

9-1-2005

# Justification for Class III Permit Modification September 2005, DSS Site 1081, Operable Unit 1295, Building.6650 Septic System at Technical Area III

Sandia National Laboratories/NM

Follow this and additional works at: [https://digitalrepository.unm.edu/snl\\_complete](https://digitalrepository.unm.edu/snl_complete)

---

## Recommended Citation

Sandia National Laboratories/NM. "Justification for Class III Permit Modification September 2005, DSS Site 1081, Operable Unit 1295, Building.6650 Septic System at Technical Area III." (2005). [https://digitalrepository.unm.edu/snl\\_complete/166](https://digitalrepository.unm.edu/snl_complete/166)

This Technical Report is brought to you for free and open access by the Sandia National Labs/NM Technical Reports at UNM Digital Repository. It has been accepted for inclusion in Regulatorily Completed by an authorized administrator of UNM Digital Repository. For more information, please contact [disc@unm.edu](mailto:disc@unm.edu).



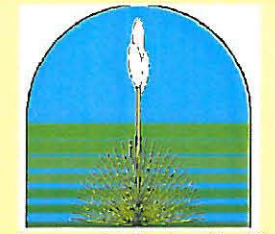


This work supported by the United States Department of Energy under contract DE-AC04-94-185000.



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

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



Environmental Restoration Project

### Summary of Data Used for NFA Justification

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

### Recommended Future Land Use

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

### Results of Risk Analysis

- Risk assessment results for industrial and residential land-use scenarios are calculated per NMED risk assessment guidance as presented in "Supplemental Risk Document Supporting Class 3 Permit Modification Process."
- Because COCs were present in concentrations greater than background-screening levels or because constituents were present that did not have background-screening numbers, it was necessary to perform risk assessments for these all of these AOCs. The risk assessment analysis evaluated the potential for adverse health effects for industrial and residential land-use scenarios.
- The maximum concentration value for lead was 22.2 mg/kg at AOC 1081 and 11.9 mg/kg at AOC 1087; these exceed the background value of 11.8 mg/kg. The EPA intentionally does not provide any human health toxicological data on lead; therefore, no risk parameter values could be calculated. The NMED guidance for lead screening concentrations for construction and industrial land-use scenarios are 750 and 1,500 mg/kg, respectively. The EPA screening guidance value for a residential land-use scenario is 400 mg/kg. The maximum concentration for lead at these two sites are less than all the screening values; therefore, lead was eliminated from further consideration in the human health risk assessment for each site.
- The non-radiological total human health HIs for 18 of the 19 AOCs are below NMED guidelines for a residential land-use scenario.
- For four sites, the total estimated excess cancer risks are at or slightly above the residential land-use scenario guideline. However, the incremental excess cancer risk values for these four sites are below the NMED residential land-use scenario guideline.
- For one of the 19 sites (AOC 1081), the total HI and the estimated excess cancer risk are above the NMED guidelines for the residential land-use scenario due to elevated levels of arsenic and silver. However, the total HI and estimated excess cancer risk values are below the NMED guidelines for the industrial land-use scenario.
- The total human health TEDEs for industrial land-use scenarios ranged from 0.001 to 0.46 mrem/yr, all of which are substantially below the EPA numerical guideline of 15 mrem/yr. The total human health TEDEs for residential land-use scenarios ranged from 0.0052 to 0.12 mrem/yr, all of which are substantially below the EPA numerical guideline of 75 mrem/yr. Therefore, these AOCs are eligible for unrestricted radiological release.
- Using the SNL predictive ecological risk and scoping assessment methodologies, it was concluded that a complete ecological pathway for each of 18 of the sites was not associated with the respective COPELs for that site. Thus, a more detailed ecological risk assessment to predict the level of risk was not deemed necessary for these sites.
- Ecological risks associated with AOC 1084 were predicted incorporating potential receptors and site-specific COPECs. The HQ values predicted were less than one, with the exception of barium. For barium, the contribution from background concentrations accounts for the majority (52%) of the HQ values. Therefore, ecological risks associated with this site are expected to be low.
- In conclusion, human health and ecological risks are acceptable for 18 sites for a residential land-use scenario and for all 19 for an industrial land-use scenario per NMED guidance. Thus, 18 of these sites are proposed for CAC without institutional controls, and one site (AOC 1081) is proposed for CAC with institutional controls.

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

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

AOC Number	Site Name	Residential Land-Use Scenario	
		Total Hazard Index	Excess Cancer Risk
276	Former Bldg 829X Silver Recovery Sump	0.27	2E-5 Total <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

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

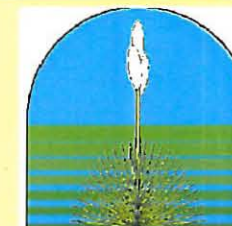
Sandia National Laboratories  
Environmental Restoration Project  
Task Leader: Mike Sanders  
Telephone (505) 284-2478



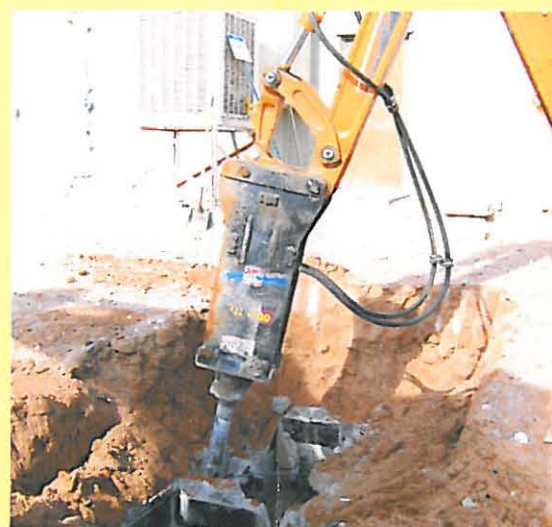
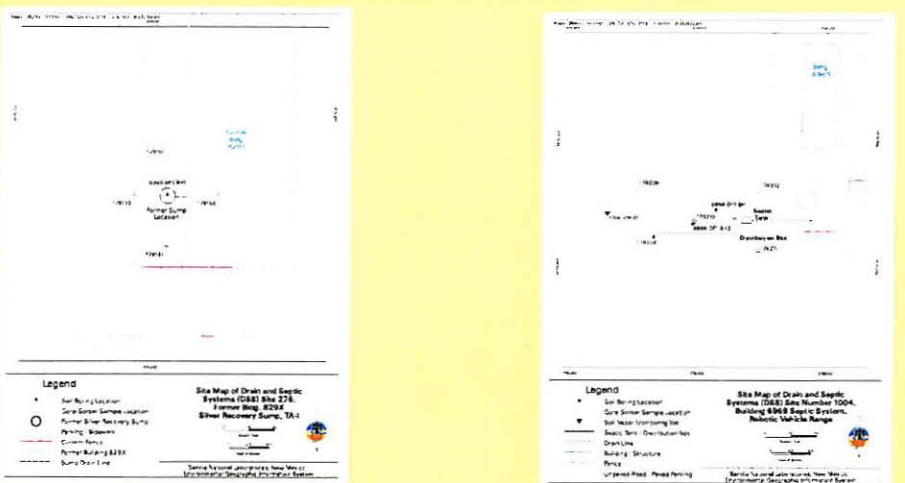


This work supported by the United States Department of Energy under contract DE-AC04-94185000.

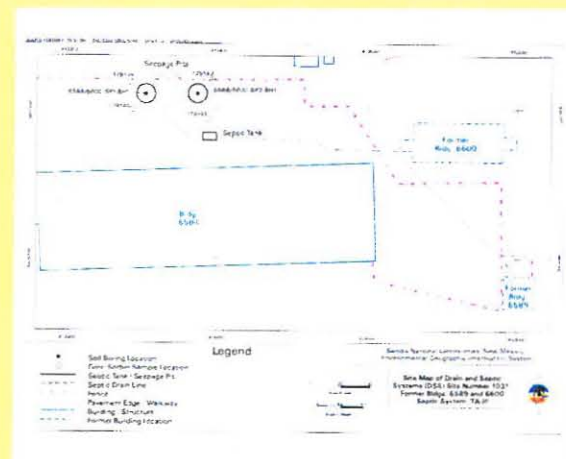
# Drain and Septic Systems (DSS) Areas of Concern (AOCs) 276, 1004, 1031, 1034, 1035 1036, 1052



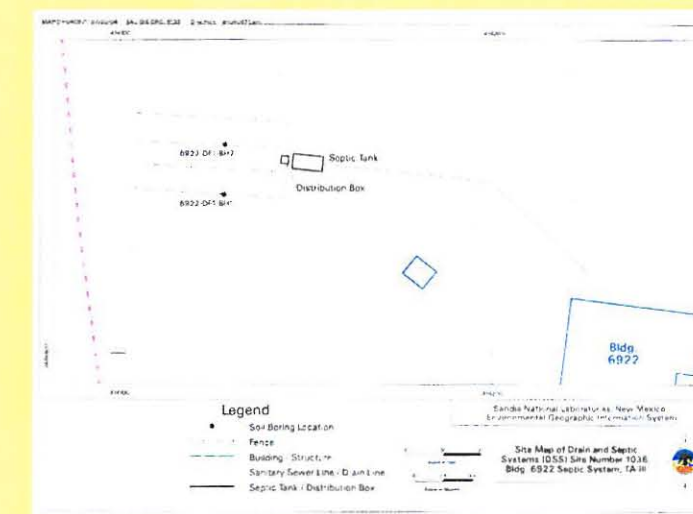
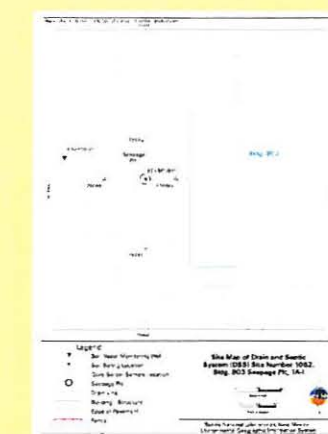
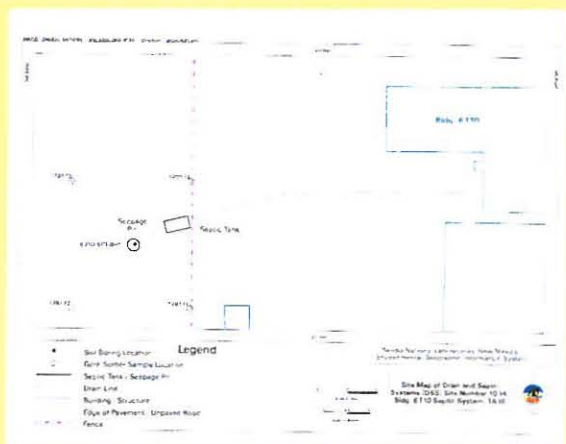
Environmental Restoration Project



Septic system demolition and backfilling.



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



### For More Information Contact

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

Sandia National Laboratories  
Environmental Restoration Project  
Task Leader: Mike Sanders  
Telephone (505) 284-2478



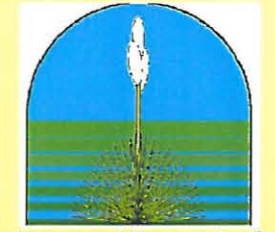


This work supported by the United States Department of Energy under contract DE-AC04-94185000.



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

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



Environmental Restoration Project

## Site History

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

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

## Depth to Groundwater

Depth to groundwater at these 19 AOCs is as follows:

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

## Constituents of Concern

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

## Investigations

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

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

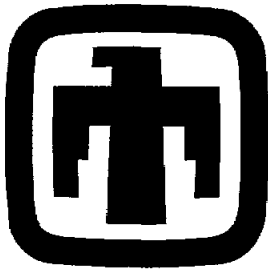
AOC Number	Site Name	Buried Components (Drain Lines, Drywells) Located With a Backhoe	Soil Sampling Beneath Drainlines, Seepage Pits, Drywells	Type(s) of Drain System, and Soil Sampling Depths (ft bgs)	Passive Soil Vapor Sampling	Active Soil Vapor Monitor Well Installation and Sampling
276	Former Bldg 829X Silver Recovery Sump	None	1994, 2002	Silver Recovery Sump 8, 13	2002	None
1004	Bldg 6969 Septic System	2002	2002	Drainfield 8, 13	2002	2003
1031	Former Bldgs 6589 and 6600 Septic System	2002	2002	Seepage Pits 15, 20	2002	None
1034	Bldg 6710 Septic System	None	2002	Seepage Pit 14, 19	2002	None
1035	Bldg 6715 Septic System	None	2002	Seepage Pit 11, 16	2002	None
1036	Bldg 6922 Septic System	1997	1998, 1999	Drainfield 5, 10	None	None
1052	Bldg 803 Seepage Pit	None	2002	Seepage Pit 27, 27	2002	2003
1078	Bldg 6640 Septic System	2002	2002	Drainfield 5, 10	None	None
1079	Bldg 6643 Septic System	2002	2002	Drainfield 11, 16	None	None
1080	Bldg 6644 Septic System	2002	2002	Drainfield Borehole 1 & 2, 5, 10; Borehole 7, 6, 11	None	None
1081	Bldg 6650 Septic System	2003 (north septic tank)	2002	South seepage pit 10, 12, 15, 17; North seepage pit 10, 12, 15, 17, 20, 24, 25	2002	2003
1084	Bldg 6505 Septic System	2002	2002	Drainfield 3, 8	2002	None
1087	Bldg 6743 Seepage Pit	None	2002	Seepage Pit 8, 13	2002	None
1092	MO 228-230 Septic System	2002, 2003	2002	Drainfield 6, 11	None	2003
1098	TA-V Plenum Rooms Drywell	None	2002	Drywell 10, 15	None	None
1102	Former Bldg 889 Septic System	1999, 2002	2002	Seepage Pit 25, 30	None	None
1104	Bldg 6595 Seepage Pit	None	2002	Seepage Pit 11, 16	None	None
1113	Bldg 6597 Drywell	2002	2002	Drywell 5, 10	None	None
1120	Bldg 6643 Drywell	2002	2002	Drywell 8, 13	2002	None

## For More Information Contact

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

Sandia National Laboratories  
Environmental Restoration Project  
Task Leader: Mike Sanders  
Telephone (505) 284-2478





**Sandia National Laboratories**

---

**Justification for Class III Permit Modification**

**September 2005**

**DSS Site 1081**

**Operable Unit 1295**

**Building 6650 Septic System at  
Technical Area III**

**CAC (SWMU Assessment Report) Submitted March 2005**

**RSI Submitted April 2005**

**Environmental  
Restoration  
Project**



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



CAC





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



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 16 2004

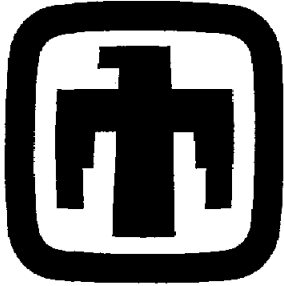
cc w/enclosure:

W. Moats, NMED-HWB (Via Certified Mail)  
L. King, EPA, Region 6 (Via Certified Mail)  
M. Gardipe, NNSA/SC/ERD  
C. Voorhees, NMED-OB  
Program Manager, NMED-OB

cc w/o enclosure:

K. Thomas, EPA, Region 6  
F. Nimick, SNL, MS 1089  
D. Stockham, SNL, MS 1087  
~~B. Langkopf~~, SNL, MS 1087  
M. Sanders, SNL, MS 1087  
R. Methvin, SNL MS 1087  
J. Pavletich, SNL MS 1087  
A. Villareal, SNL, MS 1035  
A. Blumberg, SNL, MS 0141  
M. J. Davis, SNL, MS 1089  
ESHSEC Records Center, MS 1087





Sandia National Laboratories/New Mexico  
Environmental Restoration Project

---

---

**SWMU ASSESSMENT REPORT AND  
PROPOSAL FOR  
CORRECTIVE ACTION COMPLETE  
DRAIN AND SEPTIC SYSTEMS SITE 1081,  
BUILDING 6650 SEPTIC SYSTEM**

**March 2005**



United States Department of Energy  
Sandia Site Office

---

---



## TABLE OF CONTENTS

LIST OF FIGURES .....	iii
LIST OF TABLES.....	v
LIST OF ANNEXES .....	vii
ACRONYMS AND ABBREVIATIONS .....	ix
1.0 PROJECT BACKGROUND .....	1-1
2.0 DSS SITE 1081: BUILDING 6650 SEPTIC SYSTEM .....	2-1
2.1 Summary .....	2-1
2.2 Site Description and Operational History.....	2-1
2.2.1 Site Description .....	2-1
2.2.2 Operational History.....	2-7
2.3 Land Use .....	2-7
2.3.1 Current Land Use.....	2-7
2.3.2 Future/Proposed Land Use .....	2-7
3.0 INVESTIGATORY ACTIVITIES .....	3-1
3.1 Summary .....	3-1
3.2 Investigations 1 and 6—Septic Tank Sampling .....	3-1
3.3 Investigation 2—Passive Soil-Vapor Sampling.....	3-2
3.3.1 Passive Soil-Vapor Sampling Methodology .....	3-2
3.3.2 Soil-Vapor Survey Results and Conclusions.....	3-2
3.4 Investigation 3—Soil Sampling.....	3-3
3.4.1 Soil Sampling Methodology .....	3-3
3.4.2 Soil Sampling Results and Conclusions .....	3-3
3.4.3 Soil Sampling Quality Assurance/Quality Control Samples and Data Validation Results .....	3-23
3.5 Investigation 4—Active Soil-Vapor Sampling .....	3-24
3.5.1 Active Soil-Vapor Sampling Methodology .....	3-24
3.5.2 Active Soil-Vapor Sampling Results .....	3-24
3.6 Investigation 5—Backhoe Excavation .....	3-27
3.7 Site Sampling Data Gaps.....	3-27

## TABLE OF CONTENTS (Concluded)

4.0	CONCEPTUAL SITE MODEL .....	4-1
4.1	Nature and Extent of Contamination .....	4-1
4.2	Environmental Fate.....	4-1
4.3	Site Assessment.....	4-7
4.3.1	Summary.....	4-7
4.3.2	Risk Assessments.....	4-7
4.4	Baseline Risk Assessments .....	4-9
4.4.1	Human Health .....	4-9
4.4.2	Ecological.....	4-9
5.0	RECOMMENDATION FOR CORRECTIVE ACTION COMPLETE WITHOUT CONTROLS DETERMINATION .....	5-1
5.1	Rationale .....	5-1
5.2	Criterion .....	5-1
6.0	REFERENCES.....	6-1



## LIST OF FIGURES

### Figure

2.2.1-1	Location Map of Drain and Septic Systems (DSS) Site Number 1081, Bldg. 6650 Septic System, TA-III .....	2-3
2.2.1-2	Site Map of Drain and Septic Systems (DSS) Site Number 1081, Bldg. 6650 Septic System, TA-III .....	2-5
3.4-1	Collecting soil samples with the Geoprobe™ at DSS Site 1081, Building 6650 Septic System. View to the south. August 29, 2002 .....	3-5
3.5.2-1	A typical FLUTe™ soil-vapor monitoring well completion showing five individual vapor sampling tubes exiting the wellhead. Each tube is connected to an individual, downhole soil-vapor sampling port on the side of the well. The sample ports are at depths of 5, 20, 70, 100, and 150 feet bgs. ....	3-25
4.2-1	Conceptual Site Model Flow Diagram for DSS Site 1081, Building 6650 Septic System .....	4-3

