#	#	#
# - #	# - #	#	#	#	#
# - #	# - #	#	#	#	#
# - #	# - #	#	#	#	#
# - #	# - #	#	#	#	#
# - #	# - #	#	#	#	#
# - #	# - #	#	#	#	#
Prepared By: <u>Cherene [Signature]</u>	#	#	#	#	#
Verified By: <u>Mary Anne [Signature]</u>	#	#	#	#	#
Installation Performed By:			Installation Method(s) (circle those that apply):		
Name (please print): <u>GILBERT QUINTANA</u>			Slide Hammer Hammer Drill Auger		
Company/Affiliation: <u>SNL/NM</u>			Other: <u>GEOPRUBE</u>		
Installation Start Date and Time: <u>4/23/02 10815T</u>			: <u>AM</u> PM		
Installation Complete Date and Time: <u>5/6/02 109901</u>			: <u>AM</u> PM		
Retrieval Performed By:			Total Modules Retrieved: _____ Pieces		
Name (please print): <u>GILBERT QUINTANA</u>			Total Modules Lost in Field: _____ Pieces		
Company/Affiliation: <u>SNL/NM</u>			Total Unused Modules Returned: _____ Pieces		
Retrieval Start Date and Time: <u>5/8/02 1 1</u>			: AM PM		
Retrieval Complete Date and Time: <u>1 1</u>			: AM PM		
Relinquished By: <u>[Signature]</u>	Date: <u>3-4-02</u>	Time: <u>12:00</u>	Received By: <u>Mike Sanders</u>	Date: <u>3-6-02</u>	Time: _____
Affiliation: <u>W.L. Gore &amp; Associates, Inc.</u>			Affiliation: <u>Sandia/ER</u>		
Relinquished By: <u>William [Signature]</u>	Date: <u>5-14-02</u>	Time: <u>12:58</u>	Received By: _____	Date: _____	Time: _____
Affiliation: <u>6135</u>			Affiliation: _____		
Relinquished By: _____	Date: _____	Time: _____	Received By: <u>Mary Anne [Signature]</u>	Date: <u>5/7/02</u>	Time: <u>14:00</u>
Affiliation: _____			Affiliation: <u>W.L. Gore &amp; Associates, Inc.</u>		

# GORE-SORBER® Screening Survey Chain of Custody

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



**W. L. Gore & Associates, Inc., Survey Products Group**

100 Chesapeake Boulevard • Elkton, Maryland 21921 • Tel: (410) 392-7600 • Fax (410) 506-4780

*Instructions: Customer must complete ALL shaded cells*

**R**

Customer Name: <u>SANDIA NATIONAL LABS</u>			Site Name: <u>NON-ER DRAIN+ SEPTIC</u>		
Address: <u>ACCOUNTS PAYABLE MS0154</u>			Site Address: <u>KIVL 2ND AFB, NM</u>		
<u>P.O. BOX 5130</u>			<u>KIPTLAND</u>		
<u>ALBUQUERQUE NM 87185 U.S.A.</u>			Project Manager: <u>MIKE SANDERS</u>		
Phone: <u>505-284-3303</u>			Customer Project No.: _____		
FAX: <u>505-284-2616</u>			Customer P.O. #: <u>28518</u> Quote #: <u>211946</u>		
Serial # of Modules Shipped			# of Modules for Installation <u>135</u> # of Trip Blanks <u>7</u>		
# 179087 - # 179144	# 179152 - # 179187	Total Modules Shipped: <u>142</u> Pieces			
# 179150 - # 179233	# 179188 - # 179226	Total Modules Received: <u>142</u> Pieces			
# - #	# - #	Total Modules Installed: <u>135</u> Pieces			
# - #	# - #	Serial # of Trip Blanks (Client Decides) #			
# - #	# - #	# <u>179228</u>	#	#	#
# - #	# - #	# <u>179229</u>	#	#	#
# - #	# - #	#	#	#	#
# - #	# - #	#	#	#	#
# - #	# - #	#	#	#	#
# - #	# - #	#	#	#	#
# - #	# - #	#	#	#	#
Prepared By: <u>[Signature]</u>	#	#	#	#	#
Verified By: <u>[Signature]</u>	#	#	#	#	#
Installation Performed By:			Installation Method(s) (circle those that apply):		
Name (please print): <u>GILBERT QUINTANA</u>			Slide Hammer Hammer Drill Auger		
Company/Affiliation: <u>SNL/NM</u>			Other: <u>GEOPRBE</u>		
Installation Start Date and Time: <u>4/23/02 10815T</u>			: <u>AM</u> PM		
Installation Complete Date and Time: <u>5/6/02 109401</u>			: <u>AM</u> PM		
Retrieval Performed By:			Total Modules Retrieved: <u>74</u> Pieces		
Name (please print): <u>GILBERT QUINTANA</u>			Total Modules Lost in Field: <u>4</u> Pieces		
Company/Affiliation: <u>SNL/NM</u>			Total Unused Modules Returned: <u>3</u> Pieces		
Retrieval Start Date and Time: <u>5/8/02 1 1</u>			: AM PM		
Retrieval Complete Date and Time: <u>1 1</u>			: AM PM		
Relinquished By: <u>[Signature]</u>	Date	Time	Received By: <u>Mike Sanders</u>	Date	Time
Affiliation: <u>W.L. Gore &amp; Associates, Inc.</u>	<u>3-4-02</u>	<u>12:00</u>	Affiliation: <u>Sandia; 6133</u>	<u>3-7-02</u>	
Relinquished By: <u>[Signature]</u>	Date	Time	Received By: _____	Date	Time
Affiliation: <u>Sandia N.L. 6135</u>	<u>5-21-02</u>	<u>0935</u>	Affiliation: _____		
Relinquished By: _____	Date	Time	Received By: <u>[Signature]</u>	Date	Time
Affiliation: _____			Affiliation: <u>W.L. Gore &amp; Associates, Inc.</u>	<u>5-24-02</u>	<u>13:30</u>

**GORE-SORBER® Screening Survey  
Installation and Retrieval Log**

**SITE NAME & LOCATION**

1. of 4

LINE #	MODULE #	INSTALLATION DATE/TIME	RETRIEVAL DATE/TIME	EVIDENCE OF LIQUID HYDROCARBONS (LPH) or HYDROCARBON ODOR (Check as appropriate)			MODULE IN WATER (check one)		COMMENTS
				LPH	ODOR	NONE	YES	NO	
1.	179087	4/23/02, 0815	05-08-02, 0800					✓	1001/898-GS-5
2.	179088	0822						↓	GS-3
3.	179089	0830						↓	GS-2
4.	179090	0840						↓	GS-1
5.	179091	✓ 0852						↓	GS-4
6.	179092	0952	✓ 0830					↓	1052/803-GS-1
7.	179093	1000						↓	1-4
8.	179094	1010						↓	-3
9.	179095	1018	✓					↓	-2
10.	179096	1135	0900					↓	1030/6587--5
11.	179097	1151						↓	-6
12.	179098	1238						↓	-4
13.	179099	1247						↓	-3
14.	179100	1254						↓	-2
15.	179101	1309						↓	-1
16.	179102	1347	0920					↓	1082/6620--4
	179103	1355						↓	-5
18.	179104	1404						↓	-1
19.	179105	✓ 1431						↓	-3
20.	179106	✓ 1440	✓					↓	-2
21.	179107	4/24/02, 0848	5-9-02, 0930					↓	1108/6531--5
22.	179108	0853						↓	-6
23.	179109	0900						↓	-4
24.	179110	0907						↓	-2
25.	179111	0916						↓	-3
26.	179112	✓ 0936	✓					↓	-1
27.	179113	4/25/02, 0746	5-10-02, 0812					↓	1027/6530--5
28.	179114	0754						↓	-2
29.	179115	0800						↓	-3
30.	179116	0810						↓	-4
31.	179117	0818	✓ 0917					↓	-1
32.	179118	0915	5-10-02, 0925					↓	1010/6536--5
33.	179119	0922						↓	6
34.	179120	0931						↓	4
35.	179121	0942						↓	2
36.	179122	0947						↓	1
37.	179123	0954	✓ 1002					↓	3
38.	179124	1026	5-10-02, 1013					↓	1028/6560--1
39.	179125	1043						↓	4
40.	179126	1052						↓	3
41.	179127	1103	✓ 1041					↓	2
42.	179128	✓ 1420	5-10-02, 1045					↓	1026/6501-✓ 2

**GORE-SORBER® Screening Survey  
Installation and Retrieval Log**

**SITE NAME & LOCATION**

of 4

LINE #	MODULE#	INSTALLATION DATE/TIME	RETRIEVAL DATE/TIME	EVIDENCE OF LIQUID HYDROCARBONS (LPH) OR HYDROCARBON ODOR (Check as appropriate)			MODULE IN WATER (check one)		COMMENTS
				LPH	ODOR	NONE	YES	NO	
43.	179129	4/25/02, 1428	5-10-02, 10:47						1026/6581-65-3
44.	179130		1437 5-10-02, 10:51						↓ 1
45.	179131		1442 5-10-02, 10:53						1025/6581- 1
46.	179132		1446 ↓						2
47.	179133	↓	1504 5-10-02, 11:06						↓ 3
48.	179134	4/26/02, 0905	5-10-02, 12:47						1093/6581- 1
49.	179135		0914 ↓ 12:54						4
50.	179136		0930 5-10-02, 13:05						2
51.	179137		0938 Lost						3
52.	179138		0948 Lost						↓ 5
53.	179139		1018 5-10-02, 13:22						1031/6600- 2
54.	179140		1026 Lost						3
55.	179141		1030 Lost						4
56.	179142		1038 5-10-02, 13:43						↓ 1
57.	179143		1136 5-10-02, 11:36						276/829X- 2
	179144		1142 ↓						3
	179150		1150 ↓						4
60.	179151	↓	1155 5-10-02, 11:54						↓ 1
61.	179152	4/29/02, 0814	5-14-02, 09:42						1084/6505- 5
62.	179153		0822						3
63.	179154		0829						2
64.	179155		0903						↓ 4
65.	179156		0845 5-14-02, 10:21						1083/6570- 4
66.	179157		0930 05-14-02, 09:19						1 1
67.	179158		0939 ↓						2
68.	179159		0940 ↓						3
69.	179160		0948 ↓ 0940						1032/6610- 1
70.	179161		1050 05-14-02, 10:25						2
71.	179162		1100 ↓						4
72.	179163		1110 ↓						3
73.	179164		1114 ↓						5
74.	179165		1120 ↓						6
75.	179166		1126 05-14-02, 11:03						1120/6643- 2
76.	179167		1222 05-14-02, 11:06						3
77.	179168		1230 ↓						4
78.	179169		1237 ↓						1
79.	179170		1242 05-14-02, 11:32						1034/6710- 4
80.	179171		1320 5-14-02, 08:44						3
	179172		1325 ↓ 0852						2
82.	179173		1332 ↓ 0851						1
83.	179174		1340 ↓ 0855						1035/6715-V 1
84.	179175	↓	1423 5-14-02, 0814						



**GORE-SORBER® Screening Survey  
Installation and Retrieval Log**

**SITE NAME & LOCATION**

3. of 4

LINE #	MODULE #	INSTALLATION DATE/TIME	RETRIEVAL DATE/TIME	EVIDENCE OF LIQUID HYDROCARBONS (LPH) or HYDROCARBON ODOR (Check as appropriate)			MODULE IN WATER (check one)		COMMENTS
				LPH	ODOR	NONE	YES	NO	
85.	179176	4/29/02, 1431						1035/6715-65-3	
86.	179177	1440						2	
87.	179178	1445	5-14-02	0837				1	
88.	179179	4/30/02, 0910	5-15-02	0842				1003/915-	
89.	179180	0919						2	
90.	179181	0926						1	
91.	179182	0937						4	
92.	179183	0943						5	
93.	179184	0947	5-15-02	0912				6	
94.	179185	1108	5-15-02	1146				1007/6730-	
95.	179186	1113						4	
96.	179187	1119						3	
97.	179188	1132						2	
98.	179189	1140	5-15-02	1213				5	
99.	179190	1238	5-15-02	10:09				1029/658AN-	
100.	179191	1250						1	
	179192	1300						-2	
	179193	1313						-3	
102.	179194	1318	5-15-02	1032				-4	
103.	179194	1318	5-15-02	1032				-5	
104.	179195	1445	5-15-02	1405				1006/6741-	
105.	179196	1450						5	
106.	179197	1455						3	
107.	179198	1502						4	
108.	179199	1508	5-15-02	1143				2	
109.	179200	1525	5-15-02	1039				1087/6743-	
110.	179201	1530						3	
111.	179202	1534						4	
112.	179203	1540	5-15-02	1059				1	
113.	179204	5/1/02, 0822	5-16-02	0801				1008/6750	
114.	179205	0835						3	
115.	179206	0843						4	
116.	179207	0851	5-16-02	0832				1	
117.	179208	0944	5-16-02	0841				2	
118.	179209	0952						1004/6969-	
119.	179210	1000						2	
120.	179211	1009						4	
121.	179212	1016	5-16-02	0907				5	
122.	179213	1110	5-16-02	1105				1	
123.	179214	1116						1095/9938-	
124.	179215	1122	5-16-02	1121				3	
125.	179216	1205	5-16-02	0931				2	
126.	179217	1218	5-16-02	0935				1094/452-	

1004  
1005

**GORE-SORBER® Screening Survey  
Installation and Retrieval Log**

**SITE NAME & LOCATION**

4. of 4

LINE #	MODULE #	INSTALLATION DATE/TIME	RETRIEVAL DATE/TIME	EVIDENCE OF LIQUID HYDROCARBONS (LPH) or HYDROCARBON ODOR (Check as appropriate)			MODULE IN WATER (check one)		COMMENTS
				LPH	ODOR	NONE	YES	NO	
				127.	179218	5/1/02, 1225	5-16-02, 0942		
128.	179219	1231	5-16-02, 0950						↓ -4
129.	179220	5/6/02, 0850	5-21-01 07:57						1081/6650 -1
130.	179221	0857							↓ -3
131.	179222	0909							↓ -2
132.	179223	0918							↓ -4
133.	179224	0926							↓ -6
134.	179225	0933							↓ -5
135.	179226	✓ 0940	5-21-01, 0851						✓ ↓ -7
136.	179227								
137.	179228								
138.	179229								
139.	179230								
140.	179231								
141.	179232								
142.	179233								
144.									
145.									
146.									
147.									
148.									
149.									
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168.									

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

DATE ANALYZED	SAMPLE NAME	BTEX, ug	TOL, ug	EIBENZ, ug	mpXYL, ug	oXYL, ug	C11, C13, & C15, ug	UNDEC, ug	TRIDEC, ug	PENTADEC, ug	TMBs, ug
5/28/2002	MDL=	0.03	0.02	0.01	0.01	0.01		0.02	0.01	0.02	
5/29/2002	179172	nd	nd	nd	nd	nd	0.05	0.03	0.02	bdl	nd
5/29/2002	179173	0.39	0.18	nd	0.09	0.03	0.19	0.10	0.04	0.05	0.09
5/29/2002	179174	0.03	nd	nd	0.03	nd	0.00	bdl	bdl	bdl	0.00
5/29/2002	179175	nd	nd	nd	nd	nd	0.05	0.05	bdl	bdl	nd
5/29/2002	179176	0.19	0.10	nd	0.02	nd	1.20	1.12	0.06	0.03	0.04
5/29/2002	179177	0.34	0.11	nd	0.07	0.03	0.10	0.08	0.02	bdl	0.14
5/29/2002	179178	0.08	nd	0.01	0.02	nd	0.14	0.06	0.03	0.05	0.00
5/29/2002	179179	0.03	0.03	nd	nd	nd	0.07	0.03	0.02	0.02	0.04
5/29/2002	179180	nd	nd	nd	nd	nd	0.04	0.02	0.01	bdl	0.00
5/29/2002	179181	0.00	nd	nd	bdl	nd	0.10	0.03	0.02	0.05	0.00
5/29/2002	179182	0.09	0.08	nd	0.01	nd	0.08	0.03	0.02	0.03	0.00
5/29/2002	179183	nd	nd	nd	nd	nd	0.08	0.04	bdl	0.04	0.00
5/29/2002	179184	nd	nd	nd	nd	nd	0.09	0.03	0.02	0.04	0.00
5/29/2002	179185	nd	nd	nd	nd	nd	0.05	bdl	0.01	0.04	nd
5/29/2002	179186	nd	nd	nd	nd	nd	0.05	0.03	bdl	0.03	0.04
5/29/2002	179187	0.60	0.30	0.03	0.06	0.03	0.15	0.05	0.05	0.05	0.11
5/29/2002	179188	0.02	nd	nd	0.02	nd	0.10	bdl	0.02	0.07	0.00
5/29/2002	179189	0.02	nd	nd	0.02	nd	0.07	0.04	0.03	bdl	0.00
5/29/2002	179190	0.06	0.03	nd	0.03	nd	0.11	0.05	0.03	0.04	0.00
5/29/2002	179191	0.10	0.04	nd	0.05	nd	0.08	0.02	0.01	0.05	0.00
5/29/2002	179192	0.01	nd	nd	0.01	nd	0.11	0.04	0.02	0.05	0.00
5/29/2002	179193	nd	nd	nd	nd	nd	0.07	0.03	0.01	0.02	0.00
5/29/2002	179194	0.04	nd	nd	0.04	nd	0.08	0.04	bdl	0.04	0.00
5/29/2002	179195	0.04	nd	nd	0.04	nd	0.08	0.04	0.02	0.02	0.00
5/29/2002	179196	0.02	nd	nd	0.02	nd	0.09	0.04	0.02	0.03	0.00
5/29/2002	179197	0.03	nd	nd	0.03	nd	0.15	0.05	0.04	0.06	0.04
5/29/2002	179198	0.07	0.04	nd	0.03	nd	0.09	0.04	0.03	0.03	nd
5/29/2002	179199	nd	nd	nd	nd	nd	0.05	0.03	0.01	bdl	0.00
5/29/2002	179200	0.00	nd	nd	bdl	nd	0.08	0.03	0.02	0.03	0.00
5/29/2002	179201	0.02	nd	nd	0.02	nd	0.04	0.04	bdl	bdl	0.00
5/29/2002	179202	0.02	nd	nd	0.02	nd	0.04	0.03	0.01	bdl	0.00
5/29/2002	179203	0.04	0.04	nd	nd	nd	0.06	0.04	0.02	bdl	0.00
5/29/2002	179204	0.27	0.22	nd	0.03	0.02	0.29	0.06	0.14	0.09	0.03
5/29/2002	179205	0.12	0.09	nd	0.03	bdl	1.28	1.13	0.08	0.07	0.03
5/29/2002	179206	nd	nd	nd	nd	nd	0.02	0.02	bdl	bdl	nd
5/29/2002	179207	0.03	nd	nd	0.03	nd	0.04	0.04	0.03	bdl	0.00
5/29/2002	179208	0.06	0.04	nd	0.02	nd	0.09	0.04	0.03	bdl	0.00
5/29/2002	179209	0.07	0.04	nd	0.03	nd	0.01	bdl	0.01	bdl	0.00

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

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

055 1009

DATE ANALYZED	SAMPLE NAME	BTEX, ug	BENZ, ug	TOL, ug	EIBENZ, ug	mpXYL, ug	oXYL, ug	C11, C13, & C15, ug	UNDEC, ug	TRIDEC, ug	PENTADEC, ug	TMBs, ug
	MDL=	0.03	0.02	0.01	0.01	0.01	0.01		0.02	0.01	0.02	
5/29/2002	179210	nd	nd	nd	nd	nd	nd	0.01	bdl	0.01	bdl	0.03
5/29/2002	179211	0.01	nd	nd	nd	0.01	nd	0.00	bdl	bdl	bdl	0.00
5/29/2002	179212	0.12	nd	nd	0.03	0.08	0.02	0.00	bdl	bdl	bdl	0.00
5/29/2002	179213	0.01	nd	nd	nd	0.01	nd	0.21	0.02	0.19	bdl	0.00
5/29/2002	179214	0.11	nd	0.07	nd	0.04	nd	0.08	0.04	0.02	0.02	0.03
5/29/2002	179215	0.01	nd	nd	nd	0.01	nd	0.02	bdl	0.02	bdl	0.00
5/29/2002	179216	0.16	nd	0.07	nd	0.07	0.02	0.02	0.02	0.02	bdl	0.00
5/29/2002	179217	0.35	0.10	0.10	0.03	0.09	0.03	0.07	0.03	0.04	bdl	0.04
5/29/2002	179218	0.37	0.09	0.11	0.03	0.11	0.03	0.04	0.02	0.01	bdl	0.16
5/29/2002	179219	0.23	nd	0.11	nd	0.10	0.03	0.00	0.02	0.01	bdl	0.05
5/29/2002	179220	0.30	nd	nd	0.05	0.18	0.08	0.00	bdl	nd	bdl	0.00
5/29/2002	179221	0.01	nd	bdl	nd	0.01	nd	0.01	bdl	0.01	bdl	0.05
5/29/2002	179222	0.06	nd	0.05	nd	0.01	bdl	0.00	bdl	bdl	bdl	0.03
5/29/2002	179223	0.03	nd	nd	nd	0.03	nd	0.04	bdl	bdl	0.04	0.00
5/30/2002	179224	0.02	nd	bdl	nd	0.02	nd	0.09	bdl	nd	0.09	0.00
5/30/2002	179225	0.01	nd	nd	nd	0.01	nd	0.09	bdl	bdl	0.07	0.00
5/30/2002	179226	0.01	nd	nd	nd	0.01	nd	0.13	0.03	0.04	0.08	0.00
5/20/2002	179227	nd	nd	nd	nd	nd	nd	0.00	bdl	bdl	bdl	nd
5/28/2002	179228	nd	nd	nd	nd	nd	nd	0.02	0.02	bdl	nd	nd
5/28/2002	179229	nd	nd	nd	nd	nd	nd	0.00	bdl	bdl	nd	nd
5/20/2002	method blank	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
5/21/2002	method blank	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
5/28/2002	method blank	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
5/29/2002	method blank	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
5/29/2002	method blank	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
	Maximum	0.60	0.18	0.30	0.05	0.18	0.08	1.66	1.13	0.32	1.33	0.16
	Standard Dev.	0.11	0.03	0.05	0.01	0.03	0.01	0.28	0.14	0.04	0.21	0.03
	Mean	0.06	0.01	0.03	0.00	0.02	0.00	0.18	0.05	0.03	0.10	0.01

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

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

SAMPLE NAME	124TMB, ug 0.03	135TMB, ug 0.02	ct12DCE, ug 0.14	t12DCE, ug 0.03	NAPH&2-MN, ug 0.01	NAPH, ug 0.02	2MeNAPH, ug 0.02	MTBE, ug 0.04	11DCA, ug 0.04	111TCA, ug 0.02	12DCA, ug 0.02
MDL=											
179172	nd	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179173	0.06	0.03	nd	nd	0.09	0.03	0.06	nd	nd	nd	nd
179174	bdl	bdl	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179175	nd	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179176	0.04	bdl	nd	nd	0.05	0.02	0.02	nd	nd	nd	nd
179177	0.10	0.04	nd	nd	0.10	0.06	0.04	nd	nd	nd	nd
179178	bdl	bdl	nd	nd	0.06	0.02	0.03	nd	nd	nd	nd
179179	0.04	bdl	nd	nd	0.06	0.02	0.04	nd	nd	nd	nd
179180	bdl	bdl	nd	nd	0.07	0.02	0.05	nd	nd	nd	nd
179181	bdl	bdl	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179182	bdl	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179183	bdl	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179184	bdl	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179185	nd	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179186	0.04	nd	nd	nd	0.02	nd	0.02	nd	nd	nd	nd
179187	0.09	0.02	nd	nd	0.05	0.02	0.03	nd	nd	nd	nd
179188	bdl	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179189	bdl	bdl	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179190	bdl	bdl	nd	nd	0.07	0.02	0.04	nd	nd	nd	nd
179191	bdl	bdl	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179192	bdl	nd	nd	nd	0.05	0.02	0.03	nd	nd	nd	nd
179193	bdl	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179194	bdl	bdl	nd	nd	0.02	0.02	bdl	nd	nd	nd	nd
179195	bdl	bdl	nd	nd	0.10	0.03	0.07	nd	nd	nd	nd
179196	bdl	bdl	nd	nd	0.05	0.02	0.02	nd	nd	nd	nd
179197	0.04	bdl	nd	nd	0.11	0.04	0.07	nd	nd	nd	nd
179198	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
179199	bdl	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179200	bdl	nd	nd	nd	0.02	nd	0.02	nd	nd	nd	nd
179201	bdl	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179202	bdl	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179203	0.03	bdl	nd	nd	0.03	0.03	bdl	nd	nd	nd	nd
179204	bdl	nd	nd	nd	0.11	0.04	0.07	nd	nd	bdl	nd
179205	0.03	bdl	nd	nd	0.13	0.05	0.07	nd	nd	0.05	nd
179206	nd	nd	nd	nd	0.03	0.03	0.03	nd	nd	0.02	nd
179207	bdl	bdl	nd	nd	0.00	nd	bdl	nd	nd	0.03	nd
179208	bdl	bdl	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179209	bdl	bdl	nd	nd	0.05	0.02	0.03	nd	nd	nd	nd

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

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

SAMPLE NAME	124TMB, ug	135TMB, ug	ct12DCE, ug	t12DCE, ug	c12DCE, ug	NAPH&2-MN, ug	NAPH, ug	2MeNAPH, ug	MTBE, ug	11DCA, ug	111TCA, ug	12DCA, ug
MDL=	0.03	0.02	0.14	0.03	0.03							
179210	0.03	bdll	nd	nd	0.10	0.05	0.02	0.04	nd	nd	nd	nd
179211	bdll	nd	nd	nd	0.00	bdll	nd	nd	nd	nd	nd	nd
179212	bdll	nd	nd	nd	0.00	bdll	nd	nd	nd	nd	nd	nd
179213	bdll	nd	nd	nd	0.02	0.02	0.02	0.02	nd	nd	nd	nd
179214	0.03	bdll	nd	nd	0.04	0.02	0.02	0.02	nd	nd	nd	nd
179215	bdll	nd	nd	nd	0.09	0.03	0.06	0.06	nd	nd	nd	nd
179216	0.04	bdll	nd	nd	0.00	nd	bdll	nd	nd	nd	nd	nd
179217	0.11	0.05	nd	nd	0.12	0.06	0.06	0.06	nd	nd	nd	nd
179218	0.05	bdll	nd	nd	0.02	0.02	bdll	0.02	nd	nd	nd	nd
179219	bdll	nd	nd	nd	0.04	0.02	bdll	0.02	nd	nd	nd	nd
179220	0.05	bdll	nd	nd	0.04	0.02	0.02	0.02	nd	nd	nd	nd
179221	0.03	bdll	nd	nd	0.08	0.04	0.05	0.05	nd	nd	nd	nd
179222	bdll	nd	nd	nd	0.05	0.02	0.03	0.03	nd	nd	nd	nd
179223	nd	bdll	nd	nd	0.00	nd	bdll	nd	nd	nd	nd	nd
179224	bdll	nd	nd	nd	0.00	nd	bdll	nd	nd	nd	nd	nd
179225	bdll	bdll	nd	nd	0.00	nd	bdll	nd	nd	nd	nd	nd
179226	0.09	bdll	nd	nd	0.20	0.08	0.11	0.11	nd	nd	nd	nd
179227	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
179228	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
179229	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
method blank	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
method blank	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
method blank	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
method blank	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
method blank	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Maximum	0.11	0.05	0.00	0.00	0.56	0.34	0.23	0.23	0.00	0.00	0.05	0.00
Standard Dev.	0.02	0.01	0.00	0.00	0.06	0.03	0.03	0.03	0.00	0.00	0.01	0.00
Mean	0.02	0.01	0.00	0.00	0.03	0.02	0.02	0.02	0.00	0.00	0.00	0.00

05/31/04

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

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

SAMPLE NAME	TCE, ug	OCT, ug	PCE, ug	14DCB, ug	CHCl3, ug	CCl4, ug	CIBENZ, ug
MDL =	0.02	0.02	0.01	0.01	0.03	0.03	0.01
179172	nd	nd	nd	nd	nd	nd	nd
179173	nd	0.14	0.02	nd	nd	nd	nd
179174	nd	nd	nd	nd	nd	nd	nd
179175	nd	nd	0.04	nd	nd	nd	nd
179176	nd	nd	0.03	nd	nd	nd	nd
179177	nd	0.09	0.02	nd	nd	nd	nd
179178	nd	nd	0.01	nd	nd	nd	nd
179179	0.13	nd	0.07	nd	0.05	nd	nd
179180	0.08	nd	0.02	nd	nd	nd	nd
179181	0.11	nd	0.03	nd	nd	nd	nd
179182	0.15	nd	0.04	nd	nd	nd	nd
179183	0.59	nd	0.08	nd	nd	nd	nd
179184	nd	nd	nd	nd	nd	nd	nd
179185	0.06	nd	nd	nd	nd	nd	nd
179186	nd	nd	nd	nd	nd	nd	nd
179187	0.13	nd	0.08	nd	nd	nd	nd
179188	nd	nd	0.11	nd	nd	nd	nd
179189	0.06	nd	0.02	nd	nd	nd	nd
179190	nd	nd	bdl	nd	nd	bdl	nd
179191	nd	nd	0.03	nd	nd	0.03	nd
179192	nd	nd	0.03	nd	nd	nd	nd
179193	nd	nd	0.08	nd	nd	nd	nd
179194	nd	nd	0.04	nd	nd	nd	nd
179195	nd	nd	nd	nd	nd	nd	nd
179196	nd	nd	nd	nd	nd	0.03	nd
179197	nd	nd	nd	nd	nd	bdl	nd
179198	nd	0.09	nd	nd	nd	nd	nd
179199	nd	nd	nd	nd	nd	bdl	nd
179200	nd	nd	0.09	nd	nd	nd	nd
179201	nd	nd	0.12	nd	nd	nd	nd
179202	nd	nd	0.12	nd	nd	nd	nd
179203	nd	nd	0.09	nd	nd	nd	nd
179204	1.49	nd	3.01	nd	nd	nd	nd
179205	4.14	nd	6.74	nd	nd	nd	nd
179206	4.72	nd	2.69	nd	nd	nd	nd
179207	2.89	nd	2.57	nd	nd	nd	nd
179208	nd	nd	nd	nd	0.05	nd	nd
179209	nd	nd	nd	nd	nd	nd	nd

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

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

0351004

SAMPLE NAME	TCE, ug	OCT, ug	PCE, ug	14DCB, ug	CHCl3, ug	CCl4, ug	CIBENZ, ug
MDL=	0.02	0.02	0.01	0.01	0.03	0.03	0.01
179210	nd	nd	bdl	nd	nd	nd	nd
179211	nd	nd	0.02	nd	nd	nd	nd
179212	nd	nd	bdl	nd	nd	nd	nd
179213	nd	nd	nd	nd	nd	nd	nd
179214	nd	nd	nd	nd	nd	nd	nd
179215	nd	nd	nd	nd	nd	nd	nd
179216	nd	nd	nd	nd	nd	nd	nd
179217	nd	0.02	0.01	nd	0.20	nd	nd
179218	nd	0.04	0.22	nd	0.05	nd	nd
179219	nd	0.05	0.17	nd	nd	bdl	nd
179220	nd	nd	nd	nd	nd	nd	nd
179221	nd	nd	0.03	nd	nd	nd	nd
179222	nd	nd	0.03	nd	nd	nd	nd
179223	nd	nd	bdl	nd	nd	nd	nd
179224	nd	nd	nd	nd	nd	nd	nd
179225	nd	nd	nd	nd	nd	bdl	nd
179226	nd	nd	bdl	nd	nd	nd	nd
179227	nd	nd	nd	nd	nd	nd	nd
179228	nd	nd	nd	nd	nd	nd	nd
179229	nd	nd	nd	nd	nd	nd	nd
method blank	nd	nd	nd	nd	nd	nd	nd
method blank	nd	nd	nd	nd	nd	nd	nd
method blank	nd	nd	nd	nd	nd	nd	nd
method blank	nd	nd	nd	nd	nd	nd	nd
method blank	nd	nd	nd	nd	nd	nd	nd
Maximum	14.22	0.20	6.74	0.02	0.20	0.03	0.00
Standard Dev.	1.88	0.04	0.74	0.00	0.02	0.01	0.00
Mean	0.53	0.01	0.25	0.00	0.00	0.00	0.00

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





**ANNEX B**  
**DSS Site 1004**  
**Soil Sample Data Validation Results**

RECORDS CENTER CODE: \_\_\_\_\_

**SMO ANALYTICAL DATA ROUTING FORM**

PROJECT NAME: DSS Soil Sampling PROJECT/TASK: 7223 02.03.02  
SNL TASK LEADER: Collins ORG/MS/CF0#: 6133/1089/CF032-02  
SMO PROJECT LEAD: Herrera SAMPLE SHIP DATE: 9/23/2002

ARCOG	LAB	LAB ID	PRELIM DATE	FINAL DATE	EDD		BY
					EDD	ON Q	
605670	GEL	67601A		10/22/2002	X	X	JAC
605730	GEL	67601B		10/22/2002	X	X	JAC

	NAME	DATE
CORRECTIONS REQUESTED/RECEIVED:		
PROBLEM #:	<u>5206</u>	<u>11/5/02</u>
REVIEW COMPLETED BY/DATE:	<u>W. Palencia</u>	<u>11/5/02</u>
FINAL TRANSMITTED TO/DATE:	<u>Sanders</u>	<u>1</u>
SENT TO VALIDATION BY/DATE:	<u>Conn</u>	<u>11/12/02</u>
RUSH VALIDATION REQUIRED EST. TAT:	<input type="checkbox"/>	
VALIDATION COMPLETED BY/DATE:	<u>AJ</u>	<u>11.22.02</u>
TO ERDMS OR RECORDS CENTER BY/DATE:	<u>Conn</u>	<u>11/27/02</u>

COMMENTS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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

Internal Lab

Batch No. <u>N/A</u>		SMO Use		AR/COC		605730	
Dept. No./Mail Stop: 6135/1089		Date Samples Shipped: 9-23-02		Project/Task No.: 7223.02.03.02		Waste Characterization	
Project/Task Manager: Mike Sanders		Carrier/Waybill No. 13362		SMO Authorization: <i>[Signature]</i>		-Send preliminary/copy report to:	
Project Name: DSS soil sampling		Lab Contact: Edie Kent 803-556-8171		Contract #.: PO 2167			
Record Center Code: ER/1285/DSS/DAT		Lab Destination: GEL		SOLU APPROVAL <i>[Signature]</i>		Released by COC No.:	
Logbook Ref. No.: ER 080		SMO Contact/Phone: Pam Pulisani/505-844-3185		SOLU <i>[Signature]</i>		<input checked="" type="checkbox"/> Validation Required	
Service Order No. CF032-073		Send Report to SMO: Wendy Palencia/505-844-3132		Bill To: Sandia National Labs (Accounts Payable)		P.O. Box 5800 MS 0154	
Tech Area		Room		Albuquerque, NM 87185-0154		Parameter & Method Requested	
Building 8969.9978						Lab Sample ID	
Sample No.-Fraction		ER Sample ID or Sample Location Detail		Reference LOV (available at SMO)		Lab Sample ID	
059917-001	8' -S	1004	AS	4oz	4c	G	VOC(8260B)
059918-001	13' -S		AS	4oz	4c	G	VOC(8260B)
059917-002	8' -S		AG	500ml	4c	G	see below for parameter
059918-002	13' -S		AG	500ml	4c	G	see below for parameter
059919-001	8' -S		AS	4oz	4c	G	VOC(8260B)
059920-001	13' -S		AS	4oz	4c	G	VOC(8260B)
059919-002	8' -S		AG	500ml	4c	G	see below for parameter
059920-002	13' -S		AG	500ml	4c	G	see below for parameter
059921-001	8' -S		AS	4oz	4c	G	VOC(8260B)
059922-001	13' -S		AS	4oz	4c	G	VOC(8260B)
RMMA							
Sample Disposal		Level of Rush: <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Rush		Special Instructions/QC Requirements		Abnormal Conditions on Receipt	
Turnaround Time		Return to Client <input type="checkbox"/> Disposal by lab <input checked="" type="checkbox"/>		EDD <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		SVOC(8270C)	
Return Samples By:		Signature: <i>[Signature]</i>		*Send report to:		PCB(8082)HE(8330)	
Name: J. Lee		Company/Organization/Phone/Fax: Weston/6135/505-284-3309		Mike Sanders		Total Cyanide(9010)	
Name: G. Quintana		Shaw/6135/505-284-3309		Dept 6135/MS/1089		Cr6+(7197)	
				Phone/505-284/2478		RCRA metals(6020, 7000,7471)Gross alpha-beta(900)	
1. Relinquished by <i>[Signature]</i>		Org. Date 9/21/02 Time 1005		*Please list as separate report.			
2. Relinquished by <i>[Signature]</i>		Org. Date 9/21/02 Time 1005		4. Relinquished by		Date	
2. Relinquished by <i>[Signature]</i>		Org. Date 9/21/02 Time 1100		5. Relinquished by		Date	
3. Relinquished by <i>[Signature]</i>		Org. Date		6. Relinquished by		Date	
3. Received by		Date		6. Received by		Date	



Sample Findings Summary

Site: DSS soil sampling

ARCO: 605670, 605730

Date: Organic, Inorganic and Radiochemistry

Sample ID	VOC(6280)	67-64-1 (acetone)	SVOC(6270)	PCBa (9082)	All HE(6330) compounds	Metals	7440-39-3 (berium)	7440-47-3 (chromium)	7782-49-2 (selenium)	General Chemistry	18540-29-9 (hexavalent chromium)	Radiochemistry
059813-001 6530/1027-SP1-BH1-20-S		5.28U,B1										
059814-001 6530/1027-SP1-BH1-25-S		8.04U,B1										
059822-001 6669/1004-DF1-BH3-13-S		4.81U,B1										
059858-004 6530/1027-SP2-EB					P2		J.B3	J.B				
059858-006 6530/1027-SP2-EB											R,HT	
059858-007 6530/1027-SP2-EB												
059813-002 6530/1027-SP1-BH1-20-S												
059814-002 6530/1027-SP1-BH1-25-S									J.B3		UJA2	All QC acceptance criteria were met. No data will be qualified.
059815-002 6530/1027-SP2-BH1-15-S									J.B3		UJA2	
059816-002 6530/1027-SP2-BH1-20-S									J.B3		UJA2	
059817-002 6669/1004-DF1-BH1-13-S									J.B3		J.B3	
059818-002 6669/1004-DF1-BH1-13-S									J.B3		J.B3	
059820-002 6669/1004-DF1-BH1-13-S									J.B3		J.B3	
059821-002 6669/1004-DF1-BH1-13-S									J.B3		J.B3	
059822-002 6669/1004-DF1-BH1-13-S									J.B3		J.B3	
059823-002 9978/1114-DW1-BH1-6-S									J.B3		J.B3	
059824-002 9978/1114-DW1-BH1-11-S									J.B3		J.B3	

Validated By: *A Neal*

Date: 11/22/02

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**MEMORANDUM**

DATE: 11/20/02  
TO: File  
FROM: Linda Thal  
SUBJECT: Organic Data Review and Validation - SNL  
Site: DSS soil sampling  
ARCOC # 605670, -730 GEL SDG # 67601 and 67608  
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 # 203934 (Sample 67601-001 through -012)**

Acetone was detected in the trip blanks (TB) (67608-001 and -004) at a value > RL. Sample 67601-001 and -002 had acetone values > RL but < 10X the TB value and will be qualified "U, B1" at the reported value. Sample 67601-010 had an acetone value > DL, < RL and < 10X TB value and will be qualified "U, B1" at the RL.

**HE - Batch # 204151 (Sample 67608-007)**

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

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

**Holding Times/Preservation**

**All Analysis:** The samples were properly preserved and analyzed within the method prescribed holding time.

**Calibration**

**All Analysis:** All initial and continuing calibration acceptance criteria were met except as follows:

**VOC Batch # 203934**

Vinyl acetate had %D > 20% but < 40% in all the CCVs preceding the samples. All associated sample results were non-detect and no data will be qualified.

VOC Batch # 204910

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

SVOC Batch # 203764 and 204261

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

**Blanks**

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

VOC Batch # 203934 (Sample 67601-001 through -012)

Both TBs (67608-001 and -004) had a 1,2-dichloropropane value > RL. All associated samples were non-detect and no data will be qualified.

**Surrogates**

All Analysis: All surrogate acceptance criteria were met.

**Internal Standards (ISs)**

All Analysis: All internal standard acceptance criteria were met.

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

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

VOC Batch # 204910

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

SVOC Batch # 203764 and 204261

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

SVOC Batch # 204261

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

PCB Batch # 203726

It should be noted that the sample used for the MS/MSD was of similar matrix from another SNL SDG. No data will be qualified.

HE - Batch 204142

It should be noted that the sample used for the MS/MSD was of similar matrix from another SNL SDG. No data will be qualified.

HE - Batch 204151



The MS %R for tetryl (127%) was > QC acceptance criteria (52-124%). The associated sample result was non-detect and no data will be qualified.

#### **Laboratory Control Samples (LCS/LCSD) Analysis**

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

##### **VOC Batch # 204910 and 203934**

The QC acceptance criteria for the LCS were met by the successful analysis of a second source CCV.

It should be noted that no compound was associated with internal standard 1,4-dichlorobenzene-d4. No data will be qualified as a result.

##### **SVOC Batch # 203764 and 204261**

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

##### **HE - Batch # 204151 (Sample 67608-007 (EB))**

The LCS %R failed QC acceptance criteria for several compounds. However, a MS was performed on sample 67608-007 and all the %R were in criteria with the exception of tetryl that failed high. Sample 67608-007 was non-detect for all HE compounds, as were all the soils that were associated with it. There was no more sample remaining to perform a re-extraction. Using professional judgment, no data will be qualified.

#### **Detection Limits/Dilutions**

**All Analysis:** All detection limits were properly reported. Samples were not diluted with the exception of sample 67601-022 which was diluted 4X for SVOC analysis.

#### **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 and equipment blank were submitted on the ARCOG. No field duplicate pair was submitted on the ARCOG. It should be noted that vinyl acetate is on the TAL for soils but not for waters.

**SVOC, PCB and HE:** An equipment blank was submitted on the ARCOG. No field blank or field dup were submitted on the ARCOG.

No raw data was submitted with the package.

No other specific issues were identified which affect data quality.

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**MEMORANDUM**

DATE: 11/21/02  
TO: File  
FROM: Linda Thal  
SUBJECT: Inorganic Data Review and Validation - SNL  
Site: DSS soil sampling  
ARCO # 605670, 605730  
GEL SDG # 67601 and 67608  
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 # 203818 (Samples 67601-013 through –024)**

Selenium was detected in the ICB/CCB at a value > DL but < RL. The sample results for 67601-014 through –024 were detect, < 5X the blank value and will be qualified "J, B3".

**ICP-AES – Metals Batch # 204455 (Sample 67608 –010)**

Barium was detected in the CCB and chromium in the MB at values > DL but < RL. Sample 67608 –010 results were detect, < 5X the blank values and will be qualified "J, B3" for barium and "J, B" for chromium.

**Hexavalent Chromium - Batch #205618 (Samples 67601-013 through –024)**

The MS %R (63/71%) were < QC acceptance criteria (75-125%). Samples 67601-019 and –020 were detect and will be qualified "J, A2". All remaining samples were non-detect and will be qualified "UJ, A2".

**Hexavalent Chromium – Batch # 204193 (Sample 67608-009)**

Sample 67608-009 was received by the laboratory and analyzed after 2X the holding time had expired. The sample result was non-detect and will be qualified "R, HT".

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

#### **Holding Times/Preservation**

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

#### **Calibration**

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

#### **Blanks**

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

**ICP-AES – Metals Batch # 203818 (Samples 67601-013 through –024)**

Selenium was detected in the ICB/CCB at a value > DL but < RL. Sample 67601-013 was non-detect and will not be qualified.

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

Arsenic was detected in the ICB at a negative value with an absolute value > DL but < RL. All associated sample results were detect, > 5X MDL and will not be qualified.

**ICP-AES – Metals Batch # 204455 (Sample 67608 –010)**

Cadmium and arsenic were detected in the CCB at values > DL but < RL. The sample results were non-detect and no data will be qualified.

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

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

#### **Matrix Spike (MS) Analysis**

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

**ICP-AES – Metals Batch # 203818 (Samples 67601-013 through –024)**

The sample used for the MS was of similar matrix from another SNL SDG. No data will be qualified as a result.

**ICP-AES – Metals Batch # 204455 (Sample 67608 –010)**

The sample used for the MS was of similar matrix from another SNL SDG. No data will be qualified as a result.

**CVAA-Hg Batch # 204420 (Sample 67608-008)**

The sample used for the MS was of similar matrix from another SNL SDG. No data will be qualified as a result.

**Total Cyanide - Batch #204703 (Samples 67601-013 and -014)**

The sample used for the MS was of similar matrix from another SNL SDG. No data will be qualified as a result.

**Total Cyanide - Batch #205981 (Samples 67608-008)**

The sample used for the MS was of similar matrix from another SNL SDG. No data will be qualified as a result.

**Replicate Analysis**

**All Analyses:** The replicate analysis met QC acceptance criteria except as follows:

**ICP-AES – Metals Batch # 203818 (Samples 67601-013 through -024)**

The sample used for the replicate was of similar matrix from another SNL SDG. No data will be qualified as a result.

**ICP-AES – Metals Batch # 204455 (Sample 67608 -010)**

The sample used for the replicate was of similar matrix from another SNL SDG. No data will be qualified as a result.

**CVAA-Hg Batch # 204420 (Sample 67608-008)**

The sample used for the replicate was of similar matrix from another SNL SDG. No data will be qualified as a result.

**Total Cyanide - Batch #204703 (Samples 67601-013 and -014)**

The sample used for the replicate was of similar matrix from another SNL SDG. No data will be qualified as a result.

**Total Cyanide - Batch #205981 (Samples 67608-008)**

The sample used for the replicate was of similar matrix from another SNL SDG. No data will be qualified as a result.

**ICP Interference Check Sample (ICS)**

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

**All Other Analyses:** No ICS required.

**ICP Serial Dilution**

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

**ICP-AES – Metals Batch # 203818 (Samples 67601-013 through -024)**

The sample used for the serial dilution was of similar matrix from another SNL SDG. No data will be qualified as a result.

**ICP-AES – Metals Batch # 204455 (Sample 67608 -010)**

The sample used for the serial dilution was of similar matrix from another SNL SDG.  
No data will be qualified as a result.

All Other Analyses: No serial dilutions required.

Detection Limits/Dilutions

All Analyses: All detection limits were properly reported.

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

All Other Analyses: No dilutions were performed.

Other QC

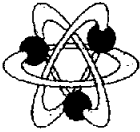
All Analyses: An equipment blank was submitted on the ARCOC. No field blank or field duplicate was submitted on the ARCOC.

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

No raw data was submitted with the package.

No other specific issues were identified which affect data quality.

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**MEMORANDUM**

DATE: November 22, 2002  
TO: File  
FROM: Linda Thal  
SUBJECT: Radiochemical Data Review and Validation - SNL  
Site: DSS soil sampling  
ARCOC 605670 and 605730  
GEL SDG # 67601 and 67608 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.

**Batch # 204950 (Sample 67608-011)**

The sample used for the MS/MSD was of similar matrix from another SNL SDG.  
No data will be qualified.

**Laboratory Control Sample (LCS) Analysis**

The LCS analyses met all QC acceptance criteria.

**Replicates**

The replicate analyses met all QC acceptance criteria.

**Batch # 204950 (Sample 67608-011)**

The sample used for the replicate was of similar matrix from another SNL SDG.  
No data will be qualified.

**Tracer/Carrier Recoveries**

No tracer/carrier required.

**Negative Bias**

All sample results met negative bias QC acceptance criteria.

**Detection Limits/Dilutions**

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

**Other QC**

An equipment blank was submitted on the ARCOC. No field blank or field duplicate were 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: 24 Matrix: Soils & H2O  
 AR/COC #: 605670 Laboratory Sample IDs: 67601 - 001 thru - 024  
 Laboratory: GLL Laboratory Report #: 67601  
 Laboratory Sample IDs: 67608 - 001 thru - 011

QC Element	Analysis											
	Organics					Inorganics				RAD	Hexavalent Chromium	
	VOC	SVOC	Pesticide/PCB	HPLC (HE)	ICP/AES	GFAA/AA	CVAA (Hg)	CN				
1. Holding Times/Preservation	✓	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓
2. Calibrations	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
3. Method Blanks	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4. MS/MSD	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5. Laboratory Control Samples	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6. Replicates	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7. Surrogates	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8. Internal Standards	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9. TCL Compound Identification	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
10. ICP Interference Check Sample	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
11. ICP Serial Dilution	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
12. Carrier/Chemical Tracer Recoveries	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
13. Other QC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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

Reviewed By: ALW Date: 11.22.02



### Holding Time and Preservation

Site/Project: D.S.S. Soil Sampling AR/COC #: 605670 605730 Laboratory Sample IDs: 67601 - 001 Thru - 024  
 Laboratory: G.F.H. Laboratory Report #: 67601 67608 - 001 Thru - 011  
 # of Samples: 24 1 Matrix: Soil 1 h<sub>2</sub>O

Sample ID	Analytical Method	Holding Time Criteria	Days Holding Time was Exceeded	Preservation Criteria	Preservation Deficiency	Comments
67608 - 009	SW - 846 7196A	24 hours	5X 24 hours	NA	NA	R, HT

Reviewed By: Alwal Date: 11.21.02

NS 2 soils

**Volatile Organics (SW 846 Method 8260)**

Site/Project: DJS Soil Sampling AR/COC # 605670 # of Samples: 12 Matrix: Soils  
 Laboratory: GFS Laboratory Report #: 67601 Laboratory Sample IDs: 67601-001 thru -012  
 Methods: SW-846 8260 A Batch #: 20393H 67608

IS	CAS #	Name	T C L	Min. RF	Intercept	Calib. RF	Calib. RSD R <sup>2</sup>	CCV		Method Blks	LCS	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks
								<20% / 0.99	20% / 0.3									
1	71-55-6	1,1,1-trichloroethane	✓	0.10		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	79-34-5	1,1,2,2-tetrachloroethane		0.30		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	79-00-5	1,1,2-trichloroethane		0.10		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	75-34-3	1,1-dichloroethane		0.10		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	75-35-4	1,1-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-bromopropane (MEK)	✓	0.01		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	110-75-8	2-chloroethyl vinyl ether		0.01		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	591-78-6	2-bromopropane (MIBK)		0.10		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	108-10-1	4-methyl-2-pentanone (MIBK)		0.10		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	67-64-1	acetone (100%bl)		0.01		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	71-43-2	benzene		0.30		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	75-27-4	bromodichloromethane		0.20		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	75-25-2	bromoforn		0.10		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	74-83-9	bromomethane		0.10		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	75-15-0	carbon disulfide		0.10		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	56-23-5	carbon tetrachloride		0.10		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	108-90-7	chlorobenzene		0.50		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	75-00-3	chloroethane		0.01		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	67-66-3	chloroform		0.20		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	74-87-3	chloromethane		0.10		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	10061-01-5	cis-1,3-dichloropropene		0.20		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	124-48-1	dibromochloromethane		0.10		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	100-41-4	ethylbenzene		0.10		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	75-09-2	methylcyclohexane (100%bl)		0.01		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	100-42-5	styrene		0.30		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	127-18-4	tetrachloroethene		0.20		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	108-88-3	toluene (100%bl)		0.40		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	10061-02-6	trans-1,3-dichloropropene		0.10		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	75-01-6	trichloroethane		0.30		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	75-01-4	vinyl chloride		0.10		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	1330-20-7	xylene (total)		0.30		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		CAH-1,1,1-trichloroethane																
		FRAN-1,2-dichloroethane																

Notes: Shaded rows are RCRA compounds. 1-21-21-26  
 Comments: Vinyl Acetate (soils only)  
 Reviewed By: Almal Date: 11.20.02

TS 1. SA 1 2 3 4  
 4 SA 5 → 12

CCV @ LCS same for B-18

WS lot 2 soils

**Volatile Organics**

Site/Project: \_\_\_\_\_ AR/COC #: 605670, 605730 Batch #s: \_\_\_\_\_  
 Laboratory: \_\_\_\_\_ Laboratory Report #: \_\_\_\_\_ # of Samples: \_\_\_\_\_ Matrix: \_\_\_\_\_

**Surrogate Recovery and Internal Standard Outliers (SW 846 Method 8260)**

Sample	SMC 1	SMC 2	SMC 3	IS 1 Area	IS 1 RT	IS 2 area	IS 2 RT	IS 3 area	IS 3 RT
<i>IN CRITERIA</i>									

**Comments:**

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

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

COV  
 1. SA 1 -4 ACS & COX 9.25 8.02  
 2. SA. 6 -11 ACS & COX 9.25 20.45  
 3. SA 5, 12 ACS & COX 9.27 8.11

W 2 of 2  
NAVER  
6/11/13 LT

**Volatile Organics (SW 846 Method 8260)**

Site/Project: D33 Soil Sampling AR/COC # 605670 - 730 Matrix: Aqueous  
 Laboratory: 952 Laboratory Report #: 67601 (67608) Laboratory Sample IDs: 67688  
 Methods: SW-846 8260 B Batch #: 204910

IS CAS #	Name	T C L	Min. RF	Intercept	Calib. RF	Calib. R <sup>2</sup>	CCV %D	Method Bkls	LCS RPD	LCS RPD	MS RPD	MSD RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks
1 71-55-6	1,1,1-trichloroethane	✓	0.10		✓	✓	✓								
2 79-34-3	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												
1 540-39-0	1,2-dichloroethane (total)		0.01												
1 78-87-5	1,2-dichloropropane	✓	0.01												
1 78-93-3	2-bromonone (MEK)		0.01												
1 110-75-8	2-chloroethyl vinyl ether		0.01												
2 591-78-6	2-hexanone (MIBK)	✓	0.01												
2 108-10-1	4-methyl-2-pentanone (MIBK)		0.10												
1 67-64-1	acetone (10xbl)		0.01	✓	✓	✓									
1 71-43-2	benzene		0.50												
1 75-27-4	bromochloromethane		0.20												
3 75-25-2	bromoform		0.10	✓	✓	✓									
1 74-83-0	bromomethane		0.10												
1 75-15-0	carbon disulfide		0.10												
1 56-23-5	carbon tetrachloride		0.10				-10%								
2 108-90-7	chlorobenzene		0.50			✓									
1 75-00-3	chloroethane		0.01												
1 67-66-3	chloroform		0.20												
1 74-87-3	chloromethane		0.10												
1 10061-01-5	cis-1,3-dichloropropene		0.20												
2 124-48-1	dibromochloromethane		0.10	✓	✓	✓									
2 100-41-4	ethylbenzene		0.10	✓	✓	✓									
1 75-09-2	methylenes chloride (10xbl)		0.01	✓	✓	✓									
2 100-42-5	styrene		0.30												
2 127-18-4	tetrachloroethane		0.20												
2 108-88-3	toluene (10xbl)		0.40												
2 10061-02-6	trans-1,3-dichloropropene		0.10	✓	✓	✓									
1 79-01-6	trichloroethane		0.30												
1 75-01-4	vinyl chloride		0.10												
2 1330-20-7	xylenes (total)		0.30												
CAL - 1,2-DICHLOROETHANE															
YACAL - 1,2-DICHLOROETHANE															

Notes: Shaded rows are RCRA compounds.  
 Reviewed By: Adhal Date: 11-20-02

Comments: KES/KCSO used to assess accuracy  
of precision.  
CCV of KCSO same but

WS dot d waters

**Volatile Organics**

Site/Project:

AR/COC #: 605670, -730

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
IN CELLULAR									

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:

Semivolatile Organics (SW 846 Method 8270)

Site/Project: DJJ Soil Sampling AR/COC #: 605670, 605780 Laboratory Sample IDs: 67601-013 thru 024

Laboratory: GFK Laboratory Report #: 67606-005 (ES)

Methods: SW-846 8270 C

# of Samples: 12 1 Matrix: Soil & 1/2 Batch #: 203764 (Soils) 204261 (ES)

Table with columns: IS, BNA, CAS #, NAME, T, C, L, Min. RF, Intercept, Calib. RF, Calib. RSD/R2, CCV %D, Method Blanks, LCS, LCS#, LCS RPD, MS, MSD, MS RPD, MS RPD, Field Dup. RPD, Equip. Blanks, Field Blanks, M, M#, M#, M#, M#

Notes: Shaded rows are RCRA compounds.

Reviewed By: [Signature] Date: 11-20-02

Semivolatile Organics

Site/Project: AR/COC #: 605670, 605730

Batch #s:

Laboratory: Laboratory Report #:

# of Samples:

Matrix:

BNA #	CAS #	NAME	T C L	Min. RF	Intercept	Calib.		CCV %D	Method Blanks	LCS RPD	LCS MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks	
						RF	RSD/ R <sup>2</sup>									
3	BN 100-01-6	4-Nitroaniline	0.01	0.01	✓	>.05	<10%/	20%	0	NA	0	0	NA	✓	NA	MSJ
3	BN 100-02-7	4-Nitrophenol	0.01	0.01	✓	>.05	<10%/	20%	0	NA	0	0	NA	✓	NA	MSJ
3	BN 83-32-9	Acenaphthene	0.90	0.90		>.05	<10%/	20%	✓	✓	✓	✓	✓	✓	✓	MSJ
3	BN 208-96-8	Acenaphthylene	0.90	0.90		>.05	<10%/	20%	✓	✓	✓	✓	✓	✓	✓	MSJ
4	BN 120-12-7	Anthracene	0.70	0.70		>.05	<10%/	20%								
5	BN 56-55-3	Benzo(a)anthracene	0.80	0.80		>.05	<10%/	20%								
6	BN 50-32-8	Benzo(a)pyrene	0.70	0.70		>.05	<10%/	20%								
6	BN 205-99-2	Benzo(b)fluoranthene	0.70	0.70		>.05	<10%/	20%								
6	BN 191-24-2	Benzo(g,h,i)perylene	0.50	0.50		>.05	<10%/	20%								
6	BN 207-08-9	Benzo(k)fluoranthene	0.70	0.70		>.05	<10%/	20%								
2	BN 111-91-1	bis(2-Chloroethoxy)methane	0.30	0.30		>.05	<10%/	20%								
1	BN 111-44-4	bis(2-Chloroethyl)ether	0.70	0.70		>.05	<10%/	20%								
1	BN 108-60-1	bis(2-chloroisopropyl)ether	0.01	0.01		>.05	<10%/	20%								
5	BN 117-81-7	bis(2-Ethylhexyl)phthalate	0.01	0.01		>.05	<10%/	20%								
5	BN 85-68-7	Bis(2-ethylhexyl)phthalate	0.01	0.01		>.05	<10%/	20%								
4	BN 86-74-8	Carbazole	0.01	0.01		>.05	<10%/	20%								
5	BN 218-01-9	Chrysene	0.70	0.70		>.05	<10%/	20%								
6	BN 53-70-3	Dibenz(a,h)anthracene	0.40	0.40	✓	>.05	<10%/	20%								
3	BN 132-64-9	Dibenzofuran	0.80	0.80		>.05	<10%/	20%								
3	BN 84-66-2	Diethylphthalate	0.01	0.01		>.05	<10%/	20%								
3	BN 131-11-3	Dimethylphthalate	0.01	0.01		>.05	<10%/	20%								
4	BN 84-74-2	Di-n-butylphthalate	0.01	0.01		>.05	<10%/	20%								
6	BN 117-84-0	Di-n-octylphthalate	0.01	0.01		>.05	<10%/	20%								
4	BN 206-44-0	Fluoranthene	0.60	0.60		>.05	<10%/	20%								
3	BN 86-73-7	Fluorene	0.90	0.90		>.05	<10%/	20%								
4	BN 118-74-1	Hexachlorobenzene	0.10	0.10		>.05	<10%/	20%								
2	BN 87-68-3	Hexachlorobutadiene	0.01	0.01		>.05	<10%/	20%								
3	BN 77-47-4	Hexachlorocyclooctadiene	0.01	0.01		>.05	<10%/	20%								
1	BN 67-72-1	Hexachloroethane	0.30	0.30		>.05	<10%/	20%								

Comments:

**Semivolatile Organics**

Site/Project: \_\_\_\_\_

AR/COC #: \_\_\_\_\_

Batch #s: \_\_\_\_\_

Laboratory: \_\_\_\_\_

Laboratory Report #: \_\_\_\_\_

# of Samples: \_\_\_\_\_

Matrix: \_\_\_\_\_

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R <sup>2</sup>	CCV %D	Method Blanks	LCS B	LCS RPD	MS MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks			
6	BN	193-39-5	Indene(1,2,3-cd)pyrene	✓	0.50	✓	>0.05	<20% / 0.99	20%	②	②	NA	①	①	NA	✓	NA	② MS MND	② RPD	
2	BN	78-59-1	Isophorone		0.40	✓	✓	✓	✓											
2	BN	91-20-3	Naphthalene		0.70															
2	BN	98-95-3	Nitrobenzene		0.20								b7	b6				✓	✓	✓
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	✓	✓	✓					✓	✓				✓	✓	✓
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						-21											

**Surrogate Recovery Outliers**

Sample	SMC 1	SMC 2	SMC 3	SMC 4	SMC 5	SMC 6	SMC 7	SMC 8
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-Trichlorophenol (A)								
SMC 7: 2-2-Chlorophenol-d4 (A)								
SMC 8: 1,2-Dichlorobenzene-d4 (BN)								

SMC 2: 2-Fluorobiphenyl (BN)  
SMC 3: p-Terphenyl-d14 (BN)  
SMC 5: 2-Fluorophenol (A)  
SMC 6: 2,4,6-Trichlorophenol (A)  
SMC 7: 2-2-Chlorophenol-d4 (A)  
SMC 8: 1,2-Dichlorobenzene-d4 (BN)

**Internal Standard Outliers**

Sample	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3-area	IS 3-RT	IS 4-area	IS 4-RT	IS 5-area	IS 5-RT	IS 6-area	IS 6-RT
IS 1: 1,4-Dichlorobenzene-d4 (BN)												
IS 2: Naphthalene-d8 (BN)												
IS 3: Acenaphthene-d10 (BN)												
IS 4: Phenanthrene-d10 (BN)												
IS 5: Chrysene-d12 (BN)												
IS 6: Perylene-d12 (BN)												

IS 1: 1,4-Dichlorobenzene-d4 (BN)  
IS 2: Naphthalene-d8 (BN)  
IS 3: Acenaphthene-d10 (BN)  
IS 4: Phenanthrene-d10 (BN)  
IS 5: Chrysene-d12 (BN)  
IS 6: Perylene-d12 (BN)

Comments: SA 22 all HX due to viscosity  
203764 \*MSDB CCV's 16.01 16.22 SA 13-22  
MSDB CCV's 12.12 13.17 SA 23-24  
\* 204261 MSDB CCV's 16.01 16.22  
\* Same I Cal & CCV. SA-001  
only 500ul used for MS/MND



**PCBs (SW 846 - Method 8082)**

Site/Project: DSS Soil Sampling AR/COC #: 605670, 605730 Laboratory Sample IDs: 67601-013 thru -024

Laboratory: 954 Laboratory Report #: 67601 67608-006 (ES)

Methods: SW-846 8082 Matrix: Soil Batch #: 203728 203726

# of Samples: 12

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

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

Comments: 203726 MW/MJO 67554 SMCs 504

Confirmation		
Sample	CAS #	RPD > 25%
IN CRITERIA		

Reviewed By: Actual Date: 11.21.02

# High Explosives (SW 846 Method 8330)

Site/Project: DJS Soil Sampling AR/COC #: 605670, 605730 Laboratory Sample IDs: 67601 - 013 thru - 024  
 Laboratory: QKA Laboratory Report #: 67608 - 007 (ES)  
 Methods: SW-846 8330 Matrix: Soil Batch #: 204142 204151  
 # of Samples: 12

CAS #	NAME	Intercept		Curve R <sup>2</sup>	GCV %D	Method Blanks		LCS	LCSB	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Field Blanks		MS	MSD	RPD
		1	2			1	2								U	NA			
2691-41-0	HMX	✓	NA	✓	✓	✓	✓	✓	✓	NA	✓	✓	✓	NA	U	NA	✓	✓	NA
121-82-4	RDX																		
99-35-4	1,3,5-Trinitrobenzene																		
99-65-0	1,3-dinitrobenzene																		
98-95-3	Nitrobenzene																		
479-45-8	Tetryl																		
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	PEIN																		

Comments: 204142 MJ/MSD 67473 5NYS (ex. sw)

Sample	SMC %REC	SMC RT	Sample	SMC %REC	SMC RT

### Confirmation

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

Solids-to-aqueous conversion:

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

204151 No measure of precision = AH P2  
 ACS fails several but MS OK  
 (OK for Temp) which fails high  
 No sample left for retraction.

Reviewed By: AWH

Date: 11.21.02

WS 704 α (soils)

**Inorganic Metals**

Site/Project: DJS Soil Sampling AR/COC #: 605670, 605730 Laboratory Sample IDs: 67601 - 013 thru - 024  
 Laboratory: SEL Laboratory Report #: 67601  
 Methods: SW-846 7471A (Ag) 60108 (metals)  
 # of Samples: 12 Matrix: Soils Batch #: 204433 (Ag) 203818 (metals)

CAS # Analyte	QC Element										ug/l	Field Dmp. RPD	Field Blanks					
	TAL	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSRD	LCSRD RPD	MS				MSD	MSD RPD	< 35% Rep. RPD	ICS AB	Serial Dilution
7429-90-5 Al	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA
7440-39-3 Be	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA
7440-41-7 Bi	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA
7440-43-9 Cd	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA
7440-70-2 Ca	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA
7440-47-3 Cr	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA
7440-48-4 Co	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA
7440-50-8 Cu	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA
7439-89-6 Fe	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA
7439-95-4 Mg	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA
7439-96-3 Mn	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA
7440-02-0 Ni	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA
7440-09-7 K	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA
7440-22-4 Ag	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA
7440-23-3 Na	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA
7440-62-2 V	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA
7440-66-6 Zn	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA
7782-49-2 Se	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA
7440-39-2 As	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA
7440-36-0 Sb	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA
7440-23-0 Tl	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA
7439-97-6 Hg	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA
Cyanide CN																		

Notes: Shaded rows are RCRA metals. Solids-to-aqueous conversion: mg/kg = ug/g. [(ug/g) x (sample mass (g) / sample vol. (ml)) x (1000 ml / 1 liter)] / Dilution Factor = ug/l

Comments: All soils αX ICP.

Reviewed By: D/hal Date: 11.21.02

203818 DUP/MS/50 67473 SNA 504

	13	14	15	16	17	18	19	20	21	22	23	24
Ba in ES	>	>	>	>	>	>	>	>	>	>	>	>
1.767X5 = 3.8350912												
Cr in ES												
1.882X5 = 4.410912	>	>	>	>	>	>	>	>	>	>	>	>
Se in ICB/CCS	NO <											
3.244X5 = 16.220912		JB3	JB3	JB3	JB3	JB3	JB3	JB3	JB3	JB3	JB3	JB3
As in ICB ny												
NDS = US												
DJ < 5X MDL = J	>	>	>	>	>	>	>	>	>	>	>	>

DL 1.202X5 = 1.01

WJ 012 (EB)

Inorganic Metals

Site/Project: DJS Soil Sampling AR/COC #: 605670, 605730 Laboratory Sample IDs: 67608 - 010

Laboratory: GEA Laboratory Report #: 67601

Methods: SW-846 7470A (Hg) 60108 (METALS)

# of Samples: 1 Matrix: Aqueous

Batch #: 204420 (Hg) 204455 (METALS)

CAS # Analyte	QC Element										Field Blanks	Equlp. Blanks	Field Blanks	8YS					
	TAL	ICV	CCV	ICB	CCB	Method Blanks	ES	LCS#	LCS# RPD	MS					MSD	MSD RPD	Rep RPD	ICS AB	Serial Dilution
7429-90-5 Al	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	NA	NA	✓	✓	NA	NA	NA	2.140 ug/L	J1B3
7440-39-3 Ba	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NO	J1B
7440-41-7 Be	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2.835 ug/L	J1B
7440-43-9 Ca	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NO	
7440-70-2 Cr	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NO	
7440-47-3 Cr	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NO	
7440-48-4 Co	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NO	
7440-50-8 Cu	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NO	
7439-89-6 Fe	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NO	
7439-95-4 Mg	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NO	
7439-96-5 Mn	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NO	
7440-02-0 Ni	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NO	
7440-09-7 K	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NO	
7440-22-4 As	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NO	
7440-23-5 Na	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NO	
7440-62-2 V	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NO	
7440-66-6 Zn	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NO	
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NO	
7782-49-2 Se	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NO	
7440-38-2 As	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NO	
7440-36-0 Sb	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NO	
7440-28-0 Tl	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NO	
7439-97-6 Hg	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NO	
Cyanide CN																			

Notes: Shaded rows are RCRA metals. Solids-to-aqueous conversion: mg/kg = ug/g : ((ug/g) x (sample mass (g) / sample vol. (ml)) x (1000 ml / 1 liter)) / Dilution Factor = ug/l

Comments: 204455 67821 DUP/mo/50 SMA 50g

204420 67354 DUP/ms SMA 50g

Reviewed By: Ahal

Date: 11.21.02

### General Chemistry

Site/Project: DJ3 Soil Sampling AR/COC #: 605670 605730 Laboratory Sample IDs: 67601 - 013 thru - 024  
 Laboratory: GRA Laboratory Report #: 67601  
 Methods: SW-846 9012A (TCN) 7196A (CC) 67608 - 008 (EB TCN) 67608 - 009 (EB-C<sup>6</sup>)  
 # of Samples: 12 @ 2 Matrix: Soil @ 120 Batch #s: 204703 @ 205123 (TCN) 205618 (C<sup>6</sup>)  
205981 (TCN EB) 204593 (C<sup>6</sup> EB)

#### QC Element

CAS #	Analyte	TAL	ICV	CCV	ICB	OCB	Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep RPD	ICS AB	Serial Dis- sem	Field Dup. RPD	Equip. Blanks	Field Blanks	LT
204703 ✓ -13 @ 14	1012 Cyanide	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA	NA	NA	NA	NA	NA	NA
205123 ✓ -15 @ 24		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA	NA	NA	NA	NA	NA	NA
205981 EB		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA	NA	NA	NA	NA	NA	NA
205618 ✓ -13 @ 24	Mercury Chromium	✓	✓	✓	✓	✓	✓	✓	✓	✓	63 64 66 71	(15-125%)	NA	NA	NA	NA	NA	NA	NA	NA
204593 LT EB		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA	NA	NA	NA	NA	NA	NA

**Comments:**

204703: 67473 DUP/MS SMX SO4.  
 204593: 67608-009 "R HT" SX prot HTS NCC 5076  
 205981: 67798 DUP/MS SMX SO4.

Reviewed By: KWal Date: 11.22.02

605618: \* MS ~~Method~~ (12) Within gens limits NCC 6532.  
 P-16 Decks 90 J A2 9A-19-20  
 NDS 90 JJ A2.

# Radiochemistry

Site/Project: DSS Soil Sampling AR/COC#: 605670, 605730 Laboratory Sample IDs: 67601-013 thru -024  
 Laboratory: GKA Laboratory Report #: 67601  
 Methods: EPA 900.0  
 # of Samples: 12 Matrix: Soils Batch #: 205009 (Soils) 204950 (ES)

## QC Element

Analyte	Method Blanks	LCS	MS/MD	Rep RER	Equip. Blanks	Field Dup. RER	Field Blanks	Sample ID	Isotope	IS/Trace	Sample ID	Isotope	IS/Trace
Criteria H3	U	20%	25%	<1.0	U	<1.0	U	NA	50-105	50-105		50-105	50-105
U-238													
U-234													
U-235/236													
Th-232													
Th-228													
Th-230													
Pu-239/240													
Gross Alpha	✓	✓	✓✓	✓	✓	NA	NA						
Nonvolatile Beta	✓	✓	✓✓	✓	✓	NA	NA						
Ra-226													
Ra-228													
Ni-63													
Gamma Spec. Am-241													
Gamma Spec. Cs-137													
Gamma Spec. Co-60													
GC/MS Alpha	✓	✓	✓✓	✓	NA	NA	NA						
Non Volatile Beta	✓	✓	✓✓	✓	NA	NA	NA						

205009

204950

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

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

Comments: 204950; 67609 DUP / MS/MSD  
 5NAD SOG

Reviewed By: Uhal

Date: 11.27.02

Contract Verification Review (CVR)

Project Leader COLLINS Project Name DSS SOIL SAMPLING Case No. 7223\_02.03.02  
 AR/COC No. 605670 & 605730 Analytical Lab GEL SDG No. 67601A & B

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

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

Line No.	Item	Complete?		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 DL), MDA and L <sub>c</sub>	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				
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X				

HEXAVALENT CHROMIUM SAMPLE #059856-006  
 RECEIVED PAST HOLDING TIME  
 PAGE 1 OF 2 MISSING FOR VOC SAMPLE  
 #059919-001



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	SEVERAL ANALYTES FAILED RECOVERY LIMITS FOR EXPLOSIVES LCS—NO SAMPLE LEFT FOR RE-EXTRACT
a) Laboratory control samples accuracy reported and met for all samples			
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	X		
c) Matrix spike recovery data reported and met		X	TETRYL FAILED RECOVERY LIMITS FOR EXPLOSIVES MATRIX SPIKE (aq)
3.4 Precision	X		
a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	X		
b) Matrix spike duplicate RPD data reported and met for all organic samples	X		
3.5 Blank data		X	CHROMIUM DETECTED IN AQUEOUS BLANK
a) Method or reagent blank data reported and met for all samples			
b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	1,2-DICHLOROPROPANE & ACETONE DETECTED IN TRIP BLANKS BARIUM & CHROMIUM DETECTED IN EQUIPMENT BLANK
3.6 Contractual qualifiers provided: "J" - estimated quantity; "B" - analyte found in method blank above the MDL for organic or above the PQL for inorganic; "U" - analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H" - analysis done beyond the holding time	X		
3.7 Narrative addresses planchet flaming for gross alpha/beta	X		
3.8 Narrative included, correct, and complete	X		
3.9 Second column confirmation data provided for methods 8330 (high explosives) and 8082 (pesticides/PCBs)	X		

Contract Verification Review (Continued)

4.0 Calibration and Validation Documentation

Item	Yes	No	Comments
4.1 GC/MS (8260, 8270, etc.)			
a) 12-hour tune check provided	X		
b) Initial calibration provided	X		
c) Continuing calibration provided	X		
d) Internal standard performance data provided	X		
e) Instrument run logs provided	X		
4.2 GC/HPLC (8330 and 8010 and 8082)			
a) Initial calibration provided	X		
b) Continuing calibration provided	X		
c) Instrument run logs provided	X		
4.3 Inorganics (metals)			
a) Initial calibration provided	X		
b) Continuing calibration provided	X		
c) ICP interference check sample data provided	X		
d) ICP serial dilution provided	X		
e) Instrument run logs provided	X		
4.4 Radiochemistry			
a) Instrument run logs provided	X		

Contract Verification Review (Concluded)

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions
059919-001	VOCs	PAGE 1 OF COA MISSING (pg. 34)
059933-001	VOCs	SAMPLE NUMBER CHANGED FROM 059957-001—GEL NOT NOTIFIED
059856-002	SVOCs	WRONG EXTRACTION FORM PROVIDED

Were deficiencies unresolved?  Yes  No

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

If no, provide: nonconformance report or correction request number 5206 and date correction request was submitted: 11-5-2002

Reviewed by: W. Palencia Date: 11-5-2002 Closed by: Date:



**ANNEX C**  
**DSS Site 1004**  
**Soil-Vapor Monitoring Well Analytical Results and Data Validation Report**

SEVERN  
TRENT

STL

# Analytical Report

## ANALYTICAL REPORT

PROJECT NO. CASE#7223.02.02.01

DSS SOIL VAPOR WELL SAMPLING

Lot #: E3I150189

Pam Puissant

SANDIA NATIONAL LABORATORIES

SEVERN TRENT LABORATORIES, INC.

Marisol Tabirara  
Project Manager

September 19, 2003

## EXECUTIVE SUMMARY - Detection Highlights

E3I150189

<u>PARAMETER</u>	<u>RESULT</u>	<u>REPORTING LIMIT</u>	<u>UNITS</u>	<u>ANALYTICAL METHOD</u>
063087-001/1004-VW-01-5-SV 09/09/03 12:30 001				
Toluene	1.4 J	2.0	ppb (v/v)	EPA-21 TO-14A
063088-001/1004-VW-01-20-SV 09/09/03 12:35 002				
Dichlorodifluoromethane	0.51 J	2.0	ppb (v/v)	EPA-21 TO-14A
Acetone	2.0 J	10	ppb (v/v)	EPA-21 TO-14A
Toluene	1.5 J	2.0	ppb (v/v)	EPA-21 TO-14A
063089-001/1004-VW-01-70-SV 09/09/03 12:40 003				
Trichlorofluoromethane	0.73 J	2.0	ppb (v/v)	EPA-21 TO-14A
Chloroform	0.82 J	2.0	ppb (v/v)	EPA-21 TO-14A
Toluene	1.7 J	2.0	ppb (v/v)	EPA-21 TO-14A
063090-001/1004-VW-01-100-SV 09/09/03 12:45 004				
Trichlorofluoromethane	0.99 J	2.0	ppb (v/v)	EPA-21 TO-14A
Acetone	2.8 J	10	ppb (v/v)	EPA-21 TO-14A
Toluene	1.3 J	2.0	ppb (v/v)	EPA-21 TO-14A
063091-001/1004-VW-01-150-SV 09/09/03 12:50 005				
Trichloroethene	0.52 J	2.0	ppb (v/v)	EPA-21 TO-14A
Toluene	2.4	2.0	ppb (v/v)	EPA-21 TO-14A



# ANALYTICAL METHODS SUMMARY

E3I150189

<u>PARAMETER</u>	<u>ANALYTICAL METHOD</u>
Volatile Organics by TO-14A	EPA-21 TO-14A

## References:

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

# SAMPLE SUMMARY

E3I150189

<u>WO #</u>	<u>SAMPLE#</u>	<u>CLIENT SAMPLE ID</u>	<u>SAMPLED DATE</u>	<u>SAMP TIME</u>
F0DCM	001	063087-001/1004-VW-01-5-SV	09/09/03	12:30
F0DCP	002	063088-001/1004-VW-01-20-SV	09/09/03	12:35
F0DCQ	003	063089-001/1004-VW-01-70-SV	09/09/03	12:40
F0DCR	004	063090-001/1004-VW-01-100-SV	09/09/03	12:45
F0DCT	005	063091-001/1004-VW-01-150-SV	09/09/03	12:50

## NOTE(S) :

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

SANDIA NATIONAL LABORATORIES

Client Sample ID: 063087-001/1004-VW-01-5-SV

GC/MS Volatiles

Lot-Sample #...: E3I150189-001    Work Order #...: F0DCMLAC    Matrix.....: AIR  
 Date Sampled...: 09/09/03    Date Received...: 09/12/03  
 Prep Date.....: 09/17/03    Analysis Date...: 09/17/03  
 Prep Batch #...: 3261541    Analysis Time...: 13:43  
 Dilution Factor: 1  
 Analyst ID.....: 117751    Instrument ID...: MSA  
 Method.....: EPA-21 TO-14A

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Dichlorodifluoromethane	ND	2.0	ppb (v/v)	0.50
Chloromethane	ND	4.0	ppb (v/v)	1.0
1,2-Dichloro- 1,1,2,2-tetrafluoroethane	ND	2.0	ppb (v/v)	0.80
Vinyl chloride	ND	2.0	ppb (v/v)	0.80
Bromomethane	ND	2.0	ppb (v/v)	1.0
Chloroethane	ND	4.0	ppb (v/v)	0.80
Trichlorofluoromethane	ND	2.0	ppb (v/v)	0.50
1,1-Dichloroethene	ND	2.0	ppb (v/v)	0.50
Carbon disulfide	ND	10	ppb (v/v)	2.0
1,1,2-Trichloro- 1,2,2-trifluoroethane	ND	2.0	ppb (v/v)	0.50
Acetone	ND	10	ppb (v/v)	2.0
Methylene chloride	ND	2.0	ppb (v/v)	0.80
trans-1,2-Dichloroethene	ND	2.0	ppb (v/v)	0.50
1,1-Dichloroethane	ND	2.0	ppb (v/v)	0.50
Vinyl acetate	ND	10	ppb (v/v)	2.0
cis-1,2-Dichloroethene	ND	2.0	ppb (v/v)	0.80
2-Butanone (MEK)	ND	10	ppb (v/v)	2.0
Chloroform	ND	2.0	ppb (v/v)	0.80
1,1,1-Trichloroethane	ND	2.0	ppb (v/v)	0.50
Carbon tetrachloride	ND	2.0	ppb (v/v)	0.50
Benzene	ND	2.0	ppb (v/v)	0.80
1,2-Dichloroethane	ND	2.0	ppb (v/v)	0.80
Trichloroethene	ND	2.0	ppb (v/v)	0.50
1,2-Dichloropropane	ND	2.0	ppb (v/v)	0.80
Bromodichloromethane	ND	2.0	ppb (v/v)	0.80
cis-1,3-Dichloropropene	ND	2.0	ppb (v/v)	0.50
4-Methyl-2-pentanone (MIBK)	ND	10	ppb (v/v)	2.0
Toluene	1.4 J	2.0	ppb (v/v)	0.50
trans-1,3-Dichloropropene	ND	2.0	ppb (v/v)	0.80
1,1,2-Trichloroethane	ND	2.0	ppb (v/v)	0.60
Tetrachloroethene	ND	2.0	ppb (v/v)	0.60
2-Hexanone	ND	10	ppb (v/v)	1.0
Dibromochloromethane	ND	2.0	ppb (v/v)	0.50
1,2-Dibromoethane (EDB)	ND	2.0	ppb (v/v)	0.50

(Continued on next page)

SANDIA NATIONAL LABORATORIES

Client Sample ID: 063087-001/1004-VW-01-5-SV

GC/MS Volatiles

Lot-Sample #....: E3I150189-001 Work Order #....: F0DCM1AC Matrix.....: AIR

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

**NOTE (S) :**

J Estimated result. Result is less than RL.



SANDIA NATIONAL LABORATORIES

Client Sample ID: 063088-001/1004-VW-01-20-SV

GC/MS Volatiles

Lot-Sample #....: E3I150189-002 Work Order #....: F0DCPIAC Matrix.....: AIR

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

**NOTE(S) :**

J Estimated result. Result is less than RL.

SANDIA NATIONAL LABORATORIES

Client Sample ID: 063089-001/1004-VW-01-70-SV

GC/MS Volatiles

Lot-Sample #....: E3I150189-003    Work Order #....: F0DCQ1AC    Matrix.....: AIR  
 Date Sampled....: 09/09/03    Date Received...: 09/12/03  
 Prep Date.....: 09/17/03    Analysis Date...: 09/17/03  
 Prep Batch #....: 3261541    Analysis Time...: 15:14  
 Dilution Factor: 1  
 Analyst ID.....: 117751    Instrument ID...: MSA  
 Method.....: EPA-21 TO-14A

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Dichlorodifluoromethane	ND	2.0	ppb (v/v)	0.50
Chloromethane	ND	4.0	ppb (v/v)	1.0
1,2-Dichloro- 1,1,2,2-tetrafluoroethane	ND	2.0	ppb (v/v)	0.80
Vinyl chloride	ND	2.0	ppb (v/v)	0.80
Bromomethane	ND	2.0	ppb (v/v)	1.0
Chloroethane	ND	4.0	ppb (v/v)	0.80
Trichlorofluoromethane	0.73 J	2.0	ppb (v/v)	0.50
1,1-Dichloroethene	ND	2.0	ppb (v/v)	0.50
Carbon disulfide	ND	10	ppb (v/v)	2.0
1,1,2-Trichloro- 1,2,2-trifluoroethane	ND	2.0	ppb (v/v)	0.50
Acetone	ND	10	ppb (v/v)	2.0
Methylene chloride	ND	2.0	ppb (v/v)	0.80
trans-1,2-Dichloroethene	ND	2.0	ppb (v/v)	0.50
1,1-Dichloroethane	ND	2.0	ppb (v/v)	0.50
Vinyl acetate	ND	10	ppb (v/v)	2.0
cis-1,2-Dichloroethene	ND	2.0	ppb (v/v)	0.80
2-Butanone (MEK)	ND	10	ppb (v/v)	2.0
Chloroform	0.82 J	2.0	ppb (v/v)	0.80
1,1,1-Trichloroethane	ND	2.0	ppb (v/v)	0.50
Carbon tetrachloride	ND	2.0	ppb (v/v)	0.50
Benzene	ND	2.0	ppb (v/v)	0.80
1,2-Dichloroethane	ND	2.0	ppb (v/v)	0.80
Trichloroethene	ND	2.0	ppb (v/v)	0.50
1,2-Dichloropropane	ND	2.0	ppb (v/v)	0.80
Bromodichloromethane	ND	2.0	ppb (v/v)	0.80
cis-1,3-Dichloropropene	ND	2.0	ppb (v/v)	0.50
4-Methyl-2-pentanone (MIBK)	ND	10	ppb (v/v)	2.0
Toluene	1.7 J	2.0	ppb (v/v)	0.50
trans-1,3-Dichloropropene	ND	2.0	ppb (v/v)	0.80
1,1,2-Trichloroethane	ND	2.0	ppb (v/v)	0.60
Tetrachloroethene	ND	2.0	ppb (v/v)	0.60
2-Hexanone	ND	10	ppb (v/v)	1.0
Dibromochloromethane	ND	2.0	ppb (v/v)	0.50
1,2-Dibromoethane (EDB)	ND	2.0	ppb (v/v)	0.50

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## SANDIA NATIONAL LABORATORIES

Client Sample ID: 063089-001/1004-VW-01-70-SV

## GC/MS Volatiles

Lot-Sample #...: E3I150189-003 Work Order #...: F0DCQ1AC Matrix.....: AIR

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

**NOTE(S) :**

J Estimated result. Result is less than RL.



## SANDIA NATIONAL LABORATORIES

Client Sample ID: 063090-001/1004-VW-01-100-SV

## GC/MS Volatiles

Lot-Sample #....: E3I150189-004 Work Order #....: F0DCR1AC Matrix.....: AIR  
 Date Sampled....: 09/09/03 Date Received...: 09/12/03  
 Prep Date.....: 09/17/03 Analysis Date...: 09/17/03  
 Prep Batch #....: 3261541 Analysis Time...: 16:22  
 Dilution Factor: 1  
 Analyst ID.....: 117751 Instrument ID...: MSA  
 Method.....: EPA-21 TO-14A

PARAMETER	RESULT	REPORTING		
		LIMIT	UNITS	MDL
Dichlorodifluoromethane	ND	2.0	ppb (v/v)	0.50
Chloromethane	ND	4.0	ppb (v/v)	1.0
1,2-Dichloro-	ND	2.0	ppb (v/v)	0.80
1,1,2,2-tetrafluoroethane				
Vinyl chloride	ND	2.0	ppb (v/v)	0.80
Bromomethane	ND	2.0	ppb (v/v)	1.0
Chloroethane	ND	4.0	ppb (v/v)	0.80
Trichlorofluoromethane	0.99 J	2.0	ppb (v/v)	0.50
1,1-Dichloroethene	ND	2.0	ppb (v/v)	0.50
Carbon disulfide	ND	10	ppb (v/v)	2.0
1,1,2-Trichloro-	ND	2.0	ppb (v/v)	0.50
1,2,2-trifluoroethane				
Acetone	2.8 J	10	ppb (v/v)	2.0
Methylene chloride	ND	2.0	ppb (v/v)	0.80
trans-1,2-Dichloroethene	ND	2.0	ppb (v/v)	0.50
1,1-Dichloroethane	ND	2.0	ppb (v/v)	0.50
Vinyl acetate	ND	10	ppb (v/v)	2.0
cis-1,2-Dichloroethene	ND	2.0	ppb (v/v)	0.80
2-Butanone (MEK)	ND	10	ppb (v/v)	2.0
Chloroform	ND	2.0	ppb (v/v)	0.80
1,1,1-Trichloroethane	ND	2.0	ppb (v/v)	0.50
Carbon tetrachloride	ND	2.0	ppb (v/v)	0.50
Benzene	ND	2.0	ppb (v/v)	0.80
1,2-Dichloroethane	ND	2.0	ppb (v/v)	0.80
Trichloroethene	ND	2.0	ppb (v/v)	0.50
1,2-Dichloropropane	ND	2.0	ppb (v/v)	0.80
Bromodichloromethane	ND	2.0	ppb (v/v)	0.80
cis-1,3-Dichloropropene	ND	2.0	ppb (v/v)	0.50
4-Methyl-2-pentanone (MIBK)	ND	10	ppb (v/v)	2.0
Toluene	1.3 J	2.0	ppb (v/v)	0.50
trans-1,3-Dichloropropene	ND	2.0	ppb (v/v)	0.80
1,1,2-Trichloroethane	ND	2.0	ppb (v/v)	0.60
Tetrachloroethene	ND	2.0	ppb (v/v)	0.60
2-Hexanone	ND	10	ppb (v/v)	1.0
Dibromochloromethane	ND	2.0	ppb (v/v)	0.50
1,2-Dibromoethane (EDB)	ND	2.0	ppb (v/v)	0.50

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SANDIA NATIONAL LABORATORIES

Client Sample ID: 063090-001/1004-VW-01-100-SV

GC/MS Volatiles

Lot-Sample #...: E3I150189-004 Work Order #...: F0DCR1AC Matrix.....: AIR

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

NOTE(S):

J Estimated result. Result is less than RL.

## SANDIA NATIONAL LABORATORIES

Client Sample ID: 063091-001/1004-VW-01-150-SV

## GC/MS Volatiles

Lot-Sample #....: E3I150189-005 Work Order #....: F0DCTLAC Matrix.....: AIR  
Date Sampled....: 09/09/03 Date Received...: 09/12/03  
Prep Date.....: 09/17/03 Analysis Date...: 09/17/03  
Prep Batch #....: 3261541 Analysis Time...: 17:29  
Dilution Factor: 1  
Analyst ID.....: 117751 Instrument ID...: MSA  
Method.....: EPA-21 TO-14A

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Dichlorodifluoromethane	ND	2.0	ppb (v/v)	0.50
Chloromethane	ND	4.0	ppb (v/v)	1.0
1,2-Dichloro- 1,1,2,2-tetrafluoroethane	ND	2.0	ppb (v/v)	0.80
Vinyl chloride	ND	2.0	ppb (v/v)	0.80
Bromomethane	ND	2.0	ppb (v/v)	1.0
Chloroethane	ND	4.0	ppb (v/v)	0.80
Trichlorofluoromethane	ND	2.0	ppb (v/v)	0.50
1,1-Dichloroethene	ND	2.0	ppb (v/v)	0.50
Carbon disulfide	ND	10	ppb (v/v)	2.0
1,1,2-Trichloro- 1,2,2-trifluoroethane	ND	2.0	ppb (v/v)	0.50
Acetone	ND	10	ppb (v/v)	2.0
Methylene chloride	ND	2.0	ppb (v/v)	0.80
trans-1,2-Dichloroethene	ND	2.0	ppb (v/v)	0.50
1,1-Dichloroethane	ND	2.0	ppb (v/v)	0.50
Vinyl acetate	ND	10	ppb (v/v)	2.0
cis-1,2-Dichloroethene	ND	2.0	ppb (v/v)	0.80
2-Butanone (MEK)	ND	10	ppb (v/v)	2.0
Chloroform	ND	2.0	ppb (v/v)	0.80
1,1,1-Trichloroethane	ND	2.0	ppb (v/v)	0.50
Carbon tetrachloride	ND	2.0	ppb (v/v)	0.50
Benzene	ND	2.0	ppb (v/v)	0.80
1,2-Dichloroethane	ND	2.0	ppb (v/v)	0.80
Trichloroethene	0.52 J	2.0	ppb (v/v)	0.50
1,2-Dichloropropane	ND	2.0	ppb (v/v)	0.80
Bromodichloromethane	ND	2.0	ppb (v/v)	0.80
cis-1,3-Dichloropropene	ND	2.0	ppb (v/v)	0.50
4-Methyl-2-pentanone (MIBK)	ND	10	ppb (v/v)	2.0
Toluene	2.4	2.0	ppb (v/v)	0.50
trans-1,3-Dichloropropene	ND	2.0	ppb (v/v)	0.80
1,1,2-Trichloroethane	ND	2.0	ppb (v/v)	0.60
Tetrachloroethene	ND	2.0	ppb (v/v)	0.60
2-Hexanone	ND	10	ppb (v/v)	1.0
Dibromochloromethane	ND	2.0	ppb (v/v)	0.50
1,2-Dibromoethane (EDB)	ND	2.0	ppb (v/v)	0.50

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SANDIA NATIONAL LABORATORIES

Client Sample ID: 063091-001/1004-VW-01-150-SV

GC/MS Volatiles

Lot-Sample #...: E3I150189-005 Work Order #...: F0DCT1AC Matrix.....: AIR

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

NOTE (S):

J Estimated result. Result is less than RL.