**This page intentionally left blank.**



## LIST OF TABLES

### Table

3.4-1	Summary of Areas Sampled, Analytical Methods, and Laboratories Used for DSS Site 1081, Building 6650 Septic System Soil Samples.....	3-7
3.4.2-1	Summary of DSS Site 1081, Building 6650 Septic System, Confirmatory Soil Sampling, VOC Analytical Results, August 2002 (Off-Site Laboratory).....	3-10
3.4.2-2	Summary of DSS Site 1081, Building 6650 Septic System, Confirmatory Soil Sampling, VOC Analytical MDLs, August 2002 (Off-Site Laboratory).....	3-11
3.4.2-3	Summary of DSS Site 1081, Building 6650 Septic System, Confirmatory Soil Sampling, SVOC Analytical Results, August 2002 (Off-Site Laboratory).....	3-12
3.4.2-4	Summary of DSS Site 1081, Building 6650 Septic System, Confirmatory Soil Sampling, SVOC Analytical MDLs, August 2002 (Off-Site Laboratory).....	3-13
3.4.2-5	Summary of DSS Site 1081, Building 6650 Septic System, Confirmatory Soil Sampling, PCB Analytical Results, August 2002 (Off-Site Laboratory).....	3-15
3.4.2-6	Summary of DSS Site 1081, Building 6650 Septic System, Confirmatory Soil Sampling, PCB Analytical MDLs, August 2002 (Off-Site Laboratory).....	3-16
3.4.2-7	Summary of DSS Site 1081, Building 6650 Septic System, Confirmatory Soil Sampling, HE Compound Analytical Results, August 2002 (Off-Site Laboratory).....	3-17
3.4.2-8	Summary of DSS Site 1081, Building 6650 Septic System, Confirmatory Soil Sampling, HE Compound Analytical MDLs, August 2002 (Off-Site Laboratory).....	3-18
3.4.2-9	Summary of DSS Site 1081, Building 6650 Septic System, Confirmatory Soil Sampling, Metals Analytical Results, August 2002 (Off-Site Laboratory).....	3-19
3.4.2-10	Summary of DSS Site 1081, Building 6650 Septic System, Confirmatory Soil Sampling, Metals Analytical MDLs, August 2002 (Off-Site Laboratory).....	3-20
3.4.2-11	Summary of DSS Site 1081, Building 6650 Septic System, Confirmatory Soil Sampling, Total Cyanide Analytical Results, August 2002 (Off-Site Laboratory).....	3-21
3.4.2-12	Summary of DSS Site 1081, Building 6650 Septic System, Confirmatory Soil Sampling, Total Cyanide Analytical MDLs, August 2002 (Off-Site Laboratory).....	3-21

## LIST OF TABLES (Concluded)

### Table

3.4.2-13	Summary of DSS Site 1081, Building 6650 Septic System, Confirmatory Soil Sampling, Gamma Spectroscopy Analytical Results, August 2002 (On-Site Laboratory) .....	3-22
3.4.2-14	Summary of DSS Site 1081, Building 6650 Septic System, Confirmatory Soil Sampling, Gross Alpha/Beta Analytical Results, August 2002 (Off-Site Laboratory) .....	3-23
4.2-1	Summary of Potential COCs for DSS Site 1081, Building 6650 Septic System.....	4-5
4.3.2-1	Summation of Incremental Nonradiological and Radiological Risks from DSS Site 1081, Building 6650 Septic System Carcinogens.....	4-8



## LIST OF ANNEXES

### Annex

- A DSS Site 1081 Septic Tank Sampling Results
- B DSS Site 1081 Gore-Sorber™ Passive Soil-Vapor Survey Analytical Results
- C DSS Site 1081 Soil Sample Data Validation Results
- D DSS Site 1081 Soil-Vapor Monitoring Well 1081-VW-01 Analytical Results and Data Validation Report
- E DSS Site 1081 Risk Assessment

**This page intentionally left blank.**



## ACRONYMS AND ABBREVIATIONS

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

**This page intentionally left blank.**

## 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 1081: BUILDING 6650 SEPTIC SYSTEM**

### **2.1 Summary**

The SNL/NM ER Project conducted an assessment of DSS Site 1081, the Building 6650 Septic System. There are no known or specific environmental concerns at this site. The assessment was conducted to determine whether environmental contamination was released to the environment via the septic system present at the site. This report provides documentation that the site was specifically characterized, that no significant releases of contaminants to the environment occurred via the Building 6650 Septic System, and that it does not pose a threat to human health or the environment under either the industrial or residential land-use scenarios. Current operations at the site are conducted in accordance with applicable laws and regulations that are protective of the environment and septic system discharges are now directed to the City of Albuquerque sewer system.

Review and analysis of all relevant data for DSS Site 1081 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 1081 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**

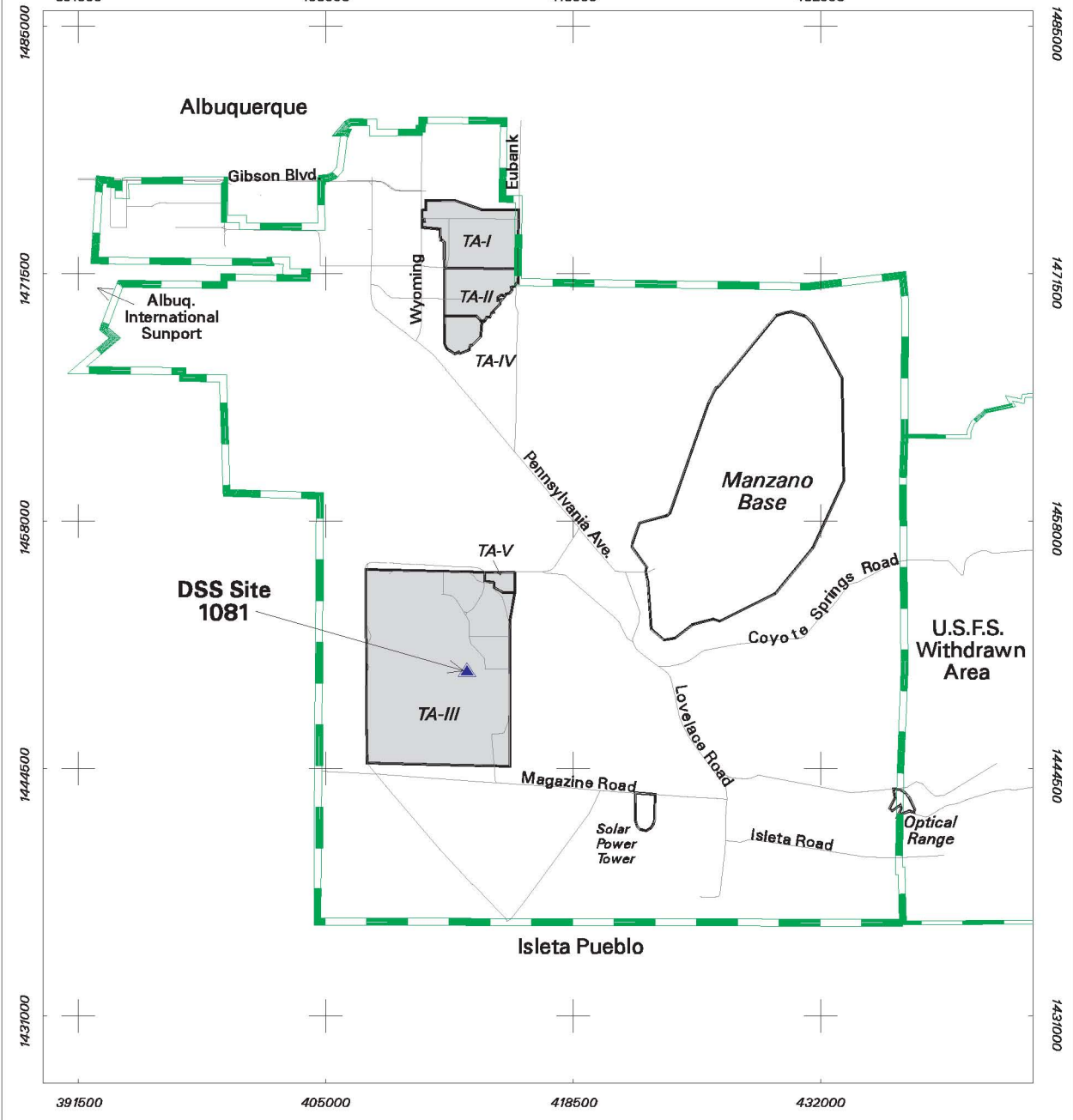
#### **2.2.1 Site Description**

DSS Site 1081 is located in SNL/NM Technical Area (TA)-III on federally owned land controlled by Kirtland Air Force Base (KAFB) and permitted to the U.S. Department of Energy. The site is located approximately 5,400 feet southwest of the entrance to TA-III (Figure 2.2.1-1). The abandoned septic system is on the west side of Building 6650 and consisted of two individual septic systems. Each system consisted of a septic tank and distribution box connected to two seepage pits (Figure 2.2.1-2). Construction details are based upon engineering drawings (SNL/NM August 1980) and site inspections of the systems.


The surface geology at DSS Site 1081 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 1081, and typically consist of a mixture of silts, sands, and gravels that are poorly sorted, and exhibit moderately connected lenticular bedding. Individual beds range from 1 to 5 feet in thickness with a preferred east-west orientation and have moderate to low hydraulic conductivities (SNL/NM March 1996). Site vegetation primarily consists of desert grasses, shrubs, and cacti.

**This page intentionally left blank.**

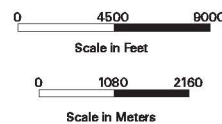




**Legend**

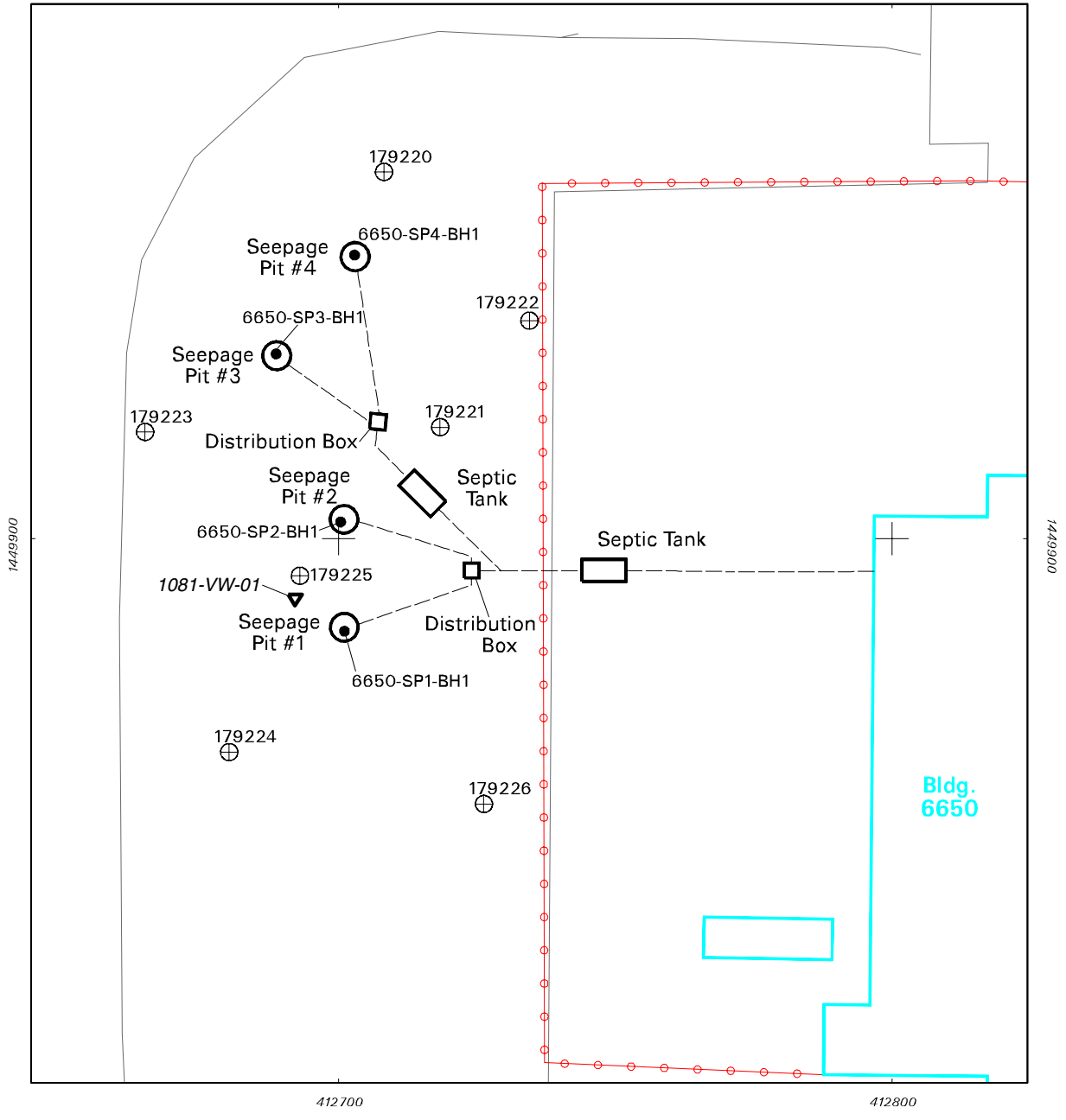
-  DSS Site 1081
-  Major Road
-  KAFB Boundary
-  USFS Withdrawn Area Boundary
-  SNL Technical Area

**Figure 2.2.1-1**  
**Location Map of Drain and Septic**  
**Systems (DSS) Site Number 1081,**  
**Bldg. 6650 Septic System, TA-III**



Sandia National Laboratories, New Mexico  
 Environmental Geographic Information System

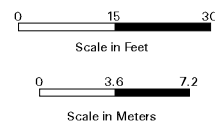




**Legend**

- Borehole Location
- ⊕ Gore-Sorber Sample Location
- ▼ Soil-Vapor Monitoring Well
- Fence
- ▭ Septic Tank / Seepage Pit / Distribution Box
- Paved & Unpaved Road
- ▭ Building / Structure
- - - Septic Drain Line

**Figure 2.2.1-2**  
**Site Map of Drain and Septic Systems (DSS) Site Number 1081, Bldg. 6650 Septic System, TA-III**



Sandia National Laboratories, New Mexico  
Environmental Geographic Information System

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

The site lies at an average elevation of approximately 5,400 feet above mean sea level (SNL/NM April 2003). Depth to groundwater is approximately 480 feet below ground surface (bgs) at the site. Groundwater flow is thought to be generally to the west in this area (SNL/NM March 2002). The nearest production wells to DSS Site 1081 are KAFB-4, approximately 3.6 miles to the northwest and KAFB-11, approximately 4.0 miles to the northeast. The nearest groundwater monitoring well is MWL-BW1, approximately 2,000 feet northwest of the site.

## **2.2.2 Operational History**

Available information indicates that Building 6650, currently known as the Vibration Data and Control Center, was constructed in 1967 (SNL/NM March 2003), and it is assumed the original (southern) system was constructed at the same time. In the early 1980s the southern system was augmented or replaced by a second (northern) system. 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. By 1991, the septic system discharges were routed to the City of Albuquerque sanitary sewer system (Jones June 1991). The old septic system lines would have been disconnected, capped, and the system abandoned in place concurrent with this change (Romero September 2003).

## **2.3 Land Use**

### **2.3.1 Current Land Use**

The current land use for DSS Site 1081 is industrial.

### **2.3.2 Future/Proposed Land Use**

The projected future land use for DSS Site 1081 is industrial (DOE et al. September 1995).



**This page intentionally left blank.**

## 3.0 INVESTIGATORY ACTIVITIES

### 3.1 Summary

Six assessment investigations have been conducted at this site. In 1992 and 1995, waste characterization samples were collected from the assumed, southern septic tank, although it is not clear from the 1993 and 1995 septic tank sampling reports which of the two tanks were sampled (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 seepage pits (Investigation 2). In August 2002, subsurface soil samples were collected from four borings drilled through the center of, and beneath, the seepage pits (Investigation 3). In May and June 2003, a 150-foot-deep, active soil-vapor monitoring well was installed at DSS Site 1081. This was one of seven DSS sites selected by the NMED/HWB for additional, deep soil-vapor monitoring (Investigation 4). In December 2004, a backhoe was used to physically locate and inspect the northern septic tank, as the tank access was covered by dirt (Investigation 5). Additional waste characterization samples were collected from the northern septic tank in July 2004 (Investigation 6). 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 Investigations 1 and 6—Septic Tank Sampling

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

A sludge sample collected on August 17, 1992, was analyzed at an off-site laboratory for gross alpha/beta activity, tritium, and radionuclides by gamma spectroscopy. A fraction of the sample was also submitted to the SNL/NM Radiation Protection Sample Diagnostics (RPSD) Laboratory for gamma spectroscopy analysis prior to off-site release (SNL/NM June 1993).

Aqueous samples collected on June 26, 1995, were analyzed at an off-site laboratory for VOCs, semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), total metals, total phenol, nitrates/nitrites, formaldehyde, fluoride, oil and grease, and for gross alpha/beta activity, isotopic analysis for tritium and uranium, and radionuclides by gamma spectroscopy. A fraction of each sample was also submitted to the SNL/NM RPSD Laboratory for gamma spectroscopy analysis prior to off-site release (SNL/NM December 1995).

The analytical results for these two sampling events are presented in Annex A. On February 21, 1996, the residual contents of the southern tank, approximately 710 gallons of waste and added water, were pumped out and managed according to SNL/NM policy (Shain August 1996). No information was available to determine whether samples or residual effluent had been removed from the northern septic tank in February 1996. It was therefore assumed that the northern tank contents had not been characterized or that the effluent had been removed from the tank.

The access cover to the northern tank was located and opened in December 2003, and the tank was found to still contain approximately 1.5 feet of liquid but no sludge. Waste characterization samples of the liquid were collected on July 12, 2004, and the analytical results for these samples are also presented in Annex A.

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

In May 2002, a passive soil-vapor survey was conducted in the Building 6650 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 seven GS passive soil-vapor samplers were placed in the seepage pit areas of the site (Figure 2.2.1-2). Samplers were installed at the site on May 6, 2002, and were retrieved on May 21, 2002. Sample locations are designated by the same six-digit sample number both on Figure 2.2.1-2 and in the analytical results tables presented in Annex B.

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

### 3.4 Investigation 3—Soil Sampling

Soil sampling was conducted in accordance with the rationale and procedures in the SAP (SNL/NM October 1999) approved by the NMED. On August 29 and August 30, 2002, soil samples were collected from four seepage pit boreholes. Soil boring locations are shown on Figure 2.2.1-2. Figure 3.4-1 shows soil samples being collected at DSS Site 1081. A summary of the boreholes, sample depths, sample analyses, analytical methods, laboratories, and sample dates is presented in Table 3.4-1.

#### 3.4.1 Soil Sampling Methodology

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

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

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

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

#### 3.4.2 Soil Sampling Results and Conclusions

Analytical results for the soil samples collected at DSS Site 1081 are presented and discussed in this section.



**This page intentionally left blank.**



Figure 3.4-1  
Collecting soil samples with the Geoprobe™ at DSS Site 1081,  
Building 6650 Septic System. View to the south. August 29, 2002

Table 3.4-1  
Summary of Areas Sampled, Analytical Methods, and Laboratories Used for  
DSS Site 1081, Building 6650 Septic System Soil Samples

Sampling Areas	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
Seepage Pits	4	10, 15 12, 17 17, 24 20, 25	8	VOCs EPA Method 8260	GEL	08-29-02 08-30-02
	4	10, 15 12, 17 17, 24 20, 25	8	SVOCs EPA Method 8270	GEL	08-29-02 08-30-02
	4	10, 15 12, 17 17, 24 20, 25	8	PCBs EPA Method 8082	GEL	08-29-02 08-30-02
	4	10, 15 12, 17 17, 24 20, 25	8	HE Compounds EPA Method 8330	GEL	08-29-02 08-30-02
	4	10, 15 12, 17 17, 24 20, 25	8	RCRA Metals EPA Methods 6000/7000	GEL	08-29-02 08-30-02
	4	10, 15 12, 17 17, 24 20, 25	8	Hexavalent Chromium EPA Method 7196A	GEL	08-29-02 08-30-02
	4	10, 15 12, 17 17, 24 20, 25	8	Total Cyanide EPA Method 9012A	GEL	08-29-02 08-30-02
	4	10, 15 12, 17 17, 24 20, 25	8	Gamma Spectroscopy EPA Method 901.1	RPSD	08-29-02 08-30-02

Refer to footnotes at end of table.

**Table 3.4-1 (Concluded)**  
**Summary of Areas Sampled, Analytical Methods, and Laboratories Used for**  
**DSS Site 1081, Building 6650 Septic System Soil Samples**

Sampling Areas	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
Seepage Pits (Continued)	4	10, 15 12, 17 17, 24 20, 25	8	Gross Alpha/Beta Activity EPA Method 900.0	GEL	08-29-02 08-30-02

<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.

## VOCs

VOC analytical results for the eight soil samples collected from the four seepage pit 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 six of the eight samples collected from the four boreholes. Both 2-butanone and methylene chloride were detected in the 12-foot-bgs sample from borehole SP2-BH1. These compounds were not detected in the associated trip blank (TB) but are common laboratory contaminants that may not indicate soil contamination at this site.

## SVOCs

SVOC analytical results for the eight soil samples collected from the four seepage pit boreholes are summarized in Table 3.4.2-3. MDLs for the SVOC soil analyses are presented in Table 3.4.2-4. Di-n-octyl phthalate was only detected in the 17-foot-bgs sample from borehole SP2-BH1. Bis(2-ethylhexyl) phthalate was detected in the 10-foot-bgs sample from borehole SP1-BH1 and in the 12- and 17-foot-bgs samples collected from borehole SP2-BH1. These compounds are common contaminants found in plastics and may not indicate soil contamination at this site.