**The remaining portions of this report:**

- **QA/QC;**
- **1004-VW-01 Extended Raw Data,**

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



Contract Verification Review (CVR)

Project Leader Collins Project Name DSS-NFA Case No. 7223\_02.02.01

AR/COC No. 606762 Analytical Lab GEL SDG No. E3I150189

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 <sub>c</sub>	X				
2.6	QC batch numbers provided	X				
2.7	Dilution factors provided and all dilution levels reported	X				
2.8	Data reported in appropriate units and using correct significant figures	X				
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	N/A				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met	X				
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X				

## Contract Verification Review (Continued)

## 3.0 Data Quality Evaluation

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



Contract Verification Review (Continued)

4.0 Calibration and Validation Documentation

Item	Yes	No	Comments
4.1 GC/MS (8260, 8270, etc.)			
a) 12-hour tune check provided	X		
b) Initial calibration provided	X		
c) Continuing calibration provided	X		
d) Internal standard performance data provided	X		
e) Instrument run logs provided	X		
4.2 GC/HPLC (8330 and 8010 and 8082)			
a) Initial calibration provided	N/A		
b) Continuing calibration provided	N/A		
c) Instrument run logs provided	N/A		
4.3 Inorganics (metals)			
a) Initial calibration provided	N/A		
b) Continuing calibration provided	N/A		
c) ICP interference check sample data provided	N/A		
d) ICP serial dilution provided	N/A		
e) Instrument run logs provided	N/A		
4.4 Radiochemistry			
a) Instrument run logs provided	N/A		

Contract Verification Review (Concluded)

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions

Were deficiencies unresolved? Yes No  Yes  No

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

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

Reviewed by: Ulan Date: 09/25/03 Closed by: \_\_\_\_\_ Date: \_\_\_\_\_

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

**AR/COC**

**606762**

Dept. No./Mail Stop: 6132/1089 Project/Task Manager: Mike Sanders Project Name: DSS Soil Vapor Well Sampling Record Center Code: Logbook Ref. No.: Service Order No.: CF023-03	Date Samples Shipped: 9/10/03 Carrier/Waybill No.: 26418 Lab Contact: Severn Trent St. Louis Lab Destination: Pam Puissant(505)844-3185 SMO Contact/Phone: Wendy Palencia(505)844-3132	Project/Task No.: 7223.02.02.01 SMO Authorization: <i>Edy Lamy</i> Contract #: <i>PO21673</i> Released by COC No.: Validation Required:	Waste Characterization -Send preliminary/copy report to: Bill To: Sandia National Labs (Accounts Payable) P.O. Box 5800 MS 0154 Albuquerque, NM 87185-0154
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Reference LOV (available at SMO)												
Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time Collected	Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
063087-001	1004-VW-01-5-SV	5		9-9-03/1230	SG	SC	6L	none	G	SA	TO-14 summa#12843	
063088-001	1004-VW-01-20-SV	20		9-9-03/1235	SG	SC	6L	none	G	SA	TO-14 summa#12167	
063089-001	1004-VW-01-70-SV	70		9-9-03/1240	SG	SC	6L	none	G	SA	TO-14 summa#12166	
063090-001	1004-VW-01-100-SV	100		9-9-03/1245	SG	SC	6L	none	G	SA	TO-14 summa#04164	
063091-001	1004-VW-01-150-SV	150		9-9-03/1250	SG	SC	6L	none	G	SA		

<b>RMMA</b> Sample Disposal: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Return to Client: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Turnaround Time: <input type="checkbox"/> 7 Day <input checked="" type="checkbox"/> 15 Day <input type="checkbox"/> 30 Day	Special Instructions/QC Requirements EDD: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Level C Package: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No *Send report to: Mike Sanders Dept. 6132 Mail stop 1089 505-284-2478 Tim Jackson Mail stop 1087 505-284-2547 *Please list as separate report.	Abnormal Conditions on Receipt: Lab Use
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Return Samples By: Signature: <i>[Signature]</i> Name: J Lee Company/Organization/Phone/Cellular: Weston Solutions 6134 (505-284-3309)	Negotiated TAT: <input type="checkbox"/> 7 Day <input type="checkbox"/> 15 Day <input type="checkbox"/> 30 Day Date Entered (mm/dd/yy): 09/11/03 Entered by: <i>[Signature]</i>	Relinquished by: <i>[Signature]</i> Date: 9/10/03 Time: 0805	Relinquished by: <i>[Signature]</i> Date: 9/10/03 Time: 0805
--	---	--	--

DSS Vapor Wells SUMMA CANNISTER LOG

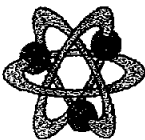
J Lee 505-284-3309 R Lynch 505-844-4013

SERIAL	DATE RCVD	DATE TESTED	VAC (IN HG)	DATE USED	VAC AFTER SAMPLING	DATE RET TO SMC
			(@5400)		(IN HG @ 5400)	(AFTER SAMPLING)

9340B	9-4-03	9-4-03	26	9-9-03		9-10-03
04340	↑	↑	25	↑		↑
12341			25			
12607			22			
A-331			24			
12943			26			
93102			26			
93124			26			
A-174			25			
12592			26			
93243			25			
9118B			25			
93227			25			
0060			25			
12485			25			
A-239			25			
12166			26			
12167			26			
04164			25			
GL0101			25			
0102			25			
60-A			26			
93276			26			
12261			25			
93108			26			
04751			26			
0117			26			
A-277			26			
02856			25			
12184			26			
93040			25			
12631			25			
* 0182			20			
93058B			24			
<del>12260</del>						
12620			24			
* 9339B	↓	↓	18	↓		↓



Analytical Quality Associates, Inc.



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

**MEMORANDUM**

DATE: September 29, 2003  
TO: File  
FROM: Kevin Lambert  
SUBJECT: Organic Data Review and Validation – SNL  
DSS-NFA, AR/COC No. 606762, SDG No. E3I150189 (STCA), and Project/Task No.  
7223.02.02.01

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

**Summary**

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

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

**Holding Times**

All samples were analyzed within the prescribed holding times.

**Calibration**

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

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

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

The CCV %D for vinyl acetate (-30%) was > 20% but ≤ 40%. Associated sample results were ND and as a result based on professional judgment no data will be qualified.

**Blanks**

No target analytes were detected in the blanks.

**Surrogates**

Surrogate assessment is not required for this analysis.

**Internal Standards**

Internal standards data met QC acceptance criteria.

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

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

**Laboratory Control Sample (LCS)**

The LCS/LCSD met QC acceptance criteria.

**Detection Limits/Dilutions**

All detection limits were properly reported; no dilutions were required

**Other QC**

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

No other specific issues were identified which affect data quality.

### Data Validation Summary

Site/Project: DSS NFA      Project/Task #: 7223.02.02.01      # of Samples: 5      Matrix: Soils  
 AR/COC #: 606762      Laboratory Sample IDs: E3I150189-801 to -005  
 Laboratory: STCA  
 SDG #: E3I150189

QC Element	Analysis												
	TO-14A			Organics			Inorganics			RAD	Other		
	VOC	SVOC	Pesticide/POB	HPLC (HE)	ICP/AES	GFAA/AA	CVAA (Hg)	CN					
1. Holding Times/Preservation	✓												
2. Calibrations	✓												
3. Method Blanks	✓												
4. MS/MSD	NA												
5. Laboratory Control Samples	✓												
6. Replicates													
7. Surrogates	NA												
8. Internal Standards	✓												
9. TCL Compound Identification	✓												
10. ICP Interference Check Sample													
11. ICP Serial Dilution													
12. Carrier/Chemical Tracer Recoveries													
13. Other QC	NA												

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

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



**Volatile Organics (TO-14)**

Site/Project: DSS-NFA AR/COC #: 606762 # of Samples: 5 Matrix: AIR  
 Laboratory: STCA Laboratory Report #: E3I150189 Laboratory Sample ID: E3I150189-001 to -005  
 Methods: EPA21 (TO-14) Batch #: 3261541

IS	CAS #	Name	T C L	Min RP	Intercept	Calib. RF	Calib. RF/ IR	CV		Method Bkls	LCS	LCS RPD	LCS RPD	MS	MS RPD	Field Dup RPD	Equip. Blanks	Trip Blanks
								<20% / 0.99	20%									
1	74-87-3	Chloromethane	✓	0.10	NA	0.034	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	74-83-9	Bromomethane	✓	0.10			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	75-00-3	Chloroethane	✓	0.01			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	75-09-2	methylene chloride (10xblk)	✓	0.01			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	67-64-1	acetone (10xblk)	✓	0.01			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	75-35-4	1,1-dichloroethane	✓	0.20			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	75-34-5	1,1,1-trichloroethane	✓	0.10			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	67-68-3	Chloroform	✓	0.20			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	107-06-2	1,2-dichloroethane	✓	0.10			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	78-93-3	2-butanone (10xblk)	✓	0.01			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	71-35-6	1,1,1-trichloroethane	✓	0.10			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	56-23-5	carbon tetrachloride	✓	0.10			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	78-87-5	1,2-dichloropropane	✓	0.01			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	10061-01-5	cis-1,3-dichloropropene	✓	0.20			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	79-01-6	Trichloroethane	✓	0.30			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	79-00-5	1,1,2-trichloroethane	✓	0.10			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	71-43-2	Benzene	✓	0.30			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	10061-02-6	trans-1,3-dichloropropene	✓	0.10			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	108-10-1	4-methyl-2-pentanone	✓	0.10			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	107-11-4	Tetrahydrofuran	✓	0.20			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	79-34-5	1,1,2,2-tetrachloroethane	✓	0.30			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	108-88-3	toluene (10xblk)	✓	0.40			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	108-90-7	Chlorobenzene	✓	0.30			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	100-41-4	Ethylbenzene	✓	0.10			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	100-42-5	Styrene	✓	0.30			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
109-85-04		Hydrochloride																
100-44-7		Benzyl chloride																
106-93-4		1,2-dibromomethane																
95-30-1		1,2-dichlorobenzene																
541-73-1		1,3-dichlorobenzene																
106-46-7		1,4-dichlorobenzene																
73-71-8		dichlorodifluoromethane																

Notes: Shaded rows are RCRA compounds.

Comments: NA - NOT APPLICABLE

① Calib. R.F. < min R.F., RSD > CCV 70 Dmet  
 QC criteria, Associated Sample result  
 ND, No data qualified as a result

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

**Volatile Organics (TO-14)**

Site/Project: \_\_\_\_\_ AR/COC #: 1006762 # of Samples: \_\_\_\_\_ Matrix: \_\_\_\_\_  
 Laboratory: \_\_\_\_\_ Laboratory Report #: \_\_\_\_\_ Laboratory Sample IDs: \_\_\_\_\_  
 Methods: \_\_\_\_\_ Batch #: \_\_\_\_\_

IS CAS #	Name	T C L	Min. RF	Intercept	Calib. RF	Calib. RSD, %	COV, %	Method Bk	LCS	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks
76-14-2	1,2-dichloro-1,1,2,2-tetrafluoroethane	✓		NA	✓		✓	✓								
156-59-2	Cis-1,2-dichloroethene	✓														
156-60-5	trans-1,2-dichloroethene	✓														
87-68-3	hexachlorobutadiene	✓														
120-82-1	1,2,4-trichlorobenzene	✓														
75-15-0	carbon disulfide	✓														
75-69-4	trichlorofluoromethane	✓														
95-63-6	1,2,4-trimethylbenzene	✓														
108-67-8	1,3,5-trimethylbenzene	✓														
76-13-1	1,1,2-trichloro-1,2,2-trifluoroethane	✓														
136777-61-2	m-, p-xylene	✓														
95-47-6	o-xylene	✓														
622-96-8	4-ethyltoluene	✓														
108-05-4	vinyl acetate	✓														
75-27-4	bromodichloromethane	✓														
391-78-6	2-hexanone	✓														
124-48-1	dibromochloromethane	✓														
75-25-2	bromoform	✓														
64-17-5	ethanol	✓														
67-56-1	methanol	✓														
80-62-6	methyl methacrylate	✓														
141-78-6	ethyl acetate	✓														
107-02-8	acrolein	✓														
75-03-8	acetonitrile	✓														
67-63-0	isopropanol	✓														
107-13-1	acrylonitrile	✓														
123-91-1	1,4-dioxane	✓														

Comments: *RSD > 70 but < 40, Associated with sample results ND, No data provided as a result*

Notes: *Shaded rows are RCRA compounds.*

**Volatile Organics (TO-14)**

Site/Project: \_\_\_\_\_ AR/COC #: 606762 Batch #: \_\_\_\_\_ Matrix: \_\_\_\_\_  
 Laboratory: \_\_\_\_\_ Laboratory Report #: \_\_\_\_\_ # of Samples: \_\_\_\_\_

**Surrogate Recovery and Internal Standard Outliers (TO-14)**

Sample	SMC 1	SMC 2	SMC 3	IS 1 area	IS 1 RT	IS 2 area	IS 2 RT	IS 3 area	IS 3 RT

*Met Criteria*

*N/A*

**Comments:**

- SMC 1: 4-Bromofluorobenzene
- SMC 2: 1,2-Dichloroethane-d4
- SMC 3: Toluene-d8
- IS 1: Bromochloromethane
- IS 2: 1,4-Difluorobenzene
- IS 3: Chlorobenzene-d5

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

Contract Verification Review (CVR)

Project Leader Collins Project Name D55-NFA Case No. 7223\_02.02.01

AR/COC No. 606762 Analytical Lab GEL SD6 No. E3I150189

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 <sub>c</sub>	X				
2.6	QC batch numbers provided	X				
2.7	Dilution factors provided and all dilution levels reported	X				
2.8	Data reported in appropriate units and using correct significant figures	X				
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	N/A				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met	X				
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X				

Contract Verification Review (Continued)

3.0 Data Quality Evaluation

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

## Contract Verification Review (Continued)

4.0 Calibration and Validation Documentation	Item	Yes	No	Comments
4.1 GC/MS (8260, 8270, etc.)	a) 12-hour tune check provided	X		
	b) Initial calibration provided	X		
	c) Continuing calibration provided	X		
	d) Internal standard performance data provided	X		
	e) Instrument run logs provided	X		
4.2 GC/HPLC (8330 and 8010 and 8082)	a) Initial calibration provided	N/A		
	b) Continuing calibration provided	N/A		
	c) Instrument run logs provided	N/A		
4.3 Inorganics (metals)	a) Initial calibration provided	N/A		
	b) Continuing calibration provided	N/A		
	c) ICP interference check sample data provided	N/A		
	d) ICP serial dilution provided	N/A		
	e) Instrument run logs provided	N/A		
4.4 Radiochemistry	a) Instrument run logs provided	N/A		

Contract Verification Review (Concluded)

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions

Were deficiencies unresolved?     Yes     No

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

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

Reviewed by: [Signature]     Date: 02/25/03     Closed by: \_\_\_\_\_     Date: \_\_\_\_\_

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab AR/COC **606762**

Batch No. N/A SMO Use  
 Dept. No./Mail Stop: 6132/1089 Project/Task No.: 7223.02.02.01  
 Project/Task Manager: Mike Sanders SMO Authorization: Off Site  
 Project Name: DSS Soil Vapor Well Sampling Contract #: P02673  
 Record Center Code: CF023-03 Released by COC No.: See notes on file  
 Logbook Ref. No.: CF023-03 Validation Required  
 Service Order No.: CF023-03 Bill To: Sandia National Labs (Accounts Payable)  
P.O. Box 5800 MS 0154  
Albuquerque, NM 87185-0154

Location		Reference LOV (available at SMO)										Lab Sample ID
Building	Room	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time (hr) Collected	Sample Matrix	Container Type	Volume	Preservative	Collection Method	Sample Type	
		1004-VW-01-5-SV	5		9-9-03/1230	SG	SC	6L	none	G	SA	TO-14 summa#12843
		1004-VW-01-20-SV	20		9-9-03/1235	SG	SC	6L	none	G	SA	TO-14 summa#GL0101
		1004-VW-01-70-SV	70		9-9-03/1240	SG	SC	6L	none	G	SA	TO-14 summa#12167
		1004-VW-01-100-SV	100		9-9-03/1245	SG	SC	6L	none	G	SA	TO-14 summa#12166
		1004-VW-01-150-SV	150		9-9-03/1250	SG	SC	6L	none	G	SA	TO-14 summa#04164

**RMMA**  Yes  No Ref. No.  
 Sample Disposal  Return to Client  Disposal by lab  
 Turnaround Time  7 Day  15 Day  30 Day  
 Return Samples By:  Negotiated TAT Signature: J Lee  
 Name: J Lee Company/Organization/Phone/Cellular: Weston Solutions 6134 (505-284-3309)  
 Sample Team Members: Tim Jackson Dept. 6132 Mail stop 1089  
505-284-2478  
Tim Jackson Mail stop 1087  
505-284-2547  
 Special Instructions/QC Requirements:  EDD  Yes  No  Level C Package  Yes  No  
 \*Send report to: Mike Sanders  
Dept. 6132 Mail stop 1089  
505-284-2478  
Tim Jackson Mail stop 1087  
505-284-2547  
 \*Please list as separate report.

1. Relinquished by <u>Mike Sanders</u> Date <u>9/10/03</u> Time <u>0805</u>	4. Relinquished by <u>Mike Sanders</u> Date <u>9/10/03</u> Time <u>0805</u>
2. Relinquished by <u>Mike Sanders</u> Date <u>9/10/03</u> Time <u>1100</u>	5. Relinquished by <u>Mike Sanders</u> Date <u>9/10/03</u> Time <u>1100</u>
3. Relinquished by <u>Mike Sanders</u> Date <u>9/10/03</u> Time <u>1100</u>	6. Relinquished by <u>Mike Sanders</u> Date <u>9/10/03</u> Time <u>1100</u>

Abnormal Conditions on Receipt Lab Use





RECORDS CENTER CODE: \_\_\_\_\_

**SMO ANALYTICAL DATA ROUTING FORM**

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

ARCOC	LAB	LAB ID	PRELIM DATE	FINAL DATE	EDD			
					EDD	ON Q	Cust CD	RC CD
606762	STCA	E31150189		9/24/2003	X	X		

DATA PACKAGE TAT:	<input checked="" type="checkbox"/> RUSH	<input checked="" type="checkbox"/> NORMAL
CORRECTIONS REQUESTED BY/DATE:		
PROBLEM #/DATE CORRECTION RECEIVED:		
CVR COMPLETED BY/DATE:	L. Herrera	09-25-03
FINAL TRANSMITTED TO/DATE:	M. Sanders	09-25-03
SENT TO VALIDATION BY/DATE:	J. Conn	09/25/03
REVISIONS REQUESTED/REVISIONS RECEIVED (DATE):		
VALIDATION COMPLETED BY/DATE:	K. P.	9/29/03
COPY TO WM BY/DATE:		
CD REQUESTED BY/DATE	J. Conn	09/25/03
CD RECEIVED BY/DATE		
TO ERDMS OR RECORDS CENTER BY/DATE:		

COMMENTS:  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**ANNEX D**  
**DSS Site 1004**  
**Risk Assessment**

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## **DSS SITE 1004: RISK ASSESSMENT REPORT**

### **I. Site Description and History**

Drain and Septic Systems (DSS) Site 1004, the Building 6969 Septic System, at Sandia National Laboratories/New Mexico (SNL/NM), is part of the Robotic Vehicle Range facility in a remote area approximately 3,200 feet east of Technical Area (TA)-II. DSS Site 1004 is located on federally owned land controlled by Kirtland Air Force Base (KAFB) and permitted to the U.S. Department of Energy (DOE). The septic system consists of a 2,000-gallon septic tank connected to a distribution box and a drainfield consisting of three 65-foot-long drain lines. Available information indicates that Building 6969 was constructed in 1988 (SNL/NM March 2003), and it is assumed that the septic system was also constructed at that time. A site inspection in September 1999 confirmed that the septic system continues to receive discharges from Building 6969.

Environmental concern about DSS Site 1004 is based upon the potential for the release of constituents of concern (COCs) in effluent discharged to the environment via the septic system at this site. Because operational records were not available, the investigation was planned to be consistent with other DSS site investigations and to sample for possible COCs that may have been released during facility operations.

The ground surface in the vicinity of the site is flat or slopes slightly to the west. The closest major drainage is the Tijeras Arroyo, located approximately 2,200 feet west of the site. 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 slightly to the west. Infiltration of precipitation is almost nonexistent as virtually all of the moisture subsequently undergoes evapotranspiration. The estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL/NM March 1996). Most of the area immediately surrounding DSS Site 1004 is unpaved with some native vegetation, and no storm sewers are used to direct surface water away from the site.

DSS Site 1004 lies at an average elevation of approximately 5,473 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 555 feet below ground surface (bgs). Groundwater flow is thought to be to the northwest in this area (SNL/NM May 2003). The nearest groundwater monitoring well is KAFB-0315, approximately 1,000 feet south of the site. The nearest production wells are west and northwest of the site and include KAFB-11 and KAFB-1, which are approximately 200 feet and 2.1 miles away, respectively.

### **II. Data Quality Objectives**

The Data Quality Objectives (DQOs) presented in the "Sampling and Analysis Plan [SAP] for Characterizing and Assessing Potential Releases to the Environment From Septic and Other Miscellaneous Drain Systems at Sandia National Laboratories/New Mexico" (SNL/NM October 1999) and "Field Implementation Plan [FIP], Characterization of Non-Environmental Restoration



Drain and Septic Systems” (SNL/NM November 2001) identified the site-specific sample locations, sample depths, sampling procedures, and analytical requirements for this and many other DSS sites. The DQOs outlined the quality assurance (QA)/quality control (QC) requirements necessary for producing defensible analytical data suitable for risk assessment purposes. The sampling conducted at this site was designed to:

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

Table 1 summarizes the rationale for determining the sampling locations at this site. The source of potential COCs at DSS Site 1004 is effluent discharged to the environment from the drainfield at this site.

**Table 1  
Summary of Sampling Performed to Meet DQOs**

<b>DSS Site 1004 Sampling Area</b>	<b>Potential COC Source</b>	<b>Number of Sampling Locations</b>	<b>Sample Density (samples/acre)</b>	<b>Sampling Location Rationale</b>
Soil beneath the septic system drainfield	Effluent discharged to the environment from the drainfield	3	NA	Evaluate potential COC releases to the environment from effluent discharged from the drainfield

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

Using a Geoprobe™, the soil samples were collected from two 3- or 4-foot-long sampling intervals at three borehole locations at DSS Site 1004. Drainfield sampling intervals started at 8 and 13 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 SNL/NM 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 1004**

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 <sup>a</sup>	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

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

**Table 3**  
**Summary of Data Quality Requirements for DSS Site 1004**

<b>Analytical Method<sup>a</sup></b>	<b>Data Quality Level</b>	<b>GEL</b>	<b>RPSD</b>
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.

<sup>a</sup>EPA November 1986.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

GEL = General Engineering Laboratories, Inc.

HE = High explosive(s).

PCB = Polychlorinated biphenyl.

QA/QC = Quality assurance/quality control.

RCRA = Resource Conservation and Recovery Act.

RPSD = Radiation Protection Sample Diagnostics Laboratory.

SVOC = Semivolatile organic compound.

VOC = Volatile organic compound.

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 samples.

All of the soil sample results were verified/validated by SNL/NM according to "Verification and Validation of Chemical and Radiochemical Data," Technical Operating Procedure (TOP) 94-03, Rev. 0 (SNL/NM July 1994) or SNL/NM ER Project "Data Validation Procedure for Chemical and Radiochemical Data," Administrative Operating Procedure (AOP) 00-03 (SNL/NM December 1999). The data validation reports are presented in the associated DSS Site 1004 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 1004 is based upon an initial conceptual site model validated with confirmatory sampling at the site. The initial conceptual model was developed from archival site research, site inspections, soil sampling, passive soil-vapor sampling, and active soil-vapor sampling. The DQOs contained in the SAP (SNL/NM October 1999) and FIP (SNL/NM November 2001) identified the sample locations, sample density, sample depth, and analytical requirements. The sample data were subsequently used to develop the final conceptual site model for DSS Site 1004, 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 1004 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 1004.

#### **III.3 Rate of Contaminant Migration**

The septic system at DSS Site 1004 continues to remain active and receive discharges from Building 6969. The migration rate of COCs that may have been introduced into the subsurface via the septic system at this site is therefore dependent upon the volume of aqueous effluent discharged to the environment 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 1004 up to the date of sampling in September 2002.

#### **III.4 Extent of Contamination**

Subsurface soil samples were collected from boreholes drilled at three locations beneath the effluent release points (drainfield drain lines) at the site to assess whether releases of effluent from the septic system caused any environmental contamination.

The soil samples were collected at sampling depths starting at 8 and 13 feet bgs in the drainfield area. Sampling intervals started at the depths at which effluent discharged from the drainfield drain lines may enter 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 1004 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 1004. All samples were collected from depths of 5 feet bgs or greater; therefore, evaluation of ecological risk was not performed. Both tables show the associated SNL/NM maximum background concentration values (Dinwiddie September 1997). Section VI.4 discusses the results presented in Tables 4 and 5.

#### **V. Fate and Transport**

The primary releases of COCs at DSS Site 1004 were to the subsurface soil resulting from the discharge of effluents from the Building 6969 septic system. Wind, water, and biota are natural mechanisms of COC transport from the primary release point; however, because the discharge was to subsurface soil, none of these mechanisms are considered to be of potential significance as transport mechanisms at this site. Infiltration of precipitation is essentially nonexistent at DSS Site 1004, as virtually all of the moisture either drains away from the site or evaporates. Because groundwater at this site is approximately 548 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 1004 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

Table 4  
Nonradiological COCs for Human Health Risk Assessment at DSS Site 1004 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) <sup>a</sup>	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? <sup>b</sup> (BCF>40, Log $K_{ow}$ >4)
<b>Inorganic</b>						
Arsenic	3.83	4.4	Yes	44 <sup>c</sup>	-	Yes
Barium	240	200	No	170 <sup>d</sup>	-	Yes
Cadmium	0.267 J	0.9	Yes	64 <sup>c</sup>	-	Yes
Chromium, total	13.8	16.2	Yes	16 <sup>c</sup>	-	No
Chromium VI	0.0549 J	NC	Unknown	16 <sup>c</sup>	-	No
Cyanide	4.07	NC	Unknown	NC	-	Unknown
Lead	8.43	11.2	Yes	49 <sup>c</sup>	-	Yes
Mercury	0.009	<0.1	Yes	5,500 <sup>c</sup>	-	Yes
Selenium	0.511 J	<1	Yes	800 <sup>e</sup>	-	Yes
Silver	0.0426 <sup>f</sup>	<1	Yes	0.5 <sup>c</sup>	-	No
<b>Organic</b>						
Acetone	0.0034 J	NA	NA	0.699	0.249	No
Benzo(a)pyrene	0.0497	NA	NA	3,000 <sup>c</sup>	6.04 <sup>c</sup>	Yes
Benzo(b)fluoranthene	0.0775	NA	NA	14,500 <sup>h</sup>	6.124 <sup>h</sup>	Yes
Benzo(g,h,i)perylene	0.0443	NA	NA	58,884 <sup>h</sup>	6.58 <sup>h</sup>	Yes
2-Butanone	0.0159	NA	NA	1 <sup>g</sup>	0.299	No
Chrysene	0.064	NA	NA	18,000 <sup>h</sup>	5.91 <sup>h</sup>	Yes
Fluoranthene	0.0673	NA	NA	12,302 <sup>h</sup>	4.90 <sup>h</sup>	Yes
Indeno(1,2,3-cd)pyrene	0.0338	NA	NA	59,407 <sup>h</sup>	6.58 <sup>h</sup>	Yes
Phenanthrene	0.0268 J	NA	NA	23,800 <sup>c</sup>	4.63 <sup>c</sup>	Yes
Pyrene	0.0722	NA	NA	36,300 <sup>c</sup>	5.32 <sup>h</sup>	Yes
Toluene	0.0005 J	NA	NA	10.7 <sup>c</sup>	2.69 <sup>c</sup>	No

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

<sup>a</sup>Dinwiddie September 1997, Tijeras Supergroup.

<sup>b</sup>NMED March 1998.

**Table 4 (Concluded)**  
**Nonradiological COCs for Human Health Risk Assessment at DSS Site 1004 with Comparison to the Associated SNL/NM Background Screening Value, BCF, and Log  $K_{ow}$**

<sup>c</sup> Yanicak March 1997.
<sup>d</sup> Neumann 1976.
<sup>e</sup> Callahan et al. 1979.
<sup>f</sup> Parameter was not detected. Concentration is one-half the maximum detection limit.
<sup>g</sup> Howard 1990.
<sup>h</sup> Micromedex, 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 1004 with  
Comparison to the Associated SNL/NM Background Screening Value and BCF

COC	Maximum Activity (All Samples) (pCi/g) <sup>a</sup>	SNL/NM Background Activity (pCi/g) <sup>b</sup>	Is Maximum COC Activity Less Than or Equal to the Applicable SNL/NM Background Screening Value?	BCF (maximum aquatic)	Is COC a Bioaccumulator? <sup>c</sup> (BCF >40)
Cs-137	ND (0.0302)	0.084	Yes	3,000 <sup>d</sup>	Yes
Th-232	1	1.54	Yes	3,000 <sup>e</sup>	Yes
U-235	ND (0.235)	0.18	No	900 <sup>e</sup>	Yes
U-238	ND (0.798)	1.3	Yes	900 <sup>e</sup>	Yes

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

<sup>a</sup>Value listed is the greater of either the maximum detection or the highest MDA.

<sup>b</sup>Dinwiddie September 1997, Tijeras Supergroup.

<sup>c</sup>NMED March 1998.

<sup>d</sup>Whicker and Schultz 1982.

<sup>e</sup>Baker and Soldat 1992.

BCF = Bioconcentration factor.

COC = Constituent of concern.

DSS = Drain and Septic Systems.

MDA = Minimum detectable activity.

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

**ND ( )** = Not detected, but the MDA (shown in parentheses) exceeds background activity.

NMED = New Mexico Environment Department.

pCi/g = Picocurie(s) per gram.

SNL/NM = Sandia National Laboratories/New Mexico.



(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 1004 are limited to VOCs and SVOCs. Organic COCs may be degraded through photolysis, hydrolysis, and biotransformation. Photolysis requires light and therefore takes place in the air, at the ground surface, or in surface water. Hydrolysis includes chemical transformations in water and may occur in the soil solution. Biotransformation (i.e., transformation caused by plants, animals, and microorganisms) may occur; however, biological activity may be limited by the arid environment at this site. Because of the depth of the COCs in the soil, the loss of acetone, 2-butanone, and toluene through volatilization is expected to be minimal.

Table 6 summarizes the fate and transport processes that can occur at DSS Site 1004. 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 1004**

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 1004. 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 1004 has been designated with a future land-use scenario of industrial (DOE and USAF March 1996) (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 1004 is approximately 555 feet bgs. No intake routes through plant, meat, or milk ingestion are considered appropriate for either the industrial or residential land-use scenarios. Figure 1 shows the conceptual site model flow diagram for DSS Site 1004.

### Pathway Identification

Nonradiological Constituents	Radiological Constituents
Soil ingestion	Soil ingestion
Inhalation (dust and volatiles)	Inhalation (dust)
Dermal contact	Direct gamma

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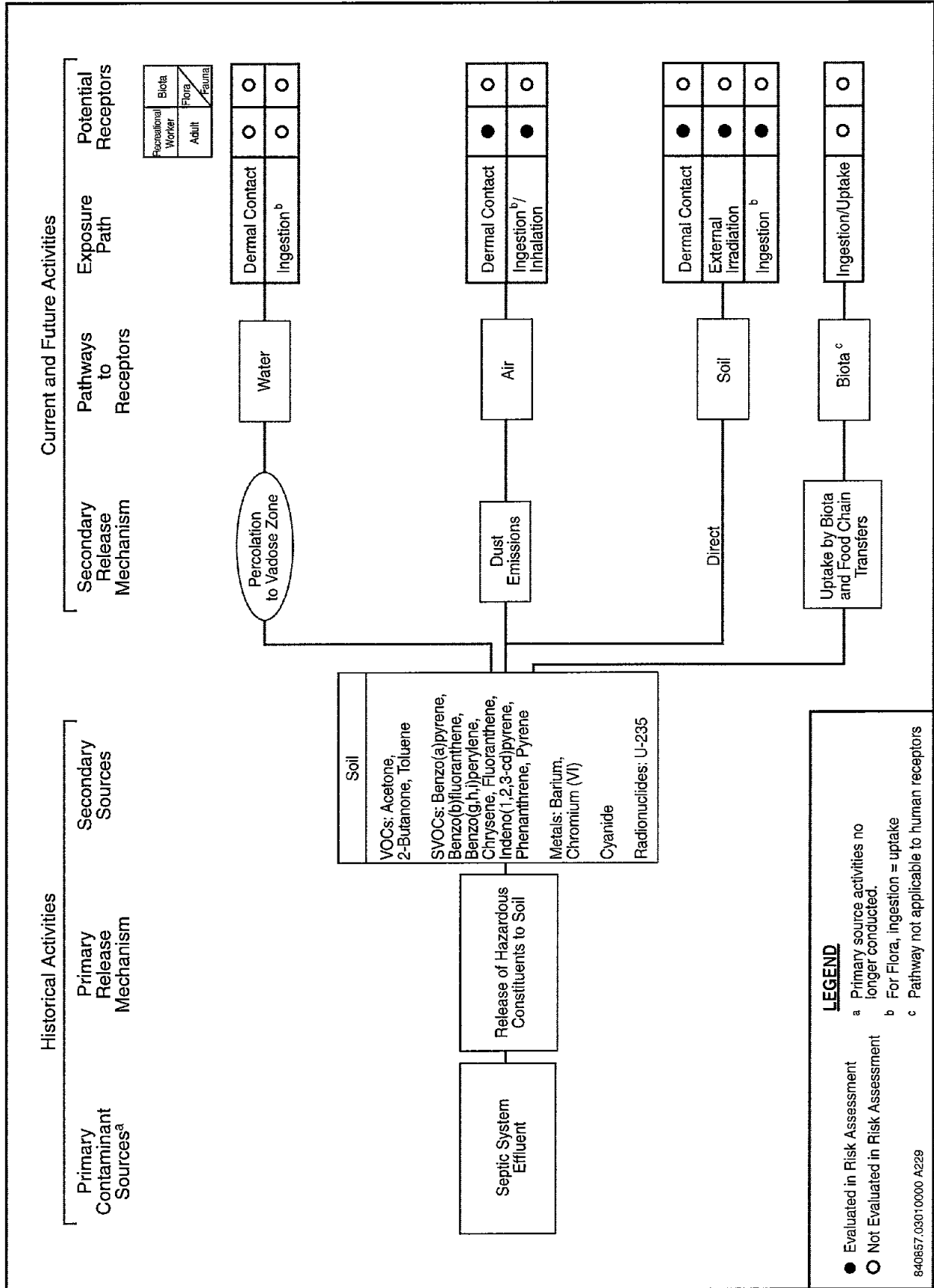


Figure 1  
 Conceptual Site Model Flow Diagram for DSS Site 1004, Building 6969 Septic System



#### 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 1004 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 was measured at a concentration greater than the background screening value. Two constituents do not have quantified background screening concentrations; therefore it is unknown whether these COCs exceed background. Eleven constituents are organic compounds that do not have corresponding background screening values.

For the radiological COCs, one constituent (U-235) was detected at an activity greater than its background screening level.

#### VI.5 Step 4. Identification of Toxicological Parameters

Tables 7 (nonradiological) and 8 (radiological) list the COCs retained in the risk assessment and the values for the available toxicological information. The toxicological values for the nonradiological COCs presented in Table 7 were obtained from the Integrated Risk Information System (IRIS) (EPA 2004a), the Health Effects Assessment Summary Tables (HEAST) (EPA 1997a), the Technical Background Document for Development of Soil Screening Levels (NMED February 2004), Risk Assessment Information System (ORNL 2003), and the EPA Region 6 electronic database (EPA 2004b). Dose conversion factors (DCF) used in determining the

Table 7  
Toxicological Parameter Values for DSS Site 1004 Nonradiological COCs

COC	RfD <sub>o</sub> (mg/kg-d)	Confidence <sup>a</sup>	RfD <sub>inh</sub> (mg/kg-d)	Confidence <sup>a</sup>	SF <sub>o</sub> (mg/kg-d) <sup>-1</sup>	SF <sub>inh</sub> (mg/kg-d) <sup>-1</sup>	Cancer Class <sup>b</sup>	ABS
<b>Inorganic</b>								
Barium	7E-2 <sup>c</sup>	M	1.4E-4 <sup>d</sup>	-	-	-	D	0.01 <sup>e</sup>
Chromium VI	3E-3 <sup>c</sup>	L	2.3E-6 <sup>c</sup>	L	-	4.2E+1 <sup>c</sup>	A	0.01 <sup>e</sup>
Cyanide	2E-2 <sup>c</sup>	M	-	-	-	-	D	0.1 <sup>e</sup>
<b>Organic</b>								
Acetone	1E-1 <sup>c</sup>	L	1E-1 <sup>f</sup>	-	-	-	D	0.01 <sup>g</sup>
Benzo(a)pyrene	-	-	-	-	7.3E+0 <sup>c</sup>	3.1E+0 <sup>f</sup>	B2	0.13 <sup>e</sup>
Benzo(b)fluoranthene	-	-	-	-	7.3E-1 <sup>f</sup>	3.1E-1 <sup>f</sup>	B2	0.13 <sup>e</sup>
Benzo(g,h,i)perylene <sup>h</sup>	-	-	-	-	7.3E+0 <sup>f</sup>	3.1E+0 <sup>f</sup>	B2	0.13 <sup>e</sup>
2-Butanone	6E-1 <sup>c</sup>	L	2.9E-1 <sup>c</sup>	L	-	-	D	0.1 <sup>e</sup>
Chrysene	-	-	-	-	7.3E-3 <sup>f</sup>	3.1E-3 <sup>f</sup>	B2	0.13 <sup>e</sup>
Fluoranthene	4E-2 <sup>c</sup>	L	4E-2 <sup>f</sup>	-	-	-	D	0.13 <sup>e</sup>
Indeno(1,2,3-cd)pyrene	-	-	-	-	7.3E-1 <sup>f</sup>	3.1E-1 <sup>f</sup>	B2	0.13 <sup>e</sup>
Phenanthrene <sup>i</sup>	3E-1 <sup>c</sup>	L	3E-1 <sup>f</sup>	L	-	-	D	0.1 <sup>e</sup>
Pyrene	3E-2 <sup>c</sup>	L	3E-2 <sup>f</sup>	-	-	-	D	0.1 <sup>e</sup>
Toluene	2E-1 <sup>c</sup>	M	1.1E-1 <sup>c</sup>	M	-	-	D	0.1 <sup>e</sup>

<sup>a</sup>Confidence associated with IRIS (EPA 2004a) database values. Confidence: L = low, M = medium.

<sup>b</sup>EPA weight-of-evidence classification system for carcinogenicity (EPA 1989) taken from IRIS (EPA 2004a):

A = Human carcinogen.

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

D = Not classifiable as to human carcinogenicity.

<sup>c</sup>Toxicological parameter values from IRIS electronic database (EPA 2004a).

<sup>d</sup>Toxicological parameter values from HEAST (EPA 1997a).

<sup>e</sup>Toxicological parameter values from NMED (February 2004).

<sup>f</sup>Toxicological parameter values from EPA Region 6 (EPA 2004b).

<sup>g</sup>Toxicological parameter values from Risk Assessment Information System (ORNL 2003).

<sup>h</sup>Toxicological parameter values for benzo(g,h,i)perylene could not be found. Dibenz[a,h]anthracene was used as a surrogate.

<sup>i</sup>Toxicological parameter values for phenanthrene could not be found. Anthracene was used as a surrogate.

ABS = Gastrointestinal absorption coefficient.

COC = Constituent of concern.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

**Table 7 (Concluded)  
Toxicological Parameter Values for DSS Site 1004 Nonradiological COCs**

HEAST	= Health Effects Assessment Summary Tables.
IRIS	= Integrated Risk Information System.
mg/kg-d	= Milligram(s) per kilogram-day.
(mg/kg-d) <sup>-1</sup>	= Per milligram per kilogram-day.
NMED	= New Mexico Environment Department.
RfD <sub>inh</sub>	= Inhalation chronic reference dose.
RfD <sub>o</sub>	= Oral chronic reference dose.
SF <sub>inh</sub>	= Inhalation slope factor.
SF <sub>o</sub>	= Oral slope factor.
-	= Information not available.



**Table 8**  
**Radiological Toxicological Parameter Values for DSS Site 1004 COCs**  
**Obtained from RESRAD Risk Coefficients<sup>a</sup>**

COC	SF <sub>o</sub> (1/pCi)	SF <sub>inh</sub> (1/pCi)	SF <sub>ev</sub> (g/pCi-yr)	Cancer Class <sup>b</sup>
U-235	4.70E-11	1.30E-08	2.70E-07	A

<sup>a</sup>Yu et al. 1993a.

<sup>b</sup>EPA weight-of-evidence classification system for carcinogenicity (EPA 1989): A = Human carcinogen for high dose and high dose rate (i.e., greater than 50 rem per year). For low-level environmental exposures, the carcinogenic effect has not been observed and documented.

1/pCi = One per picocurie.

COC = Constituent of concern.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

g/pCi-yr = Gram(s) per picocurie year.

SF<sub>ev</sub> = External volume exposure slope factor.

SF<sub>inh</sub> = Inhalation slope factor.

SF<sub>o</sub> = Oral (ingestion) slope factor.

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 (EPA 1989), the Technical Background Document for Development of Soil Screening Levels (NMED February 2004), as well as other EPA and NMED guidance documents, and reflect the reasonable maximum exposure (RME) approach advocated by the RAGS (EPA 1989). For the radiological COC, the coded equation provided in RESRAD computer code is used to estimate the incremental TEDE and cancer risk for individual exposure pathways. Further discussion of this process is provided in the "Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD" (Yu et al. 1993a).

Although the designated land-use scenario for this site is industrial, risk and TEDE values for a residential land-use scenario are also presented.

### VI.6.2 Risk Characterization

Table 9 shows an HI of 0.01 for the DSS Site 1004 nonradiological COCs and an estimated excess cancer risk of  $5E-7$  for the designated industrial land-use scenario. The numbers presented include exposure from soil ingestion, dermal contact, and dust and volatile inhalation for nonradiological COCs. Table 10 shows an HI of 0.00 and no estimated excess cancer risk for the DSS Site 1004 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  $7.9E-3$  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 1004 for the industrial land-use scenario is well below this guideline. The estimated incremental excess cancer risk is  $6.7E-8$ .

For the nonradiological COCs under the residential land-use scenario, the HI is 0.08 with an estimated excess cancer risk of  $2E-6$  (Table 9). The numbers in the table include exposure from soil ingestion, dermal contact, and dust and volatile inhalation. Although the EPA (1991) guidelines generally recommend that inhalation not be included in a residential land-use scenario, this pathway is included because of the potential for soil in Albuquerque, New Mexico, to be eroded and for dust to be present in predominantly residential areas. Because of the nature of the local soil, other exposure pathways are not considered (see Appendix 1). Table 10 shows an HI of 0.04 and no estimated incremental excess cancer risk for the DSS Site 1004 associated background constituents under the residential land-use scenario.

For the radiological COC, the incremental TEDE for the residential land-use scenario is  $2.0E-2$  mrem/yr. The guideline being used is an excess TEDE of 75 mrem/yr (SNL/NM

**Table 9**  
**Risk Assessment Values for DSS Site 1004 Nonradiological COCs**

COC	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario <sup>a</sup>		Residential Land-Use Scenario <sup>a</sup>	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
<b>Inorganic</b>					
Barium	240	0.00	–	0.05	–
Chromium VI	0.0549 J	0.00	1E-10	0.00	3E-10
Cyanide	4.07	0.00	–	0.00	–
<b>Organic</b>					
Acetone	0.0034 J	0.00	–	0.00	–
Benzo(a)pyrene	0.0497	0.00	2E-7	0.00	8E-7
Benzo(b)fluoranthene	0.0775	0.00	4E-8	0.00	1E-7
Benzo(g,h,i)perylene	0.0443	0.00	2E-7	0.00	7E-7
2-Butanone	0.0159	0.00	–	0.00	–
Chrysene	0.064	0.00	3E-10	0.00	1E-9
Fluoranthene	0.0673	0.00	–	0.00	–
Indeno(1,2,3-cd)pyrene	0.0338	0.00	2E-8	0.00	5E-8
Phenanthrene	0.0268 J	0.01	–	0.03	–
Pyrene	0.0722	0.00	–	0.00	–
Toluene	0.0005 J	0.00	–	0.00	–
<b>Total</b>		<b>0.01</b>	<b>5E-7</b>	<b>0.08</b>	<b>2E-6</b>

<sup>a</sup>EPA 1989.

COC = Constituent of concern.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

J = Estimated concentration.

mg/kg = Milligram(s) per kilogram.

– = Information not available.

**Table 10**  
**Risk Assessment Values for DSS Site 1004 Nonradiological Background Constituents**

COC	Background Concentration <sup>a</sup> (mg/kg)	Industrial Land-Use Scenario <sup>b</sup>		Residential Land-Use Scenario <sup>b</sup>	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Barium	200	0.00	–	0.04	–
Chromium VI	NC	–	–	–	–
Cyanide	NC	–	–	–	–
<b>Total</b>		<b>0.00</b>	<b>–</b>	<b>0.04</b>	<b>–</b>

<sup>a</sup>Dinwiddie September 1997, Tijeras Area Supergroup.

<sup>b</sup>EPA 1989.

COC = Constituent of concern.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

mg/kg = Milligram(s) per kilogram.

NC = Not calculated.

– = Information not available.

February 1998) for a complete loss of institutional controls (residential land use in this case); the calculated dose value for DSS Site 1004 for the residential land-use scenario is well below this guideline. Consequently, DSS Site 1004 is eligible for unrestricted radiological release as the residential land-use scenario resulted in an incremental TEDE of less than 75 mrem/yr to the on-site receptor. The estimated incremental excess cancer risk is  $2.0E-7$ . 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 0.01 (less than the numerical guideline of 1 suggested in the RAGS [EPA 1989]). The estimated excess cancer risk is  $5E-7$ . 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 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 0.01 and the estimated incremental excess cancer risk is  $4.99E-7$  for the industrial land-use scenario. These incremental risk calculations indicate insignificant risk to human health from nonradiological COCs under an industrial land-use scenario.

For the radiological COC under the industrial land-use scenario, the incremental TEDE is  $7.9E-3$  mrem/yr, which is significantly lower than EPA's numerical guideline of 15 mrem/yr. The estimated incremental excess cancer risk is  $6.7E-8$ .

The calculated HI for the nonradiological COCs under the residential land-use scenario is 0.08, which is below numerical guidance. The estimated excess cancer risk is  $2E-6$ . NMED guidance states that cumulative excess lifetime cancer risk must be less than  $1E-5$  (Bearzi January 2001); thus the excess cancer risk for this site is below the suggested acceptable risk value. The incremental HI is 0.04 and the estimated incremental excess cancer risk is  $1.70E-6$  for the residential land-use scenario. These incremental risk calculations indicate insignificant risk to human health from nonradiological COCs under the residential land-use scenario.

The incremental TEDE for a residential land-use scenario from the radiological component is  $2.0E-2$  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  $2.0E-7$ .

## VI.8 Step 7. Uncertainty Discussion

The determination of the nature, rate, and extent of contamination at DSS Site 1004 is based upon an initial conceptual model that was validated with sampling conducted at the site. The sampling was implemented in accordance with the SAP (SNL/NM October 1999) and FIP (SNL/NM November 2001). The DQOs contained in these two documents are appropriate for use in risk assessments. The data from soil samples collected at effluent release points are representative of potential COC releases to the site. The analytical requirements and results satisfy the DQOs, and data quality was verified/validated in accordance with SNL/NM procedures. Therefore, there is no uncertainty associated with the data quality used to perform the risk assessment at DSS Site 1004.

Because of the location, history of the site, and future land use (DOE and USAF March 1996), there is low uncertainty in the land-use scenario and the potentially affected populations that were considered in performing the risk assessment analysis. Based upon the COCs found in the near-surface soil and the location and physical characteristics of the site, there is little uncertainty in the exposure pathways relevant to the analysis.

An RME approach is used to calculate the risk assessment values. Specifically, the parameter values in the calculations are conservative and calculated intakes are probably overestimated. Maximum measured values of COC concentrations are used to provide conservative results.

Table 7 shows the uncertainties (confidence levels) in nonradiological toxicological parameter values. There is a combination of estimated values and values from the IRIS (EPA 2004a), HEAST (EPA 1997a), EPA Region 6 (EPA 2004b), Technical Background Document for Development of Soil Screening Levels (NMED February 2004), and Risk Assessment Information System (ORNL 2003). Where values are not provided, information is not available from the HEAST (EPA 1997a), IRIS (EPA 2004a), Technical Background Document for Development of Soil Screening Levels (NMED February 2004), Risk Assessment Information System (ORNL 2003), or EPA regions (EPA 2004b, EPA 2002a, EPA 2002b). Because of the conservative nature of the RME approach, uncertainties in toxicological values are not expected to change the conclusion from the risk assessment analysis.

Risk assessment values for the nonradiological COCs are within the acceptable range for human health under the industrial and residential land-use scenario compared to established numerical guidance.

For the radiological COC, the conclusion of the risk assessment is that potential effects on human health for both the industrial and residential land-use scenarios are below background and represent only a small fraction of the estimated 360 mrem/yr received by the average U.S. population (NCRP 1987).

The overall uncertainty in all of the steps in the risk assessment process is not considered to be significant with respect to the conclusion reached.

## VI.9 Summary

DSS Site 1004 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 (0.01) is significantly lower than the accepted numerical guidance from the EPA. The estimated excess cancer risk is 5E-7; 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 0.01 and the estimated incremental excess cancer risk is 4.99E-7 for the industrial land-use scenario. The incremental risk calculations indicate insignificant risk to human health for the industrial land-use scenario.

Using conservative assumptions and an RME approach to risk assessment, calculations for the nonradiological COCs show that for the residential land-use scenario the HI (0.08) is below the accepted numerical guidance from the EPA. The estimated excess cancer risk is 2E-6. Thus, excess cancer risk is below the acceptable risk value provided by the NMED for a residential land-use scenario (Bearzi January 2001). The incremental HI is 0.04 and the estimated incremental excess cancer risk is 1.70E-6 for the residential land-use scenario. The incremental risk calculations indicate insignificant risk to human health for the residential land-use scenario.

The incremental TEDE and corresponding estimated cancer risk from the radiological COC are much less than EPA guidance values. The estimated TEDE is 7.9E-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 estimated incremental excess cancer risk value is 6.7E-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 2.0E-2 mrem/yr with an associated estimated incremental excess cancer risk of 2.0E-7. The guideline for this scenario is 75 mrem/yr (SNL/NM February 1998). Therefore, DSS Site 1004 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 Incremental Nonradiological and Radiological Risks from  
DSS Site 1004, Building 6969 Septic System Carcinogens**

Scenario	Nonradiological Risk	Radiological Risk	Total Risk
Industrial	4.99E-7	6.7E-8	5.7E-7
Residential	1.70E-6	2.0E-7	1.9E-6

DSS = Drain and Septic Systems.

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

## **VII. Ecological Risk Assessment**

### **VII.1 Introduction**

This section addresses the ecological risks associated with exposure to constituents of potential ecological concern (COPECs) in the soil at DSS Site 1004. A component of the NMED Risk-Based Decision Tree (NMED March 1998) is to conduct an ecological risk assessment that corresponds with that presented in EPA's Ecological RAGS (EPA 1997c). The current methodology is tiered and contains an initial scoping assessment followed by a more detailed risk assessment if warranted by the results of the scoping assessment. Initial components of NMED's decision tree (a discussion of DQOs, data assessment, and evaluations of bioaccumulation as well as fate and transport potential) are addressed in previous sections of this report. At the end of the scoping assessment, a determination is made as to whether a more detailed examination of potential ecological risk is necessary.

### **VII.2 Scoping Assessment**

The scoping assessment focuses primarily on the likelihood of exposure of biota at, or adjacent to, the site to constituents associated with site activities. Included in this section are an evaluation of existing data with respect to the existence of complete ecological exposure pathways, an evaluation of bioaccumulation potential, and a summary of fate and transport potential. A scoping risk-management decision (Section VII.2.4) summarizes the scoping results and assesses the need for further examination of potential ecological impacts.

#### **VII.2.1 Data Assessment**

As indicated in Section IV, all COCs at DSS Site 1004 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**

<b>Industrial</b>	<b>Recreational</b>	<b>Residential</b>
Ingestion of contaminated drinking water	Ingestion of contaminated drinking water	Ingestion of contaminated drinking water
Ingestion of contaminated soil	Ingestion of contaminated soil	Ingestion of contaminated soil
Inhalation of airborne compounds (vapor phase or particulate)	Inhalation of airborne compounds (vapor phase or particulate)	Inhalation of airborne compounds (vapor phase or particulate)
Dermal contact (nonradiological constituents only) soil only	Dermal contact (nonradiological constituents only) soil only	Dermal contact (nonradiological constituents only) soil only
External exposure to penetrating radiation from ground surfaces	External exposure to penetrating radiation from ground surfaces	External exposure to penetrating radiation from ground surfaces

#### Equations and Default Parameter Values for Identified Exposure Routes

In general, SNL/NM expects that ingestion of compounds in drinking water and soil will be the more significant exposure routes for chemicals; external exposure to radiation may also be significant for radionuclides. All of the above routes will, however, be considered for their appropriate land-use scenarios. The general equation for calculating potential intakes via these routes is shown below. The equations are taken from "Assessing Human Health Risks Posed by Chemicals: Screening-Level Risk Assessment" (NMED March 2000) and "Technical Background Document for Development of Soil Screening Levels" (NMED December 2000). Equations from both documents are based upon the "Risk Assessment Guidance for Superfund" (RAGS): Volume 1 (EPA 1989, 1991). These general equations also apply to calculating potential intakes for radionuclides. A more in-depth discussion of the equations used in performing radiological pathway analyses with the RESRAD code may be found in the RESRAD Manual (ANL 1993). RESRAD is the only code designated by the U.S. Department of Energy (DOE) in DOE Order 5400.5 for the evaluation of radioactively contaminated sites (DOE 1993). The Nuclear Regulatory Commission (NRC) has approved the use of RESRAD for dose evaluation by licensees involved in decommissioning, NRC staff evaluation of waste disposal requests, and dose evaluation of sites being reviewed by NRC staff. EPA Science Advisory Board reviewed the RESRAD model. EPA used RESRAD in their rulemaking on radiation site cleanup regulations. RESRAD code has been verified, undergone several benchmarking analyses, and been included in the International Atomic Energy Agency's VAMP and BIOMOVs II projects to compare environmental transport models.

Also shown are the default values SNL/NM ER will use in RME risk assessment calculations for industrial, recreational, and residential land-use scenarios, based upon EPA and other governmental agency guidance. The pathways and values for chemical contaminants are discussed first, followed by those for radionuclide contaminants. RESRAD input parameters that are left as the default values provided with the code are not discussed. Further information relating to these parameters may be found in the RESRAD Manual (ANL 1993) or by directly accessing the RESRAD websites at: <http://web.ead.anl.gov/resrad/home2/> or <http://web.ead.anl.gov/resrad/documents/>.

### Generic Equation for Calculation of Risk Parameter Values

The equation used to calculate the risk parameter values (i.e., hazard quotients/HI, excess cancer risk, or radiation total effective dose equivalent [TEDE] [dose]) is similar for all exposure pathways and is given by:

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

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 [m<sup>3</sup>]/day)
- EF = Exposure frequency (days/year)
- ED = Exposure duration (years)
- VF = soil-to-air volatilization factor (m<sup>3</sup>/kg)
- PEF = particulate emission factor (m<sup>3</sup>/kg)
- BW = Body weight (kg)
- AT = Averaging time (period over which exposure is averaged) (days)

### Soil Dermal Contact

$$D_a = \frac{C_s * CF * SA * AF * ABS * EF * ED}{BW * AT}$$

where:

- $D_a$  = Absorbed dose (mg/kg-day)
- $C_s$  = Chemical concentration in soil (mg/kg)
- CF = Conversion factor (1E-6 kg/mg)
- SA = Skin surface area available for contact (cm<sup>2</sup>/event)
- AF = Soil to skin adherence factor (mg/cm<sup>2</sup>)
- ABS = Absorption factor (unitless)
- EF = Exposure frequency (events/year)



ED = Exposure duration (years)  
 BW = Body weight (kg)  
 AT = Averaging time (period over which exposure is averaged) (days)

### Groundwater Ingestion

A receptor can ingest water by drinking it or through using household water for cooking. An estimate of intake from ingesting water will be calculated as follows (EPA August 1997):

$$I_w = \frac{C_w * IR * EF * ED}{BW * AT}$$

where:

$I_w$  = Intake of contaminant from water ingestion (mg/kg/day)  
 $C_w$  = Chemical concentration in water (mg/liter [L])  
 IR = Ingestion rate (L/day)  
 EF = Exposure frequency (days/year)  
 ED = Exposure duration (years)  
 BW = Body weight (kg)  
 AT = Averaging time (period over which exposure is averaged) (days)

### Groundwater Inhalation

The amount of a constituent taken into the body via exposure to volatilization from showering or other household water uses will be evaluated using the concentration of the constituent in the water source (EPA 1991 and 1992). An estimate of intake from volatile inhalation from groundwater will be calculated as follows (EPA 1991):

$$I_w = \frac{C_w * K * IR_i * EF * ED}{BW * AT}$$

where:

$I_w$  = Intake of volatile in water from inhalation (mg/kg/day)  
 $C_w$  = Chemical concentration in water (mg/L)  
 K = volatilization factor (0.5 L/m<sup>3</sup>)  
 $IR_i$  = Inhalation rate (m<sup>3</sup>/day)  
 EF = Exposure frequency (days/year)  
 ED = Exposure duration (years)  
 BW = Body weight (kg)  
 AT = Averaging time (period over which exposure is averaged—days)

For volatile compounds, volatilization from groundwater can be an important exposure pathway from showering and other household uses of groundwater. This exposure pathway will only be evaluated for organic chemicals with a Henry's Law constant greater than 1x10<sup>-5</sup> 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
<b>General Exposure Parameters</b>			
Exposure Frequency (day/yr)	250 <sup>a,b</sup>	8.7 (4 hr/wk for 52 wk/yr) <sup>a,b</sup>	350 <sup>a,b</sup>
Exposure Duration (yr)	25 <sup>a,b,c</sup>	30 <sup>a,b,c</sup>	30 <sup>a,b,c</sup>
Body Weight (kg)	70 <sup>a,b,c</sup>	70 Adult <sup>a,b,c</sup> 15 Child <sup>a,b,c</sup>	70 Adult <sup>a,b,c</sup> 15 Child <sup>a,b,c</sup>
Averaging Time (days) for Carcinogenic Compounds (= 70 yr x 365 day/yr)	25,550 <sup>a,b</sup>	25,550 <sup>a,b</sup>	25,550 <sup>a,b</sup>
for Noncarcinogenic Compounds (= ED x 365 day/yr)	9,125 <sup>a,b</sup>	10,950 <sup>a,b</sup>	10,950 <sup>a,b</sup>
<b>Soil Ingestion Pathway</b>			
Ingestion Rate (mg/day)	100 <sup>a,b</sup>	200 Child <sup>a,b</sup> 100 Adult <sup>a,b</sup>	200 Child <sup>a,b</sup> 100 Adult <sup>a,b</sup>
<b>Inhalation Pathway</b>			
Inhalation Rate (m <sup>3</sup> /day)	20 <sup>a,b</sup>	15 Child <sup>a</sup> 30 Adult <sup>a</sup>	10 Child <sup>a</sup> 20 Adult <sup>a</sup>
Volatilization Factor (m <sup>3</sup> /kg)	Chemical Specific	Chemical Specific	Chemical Specific
Particulate Emission Factor (m <sup>3</sup> /kg)	1.36E9 <sup>a</sup>	1.36E9 <sup>a</sup>	1.36E9 <sup>a</sup>
<b>Water Ingestion Pathway</b>			
Ingestion Rate (liter/day)	2.4 <sup>a</sup>	2.4 <sup>a</sup>	2.4 <sup>a</sup>
<b>Dermal Pathway</b>			
Skin Adherence Factor (mg/cm <sup>2</sup> )	0.2 <sup>a</sup>	0.2 Child <sup>a</sup> 0.07 Adult <sup>a</sup>	0.2 Child <sup>a</sup> 0.07 Adult <sup>a</sup>
Exposed Surface Area for Soil/Dust (cm <sup>2</sup> /day)	3,300 <sup>a</sup>	2,800 Child <sup>a</sup> 5,700 Adult <sup>a</sup>	2,800 Child <sup>a</sup> 5,700 Adult <sup>a</sup>
Skin Adsorption Factor	Chemical Specific	Chemical Specific	Chemical Specific

<sup>a</sup>Technical Background Document for Development of Soil Screening Levels (NMED December 2000).

<sup>b</sup>Risk Assessment Guidance for Superfund, Vol. 1, Part B (EPA 1991).

<sup>c</sup>Exposure Factors Handbook (EPA August 1997).

ED = Exposure duration.

EPA = U.S. Environmental Protection Agency.

hr = Hour(s).

kg = Kilogram(s).

m = Meter(s).

mg = Milligram(s).

NA = Not available.

wk = Week(s).

yr = Year(s).

**Table 3**  
**Default Radiological Exposure Parameter Values for Various Land-Use Scenarios**

Parameter	Industrial	Recreational	Residential
<b>General Exposure Parameters</b>			
Exposure Frequency	8 hr/day for 250 day/yr	4 hr/wk for 52 wk/yr	365 day/yr
Exposure Duration (yr)	25 <sup>a,b</sup>	30 <sup>a,b</sup>	30 <sup>a,b</sup>
Body Weight (kg)	70 Adult <sup>a,b</sup>	70 Adult <sup>a,b</sup>	70 Adult <sup>a,b</sup>
<b>Soil Ingestion Pathway</b>			
Ingestion Rate	100 mg/day <sup>c</sup>	100 mg/day <sup>c</sup>	100 mg/day <sup>c</sup>
Averaging Time (days) (= 30 yr x 365 day/yr)	10,950 <sup>d</sup>	10,950 <sup>d</sup>	10,950 <sup>d</sup>
<b>Inhalation Pathway</b>			
Inhalation Rate (m <sup>3</sup> /yr)	7,300 <sup>d,e</sup>	10,950 <sup>e</sup>	7,300 <sup>d,e</sup>
Mass Loading for Inhalation g/m <sup>3</sup>	1.36 E-5 <sup>d</sup>	1.36 E-5 <sup>d</sup>	1.36 E-5 <sup>d</sup>
<b>Food Ingestion Pathway</b>			
Ingestion Rate, Leafy Vegetables (kg/yr)	NA	NA	16.5 <sup>c</sup>
Ingestion Rate, Fruits, Non-Leafy Vegetables & Grain (kg/yr)	NA	NA	101.8 <sup>b</sup>
Fraction Ingested	NA	NA	0.25 <sup>b,d</sup>

<sup>a</sup>Risk Assessment Guidance for Superfund, Vol. 1, Part B (EPA 1991).

<sup>b</sup>Exposure Factors Handbook (EPA August 1997).

<sup>c</sup>EPA Region VI guidance (EPA 1996).

<sup>d</sup>For radionuclides, RESRAD (ANL 1993).

<sup>e</sup>SNL/NM (February 1998).

EPA = U.S. Environmental Protection Agency.

g = Gram(s)

hr = Hour(s).

kg = Kilogram(s).

m = Meter(s).

mg = Milligram(s).

NA = Not applicable.

wk = Week(s).

yr = Year(s).

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RSI



National Nuclear Security Administration

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MAR 22 2005

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

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

Dear Mr. Bearzi,

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

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

Sincerely,

Patty Wagner  
Manager

Enclosure

cc w/enclosure:

W. Moats, NMED-HWB (via Certified Mail)  
L. King, EPA, Region 6 (Via Certified Mail)  
M. Gardipe, NNSA/SC/ERD  
D. Pepe, NMED-OB  
J. Volkerding, DOE-NMED-OB



Mr. J. Bearzi

(2)

MAR 22 2005

cc w/o enclosure:

F. Nimick, SNL, MS 1089  
R. E. Fate, SNL, MS 1089  
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A. Blumberg, SNL, MS 0141

**Sandia National Laboratories**  
**Albuquerque, New Mexico**  
**March 2005**

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

**INTRODUCTION**

This document responds to a January 26, 2005 Request for Supplemental Information (RSI) letter from William P. Moats of the State of New Mexico Environment Department (NMED) Hazardous Waste Bureau (HWB) to the U.S Department of Energy and Sandia National Laboratories/New Mexico (SNL/NM). A response to this RSI is due within sixty (60) days of receipt of the letter by SNL/NM, or by March 26, 2005.

In this document, the NMED comments (in bold font) are restated in the same order in which they were provided in the RSI. Following each comment, the word "Response" introduces the U.S. Department of Energy/SNL/NM reply (in normal font style).

**GENERAL COMMENTS**

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

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

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

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

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

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

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

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

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

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

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

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

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

**SPECIFIC COMMENTS****5. Site 1087: Building 6743 Seepage Pit:**

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

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

**6. Site 1090: Building 6721 Septic System:**

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

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

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

**7. Site 1052: Building 803 Seepage Pit:**

Provide the dates when the drainline was disconnected, the seepage pit was abandoned in place, and the discharges were routed to the City of Albuquerque sanitary sewer system.

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

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

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

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

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

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

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

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

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

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

Response:

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

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

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

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





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,

Patty Wagner  
Manager

Enclosure

Mr. J. Bearzi

(2)

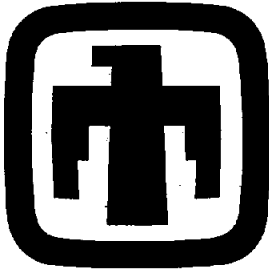
APR 7 2005

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  
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Sandia National Laboratories

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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

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**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

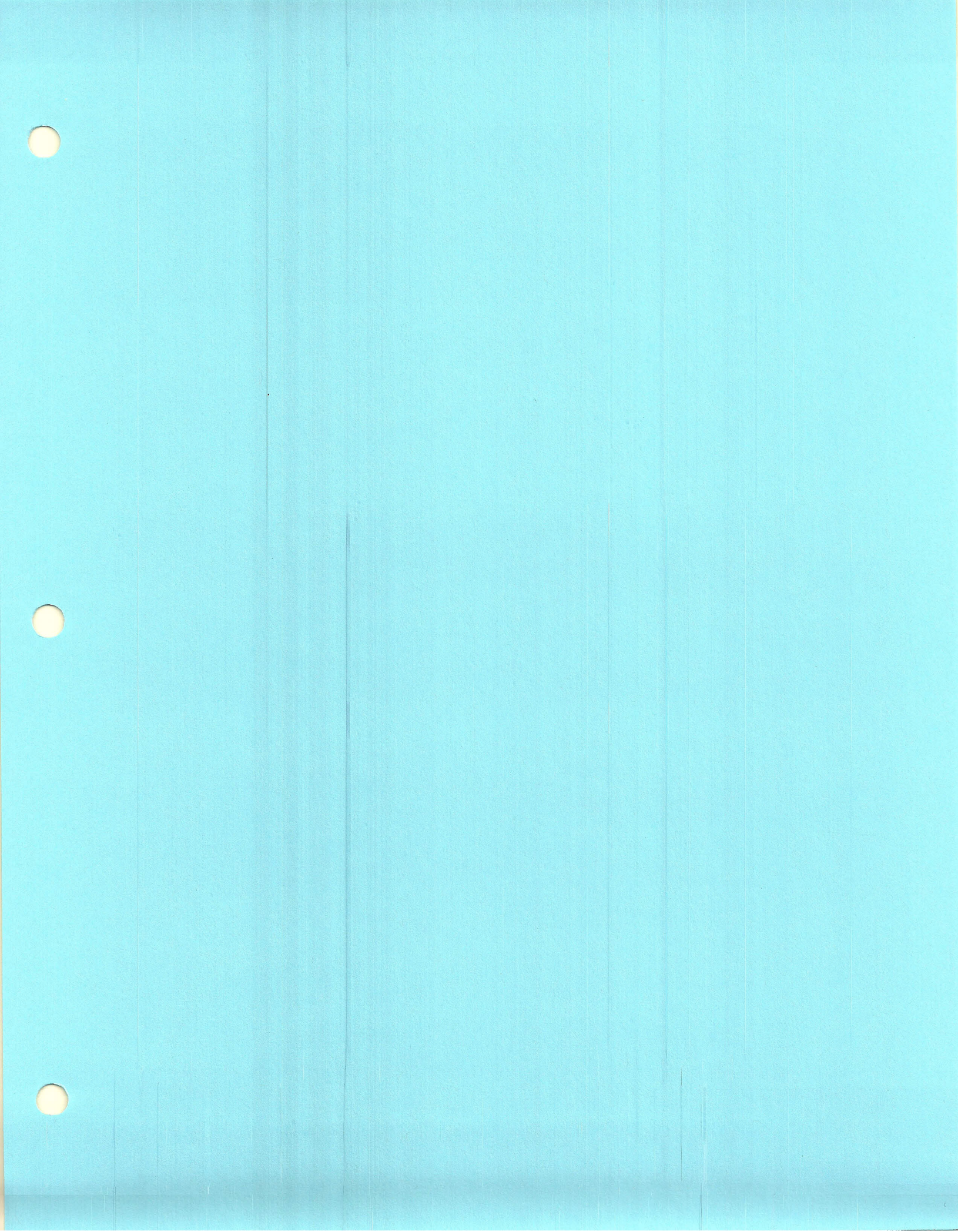
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1003	F. Bldg. 915/922 SS	Volume 5	605729	915-922/1003-SP2-BH1-31-S	059915-002	24-SEP-02	SOIL	GROSS-AB	GEL	205013
1003	F. Bldg. 915/922 SS	Volume 5	605729	915-922/1003-SP1-BH1-27-S	059912-002	24-SEP-02	SOIL	TOTAL-CN	GEL	205123
1003	F. Bldg. 915/922 SS	Volume 5	605729	915-922/1003-SP1-BH1-33-S	059913-002	24-SEP-02	SOIL	TOTAL-CN	GEL	205123
1003	F. Bldg. 915/922 SS	Volume 5	605729	915-922/1003-SP2-BH1-26-S	059914-002	24-SEP-02	SOIL	TOTAL-CN	GEL	205123
1003	F. Bldg. 915/922 SS	Volume 5	605729	915-922/1003-SP1-BH1-27-S	059912-002	24-SEP-02	SOIL	Cr+6	GEL	205620
1003	F. Bldg. 915/922 SS	Volume 5	605729	915-922/1003-SP1-BH1-33-S	059913-002	24-SEP-02	SOIL	Cr+6	GEL	205620
1003	F. Bldg. 915/922 SS	Volume 5	605729	915-922/1003-SP2-BH1-26-S	059914-002	24-SEP-02	SOIL	Cr+6	GEL	205620
1003	F. Bldg. 915/922 SS	Volume 5	605729	915-922/1003-SP2-BH1-31-S	059915-002	24-SEP-02	SOIL	Cr+6	GEL	205620
1003	F. Bldg. 915/922 SS	Volume 5	605729	915-922/1003-SP2-BH1-31-S	059915-002	24-SEP-02	SOIL	TOTAL-CN	GEL	206136
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1003	F. Bldg. 915/922 SS	Volume 5	605729	915-922/1003-SP2-BH1-26-S	059914-002	24-SEP-02	SOIL	RCRA METALS	GEL	204452, 204440
1003	F. Bldg. 915/922 SS	Volume 5	605729	915-922/1003-SP2-BH1-31-S	059915-002	24-SEP-02	SOIL	RCRA METALS	GEL	204452, 204440
1004	Bldg. 6969 SS	Volume 7	805731	6969/1004-DF1-BH1-13-S	059918-003	20-SEP-02	SOIL	GAMMA SPEC	RPSD	201342
1004	Bldg. 6969 SS	Volume 7	605731	6969/1004-DF1-BH1-8-S	059917-003	20-SEP-02	SOIL	GAMMA SPEC	RPSD	201342
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1004	Bldg. 6969 SS	Volume 7	605731	6969/1004-DF1-BH2-13-S	059920-003	20-SEP-02	SOIL	GAMMA SPEC	RPSD	201342
1004	Bldg. 6969 SS	Volume 7	605731	6969/1004-DF1-BH3-13-S	059922-003	20-SEP-02	SOIL	GAMMA SPEC	RPSD	201342
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1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH2-8-S	059919-002	20-SEP-02	SOIL	PCB-8082	GEL	203728
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH3-13-S	059922-002	20-SEP-02	SOIL	PCB-8082	GEL	203728
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH3-8-S	059921-002	20-SEP-02	SOIL	PCB-8082	GEL	203728
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH1-13-S	059918-002	20-SEP-02	SOIL	BNA-8270	GEL	203764
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1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH2-8-S	059919-002	20-SEP-02	SOIL	BNA-8270	GEL	203764
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH3-13-S	059922-002	20-SEP-02	SOIL	BNA-8270	GEL	203764
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH3-8-S	059921-002	20-SEP-02	SOIL	BNA-8270	GEL	203764
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1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH1-8-S	059917-001	20-SEP-02	SOIL	VOA-8260	GEL	203934
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH2-13-S	059920-001	20-SEP-02	SOIL	VOA-8260	GEL	203934
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH2-8-S	059919-001	20-SEP-02	SOIL	VOA-8260	GEL	203934
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH3-13-S	059922-001	20-SEP-02	SOIL	VOA-8260	GEL	203934
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH3-8-S	059921-001	20-SEP-02	SOIL	VOA-8260	GEL	203934
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH1-13-S	059918-002	20-SEP-02	SOIL	HE-8330	GEL	204142
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH1-8-S	059917-002	20-SEP-02	SOIL	HE-8330	GEL	204142
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH2-13-S	059920-002	20-SEP-02	SOIL	HE-8330	GEL	204142
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH2-8-S	059919-002	20-SEP-02	SOIL	HE-8330	GEL	204142
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH3-13-S	059922-002	20-SEP-02	SOIL	HE-8330	GEL	204142

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

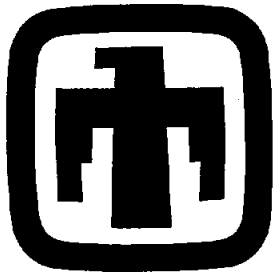
**DRAIN AND SEPTIC SYSTEMS PROJECT QC MASTER INDEX**

Site #	Site Name	Binder #	COC#	ER Sample ID	Sample #	SAMPLE DATE	MATRIX	LAB TEST	Lab	BATCH #
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH3-8-S	059921-002	20-SEP-02	SOIL	HE-8330	GEL	204142
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH1-13-S	059918-002	20-SEP-02	SOIL	GROSS-AB	GEL	205009
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH1-8-S	059917-002	20-SEP-02	SOIL	GROSS-AB	GEL	205009
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH2-13-S	059920-002	20-SEP-02	SOIL	GROSS-AB	GEL	205009
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH2-8-S	059919-002	20-SEP-02	SOIL	GROSS-AB	GEL	205009
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH3-13-S	059922-002	20-SEP-02	SOIL	GROSS-AB	GEL	205009
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH3-8-S	059921-002	20-SEP-02	SOIL	GROSS-AB	GEL	205009
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH1-13-S	059918-002	20-SEP-02	SOIL	TOTAL-CN	GEL	205123
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH1-8-S	059917-002	20-SEP-02	SOIL	TOTAL-CN	GEL	205123
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH2-13-S	059920-002	20-SEP-02	SOIL	TOTAL-CN	GEL	205123
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH2-8-S	059919-002	20-SEP-02	SOIL	TOTAL-CN	GEL	205123
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH3-13-S	059922-002	20-SEP-02	SOIL	TOTAL-CN	GEL	205123
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH3-8-S	059921-002	20-SEP-02	SOIL	TOTAL-CN	GEL	205123
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH1-13-S	059918-002	20-SEP-02	SOIL	Cr+6	GEL	205618
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH1-8-S	059917-002	20-SEP-02	SOIL	Cr+6	GEL	205618
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH2-13-S	059920-002	20-SEP-02	SOIL	Cr+6	GEL	205618
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH2-8-S	059919-002	20-SEP-02	SOIL	Cr+6	GEL	205618
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH3-13-S	059922-002	20-SEP-02	SOIL	Cr+6	GEL	205618
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH3-8-S	059921-002	20-SEP-02	SOIL	Cr+6	GEL	205618
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH1-13-S	059918-002	20-SEP-02	SOIL	RCRA METALS	GEL	203818, 204433
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH1-8-S	059917-002	20-SEP-02	SOIL	RCRA METALS	GEL	203818, 204433
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH2-13-S	059920-002	20-SEP-02	SOIL	RCRA METALS	GEL	203818, 204433
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH2-8-S	059919-002	20-SEP-02	SOIL	RCRA METALS	GEL	203818, 204433
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH3-13-S	059922-002	20-SEP-02	SOIL	RCRA METALS	GEL	203818, 204433
1004	Bldg. 6969 SS	Volume 5	605730	6969/1004-DF1-BH3-8-S	059921-002	20-SEP-02	SOIL	RCRA METALS	GEL	203818, 204433
1006	Bldg. 6741 SS	Volume 2	600423	ER-1295-6741-DF1-BH3-7-SD	041301-003	29-JUN-98	SOIL	HE-8330	GEL	125364
1006	Bldg. 6741 SS	Volume 2	600423	ER-1295-6741-DF1-BH1-12-S	041296-002	29-JUN-98	SOIL	BNA-8270	GEL	125436
1006	Bldg. 6741 SS	Volume 2	600423	ER-1295-6741-DF1-BH1-7-S	041295-002	29-JUN-98	SOIL	BNA-8270	GEL	125436
1006	Bldg. 6741 SS	Volume 2	600423	ER-1295-6741-DF1-BH2-12-S	041298-002	29-JUN-98	SOIL	BNA-8270	GEL	125436
1006	Bldg. 6741 SS	Volume 2	600423	ER-1295-6741-DF1-BH2-7-S	041297-002	29-JUN-98	SOIL	BNA-8270	GEL	125436
1006	Bldg. 6741 SS	Volume 2	600423	ER-1295-6741-DF1-BH3-12-S	041300-002	29-JUN-98	SOIL	BNA-8270	GEL	125436
1006	Bldg. 6741 SS	Volume 2	600423	ER-1295-6741-DF1-BH3-7-S	041299-002	29-JUN-98	SOIL	BNA-8270	GEL	125436
1006	Bldg. 6741 SS	Volume 2	600423	ER-1295-6741-DF1-BH3-7-SD	041301-003	29-JUN-98	SOIL	BNA-8270	GEL	125436
1006	Bldg. 6741 SS	Volume 2	600423	ER-1295-6741-DF1-BH1-12-S	041296-002	29-JUN-98	SOIL	GROSS-AB	GEL	125470
1006	Bldg. 6741 SS	Volume 2	600423	ER-1295-6741-DF1-BH1-7-S	041295-002	29-JUN-98	SOIL	GROSS-AB	GEL	125470
1006	Bldg. 6741 SS	Volume 2	600423	ER-1295-6741-DF1-BH2-12-S	041298-002	29-JUN-98	SOIL	GROSS-AB	GEL	125470
1006	Bldg. 6741 SS	Volume 2	600423	ER-1295-6741-DF1-BH2-7-S	041297-002	29-JUN-98	SOIL	GROSS-AB	GEL	125470
1006	Bldg. 6741 SS	Volume 2	600423	ER-1295-6741-DF1-BH3-7-S	041299-002	29-JUN-98	SOIL	GROSS-AB	GEL	125470
1006	Bldg. 6741 SS	Volume 2	600423	ER-1295-6741-DF1-BH3-7-SD	041301-003	29-JUN-98	SOIL	GROSS-AB	GEL	125470
1006	Bldg. 6741 SS	Volume 2	600423	ER-1295-6741-DF1-BH3-7-S	041296-002	29-JUN-98	SOIL	GAMMA SPEC	GEL	125573
1006	Bldg. 6741 SS	Volume 2	600423	ER-1295-6741-DF1-BH3-7-SD	041301-001	29-JUN-98	SOIL	VOA-8260	GEL	125781
1006	Bldg. 6741 SS	Volume 2	602762	66741-DF1-BH1-12-S	048389-002	17-AUG-98	SOIL	PCB-8082	GEL	156772

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







Sandia National Laboratories

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Drain and Septic Systems Project  
Quality Control (QC) Report

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General Engineering Laboratories, Inc. (GEL) QC Data

Environmental  
Restoration  
Project



United States Department of Energy  
Sandia Site Office

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GEL QC CROSS REFERENCE

COC 605730

Site #	Site Name	SAMPLE#	F#	DISP_ER_SAMP_LOC	SAMPLE DATE	MATRIX	LAB TEST	BATCH #
1004	Bldg. 6969 SS	059917	001	6969/1004-DF1-BH1-8-S	20-SEP-02	SOIL	VOA-8260	203934
1004	Bldg. 6969 SS	059917	002	6969/1004-DF1-BH1-8-S	20-SEP-02	SOIL	BNA-8270	203764
1004	Bldg. 6969 SS	059917	002	6969/1004-DF1-BH1-8-S	20-SEP-02	SOIL	Cr+6	205618
1004	Bldg. 6969 SS	059917	002	6969/1004-DF1-BH1-8-S	20-SEP-02	SOIL	GROSS-A/B	205009
1004	Bldg. 6969 SS	059917	002	6969/1004-DF1-BH1-8-S	20-SEP-02	SOIL	HE-8330	204142
1004	Bldg. 6969 SS	059917	002	6969/1004-DF1-BH1-8-S	20-SEP-02	SOIL	PCB-8082	203728
1004	Bldg. 6969 SS	059917	002	6969/1004-DF1-BH1-8-S	20-SEP-02	SOIL	RCRA METALS	203818, 204433
1004	Bldg. 6969 SS	059917	002	6969/1004-DF1-BH1-8-S	20-SEP-02	SOIL	TOTAL-CN	205123
1004	Bldg. 6969 SS	059918	001	6969/1004-DF1-BH1-13-S	20-SEP-02	SOIL	VOA-8260	203934
1004	Bldg. 6969 SS	059918	002	6969/1004-DF1-BH1-13-S	20-SEP-02	SOIL	BNA-8270	203764
1004	Bldg. 6969 SS	059918	002	6969/1004-DF1-BH1-13-S	20-SEP-02	SOIL	Cr+6	205618
1004	Bldg. 6969 SS	059918	002	6969/1004-DF1-BH1-13-S	20-SEP-02	SOIL	GROSS-A/B	205009
1004	Bldg. 6969 SS	059918	002	6969/1004-DF1-BH1-13-S	20-SEP-02	SOIL	HE-8330	204142
1004	Bldg. 6969 SS	059918	002	6969/1004-DF1-BH1-13-S	20-SEP-02	SOIL	PCB-8082	203728
1004	Bldg. 6969 SS	059918	002	6969/1004-DF1-BH1-13-S	20-SEP-02	SOIL	RCRA METALS	203818, 204433
1004	Bldg. 6969 SS	059918	002	6969/1004-DF1-BH1-13-S	20-SEP-02	SOIL	TOTAL-CN	205123
1004	Bldg. 6969 SS	059919	001	6969/1004-DF1-BH2-8-S	20-SEP-02	SOIL	VOA-8260	203934
1004	Bldg. 6969 SS	059919	002	6969/1004-DF1-BH2-8-S	20-SEP-02	SOIL	BNA-8270	203764
1004	Bldg. 6969 SS	059919	002	6969/1004-DF1-BH2-8-S	20-SEP-02	SOIL	Cr+6	205618
1004	Bldg. 6969 SS	059919	002	6969/1004-DF1-BH2-8-S	20-SEP-02	SOIL	GROSS-A/B	205009
1004	Bldg. 6969 SS	059919	002	6969/1004-DF1-BH2-8-S	20-SEP-02	SOIL	HE-8330	204142
1004	Bldg. 6969 SS	059919	002	6969/1004-DF1-BH2-8-S	20-SEP-02	SOIL	PCB-8082	203728
1004	Bldg. 6969 SS	059919	002	6969/1004-DF1-BH2-8-S	20-SEP-02	SOIL	RCRA METALS	203818, 204433
1004	Bldg. 6969 SS	059919	002	6969/1004-DF1-BH2-8-S	20-SEP-02	SOIL	TOTAL-CN	205123
1004	Bldg. 6969 SS	059920	001	6969/1004-DF1-BH2-13-S	20-SEP-02	SOIL	VOA-8260	203934
1004	Bldg. 6969 SS	059920	002	6969/1004-DF1-BH2-13-S	20-SEP-02	SOIL	BNA-8270	203764
1004	Bldg. 6969 SS	059920	002	6969/1004-DF1-BH2-13-S	20-SEP-02	SOIL	Cr+6	205618
1004	Bldg. 6969 SS	059920	002	6969/1004-DF1-BH2-13-S	20-SEP-02	SOIL	GROSS-A/B	205009
1004	Bldg. 6969 SS	059920	002	6969/1004-DF1-BH2-13-S	20-SEP-02	SOIL	HE-8330	204142

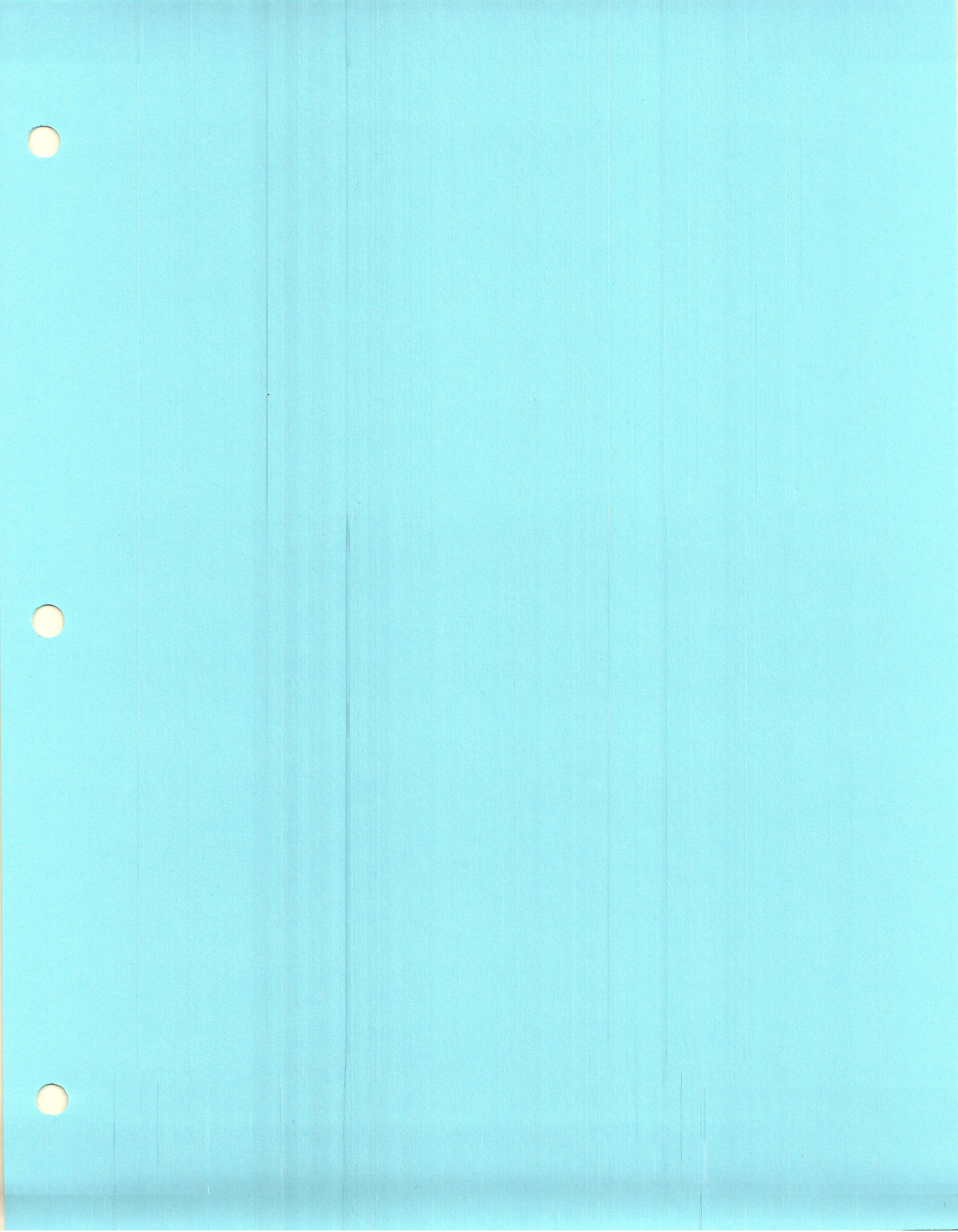
SDG 67601B

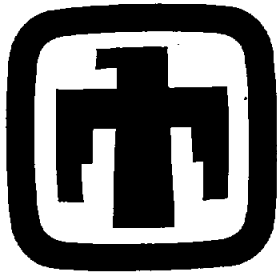
GEL QC CROSS REFERENCE

COC 605730

Site #	Site Name	SAMPLE#	F#	DISP_ER_SAMP_LOC	SAMPLE DATE	MATRIX	LAB TEST	BATCH #
1004	Bldg. 6969 SS	059920	002	6969/1004-DF1-BH2-13-S	20-SEP-02	SOIL	PCB-8082	203728
1004	Bldg. 6969 SS	059920	002	6969/1004-DF1-BH2-13-S	20-SEP-02	SOIL	RCRA METALS	203818, 204433
1004	Bldg. 6969 SS	059920	002	6969/1004-DF1-BH2-13-S	20-SEP-02	SOIL	TOTAL-CN	205123
1004	Bldg. 6969 SS	059921	001	6969/1004-DF1-BH3-8-S	20-SEP-02	SOIL	VOA-8260	203934
1004	Bldg. 6969 SS	059921	002	6969/1004-DF1-BH3-8-S	20-SEP-02	SOIL	BNA-8270	203764
1004	Bldg. 6969 SS	059921	002	6969/1004-DF1-BH3-8-S	20-SEP-02	SOIL	Cr+6	205618
1004	Bldg. 6969 SS	059921	002	6969/1004-DF1-BH3-8-S	20-SEP-02	SOIL	GROSS-A/B	205009
1004	Bldg. 6969 SS	059921	002	6969/1004-DF1-BH3-8-S	20-SEP-02	SOIL	HE-8330	204142
1004	Bldg. 6969 SS	059921	002	6969/1004-DF1-BH3-8-S	20-SEP-02	SOIL	PCB-8082	203728
1004	Bldg. 6969 SS	059921	002	6969/1004-DF1-BH3-8-S	20-SEP-02	SOIL	RCRA METALS	203818, 204433
1004	Bldg. 6969 SS	059921	002	6969/1004-DF1-BH3-8-S	20-SEP-02	SOIL	TOTAL-CN	205123
1004	Bldg. 6969 SS	059922	001	6969/1004-DF1-BH3-13-S	20-SEP-02	SOIL	VOA-8260	203934
1004	Bldg. 6969 SS	059922	002	6969/1004-DF1-BH3-13-S	20-SEP-02	SOIL	BNA-8270	203764
1004	Bldg. 6969 SS	059922	002	6969/1004-DF1-BH3-13-S	20-SEP-02	SOIL	Cr+6	205618
1004	Bldg. 6969 SS	059922	002	6969/1004-DF1-BH3-13-S	20-SEP-02	SOIL	GROSS-A/B	205009
1004	Bldg. 6969 SS	059922	002	6969/1004-DF1-BH3-13-S	20-SEP-02	SOIL	HE-8330	204142
1004	Bldg. 6969 SS	059922	002	6969/1004-DF1-BH3-13-S	20-SEP-02	SOIL	PCB-8082	203728
1004	Bldg. 6969 SS	059922	002	6969/1004-DF1-BH3-13-S	20-SEP-02	SOIL	RCRA METALS	203818, 204433
1004	Bldg. 6969 SS	059922	002	6969/1004-DF1-BH3-13-S	20-SEP-02	SOIL	TOTAL-CN	205123
1114	Bldg. 9978 DW	059923	001	9978/1114-DW1-BH1-6-S	23-SEP-02	SOIL	VOA-8260	203934
1114	Bldg. 9978 DW	059923	002	9978/1114-DW1-BH1-6-S	23-SEP-02	SOIL	BNA-8270	203764
1114	Bldg. 9978 DW	059923	002	9978/1114-DW1-BH1-6-S	23-SEP-02	SOIL	Cr+6	205618
1114	Bldg. 9978 DW	059923	002	9978/1114-DW1-BH1-6-S	23-SEP-02	SOIL	GROSS-A/B	205009
1114	Bldg. 9978 DW	059923	002	9978/1114-DW1-BH1-6-S	23-SEP-02	SOIL	HE-8330	204142
1114	Bldg. 9978 DW	059923	002	9978/1114-DW1-BH1-6-S	23-SEP-02	SOIL	PCB-8082	203728
1114	Bldg. 9978 DW	059923	002	9978/1114-DW1-BH1-6-S	23-SEP-02	SOIL	RCRA METALS	203818, 204433
1114	Bldg. 9978 DW	059924	001	9978/1114-DW1-BH1-11-S	23-SEP-02	SOIL	VOA-8260	203934
1114	Bldg. 9978 DW	059924	002	9978/1114-DW1-BH1-11-S	23-SEP-02	SOIL	BNA-8270	203764

SDG 67601B





Sandia National Laboratories

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United States Department of Energy  
Sandia Site Office

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RPSD QC CROSS REFERENCE

COC 605731  
BATCH NO. 201342

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



COC# 605730

**CASE NARRATIVE  
for  
Sandia National Laboratories  
ARCOC-605670  
SDG#67601A  
ARCOC-605730  
SDG#67601B  
Case No. 7223.02.03.02**

**October 21, 2002**

**Laboratory Identification:**

General Engineering Laboratories, Inc.

**Mailing Address:**

P.O. Box 30712  
Charleston, South Carolina 29417

**Express Mail Delivery and Shipping Address:**

2040 Savage Road  
Charleston, South Carolina 29407

**Telephone Number:**

(843) 556-8171

**Summary:**

**Sample receipt**

Sandia collected twenty-four soil samples and eleven aqueous samples on September 18, 19, 20, and 23, 2002. The samples arrived at General Engineering Laboratories, Inc., (GEL) Charleston, South Carolina on September 24, 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 and 3.0°C, as measured from the temperature control bottles.

Sample ID 059856-006 from ARCO-605670 was received out of holding for Hexavalent Chromium. An NCR was generated and is included in this package. The spikes for the soil Hexavalent Chromium batch passed GEL's SPC limits at 64.7 and 71.2 percent recovery, however, the spikes failed the client's contract limits. An NCR was

**GENERAL ENGINEERING LABORATORIES**

**P O Box 30712 • Charleston, SC 29417 • 2040 Savage Road • 29407**

**(843) 556-8171 • Fax (843) 766-1178**



generated per client request and is included in the General Chemistry section of the data package.

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

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

ARCOC	SDG#	#of samples	Collection Date	Date Rec'd by Lab
605670	67601A	18	09/18/02,09/19/02, 09/20/02	09/24/02
605730	67601B	17	09/20/02,09/23/02	09/24/02

The laboratory received the following samples:

**Laboratory ID**  
**ARCOC-605670:**

**Description**

67601001	059813-001
67601002	059814-001
67601003	059815-001
67601004	059816-001
67601013	059813-002
67601014	059814-002
67601015	059815-002
67601016	059816-002
67608001	059819-001
67608002	059856-001
67608003	059933-001
67608005	059856-002
67608006	059856-003
67608007	059856-004
67608008	059856-005
67608009	059856-006
67608010	059856-007
67608011	059856-008

**ARCOC-605730:**

67601005	059917-001
67601006	059918-001
67601007	059919-001
67601008	059920-001
67601009	059921-001
67601010	059922-001
67601011	059923-001
67601012	059924-001
67601017	059917-002

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<u>Laboratory ID</u>	<u>Description</u>
67601018	059918-002
67601019	059919-002
67601020	059920-002
67601021	059921-002
67601022	059922-002
67601023	059923-002
67601024	059924-002
67608004	059925-001

**Case Narrative**

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

**Internal Chain of Custody:**

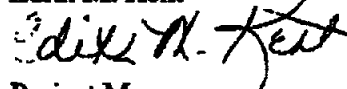
Custody was maintained for the samples.

**Data Package:**

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

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

Edith M. Kent



Project Manager

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GC/MS Volatile Organics  
Sandia National Labs (SNLS)  
SDG# 67601

Method/Analysis Information

Procedure: Volatile Organic Compounds (VOC) by Gas Chromatograph/Mass Spectrometer  
Analytical Method: SW846 8260A  
Prep Method: SW846 5030A  
Analytical Batch Number: 203934  
Prep Batch Number: 203932

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
67601001	059813-001
67601002	059814-001
67601003	059815-001
67601004	059816-001
67601005	059917-001
67601006	059918-001
67601007	059919-001
67601008	059920-001
67601009	059921-001
67601010	059922-001
67601011	059923-001
67601012	059924-001

SDG# 67601 -VOA

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1200306489	VBLK01 (Blank)
1200306490	VBLK01LCS (Laboratory Control Sample)
1200307638	VBLK02 (Blank)
1200307640	VBLK02LCS (Laboratory Control Sample)
1200307639	VBLK03 (Blank)
1200307641	VBLK03LCS (Laboratory Control Sample)
1200306491	059813-001MS (Matrix Spike)
1200306492	059813-001MSD (Matrix Spike Duplicate)

**Preparation/Analytical Method Verification**

**SOP Reference**

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

**Calibration Information**

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

**Initial Calibration**

All the initial calibration requirements were met.

**CCV Requirements**

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

**Quality Control (QC) Information**

**Surrogate Recoveries**

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

**Blank Acceptance**

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

**LCS Recovery Statement**

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

**QC Sample Designation**

The following sample was designated for matrix spike analysis:

67601001      059813-001

**MS Recovery Statement**

All the required matrix spike recoveries were within the acceptance limits.

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**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 (I STD) Acceptance**

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

**Technical Information**

**Holding Time Specifications**

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

**Sample Preservation and Integrity**

All samples met the sample preservation and integrity requirements.

**Preparation/Analytical Method Verification**

All procedures were performed as stated in the SOP.