## PCBs

PCB analytical results for the eight soil samples collected from the four seepage pit boreholes are summarized in Table 3.4.2-5. MDLs for the PCB soil analyses are presented in Table 3.4.2-6. Aroclor-1248, -1254, and -1260 were detected in the 10-foot-bgs sample and Aroclor-1254 was detected in the 15-foot-bgs sample from borehole SP1-BH1. Aroclor-1254 and -1260 were detected in both the 12- and 17-foot-bgs samples collected from borehole SP2-BH1, and Aroclor-1260 was detected in the 17-foot-bgs sample collected from borehole SP3-BH1.

## HE Compounds

High explosive (HE) compound analytical results for the eight soil samples collected from the four seepage pit 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 samples collected from the site.

## RCRA Metals and Hexavalent Chromium

Resource Conservation and Recovery Act (RCRA) metals and hexavalent chromium analytical results for the eight soil samples collected from the four seepage pit boreholes are summarized in Table 3.4.2-9. MDLs for the metals in soil analyses are presented in Table 3.4.2-10.

Arsenic, chromium, lead, mercury, and silver were detected above the NMED-approved background in the 10-foot-bgs sample collected from borehole SP1-BH1. Lead and silver were detected above the NMED-approved background in the 15-foot-bgs sample collected from



Table 3.4.2-1  
 Summary of DSS Site 1081, Building 6650 Septic System  
 Confirmatory Soil Sampling, VOC Analytical Results  
 August 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)	2-Butanone	Methylene Chloride	Toluene
605666	6650-SP1-BH1-10-S	10	<b>7.02</b>	ND (1.38)	ND (0.347)
605666	6650-SP1-BH1-15-S	15	<b>6.02</b>	ND (1.35)	ND (0.34)
605666	6650-SP2-BH1-12-S	12	<b>4.45 J (4.9)</b>	<b>1.43 J (4.9)</b>	ND (0.333)
605666	6650-SP2-BH1-17-S	17	ND (3.67)	ND (1.32)	ND (0.333)
605666	6650-SP3-BH1-17-S	17	ND (3.67)	ND (1.32)	ND (0.333)
605666	6650-SP3-BH1-24-S	24	<b>4.91 J (5.1)</b>	ND (1.38)	ND (0.347)
605666	6650-SP4-BH1-20-S	20	<b>7.09</b>	ND (1.38)	ND (0.347)
605666	6650-SP4-BH1-25-S	25	<b>11</b>	ND (1.35)	ND (0.34)
Quality Assurance/Quality Control Sample (µg/L)					
605666	6650-SP-TB <sup>c</sup>	NA	ND (2.31)	ND (3.3)	<b>0.454 J (1)</b>

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.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

ID = Identification.

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

MDL = Method detection limit.

µg/kg = Microgram(s) per kilogram.

µg/L = Microgram(s) per liter.

NA = Not applicable.

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

S = Soil sample.

SP = Seepage pit.

TB = Trip blank.

VOC = Volatile organic compound.

Table 3.4.2-2  
 Summary of DSS Site 1081, Building 6650 Septic System  
 Confirmatory Soil Sampling, VOC Analytical MDLs  
 August 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 1081, Building 6650 Septic System  
 Confirmatory Soil Sampling, SVOC Analytical Results  
 August 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)	Di-n-octyl phthalate	bis(2-Ethylhexyl) phthalate
605666	6650-SP1-BH1-10-S	10	ND (30.3)	<b>2,290</b>
605666	6650-SP1-BH1-15-S	15	ND (30.3)	ND (30)
605666	6650-SP2-BH1-12-S	12	ND (30.3)	<b>1,130</b>
605666	6650-SP2-BH1-17-S	17	<b>210 J (333)</b>	<b>2,230</b>
605666	6650-SP3-BH1-17-S	17	ND (30.3)	ND (30)
605666	6650-SP3-BH1-24-S	24	ND (30.3)	ND (30)
605666	6650-SP4-BH1-20-S	20	ND (30.3)	ND (30)
605666	6650-SP4-BH1-25-S	25	ND (30.3)	ND (30)

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

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

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

BH = Borehole.

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.

SP = Seepage pit.

SVOC = Semivolatile organic compound.

Table 3.4.2-4  
 Summary of DSS Site 1081, Building 6650 Septic System  
 Confirmatory Soil Sampling, SVOC Analytical MDLs  
 August 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

Refer to footnotes at end of table.

Table 3.4.2-4 (Concluded)  
 Summary of DSS Site 1081, Building 6650 Septic System  
 Confirmatory Soil Sampling, SVOC Analytical MDLs  
 August 2002  
 (Off-Site Laboratory)

Analyte	EPA Method 8270 <sup>a</sup> Detection Limit ( $\mu\text{g}/\text{kg}$ )
Hexachlorobenzene	20
Hexachlorobutadiene	12.7
Hexachlorocyclopentadiene	167
Hexachloroethane	22
Indeno(1,2,3-cd)pyrene	16.7
Isophorone	16
2-Methylnaphthalene	16.7
4-Methylphenol	33.3
Naphthalene	16.7
2-Nitroaniline	167
3-Nitroaniline	167
4-Nitroaniline	37
Nitrobenzene	20.3
2-Nitrophenol	17
4-Nitrophenol	167
n-Nitrosodipropylamine	22.7
Pentachlorophenol	167
Phenanthrene	16.7
Phenol	12.7
Pyrene	16.7
1,2,4-Trichlorobenzene	12.7
2,4,5-Trichlorophenol	17.3
2,4,6-Trichlorophenol	27.3

<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 1081, Building 6650 Septic System  
 Confirmatory Soil Sampling, PCB Analytical Results  
 August 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)	Aroclor-1248	Aroclor-1254	Aroclor-1260
605666	6650-SP1-BH1-10-S	10	<b>32.2 J</b>	<b>48.7 J</b>	<b>6.6 J (16.7)</b>
605666	6650-SP1-BH1-15-S	15	ND (1)	<b>2.2 J (3.33)</b>	ND (1)
605666	6650-SP2-BH1-12-S	12	ND (1)	<b>3.5</b>	<b>1.2 J (3.33)</b>
605666	6650-SP2-BH1-17-S	17	ND (1)	<b>1.5 J (3.33)</b>	<b>1.6 J (3.33)</b>
605666	6650-SP3-BH1-17-S	17	ND (1)	ND (0.5)	<b>1.4 J (3.33)</b>
605666	6650-SP3-BH1-24-S	24	ND (1)	ND (0.5)	ND (1)
605666	6650-SP4-BH1-20-S	20	ND (1)	ND (0.5)	ND (1)
605666	6650-SP4-BH1-25-S	25	ND (1)	ND (0.5)	ND (1)

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

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

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

BH = Borehole.

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.

µg/kg = Microgram(s) per kilogram.

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

PCB = Polychlorinated biphenyl.

S = Soil sample.

SP = Seepage pit.

Table 3.4.2-6  
 Summary of DSS Site 1081, Building 6650 Septic System  
 Confirmatory Soil Sampling, PCB Analytical MDLs  
 August 2002  
 (Off-Site Laboratory)

Analyte	EPA Method 8082 <sup>a</sup> Detection Limit (µg/kg)
Aroclor-1016	1-5
Aroclor-1221	2.82-14.1
Aroclor-1232	1.67-8.33
Aroclor-1242	1.67-8.33
Aroclor-1248	1-5
Aroclor-1254	0.5-2.5
Aroclor-1260	1-5

<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.

Table 3.4.2-7  
 Summary of DSS Site 1081, Building 6650 Septic System  
 Confirmatory Soil Sampling, HE Compound Analytical Results  
 August 2002  
 (Off-Site Laboratory)

Sample Attributes			HE (EPA Method 8330 <sup>a</sup> ) ( $\mu\text{g}/\text{kg}$ )
Record Number <sup>b</sup>	ER Sample ID	Sample Depth (ft)	
605666	6650-SP1-BH1-10-S	10	ND
605666	6650-SP1-BH1-15-S	15	ND
605666	6650-SP2-BH1-12-S	12	ND
605666	6650-SP2-BH1-17-S	17	ND
605666	6650-SP3-BH1-17-S	17	ND
605666	6650-SP3-BH1-24-S	24	ND
605666	6650-SP4-BH1-20-S	20	ND
605666	6650-SP4-BH1-25-S	25	ND

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

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

BH = Borehole.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

HE = High explosive(s).

ID = Identification.

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

ND = Not detected.

S = Soil sample.

SP = Seepage pit.

Table 3.4.2-8  
 Summary of DSS Site 1081, Building 6650 Septic System  
 Confirmatory Soil Sampling, HE Compound Analytical MDLs  
 August 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 1081, Building 6650 Septic System  
 Confirmatory Soil Sampling, Metals Analytical Results  
 August 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
605666	6650-SP1-BH1-10-S	10	<b>8.54 J</b>	112	0.259 J (0.485)	<b>16.7 J</b>	ND (0.0541)	<b>21.9 J</b>	<b>0.126</b>	0.66 J	<b>1,690</b>
605666	6650-SP1-BH1-15-S	15	3.03 J	59.2	0.151 J (0.481)	12.3 J	0.454	<b>22.2 J</b>	0.0182	ND (0.156)	<b>184</b>
605666	6650-SP2-BH1-12-S	12	4.35 J	89	0.757	11.2 J	ND (0.0516)	6.05 J	0.0923	0.155 J (0.45)	<b>677</b>
605666	6650-SP2-BH1-17-S	17	2.15 J	104	0.104 J (0.481)	7.99 J	ND (0.0532)	3.8 J	0.00171 J (0.00868)	ND (0.156)	<b>2.25</b>
605666	6650-SP3-BH1-17-S	17	2.07 J	59.5	0.0819 J (0.481)	6.93 J	ND (0.0529)	3.33 J	ND (0.000948 J)	0.439 J (0.481)	0.377 J (0.481)
605666	6650-SP3-BH1-24-S	24	3.41 J	49.3	0.248 J (0.467)	6.63 J	ND (0.0544)	5.03 J	ND (0.000896 J)	0.209 J (0.467)	0.246 J (0.467)
605666	6650-SP4-BH1-20-S	20	2.7 J	46.8	0.0851 J (0.481)	7.14 J	ND (0.0531)	3.23 J	0.00157 J (0.00965)	ND (0.156)	0.686 J
605666	6650-SP4-BH1-25-S	25	2.57 J	52.2	0.153 J (0.472)	7.46 J	ND (0.052)	5.3 J	ND (0.000942 J)	ND (0.153)	0.189 J (0.472)
Background Concentration—Southwest Area Supergroup <sup>c</sup>			4.4	214	0.9	15.9	1	11.8	<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.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

ID = Identification.

J = Analytical result was qualified as an estimated value.

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

MDL = Method detection limit.

mg/kg = Milligram(s) per kilogram.

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

S = Soil sample.

SP = Seepage pit.

Table 3.4.2-10  
 Summary of DSS Site 1081, Building 6650 Septic System  
 Confirmatory Soil Sampling, Metals Analytical MDLs  
 August 2002  
 (Off-Site Laboratory)

Analyte	EPA Method 6000/7000/7196A <sup>a</sup> Detection Limit (mg/kg)
Arsenic	0.186–0.2
Barium	0.0601–0.0648
Cadmium	0.0431–0.0464
Chromium	0.145–0.156
Chromium (VI)	0.0516–0.0544
Lead	0.256–0.275
Mercury	0.000854–0.000948
Selenium	0.146–0.157
Silver	0.0843–2.19

<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.

borehole SP1-BH1. Silver was detected above the NMED-approved background in the 12- and 17-foot-bgs samples collected from borehole SP2-BH1.

#### Total Cyanide

Total cyanide analytical results for the eight soil samples collected from the four seepage pit boreholes are summarized in Table 3.4.2-11. MDLs for the cyanide soil analyses are presented in Table 3.4.2-12. Cyanide was detected in the 10- and 15-foot-bgs samples from borehole SP1-BH1 and in the 12-foot-bgs sample collected from borehole SP2-BH1.

#### Radionuclides

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

Table 3.4.2-11  
 Summary of DSS Site 1081, Building 6650 Septic System  
 Confirmatory Soil Sampling, Total Cyanide Analytical Results  
 August 2002  
 (Off-Site Laboratory)

Sample Attributes			Total Cyanide (EPA Method 9012 <sup>a</sup> ) (mg/kg)
Record Number <sup>b</sup>	ER Sample ID	Sample Depth (ft)	
605666	6650-SP1-BH1-10-S	10	<b>0.115 J (0.227)</b>
605666	6650-SP1-BH1-15-S	15	<b>0.0573 J (0.25)</b>
605666	6650-SP2-BH1-12-S	12	<b>0.0549 J (0.208)</b>
605666	6650-SP2-BH1-17-S	17	ND (0.035)
605666	6650-SP3-BH1-17-S	17	ND (0.0381)
605666	6650-SP3-BH1-24-S	24	ND (0.0381)
605666	6650-SP4-BH1-20-S	20	ND (0.0419)
605666	6650-SP4-BH1-25-S	25	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.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

ID = Identification.

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

MDL = Method detection limit.

mg/kg = Milligram(s) per kilogram.

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

S = Soil sample.

SP = Seepage pit.

Table 3.4.2-12  
 Summary of DSS Site 1081, Building 6650 Septic System  
 Confirmatory Soil Sampling, Total Cyanide Analytical MDLs  
 August 2002  
 (Off-Site Laboratory)

Analyte	EPA Method 9012 <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.



Table 3.4.2-13  
 Summary of DSS Site 1081, Building 6650 Septic System  
 Confirmatory Soil Sampling, Gamma Spectroscopy Analytical Results  
 August 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	
			Result	Error	Result	Error <sup>c</sup>	Result	Error	Result	Error
605747	6650-SP1-BH1-10-S	10	ND (0.0238)	--	0.561	0.274	<b>ND (0.188)</b>	--	ND (0.59)	--
605747	6650-SP1-BH1-15-S	15	ND (0.0237)	--	0.675	0.32	<b>ND (0.19)</b>	--	ND (0.574)	--
605747	6650-SP2-BH1-12-S	12	ND (0.0252)	--	0.552	0.273	<b>ND (0.192)</b>	--	ND (0.607)	--
605747	6650-SP2-BH1-17-S	17	ND (0.0235)	--	0.589	0.281	<b>ND (0.19)</b>	--	ND (0.572)	--
605747	6650-SP3-BH1-17-S	17	ND (0.0247)	--	0.557	0.275	<b>ND (0.194)</b>	--	ND (0.611)	--
605747	6650-SP3-BH1-24-S	24	ND (0.0225)	--	0.51	0.248	<b>ND (0.175)</b>	--	ND (0.549)	--
605747	6650-SP4-BH1-20-S	20	ND (0.0237)	--	0.658	0.311	<b>ND (0.192)</b>	--	ND (0.589)	--
605747	6650-SP4-BH1-25-S	25	ND (0.0275)	--	0.637	0.31	<b>ND (0.209)</b>	--	ND (0.652)	--
Background Activity—Southwest Area Supergroup <sup>d</sup>			0.079	NA	1.01	NA	0.16	NA	1.4	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.
- 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.
- SP = Seepage pit.
- = Error not calculated for nondetect results.

## Gross Alpha/Beta Activity

Gross alpha/beta activity analytical results for the eight soil samples collected from the four seepage pit boreholes are summarized in Table 3.4.2-14. No gross alpha or beta activity was detected above the background levels (Miller September 2003) in any of the samples. These results indicate no significant levels of radioactive material are present in the soil at the site.

Table 3.4.2-14  
Summary of DSS Site 1081, Building 6650 Septic System  
Confirmatory Soil Sampling, Gross Alpha/Beta Analytical Results  
August 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>
605666	6650-SP1-BH1-10-S	10	6.68	1.43	21.8	2.07
605666	6650-SP1-BH1-15-S	15	6.76	1.55	16.7	2.12
605666	6650-SP2-BH1-12-S	12	6.43	1.47	15.5	1.86
605666	6650-SP2-BH1-17-S	17	4.94	1.68	17.6	2.01
605666	6650-SP3-BH1-17-S	17	5.43	1.41	17.8	1.88
605666	6650-SP3-BH1-24-S	24	5.36	1.46	20.3	1.97
605666	6650-SP4-BH1-20-S	20	6.57	1.38	17.3	1.88
605666	6650-SP4-BH1-25-S	25	2.21	0.866	2.1	1.6
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.

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.

SP = Seepage pit.

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

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

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

Aqueous TB samples, for VOC analysis only, were included in every sample cooler containing VOC soil samples. The analytical results for the TB samples appear on the VOC data tables for the sites in that shipment. The results were used in the data validation process for all the samples in that batch. Toluene was detected in the TB for DSS Site 1081 (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). In addition, SNL/NM Department 7713 (RPSD Laboratory) reviewed all gamma spectroscopy results according to "Laboratory Data Review Guidelines," Procedure No. RPSD-02-11, Issue No. 2 (SNL/NM July 1996). The data are acceptable for use in this request for a determination of CAC without controls. Annex C contains the data validation reports for the samples collected at this site.

### **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. 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 overall DSS project site investigations, a Flexible Liner Underground Technologies (FLUTE™) soil-vapor monitoring well was installed at a location specified by the NMED at DSS Site 1081 (Figure 2.2.1-2). This soil vapor well was constructed in accordance with deep soil-vapor well design specifications in the SAP (SNL/NM October 1999). Soil vapor well 1081-VW-01 was 150 feet deep with vapor sampling ports at depths of 5, 20, 70, 100, and 150 feet bgs. Figure 3.5.2-1 shows a typical FLUTE™ soil-vapor monitoring well completion. After installation, subsurface conditions were allowed to equilibrate for more than three months before the well was sampled on September 9, 2003. Soil-vapor samples from each of the five sampling depths were collected in special canisters and sent to an off-site laboratory for analysis. Total VOC soil-vapor concentrations ranged from a low of 0.0014 parts per million by volume (ppmv) in the 20-foot-bgs interval to a maximum of 0.0234 ppmv in the 5-foot-bgs sample. The analytical results and data validation report for these samples are presented in Annex D.



Figure 3.5.2-1

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

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

### **3.6 Investigation 5—Backhoe Excavation**

On December 2, 2003, a backhoe was used to uncover and inspect the interior of the northern septic tank at DSS Site 1081. The septic tank was determined to be intact and contained liquid that required sampling. No samples were collected during the backhoe excavation at the site.

Waste characterization samples of the liquid were collected on July 12, 2004 (see Section 3.2). It is anticipated that the effluent will be removed from the tank and disposed of according to SNL/NM policy, and both the northern and southern septic tanks and four seepage pits will be backfilled in place with clean soil in mid-2005.

### **3.7 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 1081.

**This page intentionally left blank.**

## 4.0 CONCEPTUAL SITE MODEL

The conceptual site model for DSS Site 1081, the Building 6650 Septic System, is based upon the COCs identified in the soil samples collected from beneath the seepage pits 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 1081 are VOCs, SVOCs, PCBs, HE compounds, cyanide, RCRA metals, hexavalent chromium, and radionuclides. Two VOCs, two SVOCs, and three PCBs were detected in these samples. No HE compounds were detected in any of the soil samples collected at this site. Arsenic, chromium, lead, mercury, and silver were detected at concentrations above the approved maximum background concentrations for SNL/NM Southwest Area Supergroup soils. When a metal concentration exceeded its maximum background screening value, it was considered further in the risk assessment process. Cyanide was also detected in three samples, but because it does not have a quantified background screening concentration, it is unknown whether this COC exceeds background.

None of the four representative gamma spectroscopy radionuclides were detected at activities exceeding the corresponding background levels. However, the MDAs for all of the uranium-235 analyses exceeded the corresponding background activities. Finally, no gross alpha/beta activity was detected above the background levels.

### 4.2 Environmental Fate

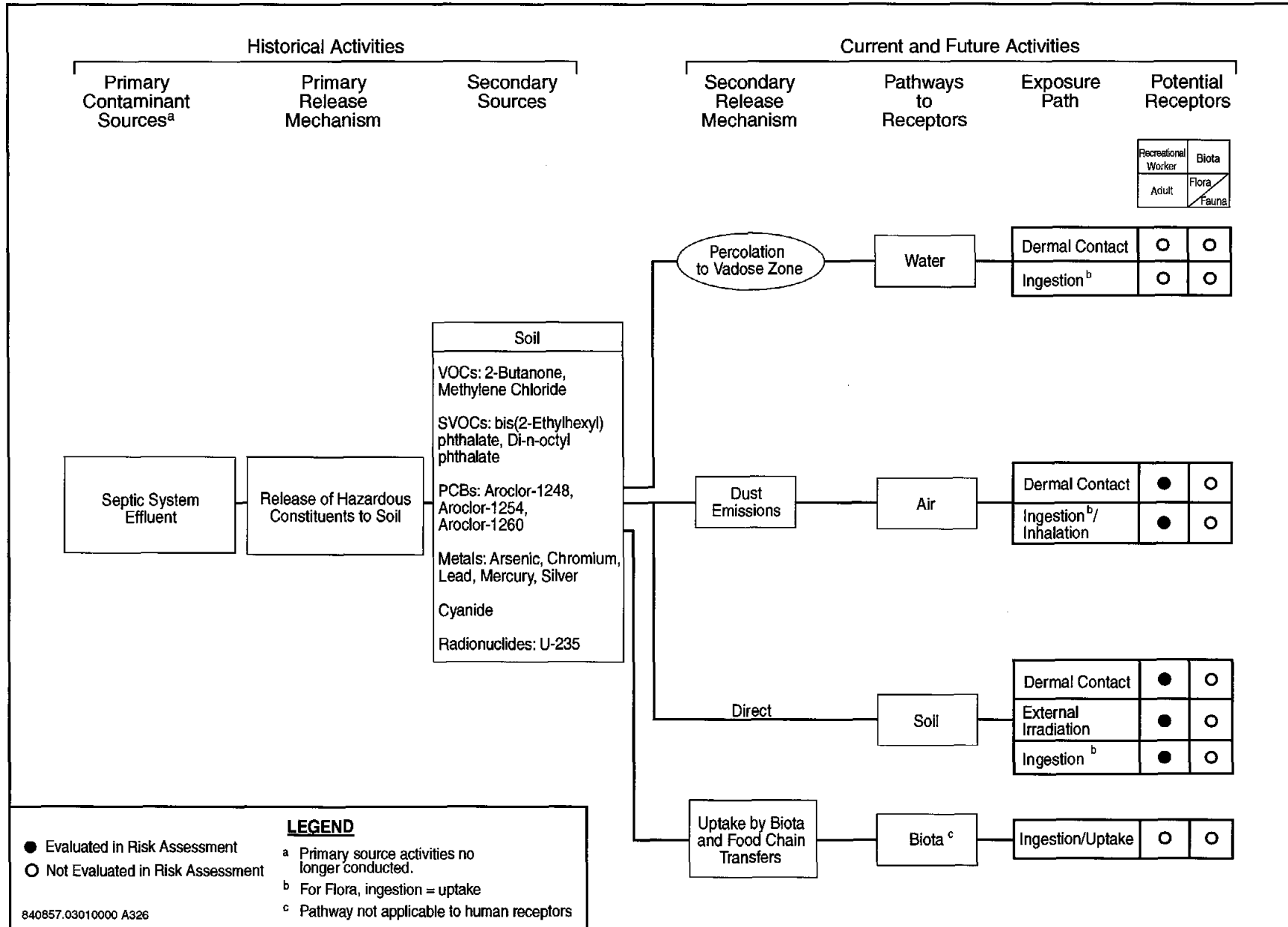
Potential COCs may have been released into the vadose zone via aqueous effluent discharged from the septic system seepage pits. Possible secondary release mechanisms include the uptake of COCs that may have been released into the soil beneath the seepage pits (Figure 4.2-1). The depth to groundwater at the site (approximately 480 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 E provides additional discussion on the fate and transport of COCs at DSS Site 1081.

Table 4.2-1 summarizes the potential COCs for DSS Site 1081. 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 1081 is industrial (DOE et al. September 1995).

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



**This page intentionally left blank.**



**Figure 4.2-1**  
**Conceptual Site Model Flow Diagram for DSS Site 1081, Building 6650 Septic System**

Table 4.2-1  
Summary of Potential COCs for DSS Site 1081, Building 6650 Septic System

COC Type	Number of Samples <sup>a</sup>	COCs Detected or with Concentrations Greater than Background or Nonquantified Background	Maximum Background Limit/Southwest Area 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	8	2-Butanone	NA	0.011	0.006	6	
	8	Methylene chloride	NA	0.0014 J	0.0008	1	
SVOCs	8	Di-n-octyl phthalate	NA	0.210 J	0.040	1	
	8	bis(2-Ethylhexyl) phthalate	NA	2.29	0.80	3	
PCBs	8	Aroclor-1248	NA	0.0322 J	0.0045	1	
	8	Aroclor-1254	NA	0.0487 J	0.0071	4	
	8	Aroclor-1260	NA	0.0066 J	0.0016	4	
HE Compounds	8	None	NA	NA	NA	None	
RCRA Metals	8	Arsenic	4.4	8.54 J	3.60	1	
	8	Chromium	15.9	16.70 J	9.54	1	
	8	Lead	11.8	22.20 J	8.86	2	
	8	Mercury	<0.1	0.1260	0.0301	1	
	8	Silver	<1	1,690	319.34	4	
Hexavalent Chromium	8	None	1	NA	NA	None	
Cyanide	8	Cyanide	NC	0.1150 J	0.0402	3	
Radionuclides (pCi/g)	Gamma Spectroscopy	8	Uranium-235	0.16	ND (0.209)	NC <sup>f</sup>	7
	Gross Alpha	8	None	NA	NA	NA	None
	Gross Beta	8	None	NA	NA	NA	None

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

<sup>b</sup>Dinwiddie 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 nondetect 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 nondetect activities for gamma spectroscopy.

COC = Constituent of concern.

DSS = Drain and Septic Systems.

HE = High explosive(s).

J = Analytical result was qualified as an estimated value.

Table 4.2-1 (Concluded)  
Summary of Potential COCs for DSS Site 1081, Building 6650 Septic System

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.

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 E provides additional discussion of the exposure routes and receptors at DSS Site 1081.

### **4.3 Site Assessment**

Site assessment at DSS Site 1081 included risk assessments for both human health and ecological risk. This section briefly summarizes the site assessment results, and Annex E discusses the risk assessment performed for DSS Site 1081 in more detail.

#### **4.3.1 Summary**

The site assessment concluded that DSS Site 1081 poses no significant threat to human health under both the industrial and 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 1081. This section summarizes the results.

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

DSS Site 1081 has been recommended for an industrial land-use scenario (DOE et al. September 1995). Because 2-butanone, methylene chloride, di-n-octyl phthalate, bis(2-ethylhexyl) phthalate, Aroclor-1248, Aroclor-1254, Aroclor-1260, arsenic, chromium, lead, mercury, silver, cyanide, and uranium-235 were detected, are present above background, or have MDAs above background, it was necessary to perform a human health risk assessment analysis for the site, which included these COCs. Annex E 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 the industrial and residential land-use scenarios.

The HI calculated for the COCs at DSS Site 1081 is 0.39 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 0.37. The estimated excess cancer risk for DSS Site 1081 is 5E-6 for an industrial land-use scenario. NMED guidance states that cumulative excess lifetime cancer risk must be less than 1E-5 (Bearzi January 2001); thus the

excess cancer risk for this site is below the suggested acceptable risk value. The estimated incremental excess cancer risk is 2.62E-6. Both the incremental HI and excess cancer risk are below NMED guidelines.

The HI calculated for the COCs at DSS Site 1081 is 4.84 for the residential land-use scenario, which is above 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 4.64. The estimated excess cancer risk for DSS Site 1081 COCs is 2E-5 for a residential land-use scenario. NMED guidance states that cumulative excess lifetime cancer risk must be less than 1E-5 (Bearzi January 2001); thus the excess cancer risk for this site is slightly above the suggested acceptable risk value. The incremental excess cancer risk is 1.07E-5. Both the incremental HI and estimated incremental excess cancer risk are above NMED guidelines.

Although both the HI and estimated excess cancer risk are above the NMED guidelines for the residential land-use scenario, maximum concentrations were used in the risk calculation. Because the site has been adequately characterized, average concentrations are more representative of actual site conditions. Using the mean concentrations for the main contributors to excess cancer risk and hazards, arsenic (3.6 milligrams [mg]/kilogram [kg], which is below background and eliminates arsenic from further evaluation) and silver (319 mg/kg), reduces the total HI and estimated excess cancer risk to 0.85 and 7E-8, respectively. The incremental HI and excess cancer risk are reduced to 0.85 and 7.15E-8, respectively. Thus, by using realistic concentrations in the risk calculations that more accurately depict site conditions, both the total and incremental HI and estimated excess cancer risk are below NMED guidelines.

For the radiological COCs, one of the constituents (uranium-235) had MDA values greater than the corresponding background 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 7.0E-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 5.9E-8 for the industrial land-use scenario. Furthermore, the incremental TEDE for the residential land-use scenario that results from a complete loss of institutional controls is 1.8E-2 mrem/yr with an associated estimated incremental excess cancer risk of 1.7E-7. The guideline for this scenario is 75 mrem/yr (SNL/NM February 1998). Therefore, DSS Site 1081 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 1081, Building 6650 Septic System Carcinogens

Scenario	Nonradiological Risk	Radiological Risk	Total Risk
Industrial	2.62E-6	5.9E-8	2.7E-6
Residential	7.15E-8 <sup>a</sup>	1.7E-7	2.4E-7

<sup>a</sup>Incremental risk using the average concentration for the primary risk drivers.  
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 E, 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 1081 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 1081 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 1081, a baseline ecological risk assessment is not required for the site.



**This page intentionally left blank.**

## **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 1081 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 1081. 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).

**This page intentionally left blank.**

## 6.0 REFERENCES

Bearzi, J. (New Mexico Environment Department/Hazardous Waste Bureau), January 2000. Letter to M.J. Zamorski (U.S. Department of Energy) and L. Shephard (Sandia National Laboratories/New Mexico) approving the "Sampling and Analysis Plan for Characterizing and Assessing Potential Releases to the Environment for Septic and Other Miscellaneous Drain Systems at Sandia National Laboratories/New Mexico." January 28, 2000.

Bearzi, J.P. (New Mexico Environment Department), January 2001. Memorandum to RCRA-Regulated Facilities, "Risk-Based Screening Levels for RCRA Corrective Action Sites in New Mexico," Hazardous Waste Bureau, New Mexico Environment Department, Santa Fe, New Mexico. January 23, 2001.

Bleakly, D. (Sandia National Laboratories/New Mexico), July 1996. Memorandum, "List of Non-ER Septic/Drain Systems for the Sites Identified Through the Septic System Inventory Program." July 8, 1996.

Dinwiddie, R.S. (New Mexico Environment Department), September 1997. Letter to M.J. Zamorski (U.S. Department of Energy), Request for Supplemental Information: Background Concentrations Report, SNL/KAFB. September 24, 1997.

DOE, see U.S. Department of Energy.

EPA, see U.S. Environmental Protection Agency.

Gore, see Gore, W.L. and Associates.

Gore, W.L. and Associates (Gore), June 2002. "Gore-Sorber Screening Survey Final Report, Non-ER Drain and Septic, Kirtland AFB, NM," W.L. Gore Production Order Number 10960025, Sandia National Laboratories/New Mexico. June 6, 2002.

IT, see IT Corporation.

IT Corporation (IT), July 1998. "Predictive Ecological Risk Assessment Methodology, Environmental Restoration Program, Sandia National Laboratories, New Mexico," IT Corporation, Albuquerque, New Mexico.

Jones, J. (Sandia National Laboratories/New Mexico), June 1991. Internal Memorandum to D. Dionne listing the septic tanks that were removed from service with the construction of the Area III sanitary sewer system. June 21, 1991.

Kieling, J.E. (New Mexico Environment Department/Hazardous Waste Bureau), December 2003. Letter to K.L. Boardman (Sandia Site Office, National Nuclear Security Administration) and P.B. Davies (Sandia National Laboratories/New Mexico), regarding "Environmental Restoration Project Drain and Septic Systems (DSS) Soil Vapor Well Sample Results; Dated November 2003."

Miller, M. (Sandia National Laboratories/New Mexico), September 2003. Memorandum to F.B. Nimick (Sandia National Laboratories/New Mexico), regarding "State of New Mexico Background for Gross Alpha/Beta Assays in Soil Samples." September 12, 2003.

Moats, W. (New Mexico Environment Department/Hazardous Waste Bureau), February 2002. Letter to M.J. Zamorski (U.S. Department of Energy) and P. Davies (Sandia National Laboratories/New Mexico) approving the "Field Implementation Plan, Characterization of Non-Environmental Restoration Drain and Septic Systems." February 21, 2002.

National Oceanic and Atmospheric Administration (NOAA), 1990. "Local Climatological Data, Annual Summary with Comparative Data," Albuquerque, New Mexico.

New Mexico Environment Department (NMED), March 1998. "RPMP Document Requirement Guide," RCRA Permits Management Program, Hazardous and Radioactive Materials Bureau, New Mexico Environment Department, Santa Fe, New Mexico.

New Mexico Environment Department (NMED), April 2004. "Compliance Order on Consent Pursuant to New Mexico Hazardous Waste Act § 74-4-10," New Mexico Environment Department, Santa Fe, New Mexico. April 29, 2004.

NMED, see New Mexico Environment Department.

NOAA, see National Oceanic and Atmospheric Administration.

Romero, T. (Sandia National Laboratories/New Mexico), September 2003. Internal communication to M. Sanders stating that during the connection of septic systems to the new City of Albuquerque sewer system, the old systems were disconnected and the lines capped. September 16, 2003.

Sandia National Laboratories/New Mexico (SNL/NM), August 1980. SNL/NM Facilities Engineering Drawing 89453 showing the Building 6650 Septic System, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), June 1993. "Sandia National Laboratories/New Mexico Septic Tank Monitoring Report, 1992 Report," Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), July 1994. "Verification and Validation of Chemical and Radiochemical Data," Technical Operating Procedure (TOP) 94-03, Rev. 0, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), December 1995. "Sandia National Laboratories Septic Tank Characterization Summary Tables of Analytical Reports, December 1995," Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), March 1996. "Site-Wide Hydrogeologic Characterization Project, Calendar Year 1995 Annual Report," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), July 1996. "Laboratory Data Review Guidelines," Radiation Protection Diagnostics Procedure No. RPSD-02-11, Issue No. 2, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), February 1998. "RESRAD Input Parameter Assumptions and Justification," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), October 1999. "Sampling and Analysis Plan for Characterizing and Assessing Potential Releases to the Environment From Septic and Other Miscellaneous Drain Systems at Sandia National Laboratories/New Mexico," Sandia National Laboratories, Albuquerque, New Mexico. October 19, 1999.

Sandia National Laboratories/New Mexico (SNL/NM), December 1999. "Data Validation Procedure for Chemical and Radiochemical Data," Administrative Operating Procedure (AOP) 00-03, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), November 2001. "Field Implementation Plan, Characterization of Non-Environmental Restoration Drain and Septic Systems," Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), March 2002. "Annual Groundwater Monitoring Report, Fiscal Year 2001," Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), March 2003. Database printout provided by SNL/NM Facilities Engineering showing the year that numerous SNL/NM buildings were constructed, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), April 2003. "DSS Sites Mean Elevation Report," GIS Group, Environmental Restoration Department, Sandia National Laboratories, Albuquerque, New Mexico.

Shain, M. (IT Corporation), August 1996. Memorandum and spreadsheet to J. Jones (Sandia National Laboratories/New Mexico) summarizing dates, locations, and volume of effluent pumped from numerous Sandia National Laboratories/New Mexico septic tanks at Sandia National Laboratories/New Mexico, Albuquerque, New Mexico. August 23, 1996.

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

U.S. Department of Energy (DOE), U.S. Air Force, and U.S. Forest Service, September 1995. "Workbook: Future Use Management Area 2," prepared by Future Use Logistics and Support Working Group in cooperation with Department of Energy Affiliates, the U.S. Air Force, and the U.S. Forest Service.

U.S. Environmental Protection Agency (EPA), November 1986. "Test Methods for Evaluating Solid Waste," 3rd ed., Update 3, SW-846, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington D.C.

U.S. Environmental Protection Agency (EPA), 1989. "Risk Assessment Guidance for Superfund, Vol. 1: Human Health Evaluation Manual," EPA/540/1-89/002, Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 1997a. "Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination," OSWER Directive No. 9200.4-18, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 1997b. "Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risks," Interim Final, U.S. Environmental Protection Agency, Washington, D.C.





**ANNEX A**  
**DSS Site 1081**  
**Septic Tank Sampling Results**

**Building 6650**  
**Area 3**  
**Sample ID No. SNLA008588**  
**Tank ID No. AD89018R**

On August 17, 1992, a sludge sample was collected for radiochemical analysis from the septic tank serving Building 6650. During review of the radiological data, no parameters were detected that exceeded U.S. Department of Energy derived concentration guidelines or the radiological investigation levels (IL) determined during this investigation.



Results of Septic Tank Analyses (Sludge Sample)			
Building No./Area:	6650 A-3		
Tank ID No.:	AD89018R		
Date Sampled:	8/17/92		
Sample ID No.:	SNLA008588		
Analytical Parameter	Measured Concentration	$\pm 2$ Sigma Uncertainty	Units
Gross Alpha	0E+02	5E+02	pCi/g
Gross Beta	0E+03	2E+02	pCi/g
Gross Alpha	2E+01	6E+01	pCi/g
Gross Beta	0E+02	2E+02	pCi/g
Tritium	1E+02	3E+02	pCi/L
Bismuth-214	<0.0333	NA	pCi/mL
Cesium-137	<0.0129	NA	pCi/mL
Potassium-40	<0.188	NA	pCi/mL
Lead-212	0.00936	0.00512	pCi/mL
Lead-214	<0.0282	NA	pCi/mL
Radium-226	<0.365	NA	pCi/mL
Thorium-234	<0.285	NA	pCi/mL
Thallium-208	<0.0138	NA	pCi/mL

ND = Not Detected  
NA = Not Applicable







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

Building ID: Bldg 6650

Sample ID Number: 024387

Date Sampled: 6-26-95

Parameter	Result	Detection Limit	NM Discharge Limit <sup>a</sup>	COA Discharge Limit <sup>b</sup>	Comments
<i>Volatile Organics (8260)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	
None detected above DL	ND	various	various	TTO = 5.0	
<i>Semivolatile Organics (8270)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	
None detected above DL	ND	various	various	TTO = 5.0	
<i>Pesticides/PCBs (8080)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	
None detected above DL	ND	various	NR \ PCBs = 0.001	TTO = 5.0	
<i>Metals (6010/7470)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	
Arsenic	0.0355	0.0100	0.1	2.0	
Barium	0.0312J	0.200	1.0	20.0	
Cadmium	ND	0.0050	0.01	2.8	
Chromium	ND	0.0200	0.05	20.0	
Copper	0.009J	0.0250	1.0	16.5	
Lead	ND	0.0030	0.05	3.2	
Manganese	0.0191	0.0100	0.2	20.0	
Nickel	ND	0.0400	0.2	12.0	
Selenium	ND	0.0050	0.05	2.0	
Silver	0.0022J	0.0100	0.05	5.0	
Thallium	0.0037J	0.0100	NR	NR	
Zinc	0.0151J	0.0200	10.0	28.0	
Mercury	ND	0.0002	0.002	0.1	
<i>Miscellaneous Analyses</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	
Field pH, standard pH units	7.8 pH units	0 - 14 pH units	6 - 9 pH units	5 - 11 pH units	
Formaldehyde (NIOSH 3500)	0.068	0.050	NR	260.0	
Fluoride (300.0)	ND	0.10	1.6	180.0	
Nitrate + Nitrite (353.1)	0.379	0.050	10.0	NR	

Refer to footnotes at end of table.

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

Building ID: Bldg 6650  
 Sample ID Number: 024387  
 Date Sampled: 6-26-95

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

**Notes:**

- <sup>a</sup> New Mexico Water Quality Control Commission Regulations (1990), Section 3-103.
- <sup>b</sup> City of Albuquerque Sewer Use and Wastewater Control Ordinance (1993), Section 8-9-3 M.
- B = Analyte detected in method blank.
- DL = Detection limit indicated on laboratory report.
- IDL = Instrument detection limit.
- J = Estimate concentration of analyte, between DL and IDL.
- ND = Not detected above DL indicated.
- NR = Not regulated.
- TTO = Total toxic organics.