**Sample Dilutions**

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

**Sample Re-prep/Re-analysis**

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

**Miscellaneous Information**

**Nonconformance (NCR) Documentation**

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

**Manual Integrations**

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

**Additional Comments**

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

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

**System Configuration**

The laboratory utilizes the following GC/MS configurations:

SDG# 67601 -VOA

**Chromatographic Columns**

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

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

**Instrument Configuration**

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

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

**Certification Statement**

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

**Review Validation**

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

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

Reviewer: Charles Wilson Date: 10-11-02

## QC Summary

Report Date: October 17, 2002  
Page 1 of 5

Client : Sandia National Laboratories  
MS-0756  
P.O. Box 5880  
Albuquerque, New Mexico  
Contact: Pamela M. Puissant  
Workorder: 67601

Parameter	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analst	Date	Time
Volatile-GC/MS Federal											
Batch 203934											
QC1200306490	LCS										
1,1-Dichloroethylene	50.0			44.7	ug/kg		89	(75%-134%)	RMB	09/25/02	08:02
Benzene	50.0			49.1	ug/kg		98	(80%-120%)			
Chlorobenzene	50.0			51.5	ug/kg		103	(82%-118%)			
Toluene	50.0			51.6	ug/kg		103	(74%-115%)			
Trichloroethylene	50.0			49.0	ug/kg		98	(80%-119%)			
**Bromofluorobenzene	50.0			47.5	ug/kg		95	(69%-138%)			
**Dibromofluoromethane	50.0			49.0	ug/kg		98	(67%-137%)			
**Toluene-d8	50.0			46.0	ug/kg		92	(67%-139%)			
QC1200307640	LCS										
1,1-Dichloroethylene	50.0			47.3	ug/kg		95	(75%-134%)		09/25/02	20:45
Benzene	50.0			50.6	ug/kg		101	(80%-120%)			
Chlorobenzene	50.0			51.5	ug/kg		103	(82%-118%)			
Toluene	50.0			51.7	ug/kg		103	(74%-115%)			
Trichloroethylene	50.0			50.7	ug/kg		101	(80%-119%)			
**Bromofluorobenzene	50.0			46.9	ug/kg		94	(69%-138%)			
**Dibromofluoromethane	50.0			50.2	ug/kg		100	(67%-137%)			
**Toluene-d8	50.0			45.5	ug/kg		91	(67%-139%)			
QC1200307641	LCS										
1,1-Dichloroethylene	50.0			43.4	ug/kg		87	(75%-134%)		09/27/02	08:11
Benzene	50.0			47.5	ug/kg		95	(80%-120%)			
Chlorobenzene	50.0			46.8	ug/kg		94	(82%-118%)			
Toluene	50.0			46.3	ug/kg		93	(74%-115%)			
Trichloroethylene	50.0			47.7	ug/kg		95	(80%-119%)			
**Bromofluorobenzene	50.0			38.2	ug/kg		76	(69%-138%)			
**Dibromofluoromethane	50.0			45.8	ug/kg		92	(67%-137%)			
**Toluene-d8	50.0			40.4	ug/kg		81	(67%-139%)			
QC1200306489	MB										
1,1,1-Trichloroethane			U	ND	ug/kg					09/25/02	09:34
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: 67601

Page 2 of 5

Paramname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Volatile-GC/MS Federal											
Batch 203934											
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			63.0	ug/kg		126	(69%-138%)			
*Dibromofluoromethane	50.0			48.2	ug/kg		96	(67%-137%)			
*Toluene-d8	50.0			47.6	ug/kg		95	(67%-139%)			
QC1200307638 MB											
1,1,1-Trichloroethane			U	ND	ug/kg						09/25/02 22:30
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: 67601

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Amht	Date	Time
Volatile-GC/MS Federal											
Batch 203934											
Styrene			U	ND	ug/kg						
Tetrachloroethyleno			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			60.5	ug/kg		121	(69%-138%)			
**Dibromofluoromethane	50.0			48.9	ug/kg		98	(67%-137%)			
**Toluene-d8	50.0			46.9	ug/kg		94	(67%-139%)			
QC1200307639 MB											
1,1,1-Trichloroethane			U	ND	ug/kg						09/27/02 09:45
1,1,2,2-Tetrachloroethane			U	ND	ug/kg						
1,1,2-Trichloroethane			U	ND	ug/kg						
1,1-Dichloroethane			U	ND	ug/kg						
1,1-Dichloroethylene			U	ND	ug/kg						
1,2-Dichloroethane			U	ND	ug/kg						
1,2-Dichloropropane			U	ND	ug/kg						
2-Butanone			U	ND	ug/kg						
2-Hexanone			U	ND	ug/kg						
4-Methyl-2-pentanone			U	ND	ug/kg						
Acetone			U	ND	ug/kg						
Benzene			U	ND	ug/kg						
Bromodichloromethane			U	ND	ug/kg						
Bromoform			U	ND	ug/kg						
Bromomethane			U	ND	ug/kg						
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: 676#1

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Parameter	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Volatile-GC/MS Federal										
Batch 203934										
trans-1,2-Dichloroethylene			U	ND	ng/kg					
trans-1,3-Dichloropropylene			U	ND	ug/kg					
**Bromofluorobenzene	50.0			62.3	ug/kg		125	(69%-138%)		
**Dibromofluoromethane	50.0			48.0	ug/kg		96	(67%-137%)		
**Toluene-d8	50.0			47.1	ug/kg		94	(67%-139%)		
QC1200306491 67601001 PS										
1,1-Dichloroethylene	50.0	U	ND	41.0	ug/L		82	(55%-128%)		09/26/02 02:02
Benzene	50.0	U	ND	45.3	ug/L		91	(53%-118%)		
Chlorobenzene	50.0	U	ND	46.4	ug/L		93	(53%-116%)		
Toluene	50.0	U	ND	47.5	ug/L		95	(56%-113%)		
Trichloroethylene	50.0	U	ND	45.3	ug/L		91	(54%-119%)		
**Bromofluorobenzene	50.0		54.8	47.8	ug/L		96	(69%-138%)		
**Dibromofluoromethane	50.0		49.6	49.6	ug/L		99	(67%-137%)		
**Toluene-d8	50.0		46.9	46.2	ug/L		92	(67%-139%)		
QC1200306492 67601001 PSD										
1,1-Dichloroethylene	50.0	U	ND	40.3	ug/L	2	81	(0%-21%)		09/26/02 02:28
Benzene	50.0	U	ND	43.3	ug/L	5	87	(0%-17%)		
Chlorobenzene	50.0	U	ND	39.8	ug/L	15	80	(0%-21%)		
Toluene	50.0	U	ND	41.4	ug/L	14	83	(0%-25%)		
Trichloroethylene	50.0	U	ND	42.1	ug/L	7	84	(0%-25%)		
**Bromofluorobenzene	50.0		54.8	49.0	ug/L		98	(69%-138%)		
**Dibromofluoromethane	50.0		49.6	50.4	ug/L		101	(67%-137%)		
*Toluene-d8	50.0		46.9	46.3	ug/L		93	(67%-139%)		

**Notes:**

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

The Qualifiers in this report are defined as follows:

- \* Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where t
- \*\* Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- H Holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
- P The response between the confirmation column and the primary column is >40%D
- U The analyte was analyzed for but not detected below this concentration. For Organic and Inorganic analytes the result is less than the effective MDL. ]
- 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: 67601

Page 5 of 5

Parname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anst	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.

**GC/MS Volatile Organics  
Sandia National Labs (SNLS)  
SDG# 67601-1**

**Method/Analysis Information**

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

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
67608001	059819-001
67608002	059856-001
67608003	059933-001
67608004	059925-001
1200308688	VBLK01 (Blank)
1200308691	VBLK01LCS (Laboratory Control Sample)
1200308692	VBLK01LCSD (Laboratory Control Sample Duplicate)

**Preparation/Analytical Method Verification**

**SOP Reference**

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

**Calibration Information**

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

SDG# 67601-1 -VOA

**Initial Calibration**

All the initial calibration requirements were met.

**CCV Requirements**

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

**Quality Control (QC) Information**

**Surrogate Recoveries**

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

**Blank Acceptance**

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

**QC Sample Designation**

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

**LCS Recovery Statement**

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

**LCSD Recovery Statement**

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

**LCS/LCSD RPD Statement**

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

**Internal Standard (ISTD) Acceptance**

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

**Technical Information**

**Holding Time Specifications**

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

**Sample Preservation and Integrity**

All samples met the sample preservation and integrity requirements.

**Preparation/Analytical Method Verification**

All procedures were performed as stated in the SOP.

**Sample Dilutions**

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

**Sample Re-prep/Re-analysis**

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

### Miscellaneous Information

#### **Nonconformance (NCR) Documentation**

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

#### **Manual Integrations**

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

#### **Additional Comments**

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

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

#### **System Configuration**

The laboratory utilizes the following GC/MS configurations:

#### **Chromatographic Columns**

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

<b>Column ID</b>	<b>Column Description</b>
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:

<b>Instrument ID</b>	<b>System Configuration</b>	<b>Chromatographic Column</b>	<b>P &amp; T Trap</b>
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# 67601-1 -VOA

RECEIVED

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

**Certification Statement**

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

**Review Validation**

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

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

Reviewer: Charles Wilson Date: 11-11-02

## QC Summary

Report Date: October 18, 2002  
Page 1 of 2

Client : Sandia National Laboratories  
MS-0756  
P.O. Box 5800  
Albuquerque, New Mexico  
Contact: Pamela M. Palasant  
Workorder: 67608

Paramname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Volatile-GC/MS Federal									
Batch 204910									
QC1200308691 LCS									
1,1-Dichloroethylene	50.0		43.0	ug/L		86	(78%-140%)	RMB	09/30/02 19:13
Benzene	50.0		47.5	ug/L		95	(78%-119%)		
Chlorobenzene	50.0		50.0	ug/L		100	(82%-120%)		
Toluene	50.0		49.4	ug/L		99	(68%-133%)		
Trichloroethylene	50.0		47.5	ug/L		95	(80%-123%)		
**Bromofluorobenzene	50.0		47.9	ug/L		96	(67%-136%)		
**Dibromofluoromethane	50.0		49.7	ug/L		99	(62%-148%)		
**Toluene-d8	50.0		46.2	ug/L		93	(58%-139%)		
QC1200308692 LCSD									
1,1-Dichloroethylene	50.0		42.4	ug/L	1	85	(0%-30%)		09/30/02 19:39
Benzene	50.0		47.7	ug/L	0	95	(0%-30%)		
Chlorobenzene	50.0		49.5	ug/L	1	99	(0%-30%)		
Toluene	50.0		49.1	ug/L	1	98	(0%-30%)		
Trichloroethylene	50.0		47.1	ug/L	1	94	(0%-30%)		
**Bromofluorobenzene	50.0		49.4	ug/L		99	(67%-136%)		
**Dibromofluoromethane	50.0		49.7	ug/L		99	(62%-148%)		
**Toluene-d8	50.0		46.3	ug/L		93	(58%-139%)		
QC1200308688 MB									
1,1,1-Trichloroethane		U	ND	ug/L					09/30/02 21:23
1,1,2,2-Tetrachloroethane		U	ND	ug/L					
1,1,2-Trichloroethane		U	ND	ug/L					
1,1-Dichloroethane		U	ND	ug/L					
1,1-Dichloroethylene		U	ND	ug/L					
1,2-Dichloroethane		U	ND	ug/L					
1,2-Dichloropropane		U	ND	ug/L					
2-Butanone		U	ND	ug/L					
2-Hexanone		U	ND	ug/L					
4-Methyl-2-pentanone		U	ND	ug/L					
Acetone		U	ND	ug/L					
Benzene		U	ND	ug/L					
Bromodichloromethane		U	ND	ug/L					
Bromoform		U	ND	ug/L					
Bromomethane		U	ND	ug/L					
Carbon disulfide		U	ND	ug/L					
Carbon tetrachloride		U	ND	ug/L					
Chlorobenzene		U	ND	ug/L					
Chloroethane		U	ND	ug/L					
Chloroform		U	ND	ug/L					
Chloromethane		U	ND	ug/L					
Dibromochloromethane		U	ND	ug/L					
Ethylbenzene		U	ND	ug/L					
Methylene chloride		U	ND	ug/L					



## QC Summary

Workorder: 67608

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Parmaame	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Amist	Date	Time
Volatile-GC/MS Federal										
Batch 204910										
Styrene		U	ND	ug/L						
Tetrachloroethylene		U	ND	ug/L						
Toluene		U	ND	ug/L						
Trichloroethylene		U	ND	ug/L						
Vinyl chloride		U	ND	ug/L						
Xylenes (total)		U	ND	ug/L						
cis-1,2-Dichloroethylene		U	ND	ug/L						
cis-1,3-Dichloropropylene		U	ND	ug/L						
trans-1,2-Dichloroethylene		U	ND	ug/L						
trans-1,3-Dichloropropylene		U	ND	ug/L						
**Bromofluorobenzene	50.0		66.5	ug/L		133	(67%-136%)			
**Dibromofluoromethane	50.0		48.2	ug/L		96	(62%-148%)			
**Toluene-d8	50.0		47.3	ug/L		95	(58%-139%)			

**Notes:**

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

The Qualifiers in this report are defined as follows:

- \* Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where f
- \*\* 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.

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.

**Semi-Volatile Case Narrative  
Sandia National Labs (SNLS)  
SDG 67601**

**Method/Analysis Information**

**Procedure:** Semivolatile Analysis by Gas Chromatograph/Mass Spectrometer  
**Analytical Method:** SW846 8270C  
**Prep Method:** SW846 3550B  
**Analytical Batch Number:** 203764  
**Prep Batch Number:** 203763

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
67601013	059813-002
67601014	059814-002
67601015	059815-002
67601016	059816-002
67601017	059917-002
67601018	059918-002
67601019	059919-002
67601020	059920-002
67601021	059921-002
67601022	059922-002
67601023	059923-002
67601024	059924-002
1200305965	SBLK01 (Blank)

1200305966	SBLK01LCS (Laboratory Control Sample)
1200305967	059813-002MS (Matrix Spike)
1200305968	059813-002MSD (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

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

##### LCS Recovery Statement

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

##### QC Sample Designation

The following sample analyzed with this SDG was chosen for matrix spike analysis:  
67601013      059813-002

##### MS Recovery Statement

The matrix spike recoveries for this SDG were within the established acceptance limits.

**MSD Recovery Statement**

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

**MS/MSD RPD Statement**

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

**Internal Standard (ISTD) Acceptance**

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

**Technical Information:**

**Holding Time Specifications**

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

**Preparation/Analytical Method Verification**

All procedures were performed as stated in the SOP.

**Sample Dilutions**

The following sample was diluted due to the thick nature of the sample in the syringe. It was very difficult to pull up into the syringe.

67601022      059922-002

**Miscellaneous Information:**

**Nonconformance (NCR) Documentation**

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

**Manual Integrations**

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

**System Configuration**

The laboratory utilizes a HP 6890 Series gas chromatograph and a HP 5973 Mass Selective Detector. The configuration is equipped with the electronic pressure control. All MS interfaces are capillary direct.

**Chromatographic Columns**

Chromatographic separation of semivolatile components is accomplished through analysis on one or more of the following columns (all with dimensions of 30 meters x 0.25 millimeters ID and 0.25 micron film except J&W DB-5MS2 which is 25 meters x 0.20 mm ID and 0.33 micron film):

Column ID	Column Description
J&W	DB-5.625(5% Phenyl)-methylpolysiloxane (identified by a DB-5.625 designation on quantitation reports and reconstructed ion chromatograms)
J&W DB-5MS	Similar to the J&W DB-5.625 with low bleed characteristics (identified by a DB-5MS designation)

Alltech	EC-5 (SE-54) 5% Phenyl, 95% Methylpolysiloxane (identified by a HP-5MS designation)
HP	HP-5MS 5% Phenylmethylsiloxane (identified by a HP-5MS designation)
Phenomenex	ZB-5 5% Phenyl Polysiloxane (identified by a ZB-5 designation)
J&W DB-5MS2	Similar to the J&W DB-5.625 with low bleed characteristics (identified by a DB-5MS2 designation)

**Instrument Configuration**

The samples reported in this SDG were analyzed on one or more of the following instrument systems. Instrument systems are referenced in the raw data and individual form headers by the Instrument ID designations listed below:

Instrument ID	System Configuration	Chromatographic Column
MSD2	HP6890/HP5973	DB-5MS2
MSD4	HP6890/HP5973	DB-5MS2
MSD5	HP6890/HP5973	DB-5MS2
MSD7	HP6890/HP5973	DB-5MS2
MSD8	HP6890/HP5973	DB-5MS2

**Certification Statement**

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

**Review Validation:**

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

Reviewer: Erin Haisel Date: 10/21/02

## QC Summary

Report Date: October 17, 2002  
Page 1 of 5

Client : Sandia National Laboratories  
MS-0756  
P.O. Box 5800  
Albuquerque, New Mexico  
Contact: Pamela M. Puisseant  
Workorder: 67601

Parameter	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlyt	Date	Time
Volatile-GC/MS Federal											
Batch 203934											
QC1200306490 LCS											
1,1-Dichloroethylene	50.0			44.7	ug/kg		89	(75%-134%)	RMB	09/25/02	08:02
Benzene	50.0			49.1	ug/kg		98	(80%-120%)			
Chlorobenzene	50.0			51.5	ug/kg		103	(82%-118%)			
Toluene	50.0			51.6	ug/kg		103	(74%-115%)			
Trichloroethylene	50.0			49.0	ug/kg		98	(80%-119%)			
**Bromofluorobenzene	50.0			47.5	ug/kg		95	(69%-138%)			
**Dibromofluoromethane	50.0			49.0	ug/kg		98	(67%-137%)			
**Toluene-d8	50.0			46.0	ug/kg		92	(67%-139%)			
QC1200307640 LCS											
1,1-Dichloroethylene	50.0			47.3	ug/kg		95	(75%-134%)		09/25/02	20:45
Benzene	50.0			50.6	ug/kg		101	(80%-120%)			
Chlorobenzene	50.0			51.5	ug/kg		103	(82%-118%)			
Toluene	50.0			51.7	ug/kg		103	(74%-115%)			
Trichloroethylene	50.0			50.7	ug/kg		101	(80%-119%)			
**Bromofluorobenzene	50.0			46.9	ug/kg		94	(69%-138%)			
**Dibromofluoromethane	50.0			50.2	ug/kg		100	(67%-137%)			
**Toluene-d8	50.0			45.5	ug/kg		91	(67%-139%)			
QC1200307641 LCS											
1,1-Dichloroethylene	50.0			43.4	ug/kg		87	(75%-134%)		09/27/02	08:11
Benzene	50.0			47.5	ug/kg		95	(80%-120%)			
Chlorobenzene	50.0			46.8	ug/kg		94	(82%-118%)			
Toluene	50.0			46.3	ug/kg		93	(74%-115%)			
Trichloroethylene	50.0			47.7	ug/kg		95	(80%-119%)			
**Bromofluorobenzene	50.0			38.2	ug/kg		76	(69%-138%)			
**Dibromofluoromethane	50.0			45.8	ug/kg		92	(67%-137%)			
**Toluene-d8	50.0			40.4	ug/kg		81	(67%-139%)			
QC1200306489 MB											
1,1,1-Trichloroethane			U	ND	ug/kg					09/25/02	09:34
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: 67601

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Parmsname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analst	Date	Time
Volatile-GC/MS Federal											
Batch 203934											
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			63.0	ug/kg		126	(69%-138%)			
*Dibromofluoromethane	50.0			48.2	ug/kg		96	(67%-137%)			
*Toluene-d8	50.0			47.6	ug/kg		95	(67%-139%)			
QC1200307638 MB											
1,1,1-Trichloroethane			U	ND	ug/kg						09/25/02 22:30
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: 67601

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Parameter	NOM	Sample Qual	QC	Units	RFD%	REC%	Range	Anst	Date Time
Volatile-GC/MS Federal									
Batch	203934								
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			60.5	ug/kg	121	(69%-138%)		
**Dibromofluoromethane	50.0			48.9	ug/kg	98	(67%-137%)		
**Toluene-d8	50.0			46.9	ug/kg	94	(67%-139%)		
QC120207639 MB									
1,1,1-Trichloroethane		U	ND	ug/kg					09/27/02 09:45
1,1,2,2-Tetrachloroethane		U	ND	ug/kg					
1,1,2-Trichloroethane		U	ND	ug/kg					
1,1-Dichloroethane		U	ND	ug/kg					
1,1-Dichloroethylene		U	ND	ug/kg					
1,2-Dichloroethane		U	ND	ug/kg					
1,2-Dichloropropane		U	ND	ug/kg					
2-Butanone		U	ND	ug/kg					
2-Hexanone		U	ND	ug/kg					
4-Methyl-2-pentanone		U	ND	ug/kg					
Acetone		U	ND	ug/kg					
Benzene		U	ND	ug/kg					
Bromodichloromethane		U	ND	ug/kg					
Bromoform		U	ND	ug/kg					
Bromomethane		U	ND	ug/kg					
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: 67601

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Paramname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlt	Date	Time
Volatile-GC/MS Federal											
Batch 203934											
trans-1,2-Dichloroethylene			U	ND	ug/kg						
trans-1,3-Dichloropropylene			U	ND	ug/kg						
**Bromofluorobenzene	50.0			62.3	ug/kg		125	(69%-138%)			
**Dibromofluoromethane	50.0			48.0	ug/kg		96	(67%-137%)			
**Toluene-d8	50.0			47.1	ug/kg		94	(67%-139%)			
QC1200306491 67601001 PS											
1,1-Dichloroethylene	50.0	U	ND	41.0	ug/L		82	(55%-128%)		09/26/02	02:02
Benzene	50.0	U	ND	45.3	ug/L		91	(53%-118%)			
Chlorobenzene	50.0	U	ND	46.4	ug/L		93	(53%-116%)			
Toluene	50.0	U	ND	47.5	ug/L		95	(56%-113%)			
Trichloroethylene	50.0	U	ND	45.3	ug/L		91	(54%-119%)			
**Bromofluorobenzene	50.0		54.8	47.8	ug/L		96	(69%-138%)			
**Dibromofluoromethane	50.0		49.6	49.6	ug/L		99	(67%-137%)			
**Toluene-d8	50.0		46.9	46.2	ug/L		92	(67%-139%)			
QC1200306492 67601001 PSD											
1,1-Dichloroethylene	50.0	U	ND	40.3	ug/L	2	81	(0%-21%)		09/26/02	02:28
Benzene	50.0	U	ND	43.3	ug/L	5	87	(0%-17%)			
Chlorobenzene	50.0	U	ND	39.8	ug/L	15	80	(0%-21%)			
Toluene	50.0	U	ND	41.4	ug/L	14	83	(0%-25%)			
Trichloroethylene	50.0	U	ND	42.1	ug/L	7	84	(0%-25%)			
**Bromofluorobenzene	50.0		54.8	49.0	ug/L		98	(69%-138%)			
**Dibromofluoromethane	50.0		49.6	50.4	ug/L		101	(67%-137%)			
**Toluene-d8	50.0		46.9	46.3	ug/L		93	(67%-139%)			

**Notes:**

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

The Qualifiers in this report are defined as follows:

- \* Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where t
- \*\* Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- H Holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
- P The response between the confirmation column and the primary column is >40%D
- U The analyte was analyzed for but not detected below this concentration. For Organic and Inorganic analytes the result is less than the effective MDL. ]
- 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: 67601

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anst	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.

**GC/MS Volatile Organics  
Sandia National Labs (SNL)**  
SDG# 67601-1

**Method/Analysis Information**

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

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
67608001	059819-001
67608002	059856-001
67608003	059933-001
67608004	059925-001
1200308688	VBLK01 (Blank)
1200308691	VBLK01LCS (Laboratory Control Sample)
1200308692	VBLK01LCSD (Laboratory Control Sample Duplicate)

**Preparation/Analytical Method Verification**

**SOP Reference**

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

**Calibration Information**

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

SDG# 67601-1 -VOA

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 for this SDG were within the established acceptance limits.

##### **QC Sample Designation**

The following sample analyzed with this SDG was chosen for matrix spike analysis:  
67608005      059856-002

##### **MS Recovery Statement**

The matrix spike recoveries for this SDG were within the established acceptance limits.

##### **MSD Recovery Statement**

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

##### **MS/MSD RPD Statement**

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

##### **Internal Standard (ISTD) Acceptance**

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

#### **Technical Information:**

##### **Holding Time Specifications**

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

##### **Preparation/Analytical Method Verification**

All procedures were performed as stated in the SOP.

**Sample Dilutions**

None of the samples analyzed in this SDG required dilution.

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

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

**Manual Integrations**

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

**System Configuration**

The laboratory utilizes a HP 6890 Series gas chromatograph and a HP 5973 Mass Selective Detector. The configuration is equipped with the electronic pressure control. All MS interfaces are capillary direct.

**Chromatographic Columns**

Chromatographic separation of semivolatile components is accomplished through analysis on one or more of the following columns (all with dimensions of 30 meters x 0.25 millimeters ID and 0.25 micron film except J&W DB-5MS2 which is 25 meters x 0.20 mm ID and 0.33 micron film):

Column ID	Column Description
J&W	DB-5.625(5% Phenyl)-methylpolysiloxane (identified by a DB-5.625 designation on quantitation reports and reconstructed ion chromatograms)
J&W DB-5MS	Similar to the J&W DB-5.625 with low bleed characteristics (identified by a DB-5MS designation)
Alltech	EC-5 (SE-54) 5% Phenyl, 95% Methylpolysiloxane (identified by a HP-5MS designation)
HP	HP-5MS 5% Phenylmethylsiloxane (identified by a HP-5MS designation)
Phenomenex	ZB-5 5% Phenyl Polysiloxane (identified by a ZB-5 designation)
J&W DB-5MS2	Similar to the J&W DB-5.625 with low bleed characteristics (identified by a DB-5MS2 designation)

**Instrument Configuration**

The samples reported in this SDG were analyzed on one or more of the following instrument systems. Instrument systems are referenced in the raw data and individual form headers by the Instrument ID designations listed below:

Instrument ID	System Configuration	Chromatographic Column
MSD2	HP6890/HP5973	DB-5MS2

MSD4	HP6890/HP5973	DB-5MS2
MSD5	HP6890/HP5973	DB-5MS2
MSD7	HP6890/HP5973	DB-5MS2
MSD8	HP6890/HP5973	DB-5MS2

**Certification Statement**

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

**Review Validation:**

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

Reviewer: Grin Haubert Date: 10/21/02

## QC Summary

Report Date: October 21, 2002  
Page 1 of 4

Client : Sandia National Laboratories  
MS-0756  
P.O. Box 5800  
Albuquerque, New Mexico  
Contact: Pamela M. Puissant  
Workorder: 67608

Paramname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analst	Date Time
Semi-Volatiles-GC/MS Federal										
Batch 204261										
QC1200307305 LCS										
1,2,4-Trichlorobenzene	50.0			41.1	ug/L		82	(53%-104%)	EHI	09/30/02 17:04
1,4-Dichlorobenzene	50.0			41.3	ug/L		83	(47%-102%)		
2,4,5-Trichlorophenol	100			84.6	ug/L		85	(67%-106%)		
2,4,6-Trichlorophenol	100			82.9	ug/L		83	(45%-111%)		
2,4-Dinitrotoluene	50.0			50.9	ug/L		102	(55%-121%)		
2-Chlorophenol	100			75.7	ug/L		76	(47%-87%)		
4-Chloro-3-methylphenol	100			91.2	ug/L		91	(51%-100%)		
4-Nitrophenol	100			38.2	ug/L		38	(10%-55%)		
Acenaphthene	50.0			45.9	ug/L		92	(63%-111%)		
Hexachlorobenzene	50.0			45.8	ug/L		92	(67%-114%)		
Hexachlorobutadiene	50.0			41.0	ug/L		82	(44%-106%)		
Hexachloroethane	50.0			41.4	ug/L		83	(47%-97%)		
N-Nitrosodipropylamine	50.0			48.0	ug/L		96	(52%-118%)		
Nitrobenzene	50.0			44.4	ug/L		89	(49%-110%)		
Pentachlorophenol	100			85.1	ug/L		85	(31%-110%)		
Phenol	100			33.1	ug/L		33	(16%-44%)		
Pyrene	50.0			50.2	ug/L		100	(58%-117%)		
m,p-Cresols	100			70.2	ug/L		70	(43%-100%)		
o-Cresol	100			72.8	ug/L		73	(47%-87%)		
**2,4,6-Tribromophenol	100			85.7	ug/L		86	(27%-126%)		
**2-Fluorobiphenyl	50.0			39.6	ug/L		79	(32%-109%)		
**2-Fluorophenol	100			47.2	ug/L		47	(13%-73%)		
**Nitrobenzene-d5	50.0			39.6	ug/L		79	(33%-107%)		
**Phenol-d5	100			31.6	ug/L		32	(14%-66%)		
**p-Terphenyl-d14	50.0			42.4	ug/L		85	(36%-130%)		
QC1200307304 MB										
1,2,4-Trichlorobenzene			U	ND	ug/L					09/30/02 16:43
1,2-Dichlorobenzene			U	ND	ug/L					
1,3-Dichlorobenzene			U	ND	ug/L					
1,4-Dichlorobenzene			U	ND	ug/L					
2,4,5-Trichlorophenol			U	ND	ug/L					
2,4,6-Trichlorophenol			U	ND	ug/L					
2,4-Dichlorophenol			U	ND	ug/L					
2,4-Dimethylphenol			U	ND	ug/L					
2,4-Dinitrophenol			U	ND	ug/L					
2,4-Dinitrotoluene			U	ND	ug/L					
2,6-Dinitrotoluene			U	ND	ug/L					
2-Chloronaphthalene			U	ND	ug/L					
2-Chlorophenol			U	ND	ug/L					
2-Methyl-4,6-dinitrophenol			U	ND	ug/L					
2-Methylnaphthalene			U	ND	ug/L					
2-Nitrophenol			U	ND	ug/L					

## QC Summary

Workorder: 67608

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-GC/MS Federal											
Batch 204261											
3,3'-Dichlorobenzidine			U	ND	ug/L						
4-Bromophenylphenylether			U	ND	ug/L						
4-Chloro-3-methylphenol			U	ND	ug/L						
4-Chloroaniline			U	ND	ug/L						
4-Chlorophenylphenylether			U	ND	ug/L						
4-Nitrophenol			U	ND	ug/L						
Acenaphthene			U	ND	ug/L						
Acenaphthylene			U	ND	ug/L						
Anthracene			U	ND	ug/L						
Benzo(a)anthracene			U	ND	ug/L						
Benzo(a)pyrene			U	ND	ug/L						
Benzo(b)fluoranthene			U	ND	ug/L						
Benzo(ghi)perylene			U	ND	ug/L						
Benzo(k)fluoranthene			U	ND	ug/L						
Butylbenzylphthalate			U	ND	ug/L						
Carbazole			U	ND	ug/L						
Chrysene			U	ND	ug/L						
Di-n-butylphthalate			U	ND	ug/L						
Di-n-octylphthalate			U	ND	ug/L						
Dibenzo(a,h)anthracene			U	ND	ug/L						
Dibenzofuran			U	ND	ug/L						
Diethylphthalate			U	ND	ug/L						
Dimethylphthalate			U	ND	ug/L						
Diphenylamine			U	ND	ug/L						
Fluoranthene			U	ND	ug/L						
Fluorene			U	ND	ug/L						
Hexachlorobenzene			U	ND	ug/L						
Hexachlorobutadiene			U	ND	ug/L						
Hexachlorocyclopentadiene			U	ND	ug/L						
Hexachloroethane			U	ND	ug/L						
Indeno(1,2,3-cd)pyrene			U	ND	ug/L						
Isophorone			U	ND	ug/L						
N-Nitrosodipropylamine			U	ND	ug/L						
Naphthalene			U	ND	ug/L						
Nitrobenzene			U	ND	ug/L						
Pentachlorophenol			U	ND	ug/L						
Phenanthrene			U	ND	ug/L						
Phenol			U	ND	ug/L						
Pyrene			U	ND	ug/L						
bis(2-Chloroethoxy)methane			U	ND	ug/L						
bis(2-Chloroethyl) ether			U	ND	ug/L						
bis(2-Chloroisopropyl)ether			U	ND	ug/L						
bis(2-Ethylhexyl)phthalate			U	ND	ug/L						
m,p-Cresols			U	ND	ug/L						
m-Nitroaniline			U	ND	ug/L						
o-Cresol			U	ND	ug/L						
o-Nitroaniline			U	ND	ug/L						
p-Nitroaniline			U	ND	ug/L						



## QC Summary

Workorder: 67608

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlyt	Date	Time
Semi-Volatiles-GC/MS Federal											
Batch 204261											
**2,4,6-Tribromophenol	100			69.1	ug/L		69	(27%-126%)			
**2-Fluorobiphenyl	50.0			37.3	ug/L		75	(32%-109%)			
**2-Fluorophenol	100			47.6	ug/L		48	(13%-73%)			
**Nitrobenzene-d5	50.0			43.1	ug/L		86	(33%-107%)			
**Phenol-d5	100			32.5	ug/L		33	(14%-66%)			
**p-Terphenyl-d14	50.0			42.4	ug/L		85	(36%-130%)			
QC1200307306 67608005 MS											
1,2,4-Trichlorobenzene	100	U	ND	80.2	ug/L		80	(44%-102%)		09/30/02	17:45
1,4-Dichlorobenzene	100	U	ND	74.0	ug/L		74	(48%-95%)			
2,4,5-Trichlorophenol	200	U	ND	152	ug/L		76				
2,4,6-Trichlorophenol	200	U	ND	153	ug/L		77				
2,4-Dinitrotoluene	100	U	ND	88.5	ug/L		89	(48%-120%)			
2-Chlorophenol	200	U	ND	139	ug/L		70	(32%-98%)			
4-Chloro-3-methylphenol	200	U	ND	171	ug/L		85	(40%-107%)			
4-Nitrophenol	200	U	ND	101	ug/L		50	(16%-78%)			
Acenaphthene	100	U	ND	84.6	ug/L		85	(32%-127%)			
Hexachlorobenzene	100	U	ND	80.0	ug/L		80				
Hexachlorobutadiene	100	U	ND	79.1	ug/L		79				
Hexachloroethane	100	U	ND	77.0	ug/L		77				
N-Nitrosodipropylamine	100	U	ND	88.9	ug/L		89	(44%-119%)			
Nitrobenzene	100	U	ND	80.5	ug/L		81				
Pentachlorophenol	200	U	ND	150	ug/L		75	(44%-104%)			
Phenol	200	U	ND	85.8	ug/L		43	(15%-70%)			
Pyrene	100	U	ND	87.0	ug/L		87	(29%-142%)			
m,p-Cresols	200	U	ND	146	ug/L		73				
o-Cresol	200	U	ND	148	ug/L		74				
**2,4,6-Tribromophenol	200		62.5	156	ug/L		78	(27%-126%)			
**2-Fluorobiphenyl	100		32.4	72.3	ug/L		72	(32%-109%)			
**2-Fluorophenol	200		34.6	103	ug/L		52	(13%-73%)			
**Nitrobenzene-d5	100		34.5	72.6	ug/L		73	(33%-107%)			
**Phenol-d5	200		23.4	82.7	ug/L		41	(14%-66%)			
**p-Terphenyl-d14	100		33.4	71.7	ug/L		72	(36%-130%)			
QC1200307307 67608005 MSD											
1,2,4-Trichlorobenzene	100	U	ND	87.0	ug/L	8	87	(0%-20%)		09/30/02	18:06
1,4-Dichlorobenzene	100	U	ND	82.2	ug/L	11	82	(0%-20%)			
2,4,5-Trichlorophenol	200	U	ND	169	ug/L	10	84				
2,4,6-Trichlorophenol	200	U	ND	159	ug/L	4	79				
2,4-Dinitrotoluene	100	U	ND	95.3	ug/L	7	95	(0%-16%)			
2-Chlorophenol	200	U	ND	152	ug/L	8	76	(0%-25%)			
4-Chloro-3-methylphenol	200	U	ND	184	ug/L	8	92	(0%-25%)			
4-Nitrophenol	200	U	ND	116	ug/L	14	58	(0%-25%)			
Acenaphthene	100	U	ND	91.7	ug/L	8	92	(0%-24%)			
Hexachlorobenzene	100	U	ND	86.0	ug/L	7	86				
Hexachlorobutadiene	100	U	ND	85.8	ug/L	8	86				
Hexachloroethane	100	U	ND	83.8	ug/L	8	84				
N-Nitrosodipropylamine	100	U	ND	92.1	ug/L	4	92	(0%-20%)			
Nitrobenzene	100	U	ND	86.4	ug/L	7	86				
Pentachlorophenol	200	U	ND	156	ug/L	4	78	(0%-17%)			

## QC Summary

Workorder: 67608

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Paramname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-GC/MS Federal											
Batch 204261											
Phenol	200	U	ND	91.9	ug/L	7	46	(0%-29%)			
Pyrene	100	U	ND	90.1	ug/L	3	90	(0%-30%)			
m,p-Cresols	200	U	ND	156	ug/L	7	78				
o-Cresol	200	U	ND	159	ug/L	7	80				
**2,4,6-Tribromophenol	200		62.5	171	ug/L		86	(27%-126%)			
**2-Fluorobiphenyl	100		32.4	77.6	ug/L		78	(32%-109%)			
**2-Fluorophenol	200		34.6	110	ug/L		55	(13%-73%)			
**Nitrobenzene-d5	100		34.5	77.3	ug/L		77	(33%-107%)			
**Phenol-d5	200		23.4	88.9	ug/L		45	(14%-66%)			
**p-Terphenyl-d14	100		33.4	76.3	ug/L		76	(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 1
- \*\* 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.

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 Narrative  
Sandia National Labs (SNLS)  
SDG 67601**

**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:** 204142

**Prep Batch Number:** 204140

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
67601013	059813-002
67601014	059814-002
67601015	059815-002
67601016	059816-002
67601017	059917-002
67601018	059918-002
67601019	059919-002
67601020	059920-002
67601021	059921-002
67601022	059922-002

67601023	059923-002
67601024	059924-002
1200306979	XBLK01 (Blank)
1200306980	XBLK01 LCS (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 were within the established acceptance limits.

### **QC Sample Designation**

A matrix spike was performed on a client sample in SDG 67473.

### **MS Recovery Statement**

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

### **MSD Recovery Statement**

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

### **MS/MSD RPD Statement**

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

## **Technical Information**

### **Holding Time Specifications**

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

### **Preparation/Analytical Method Verification**

All procedures were performed as stated in the SOP.

**Sample Dilutions**

None of the samples in this SDG required dilutions.

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

No nonconformance report (NCR) has been generated for this SDG.

**Manual Integrations**

Some initial calibration standards, continuing calibration standards, and/or samples required manual integrations due to software limitations..

**Additional Comments**

The Form 8 uses the retention time of the surrogate as a measure of how close the retention time of the samples and QC are to a standard component. The Instrument Blank does not contain the surrogate.

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: *Heather M. Mauer*

Date: *10/21/02*

## QC Summary

Report Date: October 21, 2002

Page 1 of 2

Client : Saudi National Laboratories  
 MS-0756  
 P.O. Box 5800  
 Albuquerque, New Mexico  
 Contact: Pamela M. Pulsant  
 Workorder: 67601

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analst	Date	Time
HPLC Explosives Federal											
Batch 204142											
QC1200306980	LCS										
1,3,5-Trinitrobenzene	800			832	ug/kg		104	(77%-124%)	JLW	10/03/02	12:40
2,4,6-Trinitrotoluene	800			828	ug/kg		104	(80%-120%)			
2,4-Dinitrotoluene	800			812	ug/kg		101	(77%-122%)			
2,6-Dinitrotoluene	800			899	ug/kg		112	(74%-121%)			
2-Amino-4,6-dinitrotoluene	800			862	ug/kg		108	(81%-125%)			
4-Amino-2,6-dinitrotoluene	800			869	ug/kg		109	(79%-123%)			
HMX	800			890	ug/kg		111	(84%-131%)			
Nitrobenzene	800			775	ug/kg		97	(75%-125%)			
RDX	800			863	ug/kg		108	(80%-123%)			
Tetryl	800			836	ug/kg		105	(65%-124%)			
m-Dinitrobenzene	800			812	ug/kg		102	(77%-124%)			
m-Nitrotoluene	800			771	ug/kg		96	(77%-117%)			
o-Nitrotoluene	800			771	ug/kg		96	(75%-119%)			
p-Nitrotoluene	800			786	ug/kg		98	(76%-121%)			
*1,2-dinitrobenzene	400			351	ug/kg		88	(71%-118%)			
QC1200306979	MB										
1,3,5-Trinitrobenzene			U	ND	ug/kg					10/03/02	03:27
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			383	ug/kg		96	(71%-118%)			
QC1200306981	67473007 MS										
1,3,5-Trinitrobenzene	800	U	ND	840	ug/kg		105	(66%-133%)		10/03/02	04:52
2,4,6-Trinitrotoluene	800	U	ND	858	ug/kg		107	(77%-132%)			
2,4-Dinitrotoluene	800	U	ND	812	ug/kg		101	(61%-134%)			
2,6-Dinitrotoluene	800	U	ND	862	ug/kg		108	(70%-121%)			
2-Amino-4,6-dinitrotoluene	800	U	ND	820	ug/kg		103	(79%-124%)			
4-Amino-2,6-dinitrotoluene	800	U	ND	672	ug/kg		84	(71%-120%)			
HMX	800	U	ND	870	ug/kg		109	(75%-138%)			
Nitrobenzene	800	U	ND	776	ug/kg		97	(72%-120%)			
RDX	800	U	ND	793	ug/kg		99	(61%-136%)			
Tetryl	800	U	ND	713	ug/kg		89	(65%-135%)			

## QC Summary

Workorder: 67601

Page 2 of 2

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analst	Date Time
HPLC Explosives Federal										
Batch 204142										
m-Dinitrobenzenc	800	U	ND	849	ug/kg		106	(75%-125%)		
m-Nitrotoluene	800	U	ND	801	ug/kg		100	(73%-116%)		
o-Nitrotoluene	800	U	ND	785	ug/kg		98	(68%-122%)		
p-Nitrotoluene	800	U	ND	807	ug/kg		101	(67%-125%)		
**1,2-dinitrobenzene	400		381	386	ug/kg		96	(71%-118%)		
QC1200806982 67473007 MSD										
1,3,5-Trinitrobenzene	800	U	ND	810	ug/kg	4	101	(0%-20%)		10/03/02 05:34
2,4,6-Trinitrotoluene	800	U	ND	828	ug/kg	3	104	(0%-20%)		
2,4-Dinitrotoluene	800	U	ND	777	ug/kg	4	97	(0%-24%)		
2,6-Dinitrotoluene	800	U	ND	808	ug/kg	7	101	(0%-21%)		
2-Amino-4,6-dinitrotoluene	800	U	ND	808	ug/kg	1	101	(0%-20%)		
4-Amino-2,6-dinitrotoluene	800	U	ND	803	ug/kg	18	100	(0%-20%)		
HMX	800	U	ND	839	ug/kg	4	105	(0%-38%)		
Nitrobenzene	800	U	ND	741	ug/kg	5	93	(0%-21%)		
RDX	800	U	ND	790	ug/kg	0	99	(0%-35%)		
Tetryl	800	U	ND	640	ug/kg	11	80	(0%-30%)		
m-Dinitrobenzenc	800	U	ND	814	ug/kg	4	102	(0%-23%)		
m-Nitrotoluene	800	U	ND	751	ug/kg	6	94	(0%-20%)		
o-Nitrotoluene	800	U	ND	752	ug/kg	4	94	(0%-23%)		
p-Nitrotoluene	800	U	ND	762	ug/kg	6	95	(0%-22%)		
**1,2-dinitrobenzene	400		381	380	ug/kg		95	(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 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. 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.



**HPLC Narrative  
Sandia National Labs (SNLS)  
SDG 67601-1**

**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:** 204151

**Prep Batch Number:** 204149

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
67608007	059856-004
1200307003	XBLK01 (Blank)
1200307004	XBLK01 LCS (Laboratory Control Sample)
1200307005	059856-004MS (Matrix Spike)

**System Configuration**

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

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

### **Chromatographic Columns**

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

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

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

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

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

### **Preparation/Analytical Method Verification**

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

### **Calibration Information**

#### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

#### **CCV Requirements**

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

### **Quality Control (QC) Information**

#### **Surrogate Recoveries**

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

#### **Blank Acceptance**

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

**LCS Recovery Statement**

The LCS failed to meet acceptance criteria. There was not enough sample left to perform a reextraction. Please see nonconformance report 5220.

**QC Sample Designation**

The following sample analyzed with this SDG was chosen for matrix spike analysis: 67608007 (059856-004).

**MS Recovery Statement**

One or more of the required spiking analytes were not within the acceptance limits in the matrix spike (MS).

**MSD Recovery Statement**

There was only enough sample provided for one matrix spike.

**Technical Information****Holding Time Specifications**

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

**Preparation/Analytical Method Verification**

All procedures were performed as stated in the SOP.

**Sample Dilutions**

None of the samples in this SDG required dilutions.

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

Nonconformance report 5220 was generated for this SDG.

The LCS failed to meet acceptance criteria. There was not enough sample left to perform a reextraction. Please see nonconformance report 5220.

**Manual Integration**

Some initial calibration standards, continuing calibration standards, and/or samples required manual integrations due to software limitations.

### **Additional Comments**

The Form 8 uses the retention time of the surrogate as a measure of how close the retention time of the samples and QC are to a standard component. The Instrument Blank does not contain the surrogate.

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: Nickie H. Mares Date: 10/07/02

## QC Summary

Report Date: October 7, 2002  
Page 1 of 2

Client : Sandia National Laboratories  
MS-0756  
P.O. Box 5800  
Albuquerque, New Mexico  
Contact: Pamela M. Puissant  
Workorder: 67608

Parameter	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
BPLC Explosives Federal										
Batch 204151										
QC1200307004 LCS										
1,3,5-Trinitrobenzene	1.04			1.11	ug/L		107	(84%-110%)	JLW	09/30/02 15:11
2,4,6-Trinitrotoluene	1.04			1.10	ug/L		106	(85%-110%)		
2,4-Dinitrotoluene	1.04			0.866	ug/L		83	(78%-110%)		
2,6-Dinitrotoluene	1.04			0.767	ug/L		74*	(79%-110%)		
2-Amino-4,6-dinitrotoluene	1.04			1.16	ug/L		112*	(77%-110%)		
4-Amino-2,6-dinitrotoluene	1.04			1.04	ug/L		100	(59%-110%)		
HMX	1.04			1.08	ug/L		104	(86%-110%)		
Nitrobenzene	1.04			0.520	ug/L		50*	(68%-110%)		
RDX	1.04			1.14	ug/L		110	(76%-110%)		
Tetryl	1.04			1.02	ug/L		98	(73%-110%)		
m-Dinitrobenzene	1.04			0.760	ug/L		73*	(76%-110%)		
m-Nitrotoluene	1.04			0.536	ug/L		52*	(73%-110%)		
o-Nitrotoluene	1.04			0.537	ug/L		52*	(69%-110%)		
p-Nitrotoluene	1.04			0.539	ug/L		52*	(73%-110%)		
**1,2-dinitrobenzene	0.519			0.388	ug/L		75	(59%-118%)		
QC1200307003 MB										
1,3,5-Trinitrobenzene			U	ND	ug/L					09/30/02 14:29
2,4,6-Trinitrotoluene			U	ND	ug/L					
2,4-Dinitrotoluene			U	ND	ug/L					
2,6-Dinitrotoluene			U	ND	ug/L					
2-Amino-4,6-dinitrotoluene			U	ND	ug/L					
4-Amino-2,6-dinitrotoluene			U	ND	ug/L					
HMX			U	ND	ug/L					
Nitrobenzene			U	ND	ug/L					
RDX			U	ND	ug/L					
Tetryl			U	ND	ug/L					
m-Dinitrobenzene			U	ND	ug/L					
m-Nitrotoluene			U	ND	ug/L					
o-Nitrotoluene			U	ND	ug/L					
p-Nitrotoluene			U	ND	ug/L					
**1,2-dinitrobenzene	0.519			0.348	ug/L		67	(59%-118%)		
QC1200307005 67608007 MS										
1,3,5-Trinitrobenzene	1.04	U	ND	1.13	ug/L		108	(62%-121%)		09/30/02 15:53
2,4,6-Trinitrotoluene	1.04	U	ND	1.14	ug/L		110	(56%-137%)		
2,4-Dinitrotoluene	1.04	U	ND	1.10	ug/L		106	(69%-118%)		
2,6-Dinitrotoluene	1.04	U	ND	1.12	ug/L		108	(63%-123%)		
2-Amino-4,6-dinitrotoluene	1.04	U	ND	1.17	ug/L		113	(60%-133%)		
4-Amino-2,6-dinitrotoluene	1.04	U	ND	1.11	ug/L		107	(50%-121%)		
HMX	1.04	U	ND	1.13	ug/L		108	(66%-131%)		
Nitrobenzene	1.04	U	ND	1.01	ug/L		97	(61%-106%)		
RDX	1.04	U	ND	1.10	ug/L		106	(52%-135%)		
Tetryl	1.04	U	ND	1.32	ug/L		127*	(52%-124%)		

## QC Summary

Workorder: 67608

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Parma name	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC Explosives Federal											
Batch: 204151											
m-Dinitrobenzene	1.04	U	ND	1.10	ug/L	106		(64%-117%)			
m-Nitrotoluene	1.04	U	ND	1.05	ug/L	101		(56%-129%)			
o-Nitrotoluene	1.04	U	ND	1.07	ug/L	103		(58%-122%)			
p-Nitrotoluene	1.04	U	ND	1.07	ug/L	103		(65%-116%)			
**1,2-dinitrobenzene	0.519		0.488	0.525	ug/L	101		(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.