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

Building ID: Bldg 6650  
 Sample ID Number: 024387  
 Date Sampled: 6-26-95

Parameter (Method)	Result	MDA	Critical Level	NM Discharge Limit <sup>a</sup>	Comments
<i>Radiological Analyses</i>	<i>(pCi/L ± 2-σ)</i>	<i>(pCi/L)</i>	<i>(pCi/L)</i>	<i>(pCi/L)</i>	
Gross Alpha	46.3 ± 5.8	2.4	1.04	NR	
Gross Beta	23.4 ± 2.6	1.7	0.82	NR	
<i>Isotopic Analyses</i>	<i>(pCi/L ± 2-σ)</i>	<i>(pCi/L)</i>	<i>(pCi/L)</i>	<i>(pCi/L)</i>	
Tritium (906.0)	-38 ± 58	100	49.5	NR	
Uranium-238 <sup>b</sup>	0.38 ± 0.15	0.046	0.040	NR	sampled 7-13-95
Uranium-235/236 <sup>b</sup>	0.044 ± 0.054	0.064	0.053	NR	sampled 7-13-95
Uranium-234 <sup>b</sup>	0.87 ± 0.26	0.076	0.055	NR	sampled 7-13-95
<i>Gamma Spectroscopy<sup>f</sup></i>	<i>(pCi/mL ± 2-σ)</i>	<i>(pCi/mL)</i>	<i>(pCi/L)</i>	<i>(pCi/L)</i>	
None detected above MDA	ND	various	NL	NR	

**Notes:**

<sup>a</sup> New Mexico Water Quality Control Commission Regulations (1990), Section 3-103.

<sup>b</sup> Isotopic uranium analyzed by NAS-NS-3050.

<sup>c</sup> Analyzed in-house by SNL/NM Department 7715.

MDA = Minimum detectable activity.

NL = Not listed.

NR = Not regulated.

ND = Not detected.







# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. N/A

SMO Use

AR/COC

607634

Dept. No./Mail Stop: 6133/1089	Date Samples Shipped: <u>7-13-04</u>	Project/Task No.: 7223.02.02.01	<input type="checkbox"/> Waste Characterization
Project/Task Manager: Mike Sander	Carrier/Waybill No. <u>37976</u>	SMO Authorization: <u>04 Long Street</u>	-Send preliminary/copy report to:
Project Name: DSS <u>NFA</u>	Lab Contact: Edie Kent (843) 769-7385	Contract #: <u>GFO 23-04</u>	<input type="checkbox"/> Released by COC No.: _____
Record Center Code: _____	Lab Destination: GEL	<u>PO 21671 del</u>	<input checked="" type="checkbox"/> Validation Required
Logbook Ref. No.: _____	SMO Contact/Phone: Pam Puissant (505) 844-3185	<u>As per phone conv. w/ P. Puissant</u>	Bill To: Sandia National Labs (Accounts Payable)
Service Order No. CFO# 2304	Send Report to SMO: Wendy Palencia(505) 844-3132		P.O. Box 5800 MS 0154

Location	Tech Area	<b>Reference LOV (available at SMO)</b>
Building	Room	

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container		Preserv- ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
065313-001	6650/1081-West-ST-W	NA	1081	071204/1103	W	G	3x40 ml	HCL	G	SA	VOCs (8260B)	
065313-002	6650/1081-West-ST-W	NA	1081	071204/1127	W	AG	4x1 Liter	4C	G	SA	SVOCs (8270C)	
065313-003	6650/1081-West-ST-W	NA	1081	071204/1130	W	AG	4x1 Liter	4C	G	SA	PCBs (8082)	
065313-004	6650/1081-West-ST-W	NA	1081	071204/1122	W	AG	4x1 Liter	4C	G	SA	Pesticides (8081)	
065313-005	6650/1081-West-ST-W	NA	1081	071204/1120	W	G	1 Liter	H2SO4	G	SA	Oil and Grease (9070)	
065313-006	6650/1081-West-ST-W	NA	1081	071204/1121	W	P	500 ml	HNO3	G	SA	Tal Metals+ Molybdenum (6020/7470A)	
065313-007	6650/1081-West-ST-W	NA	1081	071204/1134	W	AG	4x1 Liter	4C	G	SA	HE (8330)	
065313-008	6650/1081-West-ST-W	NA	1081	071204/1121	W	AG	250 ml	H2SO4	G	SA	Phenols (9066)	
065313-009	6650/1081-West-ST-W	NA	1081	071204/1119	W	P	250 ml	H2SO4	G	SA	NPN (353.1)	
065313-010	6650/1081-West-ST-W	NA	1081	071204/1119	W	P	250 ml	4C	G	SA	Fluoride (9056)	
065313-011	6650/1081-West-ST-W	NA	1081	071204/1118	W	P	500 ml	NAOH	G	SA	Cyanide (9012A)	

<b>RMMA</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Ref. No.	<b>Sample Tracking</b> SMO Use Date Entered (mm/dd/yy) <u>07/21/04</u> Entered by: <u>TAC</u>	<b>Special Instructions/QC Requirements</b> EDD <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Level D Package <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<b>Abnormal Conditions on Receipt</b>
--	---	---	---

<b>Return Samples By:</b> <input type="checkbox"/> Negotiated TAT <input type="checkbox"/> QC Inits. <u>UJ</u>	<b>Send report to:</b> <u>Matt Shain/ORG. 6133/MS. 1087/ 284-2565</u>	<b>Lab Use</b>																
<b>Sample Team Members</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Name</th> <th>Signature</th> <th>Init.</th> <th>Company/Organization/Phone/Cellular</th> </tr> </thead> <tbody> <tr> <td>William J Gibson</td> <td><i>[Signature]</i></td> <td><i>[Init.]</i></td> <td>Weston/6134/284-5232/239-7367</td> </tr> <tr> <td>Gilbert Quintana</td> <td><i>[Signature]</i></td> <td><i>[Init.]</i></td> <td>Shaw/6134/284-3309/238-9417</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		Name	Signature	Init.	Company/Organization/Phone/Cellular	William J Gibson	<i>[Signature]</i>	<i>[Init.]</i>	Weston/6134/284-5232/239-7367	Gilbert Quintana	<i>[Signature]</i>	<i>[Init.]</i>	Shaw/6134/284-3309/238-9417				
Name	Signature		Init.	Company/Organization/Phone/Cellular														
William J Gibson	<i>[Signature]</i>	<i>[Init.]</i>	Weston/6134/284-5232/239-7367															
Gilbert Quintana	<i>[Signature]</i>	<i>[Init.]</i>	Shaw/6134/284-3309/238-9417															
<i>*Please list as separate report.</i>																		

1. Relinquished by <u>William J Gibson</u>	Org. <u>6133</u>	Date <u>7-12-04</u>	Time <u>1400</u>	4. Relinquished by	Org.	Date	Time
1. Received by <u>Mike Sander</u>	Org. <u>6133</u>	Date <u>7-12-04</u>	Time <u>1400</u>	4. Received by	Org.	Date	Time
2. Relinquished by <u>Edie Kent</u>	Org. <u>6133</u>	Date <u>7/13/04</u>	Time <u>0930</u>	5. Relinquished by	Org.	Date	Time
2. Received by	Org.	Date	Time	5. Received by	Org.	Date	Time
3. Relinquished by	Org.	Date	Time	6. Relinquished by	Org.	Date	Time
3. Received by	Org.	Date	Time	6. Received by	Org.	Date	Time



GC/MS VOLATILES  
SAMPLE  
DATA

# GENERAL ENGINEERING LABORATORIES, LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## Certificate of Analysis

Company : Sandia National Laboratories  
 Address : MS-0756  
 P.O. Box 5800  
 Albuquerque, New Mexico 87185--0854  
 Contact: Ms. Pamela M. Puissant  
 Project: Level C Data Package

Report Date: August 10, 2004

Page 1 of 2

Client Sample ID: 065313-001      Project: SNLS00401  
 Sample ID: 116929001      Client ID: SNLS002  
 Matrix: Misc Liquid  
 Collect Date: 12-JUL-04 11:03      Client Desc.: 66501/1081-West-ST-W  
 Receive Date: 14-JUL-04  
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
<b>Volatile Organics Federal</b>										
<i>8260B TCL Liquid Federal</i>										
1,1,1-Trichloroethane	U	ND	0.340	1.00	ug/L	1	DLS 07/25/04 0541	351984	1	
1,1,2,2-Tetrachloroethane	U	ND	0.490	1.00	ug/L	1				
1,1,2-Trichloroethane	U	ND	0.440	1.00	ug/L	1				
1,1-Dichloroethane	U	ND	0.410	1.00	ug/L	1				
1,1-Dichloroethylene	U	ND	0.410	1.00	ug/L	1				
1,2-Dichloroethane	U	ND	0.290	1.00	ug/L	1				
1,2-Dichloropropane	U	ND	0.250	1.00	ug/L	1				
2-Butanone	U	ND	2.31	5.00	ug/L	1				
2-Hexanone	U	ND	1.45	5.00	ug/L	1				
4-Methyl-2-pentanone	U	ND	1.78	5.00	ug/L	1				
Acetone		5.05	4.50	5.00	ug/L	1				
Benzene	U	ND	0.330	1.00	ug/L	1				
Bromodichloromethane	U	ND	0.380	1.00	ug/L	1				
Bromoform	U	ND	0.500	1.00	ug/L	1				
Bromomethane	U	ND	0.500	1.00	ug/L	1				
Carbon disulfide	U	ND	1.91	5.00	ug/L	1				
Carbon tetrachloride	U	ND	0.290	1.00	ug/L	1				
Chlorobenzene	U	ND	0.320	1.00	ug/L	1				
Chloroethane	U	ND	0.500	1.00	ug/L	1				
Chloroform	U	ND	0.360	1.00	ug/L	1				
Chloromethane	U	ND	0.500	1.00	ug/L	1				
Dibromochloromethane	U	ND	0.290	1.00	ug/L	1				
Ethylbenzene	U	ND	0.210	1.00	ug/L	1				
Methylene chloride	U	ND	3.30	5.00	ug/L	1				
Styrene	U	ND	0.250	1.00	ug/L	1				
Tetrachloroethylene	U	ND	0.330	1.00	ug/L	1				
Toluene	U	ND	0.390	1.00	ug/L	1				
Trichloroethylene	U	ND	0.360	1.00	ug/L	1				
Vinyl acetate	U	ND	1.32	5.00	ug/L	1				
Vinyl chloride	U	ND	0.550	1.00	ug/L	1				
Xylenes (total)	U	ND	0.250	1.00	ug/L	1				
cis-1,2-Dichloroethylene	U	ND	0.300	1.00	ug/L	1				
cis-1,3-Dichloropropylene	U	ND	0.300	1.00	ug/L	1				
trans-1,2-Dichloroethylene	U	ND	0.370	1.00	ug/L	1				
trans-1,3-Dichloropropylene	U	ND	0.290	1.00	ug/L	1				

**The following Analytical Methods were performed**

Method	Description	Analyst Comments

# GENERAL ENGINEERING LABORATORIES, LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## Certificate of Analysis

Company : Sandia National Laboratories  
 Address : MS-0756  
 P.O. Box 5800  
 Albuquerque, New Mexico 87185--0854  
 Contact: Ms. Pamela M. Puissant  
 Project: Level C Data Package

Report Date: August 10, 2004

Page 2 of 2

Client Sample ID: 065313-001  
 Sample ID: 116929001

Project: SNLS00401  
 Client ID: SNLS002

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
-----------	-----------	--------	----	----	-------	----	-------------	------	-------	--------

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 8260B DOE-AL	

Surrogate/Tracer recovery	Test	Recovery%	Acceptable Limits
Bromofluorobenzene	8260B TCL Liquid Federal	94	(76%-115%)
Dibromofluoromethane	8260B TCL Liquid Federal	102	(72%-136%)
Toluene-d8	8260B TCL Liquid Federal	99	(80%-116%)

**Notes:**

The Qualifiers in this report are defined as follows :

- \* Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where the concentration falls below the effective PQL.
- \*\* Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- H Analytical 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.
- Z The percent difference is greater than 70%.
- h Prep holding time exceeded

The above sample is reported on an "as received" basis.

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 Certificate of Analysis.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories, LLC standard operating procedures. Please direct any questions to your Project Manager, Edith Kent.

Reviewed by Charles W. Wilson Jr. 08-10-04

**GENERAL ENGINEERING LABORATORIES, LLC**  
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

**Certificate of Analysis**

Company : Sandia National Laboratories  
Address : MS-0756  
P.O. Box 5800  
Albuquerque, New Mexico 87185-0854  
Contact: Ms. Pamela M. Puissant  
Project: Level C Data Package

Report Date: August 10, 2004

Page 1 of 2

Client Sample ID: 065315-001  
Sample ID: 116929002  
Matrix: Misc Liquid  
Collect Date: 12-JUL-04 11:03  
Receive Date: 14-JUL-04  
Collector: Client

Project: SNLS00401  
Client ID: SNLS002

Client Desc.: 6650-West-ST-TB

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Volatile Organics Federal</b>											
<i>8260B TCL Liquid Federal</i>											
1,1,1-Trichloroethane	U	ND	0.340	1.00	ug/L	1	DLS	07/25/04	0408	351984	1
1,1,2,2-Tetrachloroethane	U	ND	0.490	1.00	ug/L	1					
1,1,2-Trichloroethane	U	ND	0.440	1.00	ug/L	1					
1,1-Dichloroethane	U	ND	0.410	1.00	ug/L	1					
1,1-Dichloroethylene	U	ND	0.410	1.00	ug/L	1					
1,2-Dichloroethane	U	ND	0.290	1.00	ug/L	1					
1,2-Dichloropropane	U	ND	0.250	1.00	ug/L	1					
2-Butanone	U	ND	2.31	5.00	ug/L	1					
2-Hexanone	U	ND	1.45	5.00	ug/L	1					
4-Methyl-2-pentanone	U	ND	1.78	5.00	ug/L	1					
Acetone	U	ND	4.50	5.00	ug/L	1					
Benzene	U	ND	0.330	1.00	ug/L	1					
Bromodichloromethane	U	ND	0.380	1.00	ug/L	1					
Bromoform	U	ND	0.500	1.00	ug/L	1					
Bromomethane	U	ND	0.500	1.00	ug/L	1					
Carbon disulfide	U	ND	1.91	5.00	ug/L	1					
Carbon tetrachloride	U	ND	0.290	1.00	ug/L	1					
Chlorobenzene	U	ND	0.320	1.00	ug/L	1					
Chloroethane	U	ND	0.500	1.00	ug/L	1					
Chloroform	U	ND	0.360	1.00	ug/L	1					
Chloromethane	U	ND	0.500	1.00	ug/L	1					
Dibromochloromethane	U	ND	0.290	1.00	ug/L	1					
Ethylbenzene	U	ND	0.210	1.00	ug/L	1					
Methylene chloride	U	ND	3.30	5.00	ug/L	1					
Styrene	U	ND	0.250	1.00	ug/L	1					
Tetrachloroethylene	U	ND	0.330	1.00	ug/L	1					
Toluene	U	ND	0.390	1.00	ug/L	1					
Trichloroethylene	U	ND	0.360	1.00	ug/L	1					
Vinyl acetate	U	ND	1.32	5.00	ug/L	1					
Vinyl chloride	U	ND	0.550	1.00	ug/L	1					
Xylenes (total)	U	ND	0.250	1.00	ug/L	1					
cis-1,2-Dichloroethylene	U	ND	0.300	1.00	ug/L	1					
cis-1,3-Dichloropropylene	U	ND	0.300	1.00	ug/L	1					
trans-1,2-Dichloroethylene	U	ND	0.370	1.00	ug/L	1					
trans-1,3-Dichloropropylene	U	ND	0.290	1.00	ug/L	1					

The following Analytical Methods were performed

Method	Description	Analyst Comments
--------	-------------	------------------

**Certificate of Analysis**

Company : Sandia National Laboratories  
 Address : MS-0756  
           P.O. Box 5800  
           Albuquerque, New Mexico 87185--0854  
 Contact: Ms. Pamela M. Puissant  
 Project: Level C Data Package

Report Date: August 10, 2004

Page 2 of 2

Client Sample ID: 065315-001  
 Sample ID: 116929002

Project: SNLS00401  
 Client ID: SNLS002

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
-----------	-----------	--------	----	----	-------	----	---------	------	------	-------	--------

The following Analytical Methods were performed

Method	Description	Analyst	Comments
I	SW846 8260B DOE-AL		

Surrogate/Tracer recovery	Test	Recovery %	Acceptable Limits
Bromofluorobenzene	8260B TCL Liquid Federal	95	(76%-115%)
Dibromofluoromethane	8260B TCL Liquid Federal	102	(72%-136%)
Toluene-d8	8260B TCL Liquid Federal	99	(80%-116%)

Notes:

The Qualifiers in this report are defined as follows :

- \* Recovery, or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where the concentration falls below the effective PQL.
- \*\* Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- H Analytical 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.
- Z The percent difference is greater than 70%.
- h Prep holding time exceeded

The above sample is reported on an "as received" basis.

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 Certificate of Analysis.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories, LLC standard operating procedures. Please direct any questions to your Project Manager, Edith Kent.

Reviewed by Charles W. W. [Signature] 08-10-04



GC/MS SEMIVOLATILES  
SAMPLE  
DATA

# GENERAL ENGINEERING LABORATORIES, LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## Certificate of Analysis

Company : Sandia National Laboratories  
 Address : MS-0756  
 P.O. Box 5800  
 Albuquerque, New Mexico 87185-0854  
 Contact : Ms. Pamela M. Puissant  
 Project : Level C Data Package

Report Date: August 10, 2004

Page 1 of 3

Client Sample ID: 065313-002  
 Sample ID: 116929003  
 Matrix: Misc Liquid  
 Collect Date: 12-JUL-04 11:27  
 Receive Date: 14-JUL-04  
 Collector: Client

Project: SNLS00401  
 Client ID: SNLS002

Client Desc.: 6650/1081-West-ST-W

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
<b>Semi-volatile Mass spec Organics Federal</b>										
<i>3510/8270C TCL BNA Liquid</i>										
1,2,4-Trichlorobenzene	U	ND	0.710	10.0	ug/L	1	RMB 07/18/04	2026	349624	1
1,2-Dichlorobenzene	U	ND	0.410	10.0	ug/L	1				
1,3-Dichlorobenzene	U	ND	0.410	10.0	ug/L	1				
1,4-Dichlorobenzene	U	ND	0.310	10.0	ug/L	1				
2,4,5-Trichlorophenol	U	ND	0.970	10.0	ug/L	1				
2,4,6-Trichlorophenol	U	ND	0.390	10.0	ug/L	1				
2,4-Dichlorophenol	U	ND	0.470	10.0	ug/L	1				
2,4-Dimethylphenol	U	ND	0.470	10.0	ug/L	1				
2,4-Dinitrophenol	U	ND	5.00	20.0	ug/L	1				
2,4-Dinitrotoluene	U	ND	0.700	10.0	ug/L	1				
2,6-Dinitrotoluene	U	ND	0.500	10.0	ug/L	1				
2-Chloronaphthalene	U	ND	0.400	1.00	ug/L	1				
2-Chlorophenol	U	ND	0.410	10.0	ug/L	1				
2-Methyl-4,6-dinitrophenol	U	ND	1.00	10.0	ug/L	1				
2-Methylnaphthalene	U	ND	0.500	1.00	ug/L	1				
2-Nitrophenol	U	ND	0.590	10.0	ug/L	1				
3,3'-Dichlorobenzidine	U	ND	0.510	10.0	ug/L	1				
4-Bromophenylphenylether	U	ND	1.22	10.0	ug/L	1				
4-Chloro-3-methylphenol	U	ND	0.690	10.0	ug/L	1				
4-Chloroaniline	U	ND	1.10	10.0	ug/L	1				
4-Chlorophenylphenylether	U	ND	0.840	10.0	ug/L	1				
4-Nitrophenol	U	ND	5.00	10.0	ug/L	1				
Acenaphthene	U	ND	0.500	1.00	ug/L	1				
Acenaphthylene	U	ND	0.500	1.00	ug/L	1				
Anthracene	U	ND	0.500	1.00	ug/L	1				
Benzo(a)anthracene	U	ND	0.500	1.00	ug/L	1				
Benzo(a)pyrene	U	ND	0.500	1.00	ug/L	1				
Benzo(b)fluoranthene	U	ND	0.500	1.00	ug/L	1				
Benzo(ghi)perylene	U	ND	0.500	1.00	ug/L	1				
Benzo(k)fluoranthene	U	ND	0.500	1.00	ug/L	1				
Butylbenzylphthalate	U	ND	0.680	10.0	ug/L	1				
Carbazole	U	ND	0.500	10.0	ug/L	1				
Chrysene	U	ND	0.500	1.00	ug/L	1				
Di-n-butylphthalate	U	ND	1.00	10.0	ug/L	1				
Di-n-octylphthalate	U	ND	0.870	10.0	ug/L	1				
Dibenzo(a,h)anthracene	U	ND	0.500	1.00	ug/L	1				
Dibenzofuran	U	ND	0.420	10.0	ug/L	1				
Diethylphthalate	U	ND	0.890	10.0	ug/L	1				

# GENERAL ENGINEERING LABORATORIES, LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## Certificate of Analysis

Company : Sandia National Laboratories  
 Address : MS-0756  
 P.O. Box 5800  
 Albuquerque, New Mexico 87185-0854  
 Contact: Ms. Pamela M. Puissant  
 Project: Level C Data Package

Report Date: August 10, 2004

Page 2 of 3

Client Sample ID: 065313-002  
 Sample ID: 116929003

Project: SNLS00401  
 Client ID: SNLS002

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Semi-volatile Mass spec Organics Federal</b>											
<i>3510/8270C TCL BNA Liquid</i>											
Dimethylphthalate	U	ND	0.530	10.0	ug/L	1					
Diphenylamine	U	ND	0.790	10.0	ug/L	1					
Fluoranthene	U	ND	0.500	1.00	ug/L	1					
Fluorene	U	ND	0.500	1.00	ug/L	1					
Hexachlorobenzene	U	ND	0.650	10.0	ug/L	1					
Hexachlorobutadiene	U	ND	0.320	10.0	ug/L	1					
Hexachlorocyclopentadiene	U	ND	1.00	10.0	ug/L	1					
Hexachloroethane	U	ND	0.430	10.0	ug/L	1					
Indeno(1,2,3-cd)pyrene	U	ND	0.500	1.00	ug/L	1					
Isophorone	U	ND	0.590	10.0	ug/L	1					
N-Nitrosodipropylamine	U	ND	0.750	10.0	ug/L	1					
Naphthalene	U	ND	0.110	1.00	ug/L	1					
Nitrobenzene	U	ND	0.630	10.0	ug/L	1					
Pentachlorophenol	U	ND	5.00	10.0	ug/L	1					
Phenanthrene	U	ND	0.500	1.00	ug/L	1					
Phenol	U	ND	0.300	10.0	ug/L	1					
Pyrene	U	ND	0.500	1.00	ug/L	1					
bis(2-Chloroethoxy)methane	U	ND	0.480	10.0	ug/L	1					
bis(2-Chloroethyl) ether	U	ND	1.37	10.0	ug/L	1					
bis(2-Chloroisopropyl)ether	U	ND	0.800	10.0	ug/L	1					
bis(2-Ethylhexyl)phthalate	J	2.88	1.30	10.0	ug/L	1					
m,p-Cresols	U	ND	0.590	10.0	ug/L	1					
m-Nitroaniline	U	ND	1.00	10.0	ug/L	1					
o-Cresol	U	ND	0.450	10.0	ug/L	1					
o-Nitroaniline	U	ND	0.640	10.0	ug/L	1					
p-Nitroaniline	U	ND	0.670	10.0	ug/L	1					

**The following Prep Methods were performed**

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3510C	3510C BNA Liq. Prep-8270C Analysis Fed	NAG1	07/16/04	1605	349623

**The following Analytical Methods were performed**

Method	Description	Analyst Comments
1	SW846 8270C	

Surrogate/Tracer recovery	Test	Recovery%	Acceptable Limits
2,4,6-Tribromophenol	3510/8270C TCL BNA Liquid	96	(45%-118%)
2-Fluorobiphenyl	3510/8270C TCL BNA Liquid	81	(46%-97%)
2-Fluorophenol	3510/8270C TCL BNA Liquid	38	(22%-68%)
Nitrobenzene-d5	3510/8270C TCL BNA Liquid	90	(47%-110%)

# GENERAL ENGINEERING LABORATORIES, LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## Certificate of Analysis

Company : Sandia National Laboratories  
Address : MS-0756  
P.O. Box 5800  
Albuquerque, New Mexico 87185-0854  
Contact : Ms. Pamela M. Puissant  
Project : Level C Data Package

Report Date: August 10, 2004

Page 3 of 3

Client Sample ID: 065313-002  
Sample ID: 116929003  
Project: SNLS00401  
Client ID: SNLS002

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Phenol-d5	3510/8270C	TCL BNA Liquid			24	(16%-75%)				
p-Terphenyl-d14	3510/8270C	TCL BNA Liquid			98	(56%-133%)				

### Notes:

The Qualifiers in this report are defined as follows :

- \* Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where the concentration falls below the effective PQL.
- \*\* Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- H Analytical 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.
- Z The percent difference is greater than 70%.
- h Prep holding time exceeded

The above sample is reported on an "as received" basis.

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 Certificate of Analysis.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories, LLC standard operating procedures. Please direct any questions to your Project Manager, Edith Kent.

Reviewed by: N. Puissant 08/10/04

EXPLOSIVES  
SAMPLE  
DATA

# GENERAL ENGINEERING LABORATORIES, LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## Certificate of Analysis

Company : Sandia National Laboratories  
 Address : MS-0756  
 P.O. Box 5800  
 Albuquerque, New Mexico 87185-0854  
 Contact : Ms. Pamela M. Puissant  
 Project : Level C Data Package

Report Date: August 9, 2004

Page 1 of 2

Client Sample ID: 065313-007  
 Sample ID: 116929008  
 Matrix: Misc Liquid  
 Collect Date: 12-JUL-04 11:34  
 Receive Date: 14-JUL-04  
 Collector: Client

Project: SNLS00401  
 Client ID: SNLS002

Client Desc.: 6650/1081-West-ST-W

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>HPLC Explosives Federal</b>											
<i>8330 EXPLO. Std list Liquid Federal</i>											
1,3,5-Trinitrobenzene	U	ND	0.325	0.974	ug/L	2	MAP	07/24/04	2232	349638	1
2,4,6-Trinitrotoluene	U	ND	0.162	0.486	ug/L	2					
2,4-Dinitrotoluene	U	ND	0.325	0.974	ug/L	2					
2,6-Dinitrotoluene	U	ND	0.182	0.540	ug/L	2					
2-Amino-4,6-dinitrotoluene	U	ND	0.325	0.974	ug/L	2					
4-Amino-2,6-dinitrotoluene	U	ND	0.162	0.486	ug/L	2					
HMX	U	ND	0.162	0.486	ug/L	2					
Nitrobenzene	U	ND	0.162	0.486	ug/L	2					
RDX	U	ND	0.162	0.486	ug/L	2					
Tetryl	U	ND	0.487	1.46	ug/L	2					
m-Dinitrobenzene	U	ND	0.325	0.974	ug/L	2					
m-Nitrotoluene	U	ND	0.325	0.974	ug/L	2					
o-Nitrotoluene	U	ND	0.162	0.486	ug/L	2					
p-Nitrotoluene	U	ND	0.325	0.974	ug/L	2					

**The following Prep Methods were performed**

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8330 PREP	8330 EXPLOSIVES BY HPLC Prep in liquid	HMF1	07/19/04	0855	349637

**The following Analytical Methods were performed**

Method	Description	Analyst Comments
I	SW846 8330	

Surrogate/Tracer recovery	Test	Recovery%	Acceptable Limits
3,4-Dinitrotoluene	8330 EXPLO. Std list Liquid Federal	96	(64%-135%)

**Notes:**

The Qualifiers in this report are defined as follows :

- \* Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where the concentration falls below the effective PQL.
- \*\* Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- H Analytical holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.

# GENERAL ENGINEERING LABORATORIES, LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## Certificate of Analysis

Company : Sandia National Laboratories  
Address : MS-0756  
P.O. Box 5800  
Albuquerque, New Mexico 87185--0854  
Contact: Ms. Pamela M. Puissant  
Project: Level C Data Package

Report Date: August 9, 2004

Page 2 of 2

Client Sample ID: 065313-007  
Sample ID: 116929008

Project: SNLS00401  
Client ID: SNLS002

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
-----------	-----------	--------	----	----	-------	----	-------------	------	-------	--------

- 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.
- Z The percent difference is greater than 70%.
- h Prep holding time exceeded

The above sample is reported on an "as received" basis.

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 Certificate of Analysis.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories, LLC standard operating procedures. Please direct any questions to your Project Manager, Edith Kent.

*Pamela M. Puissant 08/09/04*  
Reviewed by

GC/ECD PESTICIDES  
SAMPLE  
DATA



# GENERAL ENGINEERING LABORATORIES, LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gei.com

## Certificate of Analysis

Company : Sandia National Laboratories  
 Address : MS-0756  
 P.O. Box 5800  
 Albuquerque, New Mexico 87185-0854  
 Contact: Ms. Pamela M. Puissant  
 Project: Level C Data Package

Report Date: August 11, 2004

Page 1 of 2

Client Sample ID: 065313-004  
 Sample ID: 116929005  
 Matrix: Misc Liquid  
 Collect Date: 12-JUL-04 11:22  
 Receive Date: 14-JUL-04  
 Collector: Client  
 Project: SNLS00401  
 Client ID: SNLS002  
 Client Desc.: 6650/1081-West-ST-W

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Semi-Volatiles-Pesticide Federal</b>											
<i>8081A 3510C TCL PEST H2O Federal</i>											
4,4'-DDD	U	ND	0.00556	0.0404	ug/L	1	SJ	07/20/04	2055	349632	1
4,4'-DDE	U	ND	0.00444	0.0404	ug/L	1					
4,4'-DDT	U	ND	0.011	0.0404	ug/L	1					
Aldrin	U	ND	0.0053	0.0202	ug/L	1					
Dieldrin	U	ND	0.00389	0.0404	ug/L	1					
Endosulfan I	U	ND	0.00621	0.0202	ug/L	1					
Endosulfan II	U	ND	0.012	0.0404	ug/L	1					
Endosulfan sulfate	U	ND	0.0047	0.0404	ug/L	1					
Endrin	U	ND	0.00384	0.0404	ug/L	1					
Endrin ketone	U	ND	0.00465	0.0404	ug/L	1					
Heptachlor	U	ND	0.00591	0.0202	ug/L	1					
Heptachlor epoxide	U	ND	0.00303	0.0202	ug/L	1					
Methoxychlor	U	ND	0.028	0.202	ug/L	1					
Toxaphene	U	ND	0.106	1.01	ug/L	1					
alpha-BHC	U	ND	0.00146	0.0202	ug/L	1					
alpha-Chlordane	U	ND	0.00253	0.0202	ug/L	1					
beta-BHC	U	ND	0.00288	0.0202	ug/L	1					
delta-BHC	U	ND	0.00278	0.0202	ug/L	1					
gamma-BHC (Lindane)	U	ND	0.00212	0.0202	ug/L	1					
gamma-Chlordane	U	ND	0.00369	0.0202	ug/L	1					

**The following Prep Methods were performed**

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3510C	3510C PE8T Prep H2O Federal	JPB	07/16/04	1623	349631

**The following Analytical Methods were performed**

Method	Description	Analyst Comments
1	SW846 8081A	

Surrogate/Tracer recovery	Test	Recovery%	Acceptable Limits
4cmx	8081A 3510C TCL PEST H2O Federal	58	(47%-96%)
Decachlorobiphenyl	8081A 3510C TCL PEST H2O Federal	63	(58%-102%)

**Notes:**

The Qualifiers in this report are defined as follows :

# GENERAL ENGINEERING LABORATORIES, LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## Certificate of Analysis

Company : Sandia National Laboratories  
Address : MS-0756  
P.O. Box 5800  
Albuquerque, New Mexico 87185-0854  
Contact : Ms. Pamela M. Puissant  
Project : Level C Data Package

Report Date: August 11, 2004

Page 2 of 2

Client Sample ID: 065313-004  
Sample ID: 116929005

Project: SNLS00401  
Client ID: SNLS002

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
-----------	-----------	--------	----	----	-------	----	-------------	------	-------	--------

- \* Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where the concentration falls below the effective PQL.
- \*\* Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- H Analytical 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.
- Z The percent difference is greater than 70%.
- h Prep holding time exceeded

The above sample is reported on an "as received" basis.

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 Certificate of Analysis.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories, LLC standard operating procedures. Please direct any questions to your Project Manager, Edith Kent.

Reviewed by Jimie Carr

GC/ECD PCB  
SAMPLE  
DATA

# GENERAL ENGINEERING LABORATORIES, LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## Certificate of Analysis

Company : Sandia National Laboratories  
 Address : MS-0756  
 P.O. Box 5800  
 Albuquerque, New Mexico 87185-0854  
 Contact: Ms. Pamela M. Puissant  
 Project: Level C Data Package

Report Date: August 9, 2004

Page 1 of 2

Client Sample ID: 065313-003      Project: SNLS00401  
 Sample ID: 116929004      Client ID: SNLS002  
 Matrix: Misc Liquid  
 Collect Date: 12-JUL-04 11:30      Client Desc.: 6650/1081-West-ST-W  
 Receive Date: 14-JUL-04  
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Semi-Volatiles-PCB Federal</b>											
<i>8082 3510C PCB H2O Fed</i>											
Aroclor-1016	U	ND	0.0515	0.103	ug/L	1	JSP	07/21/04	1829	349620	1
Aroclor-1221	U	ND	0.0859	0.103	ug/L	1					
Aroclor-1232	U	ND	0.0515	0.103	ug/L	1					
Aroclor-1242	U	ND	0.0619	0.103	ug/L	1					
Aroclor-1248	U	ND	0.0515	0.103	ug/L	1					
Aroclor-1254	U	ND	0.0515	0.103	ug/L	1					
Aroclor-1260	U	ND	0.0515	0.103	ug/L	1					

**The following Prep Methods were performed**

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3510C	3510C PCB Prep H2O Federal	AGS1	07/16/04	1400	349619

**The following Analytical Methods were performed**

Method	Description	Analyst Comments
1	SW846 8082	
2	SW846 8082	

Surrogate/Tracer recovery	Test	Recovery %	Acceptable Limits
4cmx	8082 3510C PCB H2O Fed	79	(47%-96%)
Decachlorobiphenyl	8082 3510C PCB H2O Fed	85	(58%-102%)

**Notes:**

The Qualifiers in this report are defined as follows :

- \* Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where the concentration falls below the effective PQL.
- \*\* Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- H Analytical 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.

# GENERAL ENGINEERING LABORATORIES, LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## Certificate of Analysis

Company : Sandia National Laboratories  
Address : MS-0756  
P.O. Box 5800  
Albuquerque, New Mexico 87185-0854  
Contact: Ms. Pamela M. Puissant  
Project: Level C Data Package

Report Date: August 9, 2004

Page 2 of 2

Client Sample ID: 065313-003  
Sample ID: 116929004

Project: SNLS00401  
Client ID: SNLS002

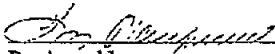
Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
-----------	-----------	--------	----	----	-------	----	-------------	------	-------	--------

- Z The percent difference is greater than 70%.
- h Prep holding time exceeded

The above sample is reported on an "as received" basis.

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 Certificate of Analysis.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories, LLC standard operating procedures. Please direct any questions to your Project Manager, Edith Kent.

  
Reviewed by

METALS  
SAMPLE  
DATA

# GENERAL ENGINEERING LABORATORIES, LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## Certificate of Analysis

Company : Sandia National Laboratories  
 Address : MS-0756  
 P.O. Box 5800  
 Albuquerque, New Mexico 87185--0854  
 Contact: Ms. Pamela M. Puissant  
 Project: Level C Data Package

Report Date: August 9, 2004

Page 1 of 2

Client Sample ID: 065313-006  
 Sample ID: 116929007  
 Matrix: Misc Liquid  
 Collect Date: 12-JUL-04 11:21  
 Receive Date: 14-JUL-04  
 Collector: Client

Project: SNLS00401  
 Client ID: SNLS002

Client Desc.: 6650/1081-West-ST-W

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Mercury Analysis-CVAA</b>											
<i>7470 Cold Vapor Hg Liquid</i>											
Mercury	U	ND	0.000047	0.0002	mg/L	1	BCD1	07/21/04	1225	350071	1
<b>Metals Analysis-ICP-MS</b>											
<i>6020 TAL Metals Liquid Federal</i>											
Aluminum	U	ND	0.0908	0.150	mg/L	1	BAJ	07/23/04	2039	349544	2
Antimony	U	ND	0.0028	0.020	mg/L	1					
Arsenic	BJ	0.0101	0.010	0.030	mg/L	1					
Barium		0.0242	0.0019	0.020	mg/L	1					
Beryllium	U	ND	0.0008	0.002	mg/L	1					
Cadmium	U	ND	0.0004	0.010	mg/L	1					
Calcium		66.5	0.400	1.00	mg/L	1					
Chromium	U	ND	0.0038	0.030	mg/L	1					
Cobalt	J	0.00064	0.0006	0.010	mg/L	1					
Copper	J	0.00762	0.0069	0.010	mg/L	1					
Iron		0.484	0.158	0.250	mg/L	1					
Lead	U	ND	0.0005	0.020	mg/L	1					
Magnesium		12.1	0.0633	0.100	mg/L	1					
Manganese	J	0.0279	0.0161	0.050	mg/L	1					
Molybdenum	U	ND	0.002	0.005	mg/L	1					
Nickel	J	0.00649	0.0007	0.020	mg/L	1					
Selenium	U	ND	0.0064	0.050	mg/L	1					
Silver		0.0143	0.0004	0.010	mg/L	1					
Sodium		128	0.0968	2.50	mg/L	1					
Thallium	J	0.00408	0.0002	0.005	mg/L	1					
Vanadium	U	ND	0.0544	0.100	mg/L	1					
Zinc	J	0.0192	0.0109	0.100	mg/L	1					
Potassium		101	0.151	3.00	mg/L	1	BAJ	07/26/04	0919	349544	3

**The following Prep Methods were performed**

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3005A	ICP-MS 3005 PREP	FGA	07/20/04	1100	349543
SW846 7470A Prep	EPA 7470A Mercury Prep Liquid	ETL	07/20/04	1130	350060

**The following Analytical Methods were performed**

Method	Description	Analyst	Comments
1	SW846 7470A		
2	SW846 3005/6020		

# GENERAL ENGINEERING LABORATORIES, LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## Certificate of Analysis

Company : Sandia National Laboratories  
Address : MS-0756  
P.O. Box 5800  
Albuquerque, New Mexico 87185--0854  
Contact: Ms. Pamela M. Puissant  
Project: Level C Data Package

Report Date: August 9, 2004

Page 2 of 2

Client Sample ID: 065313-006  
Sample ID: 116929007

Project: SNLS00401  
Client ID: SNLS002

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
3	SW846	3005/6020								

### Notes:

The Qualifiers in this report are defined as follows :

- \* Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where the concentration falls below the effective PQL.
- \*\* Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- H Analytical holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
- 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.
- h Prep holding time exceeded

The above sample is reported on an "as received" basis.

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 Certificate of Analysis.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories, LLC standard operating procedures. Please direct any questions to your Project Manager, Edith Kent.

Reviewed by

Quinn S 8/10/04



GENERAL  
CHEMISTRY  
SAMPLE  
DATA

# GENERAL ENGINEERING LABORATORIES, LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

## Certificate of Analysis

Company : Sandia National Laboratories  
Address : MS-0756  
P.O. Box 5800  
Albuquerque, New Mexico 87185-0854  
Contact: Ms. Pamela M. Puissant  
Project: Level C Data Package

Report Date: August 6, 2004

Page 1 of 1

Client Sample ID: 065313-005  
Sample ID: 116929006  
Matrix: Misc Liquid  
Collect Date: 12-JUL-04 11:20  
Receive Date: 14-JUL-04  
Collector: Client

Project: SNLS00401  
Client ID: SNLS002

Client Desc.: 6650/1081-West-ST-W

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Oil & Grease Analysis Federal										
SW9070 OIL & GREASE Federal										
Oil & Grease	J	1.54	1.36	4.40	mg/L		POW1 08/03/04	1002	353622	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 9070	

### Notes:

The Qualifiers in this report are defined as follows :

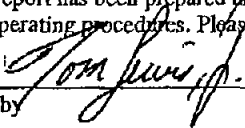
- \* Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where the concentration falls below the effective PQL.
- \*\* Indicates analyte is a surrogate compound.
- < For less than value for Flashpoint
- B The analyte was found in the blank above the effective MDL.
- H Analytical holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
- 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.
- h Prep holding time exceeded

The above sample is reported on an "as received" basis.

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 Certificate of Analysis.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories, LLC standard operating procedures. Please direct any questions to your Project Manager, Edith Kent.