**PCB Case Narrative  
Sandia National Labs (SNLS)  
SDG 67601**

**Method/Analysis Information**

**Procedure:** Polychlorinated Biphenyls by Method 8082  
**Analytical Method:** SW846 8082  
**Prep Method:** SW846 3550B  
**Analytical Batch Number:** 203728  
**Prep Batch Number:** 203727

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
67601013	059813-002
67601014	059814-002
67601015	059815-002
67601016	059816-002
67601017	059917-002
67601018	059918-002
67601019	059919-002
67601020	059920-002
67601021	059921-002
67601022	059922-002
67601023	059923-002
67601024	059924-002
1200305887	PBLK01(Method Blank)
1200305888	PBLK01LCS(Laboratory Control Sample)

**SNLS SDG#67601 - PCB**

1200305889

059813-002MS(Matrix Spike)

1200305890

059813-002MSD(Matrix Spike Duplicate)

**System Configuration****Chromatographic Columns**

Column ID	Column Description
J&W1	DB-5(5%-Phenyl)-methylsiloxane 30m x 0.53mm x 1.5um DB-608 Durabond stationary phase* 30m x 0.53mm x 0.5um
J&W2	DB-5(5%-Phenyl)-methylsiloxane 30m x 0.32mm x 1.0um DB-1701 Durabond stationary phase* 30m x 0.32mm x 0.5um
J&W3	DB-5(5%-Phenyl)-methylsiloxane 30m x 0.53mm x 1.5um DB-1701(14% Cyanopropylphenyl)-methylsiloxane 30m x 0.53mm x 0.5um
J&W4	DB-608 Durabond stationary phase* 30m x 0.53mm x .83um DB-XLB* 30m x 0.53mm x 1.5um
J&W5	DB-XLB* 30m x 0.25mm x 0.25um DB-17MS(50%-Phenyl)-methylsiloxane 30m x 0.25mm x 0.25um
J&W6	DB-5(5%-Phenyl)-methylsiloxane 30m x 0.25mm x 0.25um DB-17MS(50%-Phenyl)-methylsiloxane 30m x 0.25mm x 0.25um
RESTEK	Rtx-CLPesticides 30m x 0.25mm x 0.25um Rtx-CLPesticides II 30m x 0.25mm x 0.20um

\* Durabond and DB-XLB are trademarks of J &amp; 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#67601 - PCB

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**Preparation/Analytical Method Verification**

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

**Calibration Information****Initial Calibration**

All initial calibration requirements have been met for this SDG.

**CCV Requirements**

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

**Quality Control (QC) Information****Surrogate Recoveries**

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

**Blank Acceptance**

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

**LCS Recovery Statement**

The Laboratory Control Sample (LCS) spike recoveries for this SDG were within the established acceptance limits.

**QC Sample Designation**

The following sample was selected for the PCB method QC:

<u>Client Sample ID#</u>	<u>Laboratory Sample ID#</u>
059813-002	67601013

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 were required dilution.

#### **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 samples required manual integrations to correctly position the baseline as set in the calibration standard injections. If manual integrations are performed, copies of all manual integration peak profiles will be included in the raw data section of this package.

#### **Additional Comments**

The additional comments field is used to address special issues associated with each analysis, clarify method/contractual issues pertaining to the analysis and to list any report documents generated as a result of sample analysis or review. The following additional comments were required for this sample set:

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

### **Certification Statement**

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

**Review Validation:**

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

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

Reviewer: Juni Cao Date: 10/18/02

## QC Summary

Report Date: October 18, 2002  
Page 1 of 2

Client : Sandia National Laboratories  
MS-0756  
P.O. Box 5800  
Albuquerque, New Mexico  
Contact: Pamela M. Puissant  
Workorder: 67601

Parmsame	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlist	Date	Time
Semi-Volatiles-PCB Federal											
Batch	203728										
QC1200305888	LCS										
Aroclor-1260	33.3			30.0	ug/kg		90	(48%-116%)	GH1	09/30/02	09:56
**4cmx	6.67			5.08	ug/kg		76	(31%-120%)			
**Decachlorobiphenyl	6.67			5.68	ug/kg		85	(34%-115%)			
QC1200305887	MB										
Aroclor-1016			U	ND	ug/kg					09/30/02	09:44
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			4.96	ug/kg		74	(31%-120%)			
**Decachlorobiphenyl	6.67			5.56	ug/kg		83	(34%-115%)			
QC1200305889	67601013	MS									
Aroclor-1260	33.3	7.80		35.1	ug/kg		82	(36%-134%)		09/30/02	10:21
**4cmx	6.67			4.76	ug/kg		71	(31%-120%)			
**Decachlorobiphenyl	6.67			5.21	ug/kg		78	(34%-115%)			
QC1200305890	67601013	MSD									
Aroclor-1260	33.3	7.80		37.5	ug/kg	8	89	(0%-30%)		09/30/02	10:33
**4cmx	6.67			4.83	ug/kg		73	(31%-120%)			
**Decachlorobiphenyl	6.67			5.43	ug/kg		81	(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 f
- \*\* 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: 67601

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Paramname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Asst	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.

**PCB Case Narrative  
Sandia National Labs (SNLS)  
SDG# 67601-1**

**Method/Analysis Information**

**Procedure:** Polychlorinated Biphenyls by Method 8082  
**Analytical Method:** SW846 8082  
**Prep Method:** SW846 3510C  
**Analytical Batch Number:** 203726  
**Prep Batch Number:** 203725

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
67608006	059856-003
1200305883	PBLK01(Method Blank)
1200305884	PBLK01LCS(Laboratory Control Sample)

**System Configuration**

**Chromatographic Columns**

<b>Column ID</b>	<b>Column Description</b>
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

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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.

<b>Instrument ID</b>	<b>System Configuration</b>	<b>Chromatographic Column</b>
ECD1	HP 6890 Series GC ECD/ECD	RESTEK
ECD2	HP 6890 Series GC ECD/ECD	RESTEK
ECD3	HP 6890 Series GC ECD/ECD	RESTEK
ECD4	HP 5890 Series II Plus GC ECD/ECD	J&W5
ECD5	HP 6890 Series GC ECD/ECD	J&W5
ECD7	HP 6890 Series GC ECD/ECD	J&W5
ECD8	HP 6890 Series GC ECD/ECD	RESTEK

### **Preparation/Analytical Method Verification**

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

### **Calibration Information**

#### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

#### **CVS Requirements**

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

### **Quality Control (QC) Information**

#### **Surrogate Recoveries**

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

#### **Blank Acceptance**

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

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### **LCS Recovery Statement**

The Laboratory Control Sample (LCS) spike recoveries for this SDG were within the established acceptance limits.

### **QC Sample Designation**

The MS and MSD were analyzed on a sample contained in another SNLS SDG (67554).

### **MSD Recovery Statement**

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

### **MS/MSD RPD Statement**

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

### **Technical Information**

#### **Holding Time Specifications**

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

#### **Preparation/Analytical Method Verification**

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

#### **Sample Dilutions**

None of the samples in this SDG was required dilution.

#### **Sample Re-prep/Re-analysis**

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

### **Miscellaneous Information**

#### **Nonconformance (NCR) Documentation**

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

#### **Manual Integrations**

Certain standards and samples required manual integrations to correctly position the baseline as set in the calibration standard injections. If manual integrations are performed, copies of all manual integration peak profiles will be included in the raw data section of this package.

#### **Additional Comments**

The additional comments field is used to address special issues associated with each analysis, clarify

SNLS SDG#67601-1- PCB



method/contractual issues pertaining to the analysis and to list any report documents generated as a result of sample analysis or review. The following additional comments were required for this sample set:

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

**Certification Statement**

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

**Review Validation:**

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

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

Reviewer: Jim Cao Date: 10/18/02

## QC Summary

Report Date: October 16, 2002  
Page 1 of 2

Client : Sandia National Laboratories  
MS-0756  
P.O. Box 5900  
Albuquerque, New Mexico  
Contact: Pamela M. Puissant  
Workorder: 67698

Parent Name	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anst	Date	Time
Semi-Volatiles-PCB Federal											
Batch 203726											
QC1200305884 LCS											
Aroclor-1260	1.00			0.860	ug/L		86	(47%-131%)	GH1	09/25/02	15:40
**4cmx	0.200			0.150	ug/L		75	(34%-116%)			
**Decachlorobiphenyl	0.200			0.153	ug/L		76	(21%-122%)			
QC1200305883 MB											
Aroclor-1016			U	ND	ug/L					09/25/02	15:28
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			0.142	ug/L		71	(34%-116%)			
**Decachlorobiphenyl	0.200			0.158	ug/L		79	(21%-122%)			
QC1200305885 67554002 MS											
Aroclor-1260	1.00	U	ND	0.490	ug/L		49	(21%-113%)		09/25/02	16:04
4cmx	0.200		0.121	0.111	ug/L		56	(34%-116%)			
**Decachlorobiphenyl	0.200		0.0572	0.064	ug/L		32	(21%-122%)			
QC1200305886 67554002 MSD											
Aroclor-1260	1.00	U	ND	0.520	ug/L	6	52	(0%-30%)		09/25/02	16:16
**4cmx	0.200		0.121	0.121	ug/L		61	(34%-116%)			
**Decachlorobiphenyl	0.200		0.0572	0.0664	ug/L		33	(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 v
- \*\* 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: 67608

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Partname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anst	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.

**Inorganic Case Narrative for  
Sandia National Laboratory  
SDG# 67601**

**Sample Analysis:**

The following samples were prepared and analyzed using the methods referenced in the "Method/Analysis Information" section of this narrative:

<b>Sample ID</b>	<b>Client ID</b>
67601013	059813-002
67601014	059814-002
67601015	059815-002
67601016	059816-002
67601017	059917-002
67601018	059918-002
67601019	059919-002
67601020	059920-002
67601021	059921-002
67601022	059922-002
67601023	059923-002
67601024	059924-002
1200306108	Method Blank (MB) ICP
1200306112	Laboratory Control Sample (LCS)
1200307690	Method Blank (MB) CVAA
1200307693	Laboratory Control Sample (LCS)
1200307691	059813-002D (67601013) Sample Duplicate (DUP)
1200307692	059813-002S (67601013) Matrix Spike (MS)

**Method/Analysis Information:**

<b>Analytical Batch:</b>	203818, 204433
<b>Prep Batch :</b>	203817, 204432
<b>Standard Operating Procedures:</b>	GL-MA-E-013 REV.6, GL-MA-E-010 REV.10
<b>Analytical Method:</b>	SW846 6010B, SW846 7471A
<b>Prep Method :</b>	SW846 3050B, SW846 7471A Prep

**System Configuration**

The ICP analysis was performed on a Thermo Jarrell Ash 61E Trace axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with a Meinhardt nebulizer, cyclonic spray chamber, and yttrium internal standard. Operating conditions for the Trace ICP are set at a power level of 950 watts. The instrument has a peristaltic pump flow rate of 140 RPM (2.0 mL/min sample uptake rate), argon gas flows of 15 L/min and 0.5 L/min for the torch and auxiliary gases, and a pressure setting of 26 PSI for the nebulizer.

Mercury analysis was performed on a Perkin-Elmer Flow Injection Mercury System (FIMS-400) automated mercury analyzer. The instrument consists of a cold vapor atomic absorption spectrometer set to detect mercury at a wavelength of 254 nm. Sample introduction through the flow injection system is performed via a peristaltic pump at 9 mL/min and nitrogen carrier gas rate of 5 L/min.

**Sample Preparation**

All samples were prepared in accordance with the referenced SW-846 procedures.

### **Calibration Information:**

#### **Initial Calibration**

Instrument calibrations are conducted using method and instrument manufacturer's specifications. All initial calibration requirements have been met for this analysis.

#### **CRDL Requirements**

All CRDL standards met the referenced advisory control limits.

#### **Continuing Calibration (CCV) Requirements**

All CCV standards bracketing this SDG met the established recovery acceptance criteria.

#### **Continuing Calibration Blanks (CCB) Requirements**

All continuing calibration blanks (CCB) bracketing this SDG met the established acceptance criteria.

#### **ICSA/ICSAB Requirements**

All interference check standard (ICSA and ICSAB) elements associated with this SDG met the established acceptance criteria.

### **Quality Control (QC) Information:**

#### **Method Blank Acceptance**

The preparation blanks analyzed with this SDG did not contain analytes of interest at concentrations greater than the required detection limits (RDL).

#### **LCS Recovery Statement**

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

#### **QC Sample Designation**

Sample 67473007 from SNLS SDG 67473 was designated as the quality control sample for the ICP batch. Sample 059813-002 (67601013) was designated as the quality control sample for the CVAA batch. Each batch included a sample duplicate (DUP) and a matrix spike (MS). The ICP batch included a serial dilution (SD).

#### **MS Recovery Statement**

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

#### **RPD Statement**

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

#### **Serial Dilution % Difference Statement**

The serial dilution is used to assess interference caused by matrix suppression or enhancement. Raw element concentrations that are at least 50X the instrument detection limit (IDL) for ICP analyses are applicable for serial dilution assessment. All applicable analytes met the acceptance criteria.

**Technical Information:**

**Holding Time Specifications**

All samples were analyzed within the specified holding times.

**Sample Dilutions**

Dilutions are performed to minimize matrix interference resulting from elevated mineral element concentrations and/or to bring over range target analyte concentrations into the linear calibration range of the instruments. The samples were diluted the standard 2x for soils on the ICP. No dilutions were required for the CVAA analysis.

**Miscellaneous Information:**

**NCR Documentation**

Nonconformance reports are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. No NCR's were issued for this SDG.

**Additional Comments**

The additional comments field is used to address special issues associated with each analysis, clarify method/contractual issues pertaining to the analysis and to list any report documents generated as a result of sample analysis or review. Additional comments were not required for this SDG.

**Review/Validation:**

GEL requires all analytical data to be verified by a qualified data validator.

The following data validator verified the data presented in this SDG:

Reviewer:                     

Date:

## QC Summary

Report Date: October 16, 2002  
Page 1 of 2

Client: Sandia National Laboratories  
MS-0756  
P.O. Box 5800  
Albuquerque, New Mexico  
Contact: Pamela M. Puissant  
Workorder: 67601

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anst	Date	Time
Metals Analysis-ICP Federal											
Batch 203818											
QC1200306109 67473007 DUP											
Arsenic		3.06		2.99	mg/kg	2		(0%-20%)	HSC	10/09/02	20:41
Barium		83.2		65.8	mg/kg	23*		(0%-20%)			
Cadmium	J	0.200	J	0.159	mg/kg	N/A	^	(+/-0.495)			
Chromium		9.20		8.35	mg/kg	10		(0%-20%)			
Lead		4.89		5.11	mg/kg	4		(0%-20%)			
Selenium	J	0.244	J	0.233	mg/kg	N/A	^	(+/-0.495)			
Silver	U	ND	U	ND	mg/kg	N/A		(+/-0.495)			
QC1200306112 LCS											
Arsenic	192			187	mg/kg		98	(79%-121%)		10/09/02	20:23
Barium	417			416	mg/kg		100	(80%-120%)			
Cadmium	125			122	mg/kg		97	(81%-119%)			
Chromium	133			131	mg/kg		99	(77%-123%)			
Lead	160			157	mg/kg		98	(78%-123%)			
Selenium	97.0			92.4	mg/kg		95	(72%-128%)			
Silver	115			118	mg/kg		103	(55%-145%)			
QC1200306108 MB											
Arsenic			U	ND	mg/kg					10/09/02	20:17
Barium			U	ND	mg/kg						
Cadmium			U	ND	mg/kg						
Chromium			U	ND	mg/kg						
Lead			U	ND	mg/kg						
Selenium			U	ND	mg/kg						
Silver			U	ND	mg/kg						
QC1200306111 67473007 MS											
Arsenic	24.3	3.06		25.2	mg/kg		91	(75%-125%)		10/09/02	20:47
Barium	24.3	83.2		108	mg/kg		101	(75%-125%)			
Cadmium	24.3	J 0.200		21.9	mg/kg		90	(75%-125%)			
Chromium	24.3	9.20		32.6	mg/kg		97	(75%-125%)			
Lead	24.3	4.89		27.2	mg/kg		92	(75%-125%)			
Selenium	24.3	J 0.244		20.9	mg/kg		85	(75%-125%)			
Silver	24.3	U ND		22.7	mg/kg		94	(75%-125%)			
QC1200306110 67473007 SDLT											
Arsenic		31.2	J	2.80	ug/L	55.2				10/09/02	20:35
Barium		849		163	ug/L	3.76					
Cadmium	J	2.04	U	ND	ug/L	N/A					
Chromium		93.8		18.0	ug/L	3.81					
Lead		49.9		10.7	ug/L	6.83					
Selenium	J	2.49	U	ND	ug/L	N/A					
Silver	U	ND	U	ND	ug/L	N/A					
Metals Analysis-Mercury Federal											
Batch 204433											
QC1200307691 67601013 DUP											

## QC Summary

Werkorder: 67601

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Metals Analysis-Mercury Federal											
Batch 204433											
Mercury		J	0.00621	J	0.00382	mg/kg	N/A	(+/-0.00929) NOR1		10/14/02	12:07
QC1200307693	LCS										
Mercury	24.0				22.8	mg/kg	95	(66%-134%)		10/14/02	12:03
QC1200307690	MB										
Mercury				U	ND	mg/kg				10/14/02	12:01
QC1200307692	67601013 MS										
Mercury	0.0948	J	0.00621		0.100	mg/kg	99	(75%-125%)		10/14/02	12:10

**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.



**Metals Case Narrative for  
Sandia National Labs (SNLS)  
SDG# 67601-1**

**Sample Analysis:**

The following samples first extracted by SW 846 method 1311, then prepared and analyzed using the methods referenced in the "Method/Analysis Information" section of this narrative:

<b>Sample ID</b>	<b>Client ID</b>
67608010	059856-007
1200307728	Methods Blank (MB) ICP-204455/204453
1200307729	Laboratory Control Sample (LCS)
1200307666	Methods Blank (MB) CVAA-204420/204419
1200307669	Laboratory Control Sample (LCS)

**Method/Analysis Information:**

<b>Analytical Batch #:</b>	204455, 204420
<b>Prep Batch #:</b>	204453, 204419
<b>Analytical Method:</b>	SW846 6010B, SW846 7470A
<b>Prep Method:</b>	SW846 3010, SW846 7470A
<b>Standard Operating Procedure:</b>	GL-MA-E-013 REV.6, GL-MA-E-010 REV.10

**System Configuration**

The ICP analysis was performed on a Thermo Jarrell Ash 61E Trace axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with a Meinhardt nebulizer, cyclonic spray chamber, and yttrium internal standard. Operating conditions for the Trace ICP are set at a power level of 950 watts. The instrument has a peristaltic pump flow rate of 140 RPM (2.0 mL/min sample uptake rate), argon gas flows of 15 L/min and 0.5 L/min for the torch and auxiliary gases, and a pressure setting of 26 PSI for the nebulizer.

Mercury analysis was performed on a Perkin-Elmer Flow Injection Mercury System (FIMS-400) automated mercury analyzer. The instrument consists of a cold vapor atomic absorption spectrometer set to detect mercury at a wavelength of 254 nm. Sample introduction through the flow injection system is performed via a peristaltic pump at 9 mL/min and nitrogen carrier gas rate of 5 L/min.

**Sample Preparation**

All samples were prepared in accordance with the referenced SW-846 procedures.

**Calibration Information:**

**Initial Calibration**

Instrument calibrations are conducted using method and instrument manufacturer's specifications. All initial calibration requirements have been met for the analyses.

**CRDL Requirements**

All element recoveries in the CRDL standards met the advisory control limits (70% - 130).

**ICSA/ICSAB Requirements**

All interference check standard (ICSA and ICSAB) elements associated with this SDG met the established acceptance criteria.

**Continuing Calibration (CCV) Requirements**

All CCV standards bracketing samples from this SDG met the established recovery acceptance criteria.

**Continuing Calibration Blanks (CCB) Requirements**

All continuing calibration blanks (CCB) bracketing samples from this SDG met the established acceptance criteria.

**Quality Control (QC) Information:****Method Blank Acceptance**

The preparation blanks analyzed with this SDG did not contain analytes of interest at concentrations greater than the client required detection limits (CRDL).

**LCS Recovery Statement**

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

**QC Sample Statement**

Sample 060043-003 (67821004) from SNLS SDG 67821 was designated as the quality control sample for the ICP batch. Sample 059582-007 (67354008) from SNLS SDG 67354 was designated as the quality control sample for the CVAA batch. A matrix spike (MS) and a sample duplicate (DUP) were analyzed in each batch. A serial dilution (SD) was analyzed in the ICP batch.

**MS Recovery Statement**

The percent recoveries (%R) obtained from the MS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The MS analyses met the recommended quality control acceptance criteria for percent recovery (75%-125%) for all applicable analytes.

**DUP RPD Statement**

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

**Serial Dilution % Difference Statement**

The serial dilution is used to assess interference caused by matrix suppression or enhancement. Raw element concentrations that are at least 50X the MDL for ICP analyses are applicable for serial dilution assessment. All applicable analytes met the acceptance criteria.

**Technical Information:****Holding Time Specifications**

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

**Sample Dilutions**

Dilutions are performed to minimize matrix interferences (e.g., those resulting from elevated mineral element concentrations) present in the sample and/or to bring over range target analyte concentrations into the linear calibration range of the instruments. No dilution was necessary.

**Miscellaneous Information:**

**NCR Documentation**

Nonconformance reports (NCR) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. No NCR was generated with this SDG.

**Additional Comments**

The additional comments field is used to address special issues associated with each analysis, clarify method/contractual issues pertaining to the analysis and to list any report documents generated as a result of sample analysis or review. Additional comments were not required for this SDG.

**Review/Validation:**

GEL requires all analytical data to be verified by a qualified data validator.

The following data validator verified the data presented in this SDG:

Reviewer:           Ollison          

Date:           10/3/02

## QC Summary

Report Date: October 3, 2002  
Page 1 of 2

Client : Sandia National Laboratories  
MS-8756  
P.O. Box 5800  
Albuquerque, New Mexico

Contact: Pamela M. Puissant

Workorder: 67608

Parameter	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP Federal										
Batch 204455										
QC1200307730 67821004 DUP										
Arsenic		U	ND	U	ND	mg/L	N/A	(+/-0.005)	HSC	10/01/02 23:30
Barium				J	0.00381	mg/L	N/A ^	(+/-0.005)		
Cadmium		J	0.00473	J	0.00469	mg/L	N/A ^	(+/-0.005)		
Chromium		BJ	0.00101	BJ	0.000999	mg/L	N/A ^	(+/-0.005)		
Lead		J	0.00387	J	0.00421	mg/L	N/A ^	(+/-0.005)		
Selenium		U	ND	U	ND	mg/L	N/A	(+/-0.005)		
Silver		U	ND	U	ND	mg/L	N/A	(+/-0.005)		
QC1200307729 LCS										
Arsenic	0.500				0.504	mg/L		101 (80%-120%)		10/01/02 22:54
Barium	0.500				0.516	mg/L		103 (80%-120%)		
Cadmium	0.500				0.510	mg/L		102 (80%-120%)		
Chromium	0.500			B	0.513	mg/L		103 (80%-120%)		
Lead	0.500				0.520	mg/L		104 (80%-120%)		
Selenium	0.500				0.495	mg/L		99 (80%-120%)		
Silver	0.500				0.491	mg/L		98 (80%-120%)		
QC1200307728 MB										
Arsenic				U	ND	mg/L				10/01/02 22:48
Barium				U	ND	mg/L				
Cadmium				U	ND	mg/L				
Chromium				J	0.000567	mg/L				
Lead				U	ND	mg/L				
Selenium				U	ND	mg/L				
Silver				U	ND	mg/L				
QC1200307731 67821004 MS										
Arsenic	0.500	U	ND		0.504	mg/L		101 (75%-125%)		10/01/02 23:36
Barium	0.500				0.523	mg/L		104 (75%-125%)		
Cadmium	0.500	J	0.00473		0.514	mg/L		102 (75%-125%)		
Chromium	0.500	BJ	0.00101	B	0.518	mg/L		103 (75%-125%)		
Lead	0.500	J	0.00387		0.525	mg/L		104 (75%-125%)		
Selenium	0.500	U	ND		0.503	mg/L		101 (75%-125%)		
Silver	0.500	U	ND		0.491	mg/L		98 (75%-125%)		
QC1200307732 67821004 SDILT										
Arsenic		U	ND	J	2.65	ug/L	N/A			10/01/02 23:24
Barium				J	0.838	ug/L	N/A			
Cadmium		J	4.73	J	0.787	ug/L	16.8			
Chromium		BJ	1.01	BJ	0.917	ug/L	352			
Lead		J	3.87	J	1.91	ug/L	146			
Selenium		U	ND	U	ND	ug/L	N/A			
Silver		U	ND	U	ND	ug/L	N/A			
Metals Analysis-Mercury Federal										
Batch 204420										
QC1200307667 67354008 DUP										

## QC Summary

Workorder: 67608

Page 2 of 2

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anist	Date	Time
Metals Analysis-Mercury Federal											
Batch 204420											
Mercury		U	ND	U	ND	mg/L	N/A	(+/-0.0002)	NOR1	10/01/02	11:27
QC1200307669	LCS				0.00213	mg/L	106	(80%-120%)		10/01/02	11:17
Mercury	0.002										
QC1200307666	MB			U	ND	mg/L				10/01/02	11:15
Mercury											
QC1200307668	67354008 MS				0.0021	mg/L	104	(75%-125%)		10/01/02	11:29
Mercury	0.002	U	ND								

**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 1
- \*\* 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.

**Method/Analysis Information**

**Procedure:** Total Cyanide  
**Analytical Method:** SW846 9012A  
**Prep Method:** SW846 9010B Prep  
**Analytical Batch Number:** 205123  
**Prep Batch Number:** 205122

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
67601015	059815-002
67601016	059816-002
67601017	059917-002
67601018	059918-002
67601019	059919-002
67601020	059920-002
67601021	059921-002
67601022	059922-002
67601023	059923-002
67601024	059924-002
1200309255	MB
1200309256	DUP of 67601015
1200309257	DUP of 67601016
1200309258	MS of 67601015
1200309259	MS of 67601016
1200309261	LCS

## **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-095 Rev. 1.

## **Preparation/Analytical Method Verification**

The SOP stated above has been prepared based on technical research and testing conducted by General Engineering Laboratories, Inc. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

### **Calibration Information:**

The instrument used in this analysis was the following: Lachat QuickChem FIA+

#### **Initial Calibration**

The instrument was properly calibrated.

#### **Calibration Verification Information**

All calibration verification standards were within the required limits.

### **Quality Control (QC) Information:**

#### **Blank Acceptance**

The method and calibration blanks associated with this data were within the required acceptance limits.

#### **Laboratory Control Sample Recovery**

The recovery for the laboratory control sample was within the required acceptance limits.

#### **Quality Control**

The following samples were designated for Quality Control: 67601015 and 67601016

#### **Sample Spike Recovery**

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

#### **Sample Duplicate Acceptance**

The 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: 1200309261.

**Sample Reanalysis**

The method blank (1200309255) was reanalyzed because there was no sample in autosampler cup during the original run.

**Miscellaneous Information:**

**Nonconformance Reports**

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



**Method/Analysis Information**

**Procedure:** Hexavalent Chromium  
**Analytical Method:** SW846 7196A  
**Prep Method:** SW846 3060A  
**Analytical Batch Number:** 205618  
**Prep Batch Number:** 205617

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
67601013	059813-002
67601014	059814-002
67601015	059815-002
67601016	059816-002
67601017	059917-002
67601018	059918-002
67601019	059919-002
67601020	059920-002
67601021	059921-002
67601022	059922-002
67601023	059923-002
67601024	059924-002
1200310247	MB
1200310248	DUP of 67601013
1200310249	DUP of 67601023
1200310250	MS of 67601013

1200310251 MS of 67601023

1200310252 LCS

### **SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-044 REV.4.

### **Preparation/Analytical Method Verification**

The SOP stated above has been prepared based on technical research and testing conducted by General Engineering Laboratories, Inc. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

### **Calibration Information:**

The instrument used in this analysis was the following: Milton Roy Spectrophotometer 200

#### **Initial Calibration**

The instrument was properly calibrated.

#### **Calibration Verification Information**

All calibration verification standards were within the required limits.

### **Quality Control (QC) Information:**

#### **Blank Acceptance**

The method and calibration blanks associated with this data were within the required acceptance limits.

#### **Laboratory Control Sample Recovery**

The recovery for the laboratory control sample was within the required acceptance limits.

#### **Quality Control**

The following samples were designated for Quality Control: 67601013 and 67601023

#### **Sample Spike Recovery**

The spike recoveries for this sample set were within the GEL SPC limits, but were outside of the client's required acceptance limits of 75%-125%. See NCR# 6532.

**Sample Duplicate Acceptance**

The 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**

NCR# 6532 was written for this sample batch due to matrix spike recoveries outside of the client required limits.

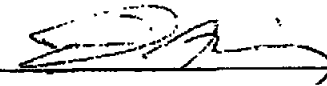
**Certification Statement**

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

**Review Validation:**

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

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

Reviewer:  Date: 10/18/02

## QC Summary

Report Date: October 18, 2002  
Page 1 of 2

Client : Sandia National Laboratories  
MS-0756  
P.O. Box 5800  
Albuquerque, New Mexico  
Contact: Pamela M. Pulsant  
Workorder: 67601

Paramname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Rapid Flow Analysis Federal</b>											
Batch	204703										
QC1200308223	67473009	DUP									
Cyanide, Total		U	ND	U	ND	mg/kg	N/A	(+/-0.227)	ADF	10/01/02	10:13
QC1200308226	LCS										
Cyanide, Total	277				381	mg/kg		(62%-138%)		10/01/02	10:12
QC1200308222	MB										
Cyanide, Total				U	ND	mg/kg				10/01/02	10:06
QC1200308224	67473009	MS									
Cyanide, Total	5.00	U	ND		5.06	mg/kg		(55%-145%)		10/01/02	10:14
Batch	205123										
QC1200309256	67601015	DUP									
Cyanide, Total		U	ND	U	ND	mg/kg	N/A	(+/-0.250)	ADF	10/02/02	12:36
QC1200309257	67601016	DUP									
Cyanide, Total		U	ND	U	ND	mg/kg	N/A	(+/-0.250)		10/02/02	12:38
QC1200309261	LCS										
Cyanide, Total	277				252	mg/kg		(62%-138%)	91	10/02/02	12:34
QC1200309255	MB										
Cyanide, Total				U	ND	mg/kg				10/02/02	13:51
QC1200309258	67601015	MS									
Cyanide, Total	5.00	U	ND		5.26	mg/kg		(55%-145%)	105	10/02/02	12:36
QC1200309259	67601016	MS									
Cyanide, Total	4.55	U	ND		4.49	mg/kg		(55%-145%)	98	10/02/02	12:39
<b>Spectrometric Analysis Federal</b>											
Batch	205618										
QC1200310248	67601013	DUP									
Hexavalent Chromium		U	ND	U	ND	mg/kg	N/A	(+/-0.0995)	BEP2	10/11/02	09:00
QC1200310249	67601023	DUP									
Hexavalent Chromium		U	ND	U	ND	mg/kg	N/A	(+/-0.0985)			
QC1200310252	LCS										
Hexavalent Chromium	0.985				0.956	mg/kg		(72%-121%)	97		
QC1200310247	MB										
Hexavalent Chromium				U	ND	mg/kg					
QC1200310250	67601013	MS									
Hexavalent Chromium	0.993	U	ND		0.665	mg/kg		(49%-130%)	63		
QC1200310251	67601023	MS									
Hexavalent Chromium	0.993	U	ND		0.715	mg/kg		(49%-130%)	71		

**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

## QC Summary

Workorder: 67601

Page 2 of 2

Paramname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analst	Date	Time
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.										

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 Narrative  
Sandia National Labs (SNLS)  
SDG 67601**

**Method/Analysis Information**

**Procedure:** Total Cyanide  
**Analytical Method:** SW846 9012A  
**Prep Method:** SW846 9010B Prep  
**Analytical Batch Number:** 204703  
**Prep Batch Number:** 204701

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
67601013	059813-002
67601014	059814-002
1200308222	MB
1200308223	DUP of 67473009
1200308224	MS of 67473009
1200308226	LCS

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-095 Rev. 1.

### **Preparation/Analytical Method Verification**

The SOP stated above has been prepared based on technical research and testing conducted by General Engineering Laboratories, Inc. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

### **Calibration Information:**

The instrument used in this analysis was the following: Lachat QuickChem FIA+.

#### **Initial Calibration**

The instrument was properly calibrated.

#### **Calibration Verification Information**

All calibration verification standards were within the required limits.

### **Quality Control (QC) Information:**

#### **Blank Acceptance**

The method and calibration blanks associated with this data were within the required acceptance limits.

#### **Laboratory Control Sample Recovery**

The recovery for the laboratory control sample was within the required acceptance limits.

#### **Quality Control**

The following SNLS sample was designated for Quality Control: 67473009

#### **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.

[REDACTED]

**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: 1200308226.

**Miscellaneous Information:**

**Nonconformance Reports**

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



**General Chemistry Narrative  
Sandia National Labs (SNLS)  
SDG 67601-1**

**Method/Analysis Information**

**Procedure:** Hexavalent Chromium  
**Analytical Method:** SW846 7196A  
**Analytical Batch Number:** 204193

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
67608009	059856-006
1200307123	MB for batch 204193
1200307124	DUP of 67608009
1200307125	PS of 67608009
1200307126	LCS for batch 204193

**SOP Reference**

Procedure(s) for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure(s) (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-044 REV.4.

**Preparation/Analytical Method Verification**

The SOP stated above has been prepared based on technical research and testing conducted by General Engineering Laboratories, Inc. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

**Calibration Information:**

The instrument used in this analysis was the following: Milton Roy Spectrophotometer 200

**Initial Calibration**

The instrument was properly calibrated.

**Calibration Verification Information**

All calibration verification standards were within the required limits.

**Quality Control (QC) Information:**

**Blank Acceptance**

The method and calibration blanks associated with this data were within the required acceptance limits.

**Laboratory Control Sample Recovery**

The recovery for the laboratory control sample was within the required acceptance limits.

**Quality Control**

The following sample was designated for Quality Control: 67608009.

**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 67608009 was received by the lab outside of the method specified holding time.

**Preparation/Analytical Method Verification**

All procedures were performed as stated in the SOP.

**Sample Dilutions**

No samples in this sample group required dilutions.

**Miscellaneous Information:**

**Nonconformance Reports**

Nonconformance Report (NCR) 5076 was submitted by the project manager for sample 67608009 because the sample was received out of holding for hexavalent chromium analysis.

**Additional Comments**

Sample 67608009 was not logged in for hexavalent chromium analysis until 9/26/02.

### Method/Analysis Information

**Procedure:** Total Cyanide  
**Analytical Method:** SW846 9012A  
**Prep Method:** SW846 9010B Prep  
**Analytical Batch Number:** 205981  
**Prep Batch Number:** 205980

### Sample Analysis

The following samples were analyzed using the analytical protocol as established in EPA 335.3:

<b>Sample ID</b>	<b>Client ID</b>
67608008	059856-005
1200311080	MB for batch 205981
1200311081	LCS for batch 205981
1200311082	DUP of 67798008
1200311083	MS of 67798008
1200311474	LCS for batch 205981

### **SOP Reference**

Procedure(s) for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure(s) (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-095 Rev. 1.

### **Preparation/Analytical Method Verification**

The SOP stated above has been prepared based on technical research and testing conducted by General Engineering Laboratories, Inc. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

**Calibration Information:**

The instrument used in this analysis was the following: Lachat QuickChem FIA+

**Initial Calibration**

The instrument was properly calibrated.

**Calibration Verification Information**

All calibration verification standards were within the required limits.

**Quality Control (QC) Information:**

**Blank Acceptance**

The method and calibration blanks associated with this data were within the required acceptance limits.

**Laboratory Control Sample Recovery**

The recovery for the laboratory control sample was within the required acceptance limits.

**LCS Duplicate Recovery**

The LCS Duplicate recovery was within the required acceptance limits.

**LCS Duplicate RPD**

The Relative Percent Difference between the LCS and LCS Duplicate was within the required acceptance limits.

**Quality Control**

The following sample was designated for Quality Control: 67798008

**Sample Spike Recovery**

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

**Sample Duplicate Acceptance**

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

**Technical Information:**

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

**Holding Times**

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

**Preparation/Analytical Method Verification**

All procedures were performed as stated in the SOP.

**Sample Dilutions**

No samples in this sample group required dilutions.

**Miscellaneous Information:**

**Nonconformance Reports**

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

**Certification Statement**

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

**Review Validation:**

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

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

Reviewer: \_\_\_\_\_



Date: \_\_\_\_\_

10/10/02

## QC Summary

Report Date: October 9, 2002  
Page 1 of 2

Client: Sandia National Laboratories  
MS-0756  
P.O. Box 5800  
Albuquerque, New Mexico  
Contact: Pamela M. Puissant  
Workorder: 67608

Parameter	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anst	Date	Time
<b>Rapid Flow Analysis Federal</b>											
Batch 205981											
QC1200311082 67798008 DUP Cyanide, Total		U	ND	U	ND	mg/L	N/A	(+/-0.005)	ADF	10/04/02	10:52
QC1200311081 LCS Cyanide, Total	0.050				0.0483	mg/L	97			10/04/02	10:48
QC1200311474 LCSD Cyanide, Total	0.050				0.0506	mg/L	5	101		10/04/02	10:49
QC1200311080 MB Cyanide, Total				U	ND	mg/L				10/04/02	10:47
QC1200311083 67798008 MS Cyanide, Total	0.100	U	ND		0.100	mg/L	100			10/04/02	10:56
<b>Spectrometric Analysis Federal</b>											
Batch 204193											
QC1200307124 67608009 DUP Hexavalent Chromium		HU	ND	HU	ND	mg/L	N/A	(+/-0.010)	VH1	09/26/02	14:20
QC1200307126 LCS Hexavalent Chromium	0.100				0.099	mg/L	99				
QC1200307123 MB Hexavalent Chromium				U	ND	mg/L					
QC1200307125 67608009 PS Hexavalent Chromium	0.100	HU	ND	H	0.093	mg/L	93				

**Notes:**

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

The Qualifiers in this report are defined as follows:

- \* Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where 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. 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: 67608

Page 2 of 2

Paramname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analst	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.



**Radiochemistry Case Narrative  
Sandia National Labs (SNLS)  
Workorder 67601**

**Method/Analysis Information**

Batch Number: 205009  
Procedure: Determination of Gross Alpha And Gross Non-Volatile Beta in Water  
Analytical Method: EPA 900.0

<b>Sample ID</b>	<b>Client ID</b>
67601013	059813-002
67601014	059814-002
67601015	059815-002
67601016	059816-002
67601017	059917-002
67601018	059918-002
67601019	059919-002
67601020	059920-002
67601021	059921-002
67601022	059922-002
67601023	059923-002
67601024	059924-002
1200308982	MB for batch 205009
1200308983	059924-002(67601024DUP)
1200308984	059924-002(67601024MS)
1200308985	059924-002(67601024MSD)
1200308986	LCS for batch 205009

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-001 REV.6.

**Calibration Information:**

**Calibration Information**

All initial and continuing calibration requirements have been met. The initial calibration was performed on June 13, 2002.

**Standards Information**

Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

**Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

**Quality Control (QC) Information:**

**Blank Information**

The blank volume is representative of the sample volume(s) in this batch.

**Designated QC**

The following sample was used for QC: 67601024.

**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 1200308983 and 67601024 were recounted due to high alpha relative error ratio.

**Gross Alpha/Beta Preparation Information**

High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating, especially to a dull red heat. For this sample set, the prepared planchet was counted for beta activity before being flamed. After flaming, the planchet was counted for alpha activity. This sequence causes the alpha count run data to record over the beta count run data in AlphaLims, therefore only the alpha count data will appear on the instrument runlog.

**Miscellaneous Information:**

**NCR Documentation**

No NCR were generated for the preparation or analysis of this sample set.

**Certification Statement**

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

**Review Validation:**

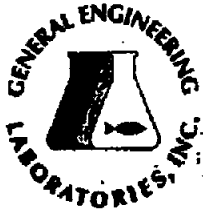
GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

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

Reviewer: \_\_\_\_\_

*M. Malone*

Date: 16 Oct 2002



# GENERAL ENGINEERING LABORATORIES

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## QC Summary

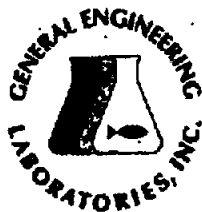
Report Date: October 16, 2002  
Page 1 of 2

Client : Sandia National Laboratories  
MS-0756  
P.O. Box 5800  
Albuquerque, New Mexico  
Contact: Pamela M. Polesant  
Workorder: 67681

Parameter	NOM	Sample Qual	QC	Units	RER	REC%	Range	Asst	Date Time
<b>Gravimetric Solids</b>									
Batch	203825								
QC1200306608	67601013 DUP								
Moisture		3.87	4.76	percent	21		(0%-24%)	TCD	09/25/02 14:48
<b>Rad Gas Flow</b>									
Batch	205009								
QC1200308983	67601024 DUP								
Alpha		13.6	13.0	pCi/g	0.0578		(0%-20%)	JS1	10/15/02 08:57
	Uncert:	+/-4.97	+/-5.36						
	TPU:	5.12	5.41						
Beta		24.2	21.9	pCi/g	0.433		(0%-20%)		
	Uncert:	+/-2.03	+/-1.97						
	TPU:	2.15	3.12						
QC1200308986	LCS								
Alpha		9.89	9.43	pCi/g		95	(75%-125%)		
	Uncert:		+/-1.06						
	TPU:		1.16						
Beta		39.7	42.3	pCi/g		107	(75%-125%)		
	Uncert:		+/-2.51						
	TPU:		5.28						
QC1200308982	MB								
Alpha		U	0.0533	pCi/g					10/14/02 14:39
	Uncert:		+/-0.0842						
	TPU:		0.0843						
Beta		U	0.115	pCi/g					
	Uncert:		+/-0.127						
	TPU:		0.128						
QC1200308984	67601024 MS								
Alpha		95.1	13.6	pCi/g		95	(75%-125%)		10/11/02 16:23
	Uncert:	+/-4.97	+/-18.8						
	TPU:	5.12	20.7						
Beta		382	24.2	pCi/g		90	(75%-125%)		
	Uncert:	+/-2.03	+/-23.2						
	TPU:	2.15	25.6						
QC1200308985	67601024 MSD								
Alpha		96.0	13.6	pCi/g		92			
	Uncert:	+/-4.97	+/-18.7						
	TPU:	5.12	20.6						
Beta		385	24.2	pCi/g		101			
	Uncert:	+/-2.03	+/-24.3						
	TPU:	2.15	63.8						

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## QC Summary

Workorder: 67491

Page 2 of 2

Parameter	NOM	Sample Qual	QC	Units	RKR	REC%	Range	Asst	Data	Time
-----------	-----	-------------	----	-------	-----	------	-------	------	------	------

### Notes:

The Qualifiers in this report are defined as follows:

- \* Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable when 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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**Radiochemistry Case Narrative  
Sandia National Labs (SNLS)  
SDG 67601-1**

**Method/Analysis Information**

Batch Number: 204950  
Procedure: Determination of Gross Alpha And Gross Non-Volatile Beta in Water  
Analytical Method: EPA 900.0

Sample ID	Client ID
67608011	059856-008
1200308804	MB for batch 204950
1200308805	059826-008(67169011DUP)
1200308806	059826-008(67169011MS)
1200308807	059826-008(67169011MSD)
1200308808	LCS for batch 204950

**SOP Reference**

Procedure(s) for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure(s) (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-001 REV.6.

**Calibration Information:**

**Calibration Information**

All initial and continuing calibration requirements have been met. The initial calibration was performed on June 12, 2002.

**Standards Information**

Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

**Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

**Quality Control (QC) Information:**

**Blank Information**

The blank volume is representative of the sample volume(s) in this batch.

**Designated QC**

The following sample was used for QC: 67169011. The QC sample is from SNLS work order 67169.

**QC Information**

All of the QC samples met the required acceptance limits.

**Technical Information:**

**Holding Time**

All sample procedures for this sample set were performed within the required holding time.

**Preparation Information**

All preparation criteria have been met for these analyses.

**Sample Re-prep/Re-analysis**

None of the samples in this sample set required reprep or reanalysis.

**Gross Alpha/Beta Preparation Information**

High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating, especially to a dull red heat. For this sample set, the prepared planchet was counted for beta activity before being flamed. After flaming, the planchet was counted for alpha activity. This sequence causes the alpha count run data to record over the beta count run data in AlphaLims, therefore only the alpha count data will appear on the instrument runlog.

**Miscellaneous Information:**

**NCR Documentation**

No NCR's were generated for the preparation or analysis of this sample set.

**Certification Statement**

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

**Review Validation:**

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package. The following data validator verified the information presented in this case narrative:

Reviewer: \_\_\_\_\_

*M. Irvine*

Date: \_\_\_\_\_

*12 Oct 2002*



# GENERAL ENGINEERING LABORATORIES

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## QC Summary

Report Date: October 12, 2002  
Page 1 of 2

Client: Sandia National Laboratories  
MS-0756  
P.O. Box 5808  
Albuquerque, New Mexico  
Contact: Pamela M. Poissant  
Workorder: 67608

Parameter	NOM	Sample Qual	QC	Units	RER	REC%	Range	Anst	Date Time
Rad Gas Flow									
Batch 204950									
QC1200308805 67169011 DUP									
Alpha		U	-0.293	U	-0.382	pCi/L	0.389 ^	(+/-1.00)	HOB1 10/08/02 05:44
		Uncert:	+/-0.333		+/-0.403				
		TPU:	0.334		0.408				
Beta		U	-0.0536	U	0.077	pCi/L	0.188 ^	(+/-1.00)	
		Uncert:	+/-0.341		+/-0.354				
		TPU:	0.341		0.354				
QC1200308806 LCS									
Alpha	9.89				10.9	pCi/L	110 (75%-125%)		10/07/02 21:03
		Uncert:			+/-1.84				
		TPU:			2.18				
Beta	39.7				44.1	pCi/L	111 (75%-125%)		
		Uncert:			+/-2.45				
		TPU:			2.52				
QC1200308804 MB									
Alpha				U	0.0431	pCi/L			10/08/02 05:44
		Uncert:			+/-0.0745				
		TPU:			0.0746				
Beta				U	0.126	pCi/L			
		Uncert:			+/-0.162				
		TPU:			0.162				
QC1200308806 67169011 MS									
Alpha	49.4	U	-0.293		56.9	pCi/L	116 (75%-125%)		10/07/02 21:03
		Uncert:	+/-0.333		+/-9.21				
		TPU:	0.334		12.7				
Beta	199	U	-0.0536		227	pCi/L	114 (75%-125%)		
		Uncert:	+/-0.341		+/-12.3				
		TPU:	0.341		12.4				
QC1200308807 67169011 MSD									
Alpha	49.4	U	-0.293		55.3	pCi/L	113 (75%-125%)		
		Uncert:	+/-0.333		+/-9.67				
		TPU:	0.334		11.9				
Beta	199	U	-0.0536		214	pCi/L	108 (75%-125%)		
		Uncert:	+/-0.341		+/-12.3				
		TPU:	0.341		12.9				

**Notes:**

The Qualifiers in this report are defined as follows:

- \* Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where the concentration falls below the effective PQL.
- \*\* Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.

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# GENERAL ENGINEERING LABORATORIES

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## QC Summary

Workorder: 67606

Page 2 of 2

Paramname	NOM	Sample Qual	QC	Units	KER	REC%	Range	Asst	Date	Time
H	Holding time was exceeded									
J	Estimated value, the analyte concentration fell above the effective MDL and below the effective FQL									
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 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.

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\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program \*  
 \* 9/26/02 9:57:52 AM \*  
 \* \*\*\*\*\*  
 \* Analyzed by: *lu 9/26/02* Reviewed by: *[Signature] 9/30/02* \*  
 \* \*\*\*\*\*

Customer : SANDERS M (6135)  
 Customer Sample ID : 059903-003  
 Lab Sample ID : 20134201  
 Sample Description : 6710/1034-SP1-BH1-14-S  
 Sample Quantity : 884.000 gram  
 Sample Date/Time : 9/19/02 11:25:00 AM  
 Acquire Start Date/Time : 9/26/02 8:17:38 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	-----	4.26E-001
RA-226	1.17E+000	4.46E-001	6.32E-001
PB-214	5.20E-001	8.08E-002	4.61E-002
BI-214	4.78E-001	8.29E-002	4.95E-002
FR-210	Not Detected	-----	7.12E+000
TH-232	3.22E-001	1.85E-001	1.82E-001
RA-228	3.44E-001	1.36E-001	1.82E-001
AC-228	4.99E-001	1.16E-001	1.05E-001
TH-228	5.89E-001	1.91E-001	3.60E-001
RA-224	5.17E-001	1.38E-001	6.63E-002
PB-212	4.98E-001	7.60E-002	3.33E-002
BI-212	1.87E-001	2.17E-001	3.48E-001
TL-208	4.36E-001	8.56E-002	7.12E-002
U-235	Not Detected	-----	1.74E-001
TH-231	Not Detected	-----	5.72E+000
PA-231	Not Detected	-----	1.22E+000
TH-227	Not Detected	-----	2.67E-001
RA-223	Not Detected	-----	1.42E-001
RN-219	Not Detected	-----	3.20E-001
PB-211	Not Detected	-----	7.30E-001
TL-207	Not Detected	-----	1.32E+001
AM-241	Not Detected	-----	1.47E-001
PU-239	Not Detected	-----	3.00E+002
NP-237	Not Detected	-----	1.63E+000
FR-233	Not Detected	-----	4.79E-002
FR-229	Not Detected	-----	1.70E-001

[Summary Report] - Sample ID: : 20134201

Slide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	3.67E-002
AG-110m	Not Detected	-----	2.91E-002
BA-133	Not Detected	-----	3.64E-002
BE-7	Not Detected	-----	2.33E-001
CD-115	Not Detected	-----	4.73E-001
CE-139	Not Detected	-----	2.19E-002
CE-141	Not Detected	-----	4.41E-002
CE-144	Not Detected	-----	1.67E-001
CM-243	Not Detected	-----	1.49E-001
CO-56	Not Detected	-----	3.08E-002
CO-57	Not Detected	-----	2.12E-002
CO-58	Not Detected	-----	3.21E-002
CO-60	Not Detected	-----	3.86E-002
CR-51	Not Detected	-----	2.38E-001
CS-134	Not Detected	-----	3.84E-002
CS-137	1.16E-002	1.16E-002	1.83E-002
EU-152	Not Detected	-----	6.28E-002
EU-154	Not Detected	-----	1.70E-001
EU-155	Not Detected	-----	9.47E-002
FE-59	Not Detected	-----	7.98E-002
GD-153	Not Detected	-----	5.63E-002
HG-203	Not Detected	-----	2.99E-002
I-131	Not Detected	-----	4.39E-002
I-192	Not Detected	-----	2.44E-002
I-130	1.83E+001	2.49E+000	2.82E-001
MN-52	Not Detected	-----	7.84E-002
MN-54	Not Detected	-----	3.29E-002
MO-99	Not Detected	-----	1.27E+000
NA-22	Not Detected	-----	4.58E-002
NA-24	Not Detected	-----	6.53E+001
ND-147	Not Detected	-----	2.97E-001
NI-57	Not Detected	-----	1.24E+000
RU-103	Not Detected	-----	2.66E-002
RU-106	Not Detected	-----	2.51E-001
SB-122	Not Detected	-----	1.98E-001
SB-124	Not Detected	-----	2.66E-002
SB-125	Not Detected	-----	7.32E-002
SN-113	Not Detected	-----	3.37E-002
SR-85	Not Detected	-----	3.34E-002
TA-182	Not Detected	-----	1.52E-001
TA-183	Not Detected	-----	3.21E-001
TL-201	Not Detected	-----	3.28E-001
Y-88	Not Detected	-----	2.45E-002
ZN-65	Not Detected	-----	1.03E-001
ZR-95	Not Detected	-----	5.72E-002

\*\*\*\*\*  
 \* Sandia National Laboratories  
 \* Radiation Protection Sample Diagnostics Program  
 \* 9/26/02 1:19:59 PM  
 \*\*\*\*\*

\*  
 \* Analyzed by: *A 9/26/02* Reviewed by: *[Signature] 9/30/02*  
 \*\*\*\*\*

Customer : SANDERS M (6135)  
 Customer Sample ID : 059904-003  
 Lab Sample ID : 20134202

Sample Description : 6710/1034-SP1-BH1-19-S  
 Sample Quantity : 871.000 gram  
 Sample Date/Time : 9/19/02 12:00:00 PM  
 Acquire Start Date/Time : 9/26/02 9:59:58 AM  
 Detector Name : LAB01  
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	4.28E-001
RA-226	1.24E+000	4.20E-001	5.72E-001
PB-214	6.17E-001	9.42E-002	5.35E-002
BI-214	5.60E-001	9.33E-002	4.77E-002
PB-210	Not Detected	-----	7.57E+000
TH-232	4.43E-001	2.33E-001	1.93E-001
RA-228	5.17E-001	1.21E-001	1.44E-001
AC-228	Not Detected	-----	1.77E-001
TH-228	3.90E-001	1.71E-001	3.87E-001
RA-224	7.30E-001	1.81E-001	8.77E-002
PB-212	5.24E-001	7.95E-002	3.43E-002
BI-212	6.08E-001	2.44E-001	3.21E-001
TL-208	4.48E-001	9.21E-002	8.53E-002
U-235	Not Detected	-----	1.74E-001
TH-231	Not Detected	-----	5.84E+000
PA-231	Not Detected	-----	1.24E+000
TH-227	Not Detected	-----	2.70E-001
RA-223	Not Detected	-----	1.48E-001
RN-219	Not Detected	-----	3.11E-001
PB-211	Not Detected	-----	7.08E-001
TL-207	Not Detected	-----	1.35E+001
AM-241	Not Detected	-----	1.49E-001
PU-239	Not Detected	-----	3.12E+002
NP-237	Not Detected	-----	1.64E+000
PA-233	Not Detected	-----	5.17E-002
TH-229	Not Detected	-----	1.69E-001

[Summary Report] - Sample ID: : 20134202

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	3.62E-002
AG-110m	Not Detected	-----	2.63E-002
BA-133	Not Detected	-----	3.72E-002
BE-7	Not Detected	-----	2.48E-001
CD-115	Not Detected	-----	4.86E-001
CE-139	Not Detected	-----	2.28E-002
CE-141	Not Detected	-----	4.36E-002
CE-144	Not Detected	-----	1.73E-001
CM-243	Not Detected	-----	1.48E-001
CO-56	Not Detected	-----	3.26E-002
CO-57	Not Detected	-----	2.20E-002
CO-58	Not Detected	-----	3.13E-002
CO-60	Not Detected	-----	3.80E-002
CR-51	Not Detected	-----	2.38E-001
CS-134	Not Detected	-----	3.96E-002
CS-137	Not Detected	-----	2.85E-002
EU-152	Not Detected	-----	6.52E-002
EU-154	Not Detected	-----	1.69E-001
EU-155	Not Detected	-----	9.76E-002
FE-59	Not Detected	-----	8.06E-002
GD-153	Not Detected	-----	5.76E-002
HG-203	Not Detected	-----	2.93E-002
I-131	Not Detected	-----	4.41E-002
IR-192	Not Detected	-----	2.53E-002
K-40	1.46E+001	2.01E+000	2.85E-001
MN-52	Not Detected	-----	6.89E-002
MN-54	Not Detected	-----	3.21E-002
MO-99	Not Detected	-----	1.28E+000
NA-22	Not Detected	-----	4.46E-002
NA-24	Not Detected	-----	7.20E+001
ND-147	Not Detected	-----	2.87E-001
NI-57	Not Detected	-----	1.33E+000
RU-103	Not Detected	-----	2.77E-002
RU-106	Not Detected	-----	2.52E-001
SB-122	Not Detected	-----	2.17E-001
SB-124	Not Detected	-----	2.71E-002
SB-125	Not Detected	-----	7.52E-002
SN-113	Not Detected	-----	3.45E-002
SR-85	Not Detected	-----	3.23E-002
TA-182	Not Detected	-----	1.59E-001
TA-183	Not Detected	-----	3.24E-001
TL-201	Not Detected	-----	3.40E-001
Y-88	Not Detected	-----	2.70E-002
ZN-65	Not Detected	-----	1.04E-001
ZR-95	Not Detected	-----	5.58E-002

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program \*  
 \* 9/26/02 1:22:31 PM \*  
 \*\*\*\*\*

\* Analyzed by: Beverly Key 9/27/02 Reviewed by: [Signature] 9/30/02 \*  
 \*\*\*\*\*

Customer : SANDERS M (6135)  
 Customer Sample ID : 059905-003  
 Lab Sample ID : 20134203

Sample Description : 803/1052-SP1-BH1-22-S  
 Sample Quantity : 932.000 gram  
 Sample Date/Time : 9/19/02 3:05:00 PM  
 Acquire Start Date/Time : 9/26/02 11:42:16 AM  
 Detector Name : LAB01  
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	4.60E-001
RA-226	1.00E+000	4.36E-001	6.37E-001
PB-214	6.18E-001	9.56E-002	6.08E-002
BI-214	5.58E-001	9.38E-002	5.44E-002
PB-210	Not Detected	-----	7.96E+000
TH-232	7.42E-001	3.66E-001	2.49E-001
RA-228	7.16E-001	1.46E-001	1.51E-001
AC-228	6.74E-001	1.37E-001	1.02E-001
TH-228	6.35E-001	1.96E-001	4.01E-001
RA-224	7.86E-001	1.86E-001	6.64E-002
PB-212	7.57E-001	1.11E-001	3.30E-002
BI-212	7.95E-001	2.92E-001	3.83E-001
TL-208	6.43E-001	1.15E-001	8.87E-002
U-235	2.38E-001	1.60E-001	1.87E-001
TH-231	Not Detected	-----	6.29E+000
PA-231	Not Detected	-----	1.28E+000
TH-227	Not Detected	-----	3.03E-001
RA-223	Not Detected	-----	1.55E-001
RN-219	Not Detected	-----	3.42E-001
PB-211	Not Detected	-----	7.76E-001
TL-207	Not Detected	-----	1.46E+001
AM-241	Not Detected	-----	1.55E-001
PU-239	Not Detected	-----	3.32E+002
NP-237	Not Detected	-----	1.80E+000
PA-233	Not Detected	-----	5.09E-002
TH-229	Not Detected	-----	1.79E-001

[Summary Report] - Sample ID: : 20134203

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	3.87E-002
AG-110m	Not Detected	-----	2.90E-002
BA-133	Not Detected	-----	3.84E-002
BE-7	Not Detected	-----	2.51E-001
CD-115	Not Detected	-----	5.13E-001
CE-139	Not Detected	-----	2.35E-002
CE-141	Not Detected	-----	4.71E-002
CE-144	Not Detected	-----	1.85E-001
CM-243	Not Detected	-----	1.56E-001
CO-56	Not Detected	-----	3.33E-002
CO-57	Not Detected	-----	2.31E-002
CO-58	Not Detected	-----	3.38E-002
CO-60	Not Detected	-----	3.84E-002
CR-51	Not Detected	-----	2.47E-001
CS-134	Not Detected	-----	4.10E-002
CS-137	Not Detected	-----	3.03E-002
EU-152	Not Detected	-----	6.86E-002
EU-154	Not Detected	-----	1.81E-001
EU-155	Not Detected	-----	1.05E-001
FE-59	Not Detected	-----	8.90E-002
GD-153	Not Detected	-----	6.13E-002
HG-203	Not Detected	-----	3.09E-002
I-131	Not Detected	-----	4.39E-002
IR-192	Not Detected	-----	2.61E-002
K-40	2.16E+001	2.91E+000	3.30E-001
MN-52	Not Detected	-----	6.91E-002
MN-54	Not Detected	-----	3.44E-002
MO-99	Not Detected	-----	1.32E+000
NA-22	Not Detected	-----	4.59E-002
NA-24	Not Detected	-----	7.22E+001
ND-147	Not Detected	-----	2.97E-001
NI-57	Not Detected	-----	1.23E+000
RU-103	Not Detected	-----	2.88E-002
RU-106	Not Detected	-----	2.66E-001
SB-122	Not Detected	-----	2.29E-001
SB-124	Not Detected	-----	2.95E-002
SB-125	Not Detected	-----	7.98E-002
SN-113	Not Detected	-----	3.63E-002
SR-85	Not Detected	-----	3.55E-002
TA-182	Not Detected	-----	1.72E-001
TA-183	Not Detected	-----	3.37E-001
TL-201	Not Detected	-----	3.58E-001
Y-88	Not Detected	-----	3.18E-002
ZN-65	Not Detected	-----	1.17E-001
ZR-95	Not Detected	-----	6.50E-002

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program \*  
 \* 9/26/02 3:41:01 PM \*  
 \*\*\*\*\*

\* Analyzed by: *Beverly Key 9/27/02* Reviewed by: *[Signature] 9/27/02* \*

Customer : SANDERS M (6135)  
 Customer Sample ID : 059906-003  
 Lab Sample ID : 20134204

Sample Description : 803/1052-SP1-BH1-27-S  
 Sample Quantity : 812.000 gram  
 Sample Date/Time : 9/19/02 3:45:00 PM  
 Acquire Start Date/Time : 9/26/02 1:24:37 PM  
 Detector Name : LAB01  
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated. ✓  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	4.93E-001
RA-226	1.34E+000	5.34E-001	7.68E-001
PB-214	6.78E-001	1.04E-001	6.09E-002
BI-214	5.68E-001	9.71E-002	5.67E-002
PB-210	Not Detected	-----	8.55E+000
TH-232	7.37E-001	3.58E-001	2.23E-001
RA-228	7.66E-001	1.57E-001	1.56E-001
AC-228	7.32E-001	1.51E-001	1.14E-001
TH-228	7.71E-001	2.30E-001	4.35E-001
RA-224	8.85E-001	2.10E-001	7.56E-002
PB-212	7.88E-001	1.16E-001	3.70E-002
BI-212	8.03E-001	3.03E-001	3.98E-001
TL-208	6.01E-001	1.10E-001	8.36E-002
U-235	1.25E-001	1.72E-001	2.01E-001
TH-231	Not Detected	-----	6.33E+000
PA-231	Not Detected	-----	1.36E+000
TH-227	Not Detected	-----	3.26E-001
RA-223	Not Detected	-----	1.60E-001
RN-219	Not Detected	-----	3.60E-001
PB-211	Not Detected	-----	8.28E-001
TL-207	Not Detected	-----	1.41E+001
AM-241	Not Detected	-----	1.68E-001
PU-239	Not Detected	-----	3.57E+002
NP-237	Not Detected	-----	1.84E+000
PA-233	Not Detected	-----	5.48E-002
TH-229	Not Detected	-----	1.84E-001



[Summary Report] - Sample ID: : 20134204

nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	4.35E-002
AG-110m	Not Detected	-----	3.19E-002
BA-133	Not Detected	-----	4.33E-002
BE-7	Not Detected	-----	2.60E-001
CD-115	Not Detected	-----	5.58E-001
CE-139	Not Detected	-----	2.51E-002
CE-141	Not Detected	-----	5.12E-002
CE-144	Not Detected	-----	1.94E-001
CM-243	Not Detected	-----	1.71E-001
CO-56	Not Detected	-----	3.56E-002
CO-57	Not Detected	-----	2.43E-002
CO-58	Not Detected	-----	3.55E-002
CO-60	Not Detected	-----	4.02E-002
CR-51	Not Detected	-----	2.61E-001
CS-134	Not Detected	-----	4.26E-002
CS-137	Not Detected	-----	3.36E-002
EU-152	Not Detected	-----	7.21E-002
EU-154	Not Detected	-----	2.02E-001
EU-155	Not Detected	-----	1.11E-001
FE-59	Not Detected	-----	9.05E-002
GD-153	Not Detected	-----	6.39E-002
HG-203	Not Detected	-----	3.40E-002
I-131	Not Detected	-----	4.96E-002
IR-192	Not Detected	-----	2.74E-002
K-40	1.74E+001	2.39E+000	3.53E-001
MN-52	Not Detected	-----	8.11E-002
MN-54	Not Detected	-----	3.57E-002
MO-99	Not Detected	-----	1.40E+000
NA-22	Not Detected	-----	4.91E-002
NA-24	Not Detected	-----	7.67E+001
ND-147	Not Detected	-----	3.24E-001
NI-57	Not Detected	-----	1.38E+000
RU-103	Not Detected	-----	3.10E-002
RU-106	Not Detected	-----	2.81E-001
SB-122	Not Detected	-----	2.49E-001
SB-124	Not Detected	-----	3.09E-002
SB-125	Not Detected	-----	8.71E-002
SN-113	Not Detected	-----	3.80E-002
SR-85	Not Detected	-----	3.78E-002
TA-182	Not Detected	-----	1.79E-001
TA-183	Not Detected	-----	3.65E-001
TL-201	Not Detected	-----	3.81E-001
Y-88	Not Detected	-----	2.81E-002
ZN-65	Not Detected	-----	1.16E-001
ZR-95	Not Detected	-----	6.60E-002

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program \*  
 \* 9/26/02 5:22:25 PM \*  
 \*\*\*\*\*

\* Analyzed by: *Beverly Key 9/27/02* Reviewed by: *[Signature] 9/20/02* \*  
 \*\*\*\*\*

Customer : SANDERS (6135)  
 Customer Sample ID : 059907-003  
 Lab Sample ID : 20134205  
 Sample Description : 829/276-SP1-BH1-8-S  
 Sample Quantity : 730.000 gram  
 Sample Date/Time : 9/24/02 2:05:00 PM  
 Acquire Start Date/Time : 9/26/02 3:42:11 PM  
 Detector Name : LAB01  
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
U-238	Not Detected	-----	5.54E-001
RA-226	1.79E+000	6.26E-001	8.72E-001
PB-214	9.41E-001	1.38E-001	6.98E-002
BI-214	7.43E-001	1.23E-001	6.53E-002
PB-210	Not Detected	-----	9.33E+000
TH-232	9.08E-001	4.31E-001	2.32E-001
RA-228	8.82E-001	1.77E-001	1.65E-001
AC-228	8.67E-001	1.72E-001	1.16E-001
TH-228	9.76E-001	2.76E-001	5.02E-001
RA-224	1.11E+000	2.58E-001	9.44E-002
PB-212	9.41E-001	1.38E-001	4.13E-002
BI-212	8.97E-001	3.62E-001	4.91E-001
TL-208	8.04E-001	1.38E-001	9.03E-002
U-235	9.46E-002	1.86E-001	2.17E-001
TH-231	Not Detected	-----	7.20E+000
PA-231	Not Detected	-----	1.57E+000
TH-227	Not Detected	-----	3.67E-001
RA-223	Not Detected	-----	1.38E-001
RN-219	Not Detected	-----	4.18E-001
PB-211	Not Detected	-----	9.28E-001
TL-207	Not Detected	-----	1.56E+001
AM-241	Not Detected	-----	1.93E-001
PU-239	Not Detected	-----	3.89E+002
NP-237	Not Detected	-----	2.07E+000
PA-233	Not Detected	-----	6.18E-002
TH-229	Not Detected	-----	2.11E-001

[Summary Report] - Sample ID: : 20134205

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	4.74E-002
AG-110m	Not Detected	-----	3.45E-002
BA-133	Not Detected	-----	4.92E-002
BE-7	Not Detected	-----	2.72E-001
CD-115	Not Detected	-----	1.48E-001
CE-139	Not Detected	-----	2.72E-002
CE-141	Not Detected	-----	4.89E-002
CE-144	Not Detected	-----	2.16E-001
CM-243	Not Detected	-----	1.94E-001
CO-56	Not Detected	-----	3.69E-002
CO-57	Not Detected	-----	2.71E-002
CO-58	Not Detected	-----	3.70E-002
CO-60	Not Detected	-----	4.39E-002
CR-51	Not Detected	-----	2.53E-001
CS-134	Not Detected	-----	5.09E-002
CS-137	Not Detected	-----	3.86E-002
EU-152	Not Detected	-----	8.11E-002
EU-154	Not Detected	-----	2.21E-001
EU-155	<del>1.71E-001</del>	<del>8.59E-002</del>	1.27E-001
FE-59	Not Detected	-----	9.06E-002
GD-153	Not Detected	-----	7.04E-002
HG-203	Not Detected	-----	3.53E-002
I-131	Not Detected	-----	3.61E-002
IR-192	Not Detected	-----	2.93E-002
K-40	1.66E+001	2.30E+000	3.12E-001
MN-52	Not Detected	-----	5.10E-002
MN-54	Not Detected	-----	4.01E-002
MO-99	Not Detected	-----	4.78E-001
NA-22	Not Detected	-----	5.21E-002
NA-24	Not Detected	-----	3.83E-001
ND-147	Not Detected	-----	2.45E-001
NI-57	Not Detected	-----	1.55E-001
RU-103	Not Detected	-----	3.31E-002
RU-106	Not Detected	-----	3.24E-001
SB-122	Not Detected	-----	7.48E-002
SB-124	Not Detected	-----	3.26E-002
SB-125	Not Detected	-----	9.58E-002
SN-113	Not Detected	-----	4.30E-002
SR-85	Not Detected	-----	4.03E-002
TA-182	Not Detected	-----	1.92E-001
TA-183	Not Detected	-----	2.16E-001
TL-201	Not Detected	-----	1.42E-001
Y-88	Not Detected	-----	3.45E-002
ZN-65	Not Detected	-----	1.32E-001
ZR-95	Not Detected	-----	6.46E-002

*Not Detected*

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program \*  
 \* 9/26/02 9:34:00 AM \*  
 \*\*\*\*\*

\* Analyzed by: *lu 9/26/02* Reviewed by: *[Signature]* \*  
 \*\*\*\*\*

Customer : SANDERS M (6135)  
 Customer Sample ID : 059908-003  
 Lab Sample ID : 20134206

Sample Description : 829/276-SP1-BH1-13-S  
 Sample Quantity : 743.000 gram  
 Sample Date/Time : 9/24/02 2:20:00 PM  
 Acquire Start Date/Time : 9/26/02 7:53:41 AM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
U-238	Not Detected	-----	7.14E-001
RA-226	1.59E+000	5.45E-001	7.58E-001
PB-214	8.54E-001	1.23E-001	6.15E-002
BI-214	7.11E-001	1.13E-001	5.58E-002
PB-210	Not Detected	-----	2.81E+001
TH-232	7.55E-001	3.62E-001	2.12E-001
RA-228	9.43E-001	1.65E-001	1.21E-001
AC-228	8.11E-001	1.56E-001	1.11E-001
TH-228	1.30E+000	4.65E-001	6.35E-001
RA-224	1.05E+000	2.24E-001	6.88E-002
PB-212	8.87E-001	1.28E-001	3.87E-002
BI-212	7.76E-001	2.69E-001	3.48E-001
TL-208	7.25E-001	1.38E-001	1.33E-001
U-235	9.72E-002	1.82E-001	2.30E-001
TH-231	Not Detected	-----	1.13E+001
PA-231	Not Detected	-----	1.42E+000
TH-227	Not Detected	-----	3.56E-001
RA-223	Not Detected	-----	1.95E-001
RN-219	Not Detected	-----	3.69E-001
PB-211	Not Detected	-----	8.28E-001
TL-207	Not Detected	-----	1.31E+001
AM-241	Not Detected	-----	4.25E-001
PU-239	Not Detected	-----	4.19E+002
NP-237	Not Detected	-----	2.28E+000
PA-233	Not Detected	-----	5.57E-002
TH-229	Not Detected	-----	2.42E-001

[Summary Report] - Sample ID: : 20134206

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.41E-002
AG-110m	Not Detected	-----	2.75E-002
BA-133	Not Detected	-----	4.85E-002
BE-7	Not Detected	-----	2.38E-001
CD-115	Not Detected	-----	1.11E-001
CE-139	Not Detected	-----	2.88E-002
CE-141	Not Detected	-----	5.18E-002
CE-144	Not Detected	-----	2.32E-001
CM-243	Not Detected	-----	1.72E-001
CO-56	Not Detected	-----	3.19E-002
CO-57	Not Detected	-----	3.04E-002
CO-58	Not Detected	-----	3.07E-002
CO-60	Not Detected	-----	3.47E-002
CR-51	Not Detected	-----	2.31E-001
CS-134	Not Detected	-----	3.97E-002
CS-137	Not Detected	-----	2.90E-002
EU-152	Not Detected	-----	9.13E-002
EU-154	Not Detected	-----	1.57E-001
EU-155	Not Detected	-----	1.32E-001
FE-59	Not Detected	-----	7.06E-002
GD-153	Not Detected	-----	9.62E-002
HG-203	Not Detected	-----	3.16E-002
I-131	Not Detected	-----	3.14E-002
IR-192	Not Detected	-----	2.68E-002
K-40	2.41E+001	3.20E+000	3.14E-001
MN-52	Not Detected	-----	3.58E-002
MN-54	Not Detected	-----	3.32E-002
MO-99	Not Detected	-----	3.28E-001
NA-22	Not Detected	-----	3.99E-002
NA-24	Not Detected	-----	2.17E-001
ND-147	Not Detected	-----	1.98E-001
NI-57	<del>1.54E-001</del>	<del>5.11E-002</del>	<del>5.75E-002</del>
RU-103	Not Detected	-----	2.68E-002
RU-106	Not Detected	-----	2.41E-001
SB-122	Not Detected	-----	5.73E-002
SB-124	Not Detected	-----	2.65E-002
SB-125	Not Detected	-----	7.95E-002
SN-113	Not Detected	-----	3.51E-002
SR-85	Not Detected	-----	3.40E-002
TA-182	Not Detected	-----	1.55E-001
TA-183	Not Detected	-----	4.62E-001
TL-201	Not Detected	-----	2.31E-001
Y-88	Not Detected	-----	2.42E-002
ZN-65	Not Detected	-----	9.91E-002
ZR-95	Not Detected	-----	5.15E-002

Not detected  
12/25  
9/26/02

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program \*  
 \* 9/26/02 12:58:06 PM \*  
 \*\*\*\*\*

\* Analyzed by: *me* 9/26/02 Reviewed by: *R. J. / a* \*

Customer : SANDERS M (6135)  
 Customer Sample ID : 059912-003  
 Lab Sample ID : 20134208

Sample Description : 915-922/1003-SP1-BH1-27-S  
 Sample Quantity : 881.000 gram  
 Sample Date/Time : 9/24/02 8:45:00 AM  
 Acquire Start Date/Time : 9/26/02 11:17:42 AM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6004 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	6.58E-001
RA-226	1.39E+000	4.83E-001	6.76E-001
PB-214	7.10E-001	1.04E-001	5.86E-002
BI-214	6.43E-001	1.02E-001	5.06E-002
PB-210	Not Detected	-----	2.56E+001
TH-232	9.28E-001	4.27E-001	1.84E-001
RA-228	8.53E-001	1.49E-001	1.16E-001
AC-228	8.86E-001	1.55E-001	7.75E-002
TH-228	8.57E-001	4.08E-001	5.99E-001
RA-224	9.75E-001	2.05E-001	5.81E-002
PB-212	8.55E-001	1.23E-001	3.60E-002
BI-212	1.08E+000	2.81E-001	3.18E-001
TL-208	7.57E-001	1.19E-001	6.79E-002
U-235	Not Detected	-----	2.04E-001
TH-231	Not Detected	-----	1.03E+001
PA-231	Not Detected	-----	1.24E+000
TH-227	Not Detected	-----	3.21E-001
RA-223	Not Detected	-----	1.82E-001
RN-219	<del>1.64E-001</del>	<del>2.75E-001</del>	<del>3.16E-001</del>
PB-211	Not Detected	-----	6.87E-001
TL-207	Not Detected	-----	1.15E+001
AM-241	Not Detected	-----	3.74E-001
PU-239	Not Detected	-----	3.78E+002
NP-237	Not Detected	-----	2.03E+000
PA-233	Not Detected	-----	4.85E-002
TH-229	Not Detected	-----	2.19E-001

*Not Detected  
 1223  
 9-26-02*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	2.98E-002
AG-110m	Not Detected	-----	2.45E-002
BA-133	Not Detected	-----	4.21E-002
BE-7	Not Detected	-----	2.05E-001
CD-115	Not Detected	-----	1.12E-001
CE-139	Not Detected	-----	2.48E-002
CE-141	Not Detected	-----	4.59E-002
CE-144	Not Detected	-----	2.03E-001
CM-243	Not Detected	-----	1.53E-001
CO-56	Not Detected	-----	2.74E-002
CO-57	Not Detected	-----	2.66E-002
CO-58	Not Detected	-----	2.67E-002
CO-60	Not Detected	-----	3.14E-002
CR-51	Not Detected	-----	2.04E-001
CS-134	Not Detected	-----	3.50E-002
CS-137	Not Detected	-----	2.56E-002
EU-152	Not Detected	-----	7.96E-002
EU-154	Not Detected	-----	1.37E-001
EU-155	Not Detected	-----	1.21E-001
FE-59	Not Detected	-----	6.26E-002
GD-153	Not Detected	-----	8.93E-002
HG-203	Not Detected	-----	2.87E-002
I-131	Not Detected	-----	2.86E-002
IR-192	Not Detected	-----	2.32E-002
K-40	2.35E+001	3.11E+000	2.25E-001
MN-52	Not Detected	-----	3.25E-002
MN-54	Not Detected	-----	2.88E-002
MO-99	Not Detected	-----	3.28E-001
NA-22	Not Detected	-----	3.56E-002
NA-24	Not Detected	-----	2.77E-001
ND-147	Not Detected	-----	1.85E-001
NI-57	Not Detected	-----	6.93E-002
RU-103	Not Detected	-----	2.41E-002
RU-106	Not Detected	-----	2.32E-001
SB-122	Not Detected	-----	5.73E-002
SB-124	Not Detected	-----	2.48E-002
SB-125	Not Detected	-----	7.09E-002
SN-113	Not Detected	-----	3.07E-002
SR-85	Not Detected	-----	3.06E-002
TA-182	Not Detected	-----	1.27E-001
TA-183	Not Detected	-----	4.28E-001
TL-201	Not Detected	-----	2.30E-001
Y-88	Not Detected	-----	2.14E-002
ZN-65	Not Detected	-----	8.24E-002
ZR-95	Not Detected	-----	4.74E-002

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program \*  
 \* 9/26/02 4:58:56 PM \*  
 \*\*\*\*\*

\* Analyzed by: *[Signature]* 9/26/02 Reviewed by: *[Signature]*  
 \*\*\*\*\*

Customer : SANDERS M (6135)  
 Customer Sample ID : 059913-003  
 Lab Sample ID : 20134209

Sample Description : 915-922/1003-SP1-BH1-33-S  
 Sample Quantity : 846.000 gram  
 Sample Date/Time : 9/24/02 9:35:00 AM  
 Acquire Start Date/Time : 9/26/02 12:59:51 PM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
U-238	Not Detected	-----	6.43E-001
RA-226	1.70E+000	4.88E-001	6.40E-001
PB-214	6.63E-001	9.88E-002	5.92E-002
BI-214	6.56E-001	1.04E-001	4.99E-002
PB-210	Not Detected	-----	2.48E+001
TH-232	8.00E-001	3.74E-001	1.84E-001
RA-228	7.84E-001	1.41E-001	1.19E-001
AC-228	7.79E-001	1.46E-001	9.82E-002
TH-228	9.10E-001	3.36E-001	4.57E-001
RA-224	9.45E-001	2.00E-001	5.01E-002
PB-212	7.88E-001	1.14E-001	3.47E-002
BI-212	8.00E-001	2.56E-001	3.22E-001
TL-208	7.09E-001	1.14E-001	6.78E-002
U-235	8.15E-002	1.61E-001	2.04E-001
TH-231	Not Detected	-----	1.03E+001
PA-231	Not Detected	-----	1.23E+000
TH-227	Not Detected	-----	3.18E-001
RA-223	Not Detected	-----	1.80E-001
RN-219	Not Detected	-----	3.11E-001
PB-211	Not Detected	-----	7.12E-001
TL-207	Not Detected	-----	1.12E+001
AM-241	Not Detected	-----	3.83E-001
PU-239	Not Detected	-----	3.81E+002
NP-237	Not Detected	-----	2.02E+000
PA-233	Not Detected	-----	4.90E-002
TH-229	Not Detected	-----	2.17E-001



[Summary Report] - Sample ID: : 20134209

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	3.02E-002
AG-110m	Not Detected	-----	2.51E-002
BA-133	Not Detected	-----	4.23E-002
BE-7	Not Detected	-----	2.10E-001
CD-115	Not Detected	-----	1.10E-001
CE-139	Not Detected	-----	2.60E-002
CE-141	Not Detected	-----	4.57E-002
CE-144	Not Detected	-----	2.08E-001
CM-243	Not Detected	-----	1.49E-001
CO-56	Not Detected	-----	2.89E-002
CO-57	Not Detected	-----	2.75E-002
CO-58	Not Detected	-----	2.66E-002
CO-60	Not Detected	-----	3.03E-002
CR-51	Not Detected	-----	2.10E-001
CS-134	Not Detected	-----	3.53E-002
CS-137	Not Detected	-----	2.66E-002
EU-152	Not Detected	-----	8.23E-002
EU-154	Not Detected	-----	1.39E-001
EU-155	Not Detected	-----	1.20E-001
FE-59	Not Detected	-----	6.01E-002
GD-153	Not Detected	-----	8.88E-002
HG-203	Not Detected	-----	2.78E-002
I-131	Not Detected	-----	2.80E-002
IR-192	Not Detected	-----	2.40E-002
K-40	2.12E+001	2.83E+000	2.43E-001
MN-52	Not Detected	-----	3.31E-002
MN-54	Not Detected	-----	1.83E-002
MO-99	Not Detected	-----	3.15E-001
NA-22	Not Detected	-----	3.53E-002
NA-24	Not Detected	-----	2.82E-001
ND-147	Not Detected	-----	1.88E-001
NI-57	Not Detected	-----	6.72E-002
RU-103	Not Detected	-----	2.43E-002
RU-106	Not Detected	-----	2.31E-001
SB-122	Not Detected	-----	5.62E-002
SB-124	Not Detected	-----	2.44E-002
SB-125	Not Detected	-----	6.79E-002
SN-113	Not Detected	-----	3.17E-002
SR-85	Not Detected	-----	2.89E-002
TA-182	Not Detected	-----	1.35E-001
TA-183	Not Detected	-----	4.40E-001
TL-201	Not Detected	-----	2.30E-001
Y-88	Not Detected	-----	2.02E-002
ZN-65	Not Detected	-----	8.60E-002
ZR-95	Not Detected	-----	4.63E-002

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 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program \*  
 \* 9/26/02 4:22:12 PM \*  
 \*\*\*\*\*

\* Analyzed by: *Beverly Key 9/27/02* Reviewed by: *[Signature]*  
 \*\*\*\*\*

Customer : SANDERS M (6135)  
 Customer Sample ID : 059914-003  
 Lab Sample ID : 20134210

Sample Description : 915-922/1003-SP1-BH1-26-S  
 Sample Quantity : 767.000 gram  
 Sample Date/Time : 9/24/02 11:10:00 AM *84\* 9/27/02*  
 Acquire Start Date/Time : 9/26/02 2:41:52 PM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	7.24E-001
RA-226	1.80E+000	5.48E-001	7.36E-001
PB-214	8.05E-001	1.18E-001	6.45E-002
BI-214	6.89E-001	1.10E-001	5.74E-002
PB-210	Not Detected	-----	2.78E+001
TH-232	9.31E-001	4.32E-001	2.01E-001
RA-228	7.92E-001	1.47E-001	1.38E-001
AC-228	9.11E-001	1.68E-001	1.10E-001
TH-228	8.37E-001	3.96E-001	5.77E-001
RA-224	1.03E+000	2.21E-001	8.12E-002
PB-212	9.87E-001	1.42E-001	3.85E-002
BI-212	1.08E+000	2.89E-001	3.24E-001
TL-208	8.14E-001	1.31E-001	8.09E-002
U-235	Not Detected	-----	2.28E-001
TH-231	Not Detected	-----	1.12E+001
PA-231	Not Detected	-----	1.38E+000
TH-227	Not Detected	-----	3.64E-001
RA-223	Not Detected	-----	2.04E-001
RN-219	Not Detected	-----	3.51E-001
PB-211	Not Detected	-----	8.11E-001
TL-207	Not Detected	-----	1.25E+001
AM-241	Not Detected	-----	4.10E-001
PU-239	Not Detected	-----	4.16E+002
NP-237	Not Detected	-----	2.21E+000
PA-233	Not Detected	-----	5.39E-002
TH-229	Not Detected	-----	2.35E-001

[Summary Report] - Sample ID: : 20134210

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	3.53E-002
AG-110m	Not Detected	-----	2.69E-002
BA-133	Not Detected	-----	4.68E-002
BE-7	Not Detected	-----	2.27E-001
CD-115	Not Detected	-----	1.22E-001
CE-139	Not Detected	-----	2.85E-002
CE-141	Not Detected	-----	5.12E-002
CE-144	Not Detected	-----	2.25E-001
CM-243	Not Detected	-----	1.68E-001
CO-56	Not Detected	-----	3.00E-002
CO-57	Not Detected	-----	2.95E-002
CO-58	Not Detected	-----	2.93E-002
CO-60	Not Detected	-----	3.35E-002
CR-51	Not Detected	-----	2.23E-001
CS-134	Not Detected	-----	3.92E-002
CS-137	Not Detected	-----	2.94E-002
EU-152	Not Detected	-----	8.79E-002
EU-154	Not Detected	-----	1.62E-001
EU-155	Not Detected	-----	1.32E-001
FE-59	Not Detected	-----	6.83E-002
GD-153	Not Detected	-----	9.66E-002
HG-203	Not Detected	-----	3.10E-002
I-131	Not Detected	-----	3.17E-002
IR-192	Not Detected	-----	2.58E-002
K-40	2.26E+001	3.01E+000	3.04E-001
MN-52	Not Detected	-----	3.31E-002
MN-54	Not Detected	-----	3.16E-002
MO-99	Not Detected	-----	3.86E-001
NA-22	Not Detected	-----	3.89E-002
NA-24	Not Detected	-----	3.26E-001
ND-147	Not Detected	-----	2.06E-001
NI-57	Not Detected	-----	7.68E-002
RU-103	Not Detected	-----	2.53E-002
RU-106	Not Detected	-----	2.65E-001
SB-122	Not Detected	-----	6.10E-002
SB-124	Not Detected	-----	2.67E-002
SB-125	Not Detected	-----	7.73E-002
SN-113	Not Detected	-----	3.40E-002
SR-85	Not Detected	-----	3.37E-002
TA-182	Not Detected	-----	1.46E-001
TA-183	Not Detected	-----	4.72E-001
TL-201	Not Detected	-----	2.52E-001
Y-88	Not Detected	-----	2.40E-002
ZN-65	Not Detected	-----	9.94E-002
ZR-95	Not Detected	-----	4.95E-002

\*\*\*\*\*  
 \* Sandia National Laboratories  
 \* Radiation Protection Sample Diagnostics Program  
 9/26/02 8:26:56 AM  
 \*\*\*\*\*

\* Analyzed by: *h* 9/26/02 Reviewed by: *R 10/1/02*  
 \*\*\*\*\*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059915-003  
 Lab Sample ID : 20134211

Sample Description : 915-922/1003-SP2-BH1-31-S  
 Sample Quantity : 859.000 gram  
 Sample Date/Time : 9/24/02 11:40:00 AM  
 Acquire Start Date/Time : 9/25/02 10:50:23 AM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	6.23E-001
RA-226	1.63E+000	4.77E-001	6.30E-001
PB-214	6.47E-001	1.04E-001	8.34E-002
BI-214	6.05E-001	9.61E-002	4.62E-002
PB-210	Not Detected	-----	2.44E+001
TH-232	7.09E-001	3.37E-001	1.90E-001
RA-228	7.26E-001	1.32E-001	1.12E-001
AC-228	7.58E-001	1.39E-001	8.39E-002
TH-228	8.12E-001	3.48E-001	4.96E-001
RA-224	9.13E-001	1.96E-001	7.09E-002
PB-212	7.58E-001	1.09E-001	3.12E-002
BI-212	7.85E-001	2.84E-001	3.82E-001
TL-208	6.10E-001	1.00E-001	6.35E-002
U-235	Not Detected	-----	2.01E-001
TH-231	Not Detected	-----	9.60E+000
PA-231	Not Detected	-----	1.18E+000
TH-227	Not Detected	-----	3.02E-001
RA-223	Not Detected	-----	1.62E-001
RN-219	Not Detected	-----	3.00E-001
PB-211	Not Detected	-----	6.78E-001
TL-207	Not Detected	-----	1.15E+001
AM-241	Not Detected	-----	3.73E-001
PU-239	Not Detected	-----	3.73E+002
NP-237	Not Detected	-----	1.92E+000
PA-233	Not Detected	-----	4.86E-002
TH-229	Not Detected	-----	2.09E-001

[Summary Report] - Sample ID: : 20134211

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	3.02E-002
AG-110m	Not Detected	-----	2.38E-002
BA-133	Not Detected	-----	4.17E-002
BE-7	Not Detected	-----	2.01E-001
CD-115	Not Detected	-----	7.50E-002
CE-139	Not Detected	-----	2.47E-002
CE-141	Not Detected	-----	4.42E-002
CE-144	Not Detected	-----	1.99E-001
CM-243	Not Detected	-----	1.43E-001
CO-56	Not Detected	-----	2.68E-002
CO-57	Not Detected	-----	2.62E-002
CO-58	Not Detected	-----	2.55E-002
CO-60	Not Detected	-----	2.96E-002
CR-51	Not Detected	-----	1.94E-001
CS-134	Not Detected	-----	3.30E-002
CS-137	Not Detected	-----	2.63E-002
EU-152	Not Detected	-----	7.90E-002
EU-154	Not Detected	-----	1.39E-001
EU-155	Not Detected	-----	1.18E-001
FE-59	Not Detected	-----	6.10E-002
GD-153	Not Detected	-----	8.66E-002
HG-203	Not Detected	-----	2.64E-002
I-131	Not Detected	-----	2.61E-002
IR-192	Not Detected	-----	2.28E-002
K-40	2.31E+001	3.06E+000	2.25E-001
MN-52	Not Detected	-----	2.92E-002
MN-54	Not Detected	-----	2.79E-002
MO-99	Not Detected	-----	2.34E-001
NA-22	Not Detected	-----	3.55E-002
NA-24	Not Detected	-----	7.81E-002
ND-147	Not Detected	-----	1.67E-001
NI-57	Not Detected	-----	3.37E-002
RU-103	Not Detected	-----	2.23E-002
RU-106	Not Detected	-----	2.20E-001
SB-122	Not Detected	-----	4.04E-002
SB-124	Not Detected	-----	2.32E-002
SB-125	Not Detected	-----	6.82E-002
SN-113	Not Detected	-----	3.08E-002
SR-85	Not Detected	-----	2.92E-002
TA-182	Not Detected	-----	1.28E-001
TA-183	Not Detected	-----	3.66E-001
TL-201	Not Detected	-----	1.75E-001
Y-88	Not Detected	-----	2.20E-002
ZN-65	Not Detected	-----	8.44E-002
ZR-95	Not Detected	-----	4.62E-002

\*\*\*\*\*  
 \* Sandia National Laboratories  
 \* Radiation Protection Sample Diagnostics Program  
 \* 9/25/02 2:12:55 PM  
 \*\*\*\*\*

\* Analyzed by: *h* 9/26/02 Reviewed by: *[Signature]* 10/1/02  
 \*\*\*\*\*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059917-003  
 Lab Sample ID : 20134212

Sample Description : 6969/1004-DF1-BH1-8-S  
 Sample Quantity : 675.000 gram  
 Sample Date/Time : 9/20/02 9:20:00 AM  
 Acquire Start Date/Time : 9/25/02 12:32:34 PM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
U-238	Not Detected	-----	7.98E-001
RA-226	1.93E+000	5.82E-001	7.74E-001
PB-214	7.89E-001	1.17E-001	6.80E-002
BI-214	6.99E-001	1.13E-001	5.82E-002
PB-210	Not Detected	-----	2.99E+001
TH-232	9.56E-001	4.45E-001	2.11E-001
RA-228	1.17E+000	1.97E-001	1.20E-001
AC-228	9.86E-001	1.84E-001	1.24E-001
TH-228	1.10E+000	4.57E-001	6.48E-001
RA-224	1.21E+000	2.56E-001	7.02E-002
PB-212	1.04E+000	1.50E-001	3.92E-002
BI-212	1.14E+000	3.32E-001	3.99E-001
TL-208	9.46E-001	1.48E-001	7.89E-002
U-235	Not Detected	-----	2.35E-001
TH-231	Not Detected	-----	1.19E+001
PA-231	Not Detected	-----	1.38E+000
TH-227	Not Detected	-----	3.89E-001
RA-223	Not Detected	-----	2.61E-001
RN-219	Not Detected	-----	3.74E-001
PB-211	Not Detected	-----	8.40E-001
TL-207	Not Detected	-----	1.17E+001
AM-241	Not Detected	-----	4.56E-001
PU-239	Not Detected	-----	4.39E+002
NP-237	Not Detected	-----	2.34E+000
PA-233	Not Detected	-----	5.73E-002
TH-229	Not Detected	-----	2.47E-001