Reviewed by



**GENERAL ENGINEERING LABORATORIES, LLC**  
 2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

**Certificate of Analysis**

Company : Sandia National Laboratories  
 Address : MS-0756  
 P.O. Box 5800  
 Albuquerque, New Mexico 87185-0854  
 Contact: Ms. Pamela M. Puissant  
 Project: Level C Data Package

Report Date: August 6, 2004

Page 1 of 1

Client Sample ID: 065313-008  
 Sample ID: 116929009  
 Matrix: Misc Liquid  
 Collect Date: 12-JUL-04 11:21  
 Receive Date: 14-JUL-04  
 Collector: Client

Project: SNLS00401  
 Client ID: SNLS002

Client Desc.: 6650/1081-West-ST-W

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Flow Injection Analysis Federal</b>											
<i>SW 9066 Phenols, Total Liquid</i>											
Total Phenol	B	0.0163	0.00369	0.010	mg/L	1	ADF	07/30/04	1253	350749	1

**The following Prep Methods were performed**

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9066:Prep	SW 9066 Phenols, Total in liquid-Fed PRE	KLP1	07/22/04	1408	350748

**The following Analytical Methods were performed**

Method	Description	Analyst Comments
1	SW846 9066	

**Notes:**

The Qualifiers in this report are defined as follows :

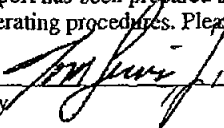
- \* Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where the concentration falls below the effective PQL.
- \*\* Indicates analyte is a surrogate compound.
- < For less than value for Flashpoint
- B The analyte was found in the blank above the effective MDL.
- H Analytical holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
- 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.
- h Prep holding time exceeded

The above sample is reported on an "as received" basis.

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 Certificate of Analysis.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories, LLC standard operating procedures. Please direct any questions to your Project Manager, Edith Kent.

Reviewed by \_\_\_\_\_



# GENERAL ENGINEERING LABORATORIES, LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gei.com

## Certificate of Analysis

Company : Sandia National Laboratories  
 Address : MS-0756  
 P.O. Box 5800  
 Albuquerque, New Mexico 87185-0854  
 Contact: Ms. Pamela M. Puissant  
 Project: Level C Data Package

Report Date: August 6, 2004

Page 1 of 1

Client Sample ID: 065313-009  
 Sample ID: 116929010  
 Matrix: Misc Liquid  
 Collect Date: 12-JUL-04 11:19  
 Receive Date: 14-JUL-04  
 Collector: Client

Project: SNLS00401  
 Client ID: SNLS002

Client Desc.: 6650/1081-West-ST-W

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
<b>Nutrient Analysis Federal</b>										
<i>EPA 353.1 Nitrogen, (NO3/NO2)</i>										
Nitrogen, Nitrate/Nitrite	J	0.030	0.010	0.050	mg/L	1	JXM 08/05/04	1119	355061	1

**The following Analytical Methods were performed**

Method	Description	Analyst Comments
1	EPA 353.1	

**Notes:**

The Qualifiers in this report are defined as follows :

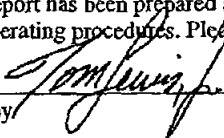
- \* Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where the concentration falls below the effective PQL.
- \*\* Indicates analyte is a surrogate compound.
- < For less than value for Flashpoint
- B The analyte was found in the blank above the effective MDL.
- H Analytical holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
- 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.
- h Prep holding time exceeded

The above sample is reported on an "as received" basis.

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 Certificate of Analysis.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories, LLC standard operating procedures. Please direct any questions to your Project Manager, Edith Kent.

Reviewed by \_\_\_\_\_



**Certificate of Analysis**

Company : Sandia National Laboratories  
 Address : MS-0756  
 P.O. Box 5800  
 Albuquerque, New Mexico 87185-0854  
 Contact: Ms. Pamela M. Puissant  
 Project: Level C Data Package

Report Date: August 6, 2004

Page 1 of 1

Client Sample ID: 065313-010  
 Sample ID: 116929011  
 Matrix: Misc Liquid  
 Collect Date: 12-JUL-04 11:19  
 Receive Date: 14-JUL-04  
 Collector: Client

Project: SNLS00401  
 Client ID: SNLS002

Client Desc.: 6650/1081-West-ST-W

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
<b>Ion Chromatography Federal</b>										
<i>SW846-9056 Fluoride in Liquid</i>										
Fluoride	U	ND	0.0553	0.100	mg/L	1	MAR107/30/04	1211	350394	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 9056	

**Notes:**

The Qualifiers in this report are defined as follows :

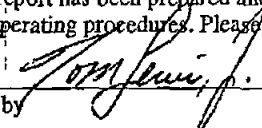
- \* Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where the concentration falls below the effective PQL.
- \*\* Indicates analyte is a surrogate compound.
- < For less than value for Flashpoint
- B The analyte was found in the blank above the effective MDL.
- H Analytical holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
- 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.
- h Prep holding time exceeded

The above sample is reported on an "as received" basis.

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 Certificate of Analysis.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories, LLC standard operating procedures. Please direct any questions to your Project Manager, Edith Kent.

Reviewed by \_\_\_\_\_



**GENERAL ENGINEERING LABORATORIES, LLC**  
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

**Certificate of Analysis**

Company : Sandia National Laboratories  
Address : MS-0756  
P.O. Box 5800  
Albuquerque, New Mexico 87185--0854  
Contact: Ms. Pamela M. Puissant  
Project: Level C Data Package

Report Date: August 6, 2004

Page 1 of 1

Client Sample ID: 065313-011  
Sample ID: 116929012  
Matrix: Misc Liquid  
Collect Date: 12-JUL-04 11:18  
Receive Date: 14-JUL-04  
Collector: Client

Project: SNLS00401  
Client ID: SNLS002

Client Desc.: 6650/1081-West-ST-W

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Flow Injection Analysis Federal</b>											
SW9012A Cyanide, Total Federal Cyanide, Total	U	ND	0.00172	0.005	mg/L	1	ADF	07/22/04	1758	351193	1

**The following Prep Methods were performed**

Method	Description	Analyst	Date	Time	Prep Batch
SW846 9010B Prep	SW846 9010B Prep	KLP1	07/22/04	1129	351189

**The following Analytical Methods were performed**

Method	Description	Analyst Comments
1	SW846 9012A	

**Notes:**

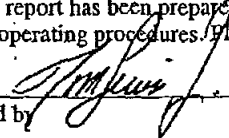
The Qualifiers in this report are defined as follows :

- \* 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.
- < For less than value for Flashpoint
- B The analyte was found in the blank above the effective MDL.
- H Analytical holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
- 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.
- h Prep holding time exceeded

The above sample is reported on an "as received" basis.

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 Certificate of Analysis.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories, LLC standard operating procedures. Please direct any questions to your Project Manager, Edith Kent.

Reviewed by 

RADIOCHEMISTRY  
SAMPLE  
DATA

**GENERAL ENGINEERING LABORATORIES, LLC**  
 2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

**Certificate of Analysis**

Company: Sandia National Laboratories  
 Address: MS-0756  
 P.O. Box 5800  
 Albuquerque, New Mexico 87185-0854  
 Contact: Ms. Pamela M. Puissant  
 Project: Level C Data Package

Report Date: August 10, 2004

Page 1 of 1

Client Sample ID: 065313-014  
 Sample ID: 116929013  
 Matrix: Misc Liquid  
 Collect Date: 12-JUL-04  
 Receive Date: 14-JUL-04  
 Collector: Client

Project: SNLS00401  
 Client ID: SNLS002  
 Client Desc.: 6650/1081-West-ST-W

Parameter	Qualifier	Result	LC	TPU	MDA	Units	DF	Analyst	Date	Time	Batch	Mtd.
<b>Rad Liquid Scintillation Analysis</b>												
<i>LSC, Tritium Dist, Liquid</i>												
Tritium	U	-169	100	+/-113	206	pCi/L		JLB1	08/02/04	0842	350329	1

The following Analytical Methods were performed

Method	Description
1	EPA 906.0 Modified

**Notes:**

TPU 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 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 Analytical holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
- 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 Data rejected due to interference.
- X Data rejected due to low abundance.
- X Data rejected due to no valid peak.
- X Uncertain identification for gamma spectroscopy.
- h Prep holding time exceeded

The above sample is reported on an "as received" basis.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories, LLC standard operating procedures. Please direct any questions to your Project Manager, Edith Kent.

*Heather J. Woods*

Reviewed by:



**ON-SITE LABORATORY (RPSD)  
ANALYSIS REQUEST AND CHAIN OF CUSTODY**

Internal Lab

Page 1 of 1

Batch No. <b>400987</b>	SAR/WR No.	AR/COC <b>607644</b>
Dept. No./Mail Stop: <b>6133/1089</b>	Date Samples Shipped: <b>7-12-04</b> SMO Use: _____	Logged By: _____
Project/Task Manager: <b>Mike Sanders</b>	Carrier/Waybill No. <b>HC</b>	Project/Task No.: <b>7223.02.02.01</b>
Project Name: <b>DSS</b>	Lab Contact: <b>Kathye Chavez (505) 844-3975</b>	SMO Authorization: <b>OK</b>
Record Center Code: _____	Lab Destination: <b>RPSD</b>	Location: _____ Tech Area: _____
Logbook Ref. No.: _____	SMO Contact/Phone: <b>Doug Perry (505) 845-0867</b>	Building: _____ Room: _____
Service Order No.: <b>CFO 23-04</b>		

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Beginning Depth (ft)	ER Site No.	Date/Time(hr) Collected	Reference LOV(available at SMO)					
					Sample Matrix	Container Type	Volume	Preservative	Collection Method	Sample Type
RPSD No.-Fraction	RPSD Remarks/Alliquot Amounts	Screen CPM	Sample Mass	Sample Quantity						
065313-015	6650/1081-West-ST-W	NA	1081	071204/1118	W	M	500 ml	None	G	SA
					Gamma Spec					
065313-016	6650/1081-West-ST-W	NA	1081	071204/1122	W	G	40 ml	None	G	SA
					Gross Alpha/Beta					

RMMA <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Ref. No.	Sample Tracking	Smo Use	Special Instructions/QC Requirements
Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab		Date Entered(mm/dd/yy)	<b>07/12/04</b>	EDD <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Turnaround Time <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Rush		Entered by:	<b>JAC</b>	Raw Data Package <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

<b>Sample Team Members</b>	Name	Signature	Init	Company/Organization/Phone/Cellular
	William J Gibson	<i>[Signature]</i>	WJG	Weston/6134/284-5232/239-7367
	Gilbert Quintana	<i>[Signature]</i>	GQ	Shaw/6134/284-3309/238-9417

1. Relinquished by <i>William J Gibson</i>	Org. <b>6133</b> Date <b>7-12-04</b> Time <b>1400</b>	4. Relinquished by	Org.	Date	Time
1. Received by <i>[Signature]</i>	Org. <b>6133</b> Date <b>7-12-04</b> Time <b>1400</b>	4. Received by	Org.	Date	Time
2. Relinquished by <i>[Signature]</i>	Org. <b>6133</b> Date <b>7/12/04</b> Time <b>1600</b>	5. Relinquished by	Org.	Date	Time
2. Received by <i>[Signature]</i>	Org. <b>6133</b> Date <b>7-12-04</b> Time <b>1600</b>	5. Received by	Org.	Date	Time
3. Relinquished by <i>[Signature]</i>	Org. <b>6133</b> Date <b>7/14/04</b> Time <b>1105</b>	6. Relinquished by	Org.	Date	Time
3. Received by <i>[Signature]</i>	Org. <b>6133</b> Date <b>7/14/04</b> Time <b>1105</b>	6. Received by	Org.	Date	Time

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program \*  
 \* 7/12/04 6:24:14 PM \*  
 \*\*\*\*\*

\* Analyzed by: *h 7/13/04* Reviewed by: *Jim PK 7-13-04* \*  
 \*\*\*\*\*

Customer : SANDERS, M (6133)  
 Customer Sample ID : 065313-015  
 Lab Sample ID : 40098701

Sample Description : 6650/1081-WEST-ST-W  
 Sample Quantity : 0.529 Liter  
 Sample Date/Time : 7/12/04 11:18:00 AM  
 Acquire Start Date/Time : 7/12/04 4:44:04 PM  
 Detector Name : LAB03  
 Elapsed Live/Real Time : 6000 / 6001 seconds

Comments:

\*\*\*\*\*

Nuclide Name	Activity (pCi/Liter)	2-sigma Error	MDA (pCi/Liter)
U-238	Not Detected	-----	4.89E+002
RA-226	Not Detected	-----	3.75E+002
PB-214	Not Detected	-----	4.23E+001
BI-214	Not Detected	-----	4.82E+001
PB-210	Not Detected	-----	1.45E+003
TH-232	Not Detected	-----	1.09E+002
RA-228	Not Detected	-----	1.28E+002
AC-228	Not Detected	-----	6.82E+001
TH-228	Not Detected	-----	4.00E+002
RA-224	Not Detected	-----	1.51E+002
PB-212	Not Detected	-----	3.32E+001
BI-212	Not Detected	-----	2.62E+002
TL-208	Not Detected	-----	6.56E+001
U-235	Not Detected	-----	9.15E+001
TH-231	Not Detected	-----	2.89E+003
PA-231	Not Detected	-----	7.22E+002
TH-227	Not Detected	-----	1.19E+002
RA-223	Not Detected	-----	4.91E+001
RN-219	Not Detected	-----	2.28E+002
PB-211	Not Detected	-----	4.83E+002
TL-207	Not Detected	-----	9.12E+003
AM-241	Not Detected	-----	5.12E+001
PU-239	Not Detected	-----	1.35E+005
NP-237	Not Detected	-----	7.45E+002
PA-233	Not Detected	-----	3.23E+001
TH-229	Not Detected	-----	8.39E+001

[Summary Report] - Sample ID: : 40098701

Nuclide Name	Activity (pCi/Liter)	2-sigma Error	MDA (pCi/Liter)
AG-108m	Not Detected	-----	2.08E+001
AG-110m	Not Detected	-----	1.72E+001
BA-133	Not Detected	-----	2.47E+001
BE-7	Not Detected	-----	1.38E+002
CD-115	Not Detected	-----	3.09E+001
CE-139	Not Detected	-----	1.21E+001
CE-141	Not Detected	-----	1.99E+001
CE-144	Not Detected	-----	8.24E+001
CM-243	Not Detected	-----	9.44E+001
CO-56	Not Detected	-----	2.11E+001
CO-57	Not Detected	-----	1.05E+001
CO-58	Not Detected	-----	1.83E+001
CO-60	Not Detected	-----	2.53E+001
CR-51	Not Detected	-----	1.32E+002
CS-134	Not Detected	-----	2.26E+001
CS-137	Not Detected	-----	2.04E+001
EU-152	Not Detected	-----	3.20E+001
EU-154	Not Detected	-----	9.29E+001
EU-155	Not Detected	-----	4.46E+001
FE-59	Not Detected	-----	3.77E+001
GD-153	Not Detected	-----	3.37E+001
HG-203	Not Detected	-----	1.70E+001
I-131	Not Detected	-----	1.78E+001
IR-192	Not Detected	-----	1.56E+001
K-40	Not Detected	-----	3.46E+002
MN-52	Not Detected	-----	2.24E+001
MN-54	Not Detected	-----	2.08E+001
MO-99	Not Detected	-----	1.52E+002
NA-22	Not Detected	-----	2.39E+001
NA-24	Not Detected	-----	3.40E+001
ND-147	Not Detected	-----	1.22E+002
NI-57	Not Detected	-----	3.66E+001
RU-103	Not Detected	-----	1.52E+001
RU-106	Not Detected	-----	1.87E+002
SB-122	Not Detected	-----	2.55E+001
SB-124	Not Detected	-----	2.07E+001
SB-125	Not Detected	-----	5.19E+001
SN-113	Not Detected	-----	2.16E+001
SR-85	Not Detected	-----	2.52E+001
TA-182	Not Detected	-----	6.83E+001
TA-183	Not Detected	-----	4.40E+001
TL-201	Not Detected	-----	3.01E+001
Y-88	Not Detected	-----	2.97E+001
ZN-65	Not Detected	-----	4.37E+001
ZR-95	Not Detected	-----	3.10E+001

\*\*\*\*\*  
\* Sandia Radiation Protection Sample Diagnostics Program 7-13-2004 \*  
\*\*\*\*\*  
LSC Windows Analysis Program - Version 1.3 Procedure RPSD-09-03

Customer : SANDERS, Org. 6133 (MRSANDE)  
Program ID : ER  
Sample Building/Room :  
Sample Category : SA  
Sample Description : 065313-016 6650/1081-WEST-ST-W 11:22 COC 607644

Analyst : KRSANSO  
Batch Number : 40098702 *dpk 7-13-04*  
LSC System ID : UNIT02 - 403809  
Protocol Number/Name : 22 H3AB -- LIQUID  
No. of Samples : 1  
Collection Date : 07/12/2004  
Received Date : 07/12/2004  
Count Date : 07/12/2004  
Count Time (min) : 100.00  
Background cpm : 1.93E+01  
Background tSIE : 2.42E+02  
Background Eff : 2.42E-01  
Sample Aliquot : 1.00E-02 Liter

Efficiency = 9.67E-01 - Exp(-6.90E-04\*tSIE^1.12E+00)  
H-3 MDA = 3.86E+02 pCi/Liter  
H-3 CL = 1.90E+02 pCi/Liter

Reviewed by                     L 7/13/04                    

Lab ID	Customer ID	Aliquot Liter	cpm	tSIE	Eff	H-3 Activity pCi/Liter	2s Error	Flag
001*	065313-016	1.00E-02	1.96E+01	235	0.235	5.18E+01	2.55E+02	

\*\*\*\*\*  
 \* Sandia Radiation Protection Sample Diagnostics Program 7-13-2004 \*  
 \*\*\*\*\*  
 LSC Windows Analysis Program - Version1.3 Procedure RPSD-09-03

Customer : SANDERS, Org. 6133 (MRSANDE)  
 Program ID : ER  
 Sample Building/Room :  
 Sample Category : SA  
 Sample Description : 065313-016 6650/1081-WEST-ST-W 11:22 COC 607644

Analyst : KRSANSO  
 Batch Number : 40098702  
 LSC System ID : UNIT02 - 403809  
 Protocol Number/Name : 22 H3AB -- LIQUID  
 No. of Samples : 1  
 Collection Date : 07/12/2004  
 Received Date : 07/12/2004  
 Count Date : 07/12/2004  
 Count Time (min) : 100.00  
 Background cpm : 4.15E+00  
 Background tSIE : 2.42E+02  
 Background Eff : 9.85E-01  
 Sample Aliquot : 1.00E-02 Liter

Efficiency = 9.94E-01 - Exp(-1.73E-02\*tSIE^1.02E+00)  
 Alpha MDA = 4.48E+01 pCi/Liter  
 Alpha CL = 2.17E+01 pCi/Liter

Lab ID	Customer ID	Aliquot Liter	cpm	tSIE	Eff	Alpha Activity pCi/Liter	2s Error	Flag
001*	065313-016	1.00E-02	2.84E+00	235	0.983	-6.00E+01	2.80E+01	

\*\*\*\* Sandia Radiation Protection Sample Diagnostics Program 7-13-2004 \*  
 \*\*\*\*  
 LSC Windows Analysis Program - Version 1.3 Procedure RPSD-09-03

Customer : SANDERS, Org. 6133 (MRSANDE)  
 Program ID : ER  
 Sample Building/Room :  
 Sample Category : SA  
 Sample Description : 065313-016 6650/1081-WEST-ST-W 11:22 COC 607644

Analyst : KRSANSO  
 Batch Number : 40098702  
 LSC System ID : UNIT02 - 403809  
 Protocol Number/Name : 22 H3AB -- LIQUID  
 No. of Samples : 1  
 Collection Date : 07/12/2004  
 Received Date : 07/12/2004  
 Count Date : 07/12/2004  
 Count Time (min) : 100.00  
 Background cpm : 3.32E+01  
 Background tSIE : 2.42E+02  
 Background Eff : 9.28E-01  
 Sample Aliquot : 1.00E-02 Liter

Efficiency = 9.41E-01 - Exp(-3.82E-02\*tSIE^8.64E-01)  
 Beta MDA = 1.32E+02 pCi/Liter  
 Beta CL = 6.51E+01 pCi/Liter

Lab ID	Customer ID	Aliquot Liter	cpm	tSIE	Eff	Beta Activity pCi/Liter	2s Error	Flag
001*	065313-016	1.00E-02	3.44E+01	235	0.927	5.59E+01	8.48E+01	





**ANNEX B**  
**DSS Site 1081**  
**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.)

I:\MAPPING\PROJECTS\10960025\020606R.DOC

ASIA • AUSTRALIA • EUROPE • NORTH AMERICA

GORE-SORBER and PETREX are registered service marks of W. L. Gore & Associates, Inc.  
GORE-TEX and GORE-SORBER are registered trademarks of W. L. Gore & Associates, Inc.