[Summary Report] - Sample ID: : 20134212

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	3.66E-002
AG-110m	Not Detected	-----	2.87E-002
BA-133	Not Detected	-----	5.04E-002
BE-7	Not Detected	-----	2.45E-001
CD-115	Not Detected	-----	3.44E-001
CE-139	Not Detected	-----	2.98E-002
CE-141	Not Detected	-----	5.83E-002
CE-144	Not Detected	-----	2.42E-001
CM-243	Not Detected	-----	1.77E-001
CO-56	Not Detected	-----	3.31E-002
CO-57	Not Detected	-----	3.10E-002
CO-58	Not Detected	-----	3.14E-002
CO-60	Not Detected	-----	3.48E-002
CR-51	Not Detected	-----	2.61E-001
CS-134	Not Detected	-----	4.11E-002
CS-137	Not Detected	-----	3.02E-002
EU-152	Not Detected	-----	9.18E-002
EU-154	Not Detected	-----	1.68E-001
EU-155	Not Detected	-----	1.40E-001
FE-59	Not Detected	-----	6.84E-002
GD-153	Not Detected	-----	1.01E-001
HG-203	Not Detected	-----	3.38E-002
I-131	Not Detected	-----	4.26E-002
IR-192	Not Detected	-----	2.83E-002
K-40	1.84E+001	2.48E+000	3.02E-001
MN-52	Not Detected	-----	5.45E-002
MN-54	Not Detected	-----	3.42E-002
MO-99	Not Detected	-----	8.01E-001
NA-22	Not Detected	-----	4.03E-002
NA-24	Not Detected	-----	9.80E+000
ND-147	Not Detected	-----	2.58E-001
NI-57	Not Detected	-----	5.29E-001
RU-103	Not Detected	-----	3.01E-002
RU-106	Not Detected	-----	2.73E-001
SB-122	Not Detected	-----	1.48E-001
SB-124	Not Detected	-----	2.88E-002
SB-125	Not Detected	-----	7.97E-002
SN-113	Not Detected	-----	3.78E-002
SR-85	Not Detected	-----	3.71E-002
TA-182	Not Detected	-----	1.52E-001
TA-183	Not Detected	-----	7.87E-001
TL-201	Not Detected	-----	5.33E-001
Y-88	Not Detected	-----	2.59E-002
ZN-65	Not Detected	-----	9.97E-002
ZR-95	Not Detected	-----	5.35E-002

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program \*  
 \* 9/25/02 3:55:00 PM \*  
 \*\*\*\*\*

\* Analyzed by: *su 9/26/02* Reviewed by: *[Signature] 10/1/02*  
 \*\*\*\*\*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059918-003  
 Lab Sample ID : 20134213

Sample Description : 6969/1004-DF1-BH1-13-S  
 Sample Quantity : 770.000 gram  
 Sample Date/Time : 9/20/02 9:35:00 AM  
 Acquire Start Date/Time : 9/25/02 2:14:41 PM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	7.02E-001
RA-226	2.17E+000	5.71E-001	7.20E-001
PB-214	7.90E-001	1.15E-001	6.04E-002
BI-214	7.36E-001	1.15E-001	5.15E-002
PB-210	Not Detected	-----	2.78E+001
TH-232	1.00E+000	4.74E-001	2.63E-001
RA-228	9.73E-001	1.70E-001	1.32E-001
AC-228	9.77E-001	1.75E-001	9.94E-002
TH-228	9.36E-001	4.35E-001	6.35E-001
RA-224	1.26E+000	2.62E-001	7.86E-002
PB-212	1.06E+000	1.51E-001	3.58E-002
BI-212	1.08E+000	3.14E-001	3.81E-001
TL-208	9.21E-001	1.44E-001	7.91E-002
U-235	Not Detected	-----	2.31E-001
TH-231	Not Detected	-----	1.13E+001
PA-231	Not Detected	-----	1.33E+000
TH-227	Not Detected	-----	3.67E-001
RA-223	Not Detected	-----	2.41E-001
RN-219	<del>2.31E-001</del>	<del>3.11E-001</del>	<del>3.60E-001</del>
PB-211	Not Detected	-----	7.91E-001
TL-207	Not Detected	-----	1.19E+001
AM-241	Not Detected	-----	4.13E-001
PU-239	Not Detected	-----	4.17E+002
NP-237	Not Detected	-----	2.19E+000
PA-233	Not Detected	-----	5.40E-002
TH-229	Not Detected	-----	2.37E-001

*NOT Detected  
 10/5  
 9-26-02*



[Summary Report] - Sample ID: : 20134213

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	3.45E-002
AG-110m	Not Detected	-----	2.59E-002
BA-133	Not Detected	-----	4.69E-002
BE-7	Not Detected	-----	2.23E-001
CD-115	Not Detected	-----	3.30E-001
CE-139	Not Detected	-----	2.79E-002
CE-141	Not Detected	-----	5.55E-002
CE-144	Not Detected	-----	2.29E-001
CM-243	Not Detected	-----	1.68E-001
CO-56	Not Detected	-----	3.03E-002
CO-57	Not Detected	-----	2.97E-002
CO-58	Not Detected	-----	2.81E-002
CO-60	Not Detected	-----	3.24E-002
CR-51	Not Detected	-----	2.43E-001
CS-134	Not Detected	-----	3.76E-002
CS-137	Not Detected	-----	2.85E-002
EU-152	Not Detected	-----	8.82E-002
EU-154	Not Detected	-----	1.59E-001
EU-155	Not Detected	-----	1.33E-001
FE-59	Not Detected	-----	6.51E-002
GD-153	Not Detected	-----	9.82E-002
HG-203	Not Detected	-----	3.30E-002
I-131	Not Detected	-----	4.01E-002
IR-192	Not Detected	-----	2.66E-002
K-40	1.82E+001	2.44E+000	2.60E-001
MN-52	Not Detected	-----	4.79E-002
MN-54	Not Detected	-----	2.92E-002
MO-99	Not Detected	-----	7.54E-001
NA-22	Not Detected	-----	3.65E-002
NA-24	Not Detected	-----	8.75E+000
ND-147	Not Detected	-----	2.43E-001
NI-57	Not Detected	-----	3.31E-001
RU-103	Not Detected	-----	2.75E-002
RU-106	Not Detected	-----	2.50E-001
SB-122	Not Detected	-----	1.33E-001
SB-124	Not Detected	-----	2.59E-002
SB-125	Not Detected	-----	7.72E-002
SN-113	Not Detected	-----	3.53E-002
SR-85	Not Detected	-----	3.40E-002
TA-182	Not Detected	-----	1.38E-001
TA-183	Not Detected	-----	7.19E-001
TL-201	Not Detected	-----	5.11E-001
Y-88	Not Detected	-----	2.43E-002
ZN-65	Not Detected	-----	9.09E-002
ZR-95	Not Detected	-----	4.94E-002

\*\*\*\*\*  
 \* Sandia National Laboratories  
 \* Radiation Protection Sample Diagnostics Program  
 \* 9/25/02 5:37:06 PM  
 \*\*\*\*\*

\* Analyzed by: *mu* 9/26/02 Reviewed by: *[Signature]*  
 \*\*\*\*\*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059919-003  
 Lab Sample ID : 20134214

Sample Description : 6969/1004-DF1-BH2-8-S  
 Sample Quantity : 762.000 gram  
 Sample Date/Time : 9/20/02 10:35:00 AM  
 Acquire Start Date/Time : 9/25/02 3:56:45 PM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	7.44E-001
RA-226	2.37E+000	5.86E-001	7.16E-001
PB-214	8.97E-001	1.28E-001	6.35E-002
BI-214	8.14E-001	1.35E-001	9.40E-002
PB-210	Not Detected	-----	2.81E+001
TH-232	8.82E-001	4.11E-001	1.95E-001
RA-228	9.36E-001	1.63E-001	1.18E-001
AC-228	1.02E+000	1.81E-001	9.97E-002
TH-228	9.84E-001	3.80E-001	5.24E-001
RA-224	1.05E+000	2.25E-001	7.81E-002
PB-212	9.73E-001	1.40E-001	3.73E-002
BI-212	1.16E+000	2.99E-001	3.28E-001
TL-208	8.87E-001	1.39E-001	7.47E-002
U-235	1.66E-001	1.81E-001	2.30E-001
TH-231	Not Detected	-----	1.11E+001
PA-231	Not Detected	-----	1.31E+000
TH-227	Not Detected	-----	3.55E-001
RA-223	Not Detected	-----	2.40E-001
RN-219	Not Detected	-----	3.33E-001
PB-211	Not Detected	-----	7.46E-001
TL-207	Not Detected	-----	1.18E+001
AM-241	Not Detected	-----	4.16E-001
PU-239	Not Detected	-----	4.09E+002
NP-237	Not Detected	-----	2.25E+000
PA-233	Not Detected	-----	5.17E-002
TH-229	Not Detected	-----	2.31E-001

[Summary Report] - Sample ID: : 20134214

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	3.38E-002
AG-110m	Not Detected	-----	2.67E-002
BA-133	Not Detected	-----	5.00E-002
BE-7	Not Detected	-----	2.28E-001
CD-115	Not Detected	-----	3.22E-001
CE-139	Not Detected	-----	2.87E-002
CE-141	Not Detected	-----	5.50E-002
CE-144	Not Detected	-----	2.27E-001
CM-243	Not Detected	-----	1.68E-001
CO-56	Not Detected	-----	2.91E-002
CO-57	Not Detected	-----	2.93E-002
CO-58	Not Detected	-----	2.92E-002
CO-60	Not Detected	-----	3.10E-002
CR-51	Not Detected	-----	2.46E-001
CS-134	Not Detected	-----	4.01E-002
CS-137	Not Detected	-----	2.85E-002
EU-152	Not Detected	-----	8.71E-002
EU-154	Not Detected	-----	1.56E-001
EU-155	Not Detected	-----	1.37E-001
FE-59	Not Detected	-----	6.35E-002
GD-153	Not Detected	-----	9.58E-002
HG-203	Not Detected	-----	3.28E-002
I-131	Not Detected	-----	4.07E-002
IR-192	Not Detected	-----	2.63E-002
K-40	1.67E+001	2.25E+000	2.74E-001
MN-52	Not Detected	-----	5.11E-002
MN-54	Not Detected	-----	2.99E-002
MO-99	Not Detected	-----	7.38E-001
NA-22	Not Detected	-----	3.56E-002
NA-24	Not Detected	-----	9.45E+000
ND-147	Not Detected	-----	2.49E-001
NI-57	Not Detected	-----	2.66E-001
RU-103	Not Detected	-----	2.55E-002
RU-106	Not Detected	-----	2.55E-001
SB-122	Not Detected	-----	1.37E-001
SB-124	Not Detected	-----	2.79E-002
SB-125	Not Detected	-----	7.63E-002
SN-113	Not Detected	-----	3.57E-002
SR-85	Not Detected	-----	3.46E-002
TA-182	Not Detected	-----	1.47E-001
TA-183	Not Detected	-----	7.28E-001
TL-201	Not Detected	-----	5.00E-001
Y-88	Not Detected	-----	2.37E-002
ZN-65	Not Detected	-----	9.62E-002
ZR-95	Not Detected	-----	4.97E-002

\*\*\*\*\*  
 \* Sandia National Laboratories  
 \* Radiation Protection Sample Diagnostics Program  
 \* 9/25/02 7:19:08 PM  
 \*\*\*\*\*

\* Analyzed by: *[Signature]* 9/26/02 Reviewed by: *[Signature]* 10/1/02  
 \*\*\*\*\*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059920-003  
 Lab Sample ID : 20134215

Sample Description : 6969/1004-DF1-BH2-13-S  
 Sample Quantity : 765.000 gram  
 Sample Date/Time : 9/20/02 10:55:00 AM  
 Acquire Start Date/Time : 9/25/02 5:38:51 PM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
U-238	Not Detected	-----	6.98E-001
RA-226	2.10E+000	5.51E-001	6.92E-001
PB-214	7.90E-001	1.14E-001	5.88E-002
BI-214	6.62E-001	1.06E-001	5.45E-002
PB-210	Not Detected	-----	2.65E+001
TH-232	9.66E-001	4.45E-001	1.93E-001
RA-228	9.35E-001	1.64E-001	1.27E-001
AC-228	8.67E-001	1.58E-001	9.12E-002
TH-228	8.49E-001	3.71E-001	5.29E-001
RA-224	1.10E+000	2.32E-001	6.64E-002
PB-212	9.54E-001	1.37E-001	3.59E-002
BI-212	1.40E+000	3.28E-001	3.35E-001
TL-208	8.63E-001	1.35E-001	7.31E-002
U-235	2.03E-001	1.75E-001	2.23E-001
TH-231	Not Detected	-----	1.06E+001
PA-231	Not Detected	-----	1.31E+000
TH-227	Not Detected	-----	3.49E-001
RA-223	Not Detected	-----	2.26E-001
RN-219	Not Detected	-----	3.42E-001
PB-211	Not Detected	-----	7.56E-001
TL-207	Not Detected	-----	1.15E+001
AM-241	Not Detected	-----	4.33E-001
PU-239	Not Detected	-----	4.09E+002
NP-237	Not Detected	-----	2.16E+000
PA-233	Not Detected	-----	5.15E-002
TH-229	Not Detected	-----	2.31E-001

[Summary Report] - Sample ID: : 20134215

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	3.46E-002
AG-110m	Not Detected	-----	2.61E-002
BA-133	Not Detected	-----	4.65E-002
BE-7	Not Detected	-----	2.23E-001
CD-115	Not Detected	-----	3.23E-001
CE-139	Not Detected	-----	2.78E-002
CE-141	Not Detected	-----	5.33E-002
CE-144	Not Detected	-----	2.26E-001
CM-243	Not Detected	-----	1.62E-001
CO-56	Not Detected	-----	2.91E-002
CO-57	Not Detected	-----	2.92E-002
CO-58	Not Detected	-----	2.88E-002
CO-60	Not Detected	-----	3.02E-002
CR-51	Not Detected	-----	2.40E-001
CS-134	Not Detected	-----	3.77E-002
CS-137	Not Detected	-----	2.81E-002
EU-152	Not Detected	-----	8.70E-002
EU-154	Not Detected	-----	1.59E-001
EU-155	Not Detected	-----	1.32E-001
FE-59	Not Detected	-----	6.81E-002
GD-153	Not Detected	-----	9.79E-002
HG-203	Not Detected	-----	3.14E-002
I-131	Not Detected	-----	3.96E-002
IR-192	Not Detected	-----	2.60E-002
K-40	1.72E+001	2.32E+000	2.58E-001
MN-52	Not Detected	-----	5.08E-002
MN-54	Not Detected	-----	3.23E-002
MO-99	Not Detected	-----	7.14E-001
NA-22	Not Detected	-----	3.56E-002
NA-24	Not Detected	-----	9.53E+000
ND-147	Not Detected	-----	2.30E-001
NI-57	Not Detected	-----	3.31E-001
RU-103	Not Detected	-----	2.69E-002
RU-106	Not Detected	-----	2.47E-001
SB-122	Not Detected	-----	1.34E-001
SB-124	Not Detected	-----	2.64E-002
SB-125	Not Detected	-----	7.72E-002
SN-113	Not Detected	-----	3.31E-002
SR-85	Not Detected	-----	3.31E-002
TA-182	Not Detected	-----	1.34E-001
TA-183	Not Detected	-----	7.63E-001
TL-201	Not Detected	-----	5.09E-001
Y-88	Not Detected	-----	2.47E-002
ZN-65	Not Detected	-----	8.64E-002
ZR-95	Not Detected	-----	4.99E-002

\*\*\*\*\*  
 \* Sandia National Laboratories  
 \* Radiation Protection Sample Diagnostics Program  
 \* 9/25/02 9:01:10 PM  
 \*\*\*\*\*

\* Analyzed by: *pe 9/26/02* Reviewed by: *[Signature] 10/1/02*  
 \*\*\*\*\*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059921-003  
 Lab Sample ID : 20134216 ✓

Sample Description : 6969/1004-DF1-BH3-8-S  
 Sample Quantity : 873.000 gram  
 Sample Date/Time : 9/20/02 11:30:00 AM  
 Acquire Start Date/Time : 9/25/02 7:20:52 PM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	6.21E-001
RA-226	1.35E+000	4.62E-001	6.43E-001
PB-214	6.43E-001	9.51E-002	5.43E-002
BI-214	5.98E-001	9.55E-002	4.86E-002
PB-210	Not Detected	-----	2.45E+001
TH-232	6.67E-001	3.21E-001	1.94E-001
RA-228	7.40E-001	1.35E-001	1.17E-001
AC-228	6.86E-001	1.34E-001	1.02E-001
TH-228	7.95E-001	3.99E-001	5.91E-001
RA-224	8.03E-001	1.75E-001	5.90E-002
PB-212	7.78E-001	1.12E-001	3.35E-002
BI-212	1.05E+000	2.67E-001	2.93E-001
TL-208	7.10E-001	1.13E-001	6.58E-002
U-235	Not Detected	-----	2.02E-001
TH-231	Not Detected	-----	1.01E+001
PA-231	Not Detected	-----	1.21E+000
TH-227	Not Detected	-----	3.08E-001
RA-223	Not Detected	-----	2.15E-001
RN-219	Not Detected	-----	3.06E-001
PB-211	Not Detected	-----	6.84E-001
TL-207	Not Detected	-----	1.17E+001
AM-241	Not Detected	-----	3.78E-001
PU-239	Not Detected	-----	3.66E+002
NP-237	Not Detected	-----	2.00E+000
PA-233	Not Detected	-----	4.75E-002
TH-229	Not Detected	-----	2.12E-001

[Summary Report] - Sample ID: : 20134216

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	2.99E-002
AG-110m	Not Detected	-----	2.40E-002
BA-133	Not Detected	-----	4.19E-002
BE-7	Not Detected	-----	2.19E-001
CD-115	Not Detected	-----	2.90E-001
CE-139	Not Detected	-----	2.55E-002
CE-141	Not Detected	-----	4.82E-002
CE-144	Not Detected	-----	2.07E-001
CM-243	Not Detected	-----	1.51E-001
CO-56	Not Detected	-----	2.88E-002
CO-57	Not Detected	-----	2.70E-002
CO-58	Not Detected	-----	2.72E-002
CO-60	Not Detected	-----	3.25E-002
CR-51	Not Detected	-----	2.19E-001
CS-134	Not Detected	-----	3.47E-002
CS-137	Not Detected	-----	2.58E-002
EU-152	Not Detected	-----	8.00E-002
EU-154	Not Detected	-----	1.38E-001
EU-155	Not Detected	-----	1.17E-001
FE-59	Not Detected	-----	6.83E-002
GD-153	Not Detected	-----	8.85E-002
HG-203	Not Detected	-----	2.97E-002
I-131	Not Detected	-----	3.67E-002
IR-192	Not Detected	-----	2.33E-002
K-40	2.53E+001	3.35E+000	2.35E-001
MN-52	Not Detected	-----	4.40E-002
MN-54	Not Detected	-----	2.92E-002
MO-99	Not Detected	-----	7.23E-001
NA-22	Not Detected	-----	3.70E-002
NA-24	Not Detected	-----	1.03E+001
ND-147	Not Detected	-----	2.24E-001
NI-57	Not Detected	-----	2.52E-001
RU-103	Not Detected	-----	2.53E-002
RU-106	Not Detected	-----	2.24E-001
SB-122	Not Detected	-----	1.30E-001
SB-124	Not Detected	-----	2.49E-002
SB-125	Not Detected	-----	7.15E-002
SN-113	Not Detected	-----	3.23E-002
SR-85	Not Detected	-----	3.05E-002
TA-182	Not Detected	-----	1.29E-001
TA-183	Not Detected	-----	6.71E-001
TL-201	Not Detected	-----	4.57E-001
Y-88	Not Detected	-----	1.98E-002
ZN-65	Not Detected	-----	8.64E-002
ZR-95	Not Detected	-----	4.68E-002

\*\*\*\*\*  
 \* Sandia National Laboratories  
 Radiation Protection Sample Diagnostics Program  
 9/25/02 10:43:10 PM  
 \*\*\*\*\*

\* Analyzed by: *SL 7/26/02* Reviewed by: *[Signature] 10/1/e*  
 \*\*\*\*\*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059922-003  
 Lab Sample ID : 20134217

Sample Description : 6969/1004-DF1-BH3-13-S  
 Sample Quantity : 779.000 gram  
 Sample Date/Time : 9/20/02 11:50:00 AM  
 Acquire Start Date/Time : 9/25/02 9:02:55 PM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	7.01E-001
RA-226	1.94E+000	5.38E-001	6.94E-001
PB-214	7.27E-001	1.06E-001	5.71E-002
BI-214	6.68E-001	1.06E-001	5.06E-002
PB-210	Not Detected	-----	2.67E+001
TH-232	9.21E-001	4.26E-001	1.89E-001
RA-228	8.98E-001	1.57E-001	1.08E-001
AC-228	8.46E-001	1.56E-001	9.69E-002
TH-228	9.37E-001	4.16E-001	5.99E-001
RA-224	9.66E-001	2.08E-001	6.58E-002
PB-212	9.26E-001	1.33E-001	3.65E-002
BI-212	8.84E-001	3.01E-001	3.94E-001
TL-208	7.70E-001	1.24E-001	7.71E-002
U-235	Not Detected	-----	2.19E-001
TH-231	Not Detected	-----	1.06E+001
PA-231	Not Detected	-----	1.26E+000
TH-227	Not Detected	-----	3.43E-001
RA-223	Not Detected	-----	2.36E-001
RN-219	Not Detected	-----	3.27E-001
PB-211	Not Detected	-----	7.46E-001
TL-207	Not Detected	-----	1.17E+001
AM-241	Not Detected	-----	4.13E-001
PU-239	Not Detected	-----	4.05E+002
NP-237	Not Detected	-----	2.09E+000
PA-233	Not Detected	-----	5.13E-002
TH-229	Not Detected	-----	2.30E-001



[Summary Report] - Sample ID: : 20134217

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.09E-002
AG-110m	Not Detected	-----	2.59E-002
BA-133	Not Detected	-----	4.34E-002
BE-7	Not Detected	-----	2.22E-001
CD-115	Not Detected	-----	3.31E-001
CE-139	Not Detected	-----	2.69E-002
CE-141	Not Detected	-----	5.40E-002
CE-144	Not Detected	-----	2.20E-001
CM-243	Not Detected	-----	1.55E-001
CO-56	Not Detected	-----	2.94E-002
CO-57	Not Detected	-----	2.84E-002
CO-58	Not Detected	-----	2.93E-002
CO-60	Not Detected	-----	3.12E-002
CR-51	Not Detected	-----	2.38E-001
CS-134	Not Detected	-----	3.65E-002
CS-137	Not Detected	-----	2.78E-002
EU-152	Not Detected	-----	8.43E-002
EU-154	Not Detected	-----	1.42E-001
EU-155	Not Detected	-----	1.27E-001
FE-59	Not Detected	-----	6.75E-002
GD-153	Not Detected	-----	9.43E-002
HG-203	Not Detected	-----	3.07E-002
I-131	Not Detected	-----	3.90E-002
IR-192	Not Detected	-----	2.58E-002
K-40	1.81E+001	2.43E+000	2.74E-001
MN-52	Not Detected	-----	5.08E-002
MN-54	Not Detected	-----	3.02E-002
MO-99	Not Detected	-----	7.68E-001
NA-22	Not Detected	-----	3.50E-002
NA-24	Not Detected	-----	1.08E+001
ND-147	Not Detected	-----	2.35E-001
NI-57	Not Detected	-----	5.19E-001
RU-103	Not Detected	-----	2.54E-002
RU-106	<del>7.35E-002</del>	<del>7.05E-002</del>	<del>1.10E-001</del>
SB-122	Not Detected	-----	1.36E-001
SB-124	Not Detected	-----	2.50E-002
SB-125	Not Detected	-----	7.27E-002
SN-113	Not Detected	-----	3.36E-002
SR-85	Not Detected	-----	3.34E-002
TA-182	Not Detected	-----	1.39E-001
TA-183	Not Detected	-----	7.39E-001
TL-201	Not Detected	-----	5.11E-001
Y-88	Not Detected	-----	2.06E-002
ZN-65	Not Detected	-----	8.56E-002
ZR-95	Not Detected	-----	5.11E-002

NOT  
Detected  
KRS  
9-26-02

\*\*\*\*\*  
 \* Sandia National Laboratories  
 \* Radiation Protection Sample Diagnostics Program  
 \* 9/26/02 12:25:14 AM  
 \*\*\*\*\*

\* Analyzed by: *lu 9/26/02* Reviewed by: *[Signature]*  
 \*\*\*\*\*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059923-003  
 Lab Sample ID : 20134218

Sample Description : 9978/1114-DW1-BH1-6-S  
 Sample Quantity : 711.000 gram  
 Sample Date/Time : 9/23/02 8:45:00 AM  
 Acquire Start Date/Time : 9/25/02 10:44:54 PM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	6.46E-001
RA-226	1.83E+000	4.84E-001	5.99E-001
PB-214	6.57E-001	1.00E-001	6.21E-002
BI-214	5.48E-001	9.14E-002	5.25E-002
PB-210	Not Detected	-----	2.64E+001
TH-232	6.04E-001	2.95E-001	1.89E-001
RA-228	7.15E-001	1.36E-001	1.12E-001
AC-228	5.75E-001	1.21E-001	9.73E-002
TH-228	6.60E-001	4.00E-001	6.07E-001
RA-224	6.85E-001	1.65E-001	9.51E-002
PB-212	6.50E-001	9.59E-002	3.36E-002
BI-212	8.65E-001	2.76E-001	3.41E-001
TL-208	5.67E-001	9.98E-002	7.22E-002
U-235	Not Detected	-----	2.10E-001
TH-231	Not Detected	-----	1.03E+001
PA-231	Not Detected	-----	1.22E+000
TH-227	Not Detected	-----	3.16E-001
RA-223	Not Detected	-----	1.85E-001
RN-219	Not Detected	-----	3.30E-001
PB-211	Not Detected	-----	7.39E-001
TL-207	Not Detected	-----	1.12E+001
AM-241	Not Detected	-----	3.92E-001
PU-239	Not Detected	-----	3.69E+002
NP-237	Not Detected	-----	2.00E+000
PA-233	Not Detected	-----	5.12E-002
TH-229	Not Detected	-----	2.06E-001

[Summary Report] - Sample ID: : 20134218

Isotope Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.04E-002
AG-110m	Not Detected	-----	2.53E-002
BA-133	Not Detected	-----	4.51E-002
BE-7	Not Detected	-----	2.07E-001
CD-115	Not Detected	-----	1.28E-001
CE-139	Not Detected	-----	2.60E-002
CE-141	Not Detected	-----	4.76E-002
CE-144	Not Detected	-----	2.02E-001
CM-243	Not Detected	-----	1.49E-001
CO-56	Not Detected	-----	2.70E-002
CO-57	Not Detected	-----	2.59E-002
CO-58	Not Detected	-----	2.53E-002
CO-60	Not Detected	-----	2.98E-002
CR-51	Not Detected	-----	2.05E-001
CS-134	Not Detected	-----	3.64E-002
CS-137	Not Detected	-----	2.75E-002
EU-152	Not Detected	-----	7.79E-002
EU-154	Not Detected	-----	1.40E-001
EU-155	Not Detected	-----	1.18E-001
FE-59	Not Detected	-----	5.86E-002
GD-153	Not Detected	-----	8.38E-002
HG-203	Not Detected	-----	2.78E-002
I-131	Not Detected	-----	3.01E-002
IR-192	Not Detected	-----	2.38E-002
K-40	1.48E+001	2.02E+000	2.50E-001
MN-52	Not Detected	-----	3.64E-002
MN-54	Not Detected	-----	2.92E-002
MO-99	Not Detected	-----	3.54E-001
NA-22	Not Detected	-----	3.34E-002
NA-24	Not Detected	-----	4.89E-001
ND-147	Not Detected	-----	1.94E-001
NI-57	<del>2.17E-001</del>	<del>0.31E-002</del>	<del>1.04E-001</del>
RU-103	Not Detected	-----	2.37E-002
RU-106	Not Detected	-----	2.33E-001
SB-122	Not Detected	-----	6.11E-002
SB-124	Not Detected	-----	2.50E-002
SB-125	Not Detected	-----	6.80E-002
SN-113	Not Detected	-----	3.13E-002
SR-85	Not Detected	-----	3.10E-002
TA-182	Not Detected	-----	1.29E-001
TA-183	Not Detected	-----	4.79E-001
TL-201	Not Detected	-----	2.52E-001
Y-88	Not Detected	-----	2.36E-002
ZN-65	Not Detected	-----	8.63E-002
ZR-95	Not Detected	-----	4.67E-002

NOT DETECTED  
ICRS 9-16-02

Sandia National Laboratories  
 Radiation Protection Sample Diagnostics Program  
 9/26/02 2:07:15 AM

\* Analyzed by: *he 9/26/02* Reviewed by: *[Signature]*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059924-003  
 Lab Sample ID : 20134219

Sample Description : 9978/1114-DW1-BH1-11-S  
 Sample Quantity : 906.000 gram  
 Sample Date/Time : 9/23/02 9:10:00 AM  
 Acquire Start Date/Time : 9/26/02 12:26:59 AM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	5.82E-001
RA-226	1.33E+000	4.34E-001	5.95E-001
PB-214	4.86E-001	7.74E-002	5.65E-002
BI-214	5.03E-001	8.23E-002	4.65E-002
PB-210	Not Detected	-----	2.30E+001
TH-232	6.51E-001	3.10E-001	1.75E-001
RA-228	6.45E-001	1.22E-001	1.17E-001
AC-228	5.80E-001	1.45E-001	1.64E-001
TH-228	9.08E-001	3.71E-001	5.25E-001
RA-224	7.33E-001	1.62E-001	5.94E-002
PB-212	6.32E-001	9.21E-002	3.15E-002
BI-212	8.13E-001	2.61E-001	3.34E-001
TL-208	5.67E-001	9.57E-002	6.68E-002
U-235	Not Detected	-----	1.92E-001
TH-231	Not Detected	-----	9.16E+000
PA-231	Not Detected	-----	1.12E+000
TH-227	Not Detected	-----	2.76E-001
RA-223	Not Detected	-----	1.70E-001
RN-219	Not Detected	-----	2.92E-001
PB-211	Not Detected	-----	6.57E-001
TL-207	Not Detected	-----	1.05E+001
AM-241	Not Detected	-----	3.40E-001
PU-239	Not Detected	-----	3.44E+002
NP-237	Not Detected	-----	1.85E+000
PA-233	Not Detected	-----	4.66E-002
TH-229	Not Detected	-----	1.97E-001

[Summary Report] - Sample ID: : 20134219

Isotope Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	2.84E-002
AG-110m	Not Detected	-----	2.26E-002
BA-133	Not Detected	-----	3.77E-002
BE-7	Not Detected	-----	1.94E-001
CD-115	Not Detected	-----	1.17E-001
CE-139	Not Detected	-----	2.39E-002
CE-141	Not Detected	-----	4.45E-002
CE-144	Not Detected	-----	1.89E-001
CM-243	Not Detected	-----	1.35E-001
CO-56	Not Detected	-----	2.83E-002
CO-57	Not Detected	-----	2.54E-002
CO-58	Not Detected	-----	2.45E-002
CO-60	Not Detected	-----	3.00E-002
CR-51	Not Detected	-----	1.90E-001
CS-134	Not Detected	-----	3.15E-002
CS-137	Not Detected	-----	2.42E-002
EU-152	Not Detected	-----	7.63E-002
EU-154	Not Detected	-----	1.31E-001
EU-155	Not Detected	-----	1.10E-001
FE-59	Not Detected	-----	5.72E-002
GD-153	Not Detected	-----	8.03E-002
HG-203	Not Detected	-----	2.55E-002
I-131	Not Detected	-----	2.78E-002
IR-192	Not Detected	-----	2.23E-002
K-40	2.31E+001	3.06E+000	2.44E-001
MN-52	Not Detected	-----	2.92E-002
MN-54	Not Detected	-----	2.59E-002
MO-99	Not Detected	-----	3.35E-001
NA-22	Not Detected	-----	3.57E-002
NA-24	Not Detected	-----	4.82E-001
ND-147	Not Detected	-----	1.74E-001
NI-57	Not Detected	-----	6.76E-002
RU-103	Not Detected	-----	2.25E-002
RU-106	Not Detected	-----	2.17E-001
SB-122	Not Detected	-----	5.99E-002
SB-124	Not Detected	-----	2.34E-002
SB-125	Not Detected	-----	6.49E-002
SN-113	Not Detected	-----	2.95E-002
SR-85	Not Detected	-----	2.77E-002
TA-182	Not Detected	-----	1.23E-001
TA-183	Not Detected	-----	4.18E-001
TL-201	Not Detected	-----	2.37E-001
Y-88	Not Detected	-----	1.65E-002
ZN-65	Not Detected	-----	8.13E-002
ZR-95	Not Detected	-----	4.11E-002

Sandia National Laboratories  
 Radiation Protection Sample Diagnostics Program  
 9/26/02 11:15:58 AM

\* Analyzed by:

*9/26/02* Reviewed by: *[Signature]*

Customer : SANDERS M (6135)  
 Customer Sample ID : 059931-001  
 Lab Sample ID : 20134207

Sample Description : 829/276-SP1-BH1-8-DU  
 Sample Quantity : 735.000 gram  
 Sample Date/Time : 9/24/02 2:00:00 PM  
 Acquire Start Date/Time : 9/26/02 9:35:43 AM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:

U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	7.37E-001
RA-226	2.02E+000	5.63E-001	7.28E-001
PB-214	9.18E-001	1.30E-001	6.03E-002
BI-214	7.84E-001	1.21E-001	4.84E-002
PB-210	Not Detected	-----	2.80E+001
TH-232	1.00E+000	4.61E-001	1.90E-001
RA-228	9.91E-001	1.72E-001	1.23E-001
AC-228	9.13E-001	1.66E-001	9.81E-002
TH-228	1.21E+000	4.61E-001	6.42E-001
RA-224	1.05E+000	2.27E-001	8.66E-002
PB-212	1.04E+000	1.49E-001	3.75E-002
BI-212	1.15E+000	3.15E-001	3.65E-001
TL-208	8.85E-001	1.40E-001	8.07E-002
U-235	Not Detected	-----	2.31E-001
TH-231	Not Detected	-----	1.16E+001
PA-231	Not Detected	-----	1.34E+000
TH-227	Not Detected	-----	3.75E-001
RA-223	Not Detected	-----	2.03E-001
RN-219	Not Detected	-----	3.68E-001
PB-211	Not Detected	-----	8.25E-001
TL-207	Not Detected	-----	1.16E+001
AM-241	Not Detected	-----	4.27E-001
PU-239	Not Detected	-----	4.13E+002
NP-237	Not Detected	-----	2.22E+000
PA-233	Not Detected	-----	5.35E-002
TH-229	Not Detected	-----	2.35E-001

[Summary Report] - Sample ID: : 20134207

Isotope Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.57E-002
AG-110m	Not Detected	-----	2.75E-002
BA-133	Not Detected	-----	4.90E-002
BE-7	Not Detected	-----	2.29E-001
CD-115	Not Detected	-----	1.14E-001
CE-139	Not Detected	-----	2.89E-002
CE-141	Not Detected	-----	5.23E-002
CE-144	Not Detected	-----	2.25E-001
CM-243	Not Detected	-----	1.62E-001
CO-56	Not Detected	-----	3.01E-002
CO-57	Not Detected	-----	2.98E-002
CO-58	Not Detected	-----	2.85E-002
CO-60	Not Detected	-----	3.38E-002
CR-51	Not Detected	-----	2.22E-001
CS-134	Not Detected	-----	3.96E-002
CS-137	Not Detected	-----	2.96E-002
EU-152	Not Detected	-----	8.96E-002
EU-154	Not Detected	-----	1.64E-001
EU-155	Not Detected	-----	1.34E-001
FE-59	Not Detected	-----	6.20E-002
GD-153	Not Detected	-----	9.58E-002
HG-203	Not Detected	-----	2.95E-002
I-131	Not Detected	-----	3.19E-002
IR-192	Not Detected	-----	2.62E-002
K-40	1.71E+001	2.30E+000	2.65E-001
MN-52	Not Detected	-----	3.49E-002
MN-54	Not Detected	-----	3.09E-002
MO-99	Not Detected	-----	3.32E-001
NA-22	Not Detected	-----	3.61E-002
NA-24	Not Detected	-----	2.28E-001
ND-147	Not Detected	-----	1.95E-001
NI-57	Not Detected	-----	7.28E-002
RU-103	Not Detected	-----	2.55E-002
RU-106	Not Detected	-----	2.39E-001
SB-122	Not Detected	-----	5.81E-002
SB-124	Not Detected	-----	2.49E-002
SB-125	Not Detected	-----	7.27E-002
SN-113	Not Detected	-----	3.49E-002
SR-85	Not Detected	-----	3.38E-002
TA-182	Not Detected	-----	1.43E-001
TA-183	Not Detected	-----	4.70E-001
TL-201	Not Detected	-----	2.38E-001
Y-88	Not Detected	-----	2.49E-002
ZN-65	Not Detected	-----	9.51E-002
ZR-95	Not Detected	-----	4.93E-002

\*\*\*\*\*  
 \* Sandia National Laboratories  
 Radiation Protection Sample Diagnostics Program  
 9/26/02 7:40:07 AM  
 \*\*\*\*\*

\* Analyzed by: *[Signature]* 9/26/02 Reviewed by: *[Signature]* 10/1/02  
 \*\*\*\*\*

Customer : SANDERS M (6135)  
 Customer Sample ID : LAB\_CONTROL\_SAMPLE\_USING\_CG-134  
 Lab Sample ID : 20134220

Sample Description : MIXED\_GAMMA\_STANDARD\_CG-134  
 Sample Quantity : 1.000 Each  
 Sample Date/Time : 11/1/90 12:00:00 PM  
 Acquire Start Date/Time : 9/26/02 7:29:51 AM  
 Detector Name : LAB01  
 Elapsed Live/Real Time : 600 / 604 seconds

Comments:

\*\*\*\*\*

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
BE-7	Not Detected	-----	1.00E+026
NA-22	Not Detected	-----	4.50E+003
NA-24	Not Detected	-----	1.00E+026
K-40	Not Detected	-----	1.34E+003
CR-51	Not Detected	-----	1.00E+026
MN-52	Not Detected	-----	1.00E+026
MN-54	Not Detected	-----	5.15E+006
CO-56	Not Detected	-----	2.96E+019
CO-57	Not Detected	-----	1.11E+007
NI-57	Not Detected	-----	1.00E+026
CO-58	Not Detected	-----	8.61E+020
FE-59	Not Detected	-----	1.00E+026
CO-60	7.93E+004	1.05E+004	9.20E+002
ZN-65	Not Detected	-----	1.90E+008
SR-85	Not Detected	-----	1.00E+026
Y-88	Not Detected	-----	2.94E+014
ZR-95	Not Detected	-----	1.00E+026
MO-99	Not Detected	-----	1.00E+026
RU-103	Not Detected	-----	1.00E+026
RU-106	Not Detected	-----	9.72E+006
AG-108m	Not Detected	-----	3.24E+002
AG-110m	Not Detected	-----	2.87E+008
SN-113	Not Detected	-----	1.01E+014
CD-115	Not Detected	-----	1.00E+026
SB-122	Not Detected	-----	1.00E+026
SB-124	Not Detected	-----	1.00E+026
SB-125	Not Detected	-----	2.38E+004
I-131	Not Detected	-----	1.00E+026
BA-133	Not Detected	-----	9.09E+002



Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
S-134	Not Detected	-----	1.51E+004
CS-137	6.80E+004	8.63E+003	3.65E+002
CE-139	Not Detected	-----	5.72E+011
CE-141	Not Detected	-----	1.00E+026
CE-144	Not Detected	-----	5.17E+007
ND-147	Not Detected	-----	1.00E+026
EU-152	Not Detected	-----	9.43E+002
GD-153	Not Detected	-----	1.11E+008
EU-154	Not Detected	-----	3.66E+003
EU-155	Not Detected	-----	4.26E+003
TA-182	Not Detected	-----	2.50E+014
TA-183	Not Detected	-----	1.00E+026
IR-192	Not Detected	-----	1.48E+020
TL-201	Not Detected	-----	1.00E+026
HG-203	Not Detected	-----	1.00E+026
TL-207	Not Detected	-----	2.34E+005
TL-208	Not Detected	-----	6.32E+004
PB-210	Not Detected	-----	9.80E+004
PB-211	Not Detected	-----	1.51E+004
BI-212	Not Detected	-----	2.99E+005
PB-212	Not Detected	-----	3.36E+004
BI-214	Not Detected	-----	5.79E+002
PB-214	Not Detected	-----	6.74E+002
RN-219	Not Detected	-----	6.71E+003
RA-223	Not Detected	-----	1.00E+026
RA-224	Not Detected	-----	1.86E+004
RA-226	Not Detected	-----	5.65E+003
TH-227	Not Detected	-----	2.57E+003
AC-228	Not Detected	-----	1.45E+003
RA-228	Not Detected	-----	2.46E+003
TH-228	Not Detected	-----	4.75E+005
TH-229	Not Detected	-----	1.26E+003
PA-231	Not Detected	-----	1.39E+004
TH-231	Not Detected	-----	4.04E+004
TH-232	Not Detected	-----	2.05E+003
PA-233	Not Detected	-----	5.84E+002
U-235	Not Detected	-----	1.38E+003
NP-237	Not Detected	-----	1.23E+004
U-238	Not Detected	-----	2.59E+003
PU-239	Not Detected	-----	2.32E+006
AM-241	8.91E+004	1.29E+004	1.91E+003
CM-243	Not Detected	-----	2.16E+003

\*\*\*\*\*  
 Sandia National Laboratories  
 Radiation Protection Sample Diagnostics Program  
 Quality Assurance Report  
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Report Date : 9/26/02 7:40:12 AM  
 QA File : C:\GENIE2K\CAMFILES\LCS1.QAF  
 Analyst : KICHAVE  
 Sample ID : 20134220  
 Sample Quantity : 1.00 Each  
 Sample Date : 11/1/90 12:00:00 PM  
 Measurement Date : 9/26/02 7:29:51 AM  
 Elapsed Live Time : 600 seconds  
 Elapsed Real Time : 604 seconds

Parameter	Mean	1S Error	New Value	< LU	: SD	: UD	: BS	>
AM-241 ACTIVITY	8.574E-002	3.464E-003	8.909E-002	<	:	:	:	>
CS-137 Activity	6.836E-002	1.361E-003	6.799E-002	<	:	:	:	>
CO-60 Activity	7.658E-002	3.463E-003	7.716E-002	<	:	:	:	>

Flags Key: LU = Boundary Test (Ab = Above, Be = Below)  
 SD = Sample Driven N-Sigma Test (In = Investigate, Ac = Action)  
 UD = User Driven N-Sigma Test (In = Investigate, Ac = Action)  
 BS = Measurement Bias Test (In = Investigate, Ac = Action)

Reviewed by: \_\_\_\_\_

*[Signature]*  
10/1/02

\*\*\*\*\*  
 \* Sandia National Laboratories  
 Radiation Protection Sample Diagnostics Program  
 9/26/02 7:36:45 AM  
 \*\*\*\*\*

\* Analyzed by: *h* 9/26/02 Reviewed by: *[Signature]* 10/1/02  
 \*\*\*\*\*

Customer : SANDERS M (6135)  
 Customer Sample ID : LAB\_CONTROL\_SAMPLE\_USING\_CG-134  
 Lab Sample ID : 20134221

Sample Description : MIXED\_GAMMA\_STANDARD\_CG-134  
 Sample Quantity : 1.000 Each  
 Sample Date/Time : 11/01/90 12:00:00 PM  
 Acquire Start Date/Time : 9/26/02 7:26:30 AM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 600 / 604 seconds

Comments:

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
U-238	Not Detected	-----	3.94E+003
RA-226	Not Detected	-----	5.61E+003
PB-214	Not Detected	-----	5.75E+002
BI-214	Not Detected	-----	4.66E+002
PB-210	Not Detected	-----	2.67E+005
TH-232	Not Detected	-----	1.77E+003
RA-228	Not Detected	-----	1.77E+003
AC-228	Not Detected	-----	1.05E+003
TH-228	Not Detected	-----	4.27E+005
RA-224	Not Detected	-----	1.90E+004
PB-212	Not Detected	-----	3.36E+004
BI-212	Not Detected	-----	2.08E+005
TL-208	Not Detected	-----	5.50E+004
U-235	Not Detected	-----	1.55E+003
TH-231	Not Detected	-----	6.77E+004
PA-231	Not Detected	-----	1.22E+004
TH-227	Not Detected	-----	2.58E+003
RA-223	Not Detected	-----	1.00E+026
RN-219	Not Detected	-----	5.66E+003
PB-211	Not Detected	-----	1.26E+004
TL-207	Not Detected	-----	1.74E+005
AM-241	8.21E+004	1.22E+004	3.94E+003
PU-239	Not Detected	-----	2.60E+006
NP-237	Not Detected	-----	1.41E+004
PA-233	Not Detected	-----	5.09E+002
TH-229	Not Detected	-----	1.49E+003

[Summary Report] - Sample ID: : 20134221

Nuclide Name	Activity (pCi/Each )	2-sigma Error	MDA (pCi/Each )
AG-108m	Not Detected	-----	2.21E+002
AG-110m	Not Detected	-----	2.27E+008
BA-133	Not Detected	-----	7.80E+002
BE-7	Not Detected	-----	1.00E+026
CD-115	Not Detected	-----	1.00E+026
CE-139	Not Detected	-----	6.26E+011
CE-141	Not Detected	-----	1.00E+026
CE-144	Not Detected	-----	5.81E+007
CM-243	Not Detected	-----	1.88E+003
CO-56	Not Detected	-----	2.28E+019
CO-57	Not Detected	-----	1.28E+007
CO-58	Not Detected	-----	6.47E+020
CO-60	8.15E+004	1.06E+004	7.25E+002
CR-51	Not Detected	-----	1.00E+026
CS-134	Not Detected	-----	1.22E+004
CS-137	7.02E+004	8.88E+003	3.35E+002
EU-152	Not Detected	-----	1.09E+003
EU-154	Not Detected	-----	2.49E+003
EU-155	Not Detected	-----	4.92E+003
FE-59	Not Detected	-----	1.00E+026
GD-153	Not Detected	-----	1.61E+008
HG-203	Not Detected	-----	1.00E+026
I-131	Not Detected	-----	1.00E+026
IR-192	Not Detected	-----	1.28E+020
K-40	Not Detected	-----	1.06E+003
MN-52	Not Detected	-----	1.00E+026
MN-54	Not Detected	-----	3.76E+006
MO-99	Not Detected	-----	1.00E+026
NA-22	Not Detected	-----	3.47E+003
NA-24	Not Detected	-----	1.00E+026
ND-147	Not Detected	-----	1.00E+026
NI-57	Not Detected	-----	1.00E+026
RU-103	Not Detected	-----	1.00E+026
RU-106	Not Detected	-----	8.00E+006
SB-122	Not Detected	-----	1.00E+026
SB-124	Not Detected	-----	1.00E+026
SB-125	Not Detected	-----	1.98E+004
SN-113	Not Detected	-----	8.64E+013
SR-85	Not Detected	-----	1.00E+026
TA-182	Not Detected	-----	1.84E+014
TA-183	Not Detected	-----	1.00E+026
TL-201	Not Detected	-----	1.00E+026
Y-88	Not Detected	-----	2.73E+014
ZN-65	Not Detected	-----	1.38E+008
ZR-95	Not Detected	-----	1.00E+026

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 Sandia National Laboratories  
 Radiation Protection Sample Diagnostics Program  
 Quality Assurance Report  
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Report Date : 9/26/02 7:36:51 AM  
 QA File : C:\GENIE2K\CAMFILES\LCS2.QAF  
 Analyst : KICHAVE  
 Sample ID : 20134221  
 Sample Quantity : 1.00 Each  
 Sample Date : 11/01/90 12:00:00 PM  
 Measurement Date : 9/26/02 7:26:30 AM  
 Elapsed Live Time : 600 seconds  
 Elapsed Real Time : 604 seconds

Parameter	Mean	1S Error	New Value	< LU : SD : UD : BS >
AM-241 Activity	8.240E-002	3.922E-003	8.212E-002	< : : : >
CS-137 Activity	7.182E-002	3.734E-003	7.023E-002	< : : : >
CO-60 Activity	8.001E-002	5.095E-003	8.027E-002	< : : : >

Flags Key: LU = Boundary Test (Ab = Above , Be = Below )  
 SD = Sample Driven N-Sigma Test (In = Investigate, Ac = Action)  
 UD = User Driven N-Sigma Test (In = Investigate, Ac = Action)  
 BS = Measurement Bias Test (In = Investigate, Ac = Action)

Reviewed by: \_\_\_\_\_

*PC 10/1/02*