# 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

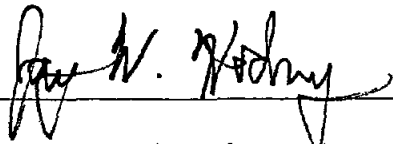
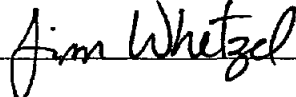
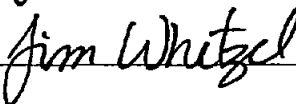
Prepared For:  
Sandia National Laboratories  
Mail Stop 0719, 1515 Eubank, SE  
Albuquerque, NM 87123

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

  
\_\_\_\_\_  
  
\_\_\_\_\_  
  
\_\_\_\_\_

I:\MAPPING\PROJECTS\10960025\020606R.DOC

*This document shall not be reproduced, except in full, without written approval of W.L. Gore & Associates*

**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 (sorbent, each containing 40mg of a suitable granular adsorbent) to a thermal desorption tube for analysis. Sorbent containers 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 sorbent 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 sorbent 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 sorbents 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**

**UNITS**

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

**ANALYTES**

BTEX	combined masses of benzene, toluene, ethylbenzene and total xylenes (Gasoline Range Aromatics)
BENZ	benzene
TOL	toluene
EtBENZ	ethylbenzene
mpXYL	m-, p-xylene
oXYL	o-xylene
C11,C13&C15	combined masses of undecane, tridecane, and pentadecane (C11+C13+C15) (Diesel Range Alkanes)
UNDEC	undecane
TRIDEC	tridecane
PENTADEC	pentadecane
TMBs	combined masses of 1,3,5-trimethylbenzene and 1,2,4-trimethylbenzene
135TMB	1,3,5-trimethylbenzene
124TMB	1,2,4-trimethylbenzene
ct12DCE	cis- & trans-1,2-dichloroethene
t12DCE	trans-1,2-dichloroethene
c12DCE	cis-1,2-dichloroethene
NAPH&2-MN	combined masses of naphthalene and 2-methyl naphthalene
NAPH	naphthalene
2MeNAPH	2-methyl naphthalene
MTBE	methyl t-butyl ether
11DCA	1,1-dichloroethane
CHCl <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

**BLANKS**

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

**APPENDIX A:**

1. CHAIN OF CUSTODY
2. DATA TABLE
3. STACKED TOTAL ION CHROMATOGRAMS



# 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>[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>GEORBE</u>		
Installation Start Date and Time: <u>4/23/02 10815</u>			: <u>AM</u> PM		
Installation Complete Date and Time: <u>5/6/02 10940</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: _____			: 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/ER</u>	<u>3-6-02</u>	
Relinquished By: <u>[Signature]</u>	Date	Time	Received By: _____	Date	Time
Affiliation: <u>6135</u>	<u>5-14-02</u>	<u>12:58</u>	Affiliation: _____		
Relinquished By: _____	Date	Time	Received By: <u>[Signature]</u>	Date	Time
Affiliation: _____			Affiliation: <u>W.L. Gore &amp; Associates, Inc.</u>	<u>5/17/02</u>	<u>14:00</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>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>179152</u> - # <u>179187</u>	Total Modules Shipped: <u>142</u>	Pieces		
# 179150 - # 179233	# <u>179188</u> - # <u>179226</u>	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>79</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: <u>3-4-02</u>	Time: <u>12:00</u>	Received By: <u>Mike Sanders</u>	Date: <u>3-7-02</u>	Time: _____
Affiliation: <u>W.L. Gore &amp; Associates, Inc.</u>			Affiliation: <u>Sandia; 6133</u>		
Relinquished By: <u>[Signature]</u>	Date: <u>5-21-02</u>	Time: <u>0935</u>	Received By: _____	Date: _____	Time: _____
Affiliation: <u>Sandia N.L., 6135</u>			Affiliation: _____		
Relinquished By: _____	Date: _____	Time: _____	Received By: <u>[Signature]</u>	Date: <u>5-24-02</u>	Time: <u>13:30</u>
Affiliation: _____			Affiliation: <u>W.L. Gore &amp; Associates, Inc.</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							-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	1304							-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, 0730						1109/6531- -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**

2 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, 1047						1026/6501-65-3
44.	179130		1437 5-10-02, 1051						↓ 1
45.	179131		1442 5-10-02, 1053						1025/6501- 1
46.	179132		1446 ↓						↓ 2
47.	179133	↓	1504 5-10-02, 11:06						↓ 3
48.	179134	4/26/02, 0905	5-10-02 1247						1093/6504- 1
49.	179135		0914 ↓ 1254						↓ 4
50.	179136		0930 5-10-02, 1305						↓ 2
51.	179137		0938 Lost						↓ 3
52.	179138		0948 Lost						↓ 5
53.	179139		1018 5-10-02, 1322						1031/6600- 2
54.	179140		1026 Lost						↓ 3
55.	179141		1030 Lost						↓ 4
56.	179142		1038 5-10-02, 1343						↓ 1
57.	179143		1136 5-10-02, 11:36						276/829X- 2
	179144		1142 ↓						↓ 3
	179150		1150 ↓						↓ 4
60.	179151	↓	1155 5-10-02, 11:54						↓ 1
61.	179152	4/29/02, 0814	5-14-02, 09:42						1004/6505- 1
62.	179153		0822 ↓						↓ 5
63.	179154		0829 ↓						↓ 3
64.	179155		0903 ↓						↓ 2
65.	179156		0945 5-14-02 ↓ 1021						↓ 4
66.	179157		0930 05-14-02, 09:19						1003/6570- 4
67.	179158		0934 ↓						↓ 1
68.	179159		0940 ↓						↓ 2
69.	179160		0948 ↓ 0940						↓ 3
70.	179161		1050 05-14-02, 1026						1032/6610- 1
71.	179162		1100 ↓						↓ 2
72.	179163		1110 ↓						↓ 4
73.	179164		1114 ↓						↓ 3
74.	179165		1120 ↓						↓ 5
75.	179166		1126 05-14-02, 11:03						↓ 6
76.	179167		1222 05-14-02, 11:06						1120/6643- 2
77.	179168		1230 ↓						↓ 3
78.	179169		1237 ↓						↓ 4
79.	179170		1242 05-14-02 ↓ 11:32						↓ 1
80.	179171		1320 5-14-02, 0844						1034/6710- 4
	179172		1325 ↓ 0912						↓ 3
82.	179173		1332 ↓ 0851						↓ 2
83.	179174		1340 ↓ 0855						↓ 1
84.	179175	↓	1423 5-14-02, 0814						1035/6710-V

**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- 3
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- 4
95.	179186	1113							3
96.	179187	1119							2
97.	179188	1132							5
98.	179189	1140	5-15-02 1213						1
99.	179190	1238	5-15-02, 10:09						1029/6584N- 1
100.	179191	1250							-2
	179192	1300							-3
102.	179193	1313							-5
103.	179194	1318	5-15-02, 1032						-4
104.	179195	1445	5-15-02, 1405						1006/6741- 5
105.	179196	1450							3
106.	179197	1455							4
107.	179198	1502							2
108.	179199	1508	5-15-02, 1143						1
109.	179200	1525	5-15-02, 1039						1087/6743- 2
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 3
114.	179205	0835							4
115.	179206	0843							1
116.	179207	0851	5-16-02, 0832						2
117.	179208	0944	5-16-02, 0841						1004/6969- 2
118.	179209	0952							4
119.	179210	1000							3
120.	179211	1009							5
121.	179212	1016	5-16-02, 0907						1
122.	179213	1110	5-16-02, 1105						1095/9938- 3
123.	179214	1116							2
124.	179215	1122	5-16-02, 11:21						1
125.	179216	1205	5-16-02-0931						1094/452- 2
126.	179217	✓ 1218	5-16-02-0935						1

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

4. of 4

**SITE NAME & LOCATION**

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						1079/LEP-GS-3
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								
143.									
144.									
145.									
146.									
147.									
148.									
149.									
150.									
151.									
152.									
153.									
154.									
155.									
156.									
157.									
158.									
159.									
160.									
161.									
162.									
163.									
164.									
165.									
166.									
167.									
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

DSS  
Site  
1081

DATE ANALYZED	SAMPLE NAME	BTEX, ug	BENZ, ug	TOL, ug	EtBENZ, ug	mpXYL, ug	oXYL, ug	C11, C13, &C15, ug	UNDEC, ug	TRIDEC, ug	PENTADEC, ug	TMBs, ug
	MDL=		0.03	0.02	0.01	0.01	0.01		0.02	0.01	0.02	
5/29/2002	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	nd	bdl	0.04
5/29/2002	179217	0.35	0.10	0.10	0.03	0.09	0.03	0.07	0.03	0.04	bdl	0.16
5/29/2002	179218	0.37	0.09	0.11	0.03	0.11	0.03	0.04	0.02	0.01	bdl	0.05
5/29/2002	179219	0.23	nd	0.11	nd	0.10	0.03	0.00	bdl	nd	bdl	0.00
5/29/2002	179220	0.30	nd	nd	0.05	0.18	0.08	0.01	bdl	0.01	bdl	0.05
5/29/2002	179221	0.01	nd	bdl	nd	0.01	nd	0.00	bdl	bdl	bdl	0.03
5/29/2002	179222	0.06	nd	0.05	nd	0.01	bdl	0.04	bdl	bdl	0.04	0.00
5/29/2002	179223	0.03	nd	nd	nd	0.03	nd	0.09	bdl	nd	0.09	0.00
5/30/2002	179224	0.02	nd	bdl	nd	0.02	nd	0.07	bdl	bdl	0.07	0.00
5/30/2002	179225	0.01	nd	nd	nd	0.01	nd	0.09	bdl	0.01	0.08	0.00
5/30/2002	179226	0.01	nd	nd	nd	0.01	nd	0.13	0.03	0.04	0.06	0.09
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

DSS  
Site  
1081

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



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

DSS  
 Site  
 1081

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 C**  
**DSS Site 1081**  
**Soil Sample Data Validation Results**



# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

*N/A*

Batch No. _____		SMO Use _____		AR/COC <b>605666</b>	
Dept. No./Mail Stop: 6135/1089		Date Samples Shipped: 9-3-02		Project/Task No. 7223.02.03.02	
Project/Task Manager: Mike Sanders		Carrier/Waybill No. _____		SMO Authorization: <i>OK</i>	
Project Name: DSS soil sampling		Lab Contact: Edie Kent 803-556-8171		Contract #: _____	
Record Center Code: ER/1295/DSS/DAT		Lab Destination: GEL		<input type="checkbox"/> Waste Characterization -Send preliminary/copy report to: Wendy Palencia 505-844-3132	
Logbook Ref. No.: ER 090		SMO Contact/Phone: Pam Puissant 505- 844-3185		<input type="checkbox"/> Released by COC No.: _____ <input checked="" type="checkbox"/> Validation Required	
Service Order No. CF032-02		Send Report to SMO: Wendy Palencia 505- 844-3132		Bill To: Sandia National Labs (Accounts Payable)	

Location	Tech Area	Reference LOV(available at SMO)
Building 6650	Room	

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
059775-001	6650/1081-SP1-BH1-10-S	10'	1081	8-29-02/0900	S	AS	4oz	4c	G	SA	VOC (8260B)	
059776-001	6650/1081-SP1-BH1-15-S	15'		0955	S	AS	4oz	4c	G	SA	VOC (8260B)	
059775-002	6650/1081-SP1-BH1-15-S	15'		1000	S	AG	500ml	4c	G	SA	see below for parameter	
059776-002	6650/1081-SP1-BH1-18-S	10'		0915	S	AG	500ml	4c	G	SA	see below for parameter	
059777-001	6650/1081-SP2-BH1-12-S	12'		1050	S	AS	4oz	4c	G	SA	VOC (8260B)	
059778-001	6650/1081-SP2-BH1-17-S	17'		1145	S	AS	4oz	4c	G	SA	VOC (8260B)	
059777-002	6650/1081-SP2-BH1-17-S	17'		1150	S	AG	500ml	4c	G	SA	see below for parameter	
059778-002	6650/1081-SP2-BH1-17-S	17'		1055	S	AG	500ml	4c	G	SA	see below for parameter	
059779-001	6650/1081-SP3-BH1-17-S	17'		1445	S	AS	4oz	4c	G	SA	VOC (8260B)	
059780-001	6650/1081-SP3-BH1-24-S	24'		1525	S	AS	4oz	4c	G	SA	VOC (8260B)	

RMMA <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Ref. No. _____	Sample Tracking		Smo Use _____	Special Instructions/QC Requirements		Abnormal Conditions on Receipt  Lab Use
Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by lab		Date Entered(mm/dd/yy) _____		Entered by: _____		EDD <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Turnaround Time <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Rush		Level of Rush: _____		QC initials: _____		Level C Package <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Return Samples By: _____		Name		Signature		*Send report to: SVOC (8270C)		
Sample Team Members		J.Lee		<i>[Signature]</i>		Mike Sanders		
		W.Gibson		<i>[Signature]</i>		Dept6135/MS/1089		
		G.Quintana		<i>[Signature]</i>		Phone/505-284/2478		
						PCBs(8082)Cr6+(7197)		
						HE(8330)		
						Total Cyanide(9010)		
						RCRA Metals(6020,7000, 7471)		
						*Please list as separate report. Gross alpha/beta (900)		

1. Relinquished by <i>[Signature]</i>	Org. 6135	Date 9/3/02	Time 0745	4. Relinquished by _____	Org. _____	Date _____	Time _____
1. Received by <i>[Signature]</i>	Org. 6135	Date 9/3/02	Time 0745	4. Received by _____	Org. _____	Date _____	Time _____
2. Relinquished by <i>[Signature]</i>	Org. 6135	Date 9/3/02	Time 1030	5. Relinquished by _____	Org. _____	Date _____	Time _____
2. Received by _____	Org. _____	Date _____	Time _____	5. Received by _____	Org. _____	Date _____	Time _____
3. Relinquished by _____	Org. _____	Date _____	Time _____	6. Relinquished by _____	Org. _____	Date _____	Time _____
3. Received by _____	Org. _____	Date _____	Time _____	6. Received by _____	Org. _____	Date _____	Time _____

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

AR/COC 605666

Project Name: OSS soil sampling		Project/Task Manager: Mike Sanders			Project/Task No.: 7223.02.03.02							
Location: Tech Area		Reference LOV (available at SMO)										
Building: Room:		66454% Lab use										
Sample No-Fraction	ER Sample ID or Sample Location detail	Beginning Depth (ft)	ER Site No.	Date/Time (hr) Collected	Sample Matrix	Container Type	Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
059779-002	6650/1081-SP3-BH1-17-S	17'	1081	8-29-02/1450	S	AG	500ml	4c	G	SA	see below for parameter . 2	013
059780-002	6650/1081-SP3-BH1-24-S	24'	↑	↓ 1530	S	AG	500ml	4c	G	SA	see below for parameter . 2	014
059781-001	6650/1081-SP4-BH1-20-S	20'	↑	8-30-02/0900	S	AS	4oz	4c	G	SA	VOC (8260B) . 1	007
059782-001	6650/1081-SP4-BH1-25-S	25'	↑	0940	S	AS	4oz	4c	G	SA	VOC (8260B) . 1	008
059781-002	6650/1081-SP4-BH1-20-S	20'	↑	0905	S	AG	500ml	4c	G	SA	see below for parameter . 2	015
059782-002	6650/1081-SP4-BH1-25-S	25'	↑	0945	S	AG	500ml	4c	G	SA	see below for parameter . 2	016
059783-001	6650/1081-SP-TB	N/A	↓	↓ 0950	DIW	G	3x40ml	HCL	G	TB	VOC (8260B) 66456	01
Abnormal Conditions on Receipt												
LAB USE												
Recipient Initials: <i>MS 9/14/02</i>												

Contract Verification Review (CVR)

Project Leader Collins Project Name DSS Soil Sampling Case No. 7223\_02.03.02  
 AR/COC No. 605666 Analytical Lab GEL SDG No. 66454

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	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				

Contract Verification Review (Continued)

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1 Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2 Quantitation limit met for all samples	X		
3.3 Accuracy		X	4-Amino-2,6-DNT not within SNL acceptance limits but within GEL SPC limit
a) Laboratory control samples accuracy reported and met for all samples		X	PCB surrogate recovery for decachlorobiphenyl high for sample 069776-002
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique		X	
c) Matrix spike recovery data reported and met	X		
3.4 Precision	X		
a) Replicate sample precision reported and met for all inorganic and radiochemistry samples		X	arsenic, chromium, lead, and silver not within RPD acceptance limits
b) Matrix spike duplicate RPD data reported and met for all organic samples		X	bis(2-Ethylhexyl)phthalate detected in SVOC method blank
3.5 Blank data		X	
a) Method or reagent blank data reported and met for all samples		X	toluene detected in VOC trip blank
b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	
3.6 Contractual qualifiers provided: "J"- estimated quantity; "B"-analyte found in method blank above the MDL for organic or above the PQL for Inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"-analysis done beyond the holding time	X		
3.7 Narrative addresses planchet flaming for gross alpha/beta	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		







Sample Findings Summary

Site: DSS soil sampling

ARCOC: 605666

Date: Organic, Inorganic and Radiochemistry

Sample ID	All VOCs (8266) compounds	591-78-6 (2-hexanone)	108-88-3 (toluene)	SVOC	117-81-7 (bis(2-ethylhexyl)phthalate)	PCB	12672-29-6 (aroclor 1248)	11097-69-1 (aroclor-1254)	11098-82-5 (aroclor 1260)	HE	Metals	7439-62-1 (lead)	7440-38-2 (arsenic)	7440-47-3 (chromium)	7782-49-2 (selenium)	7440-22-4 (silver)	7439-97-6 (mercury)	General Chemistry	Radiochemistry			
059783-001 6650/1081-SP-TB	P2									All QC acceptance criteria were met. No data will be qualified.								All QC acceptance criteria were met. No data will be qualified.	All QC acceptance criteria were met. No data will be qualified.			
059775-001 6650/1081-SP1-BH1-10-S		J	1.02U,B1																			
059776-001 6650/1081-SP1-BH1-15-S		J																				
059777-001 6650/1081-SP2-BH1-12-S		J																				
059780-001 6650/1081-SP3-BH1-24-S		J																				
059781-001 6650/1081-SP4-BH1-20-S		J																				
059775-002 6650/1081-SP1-BH1-15-S					511U,B							J	J	J								
059776-002 6650/1081-SP1-BH1-10-S							J,A1	J,A1	J,A1			J	J	J	J,B3							
059777-002 6650/1081-SP2-BH1-17-S												J	J	J			J,B3					
059778-002 6650/1081-SP2-BH1-12-S									1.8J			J	J	J	J,B3							
059779-002 6650/1081-SP3-BH1-17-S					333U,B							J	J	J	J,B3	J,B3	UJ,B3					
059780-002 6650/1081-SP3-BH1-24-S					333U,B							J	J	J	J,B3	J,B3	UJ,B3					
059781-002 6650/1081-SP4-BH1-20-S					333U,B							J	J	J		J,B3	J,B3					
059782-002 6650/1081-SP4-BH1-25-S												J	J	J		J,B3	UJ,B3					

Validated By:

*A. Neal*

Date: 10/29/02

## Data Validation Qualifiers and Descriptive Flags\*

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

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

### Descriptive Flags

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

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

Updated: September 14, 1999

# Beginning January 2000

## Application of Data Validation Qualifiers to Data Tables

### Laboratory Qualifier

J →

J (Reporting Limit)

U →

ND (Detection Limit)

None →

Detected concentration; See Data Validation Report

### Laboratory Descriptive Flag

B →

Analyte concentration; See Data Validation Report, analyte present in method blank

### Data Validation Qualifier

J (Estimated quantity) →

J\* \* - See Data Validation Report

UJ (Analyzed for but not detected; associated value is an estimate and may be inaccurate or imprecise) →

ND (Detection Limit J); See Data Validation Report

U (Analyzed for but not detected) →

ND (Reporting Limit or Reported Value if > Reporting Limit); See Data Validation Report

R (Data unusable) →

R\* \* - See Data Validation Report

N (Presumptive evidence of the presence of the material) →

Detected concentration(N); See Data Validation Report

NJ (Presumptive evidence of the presence of the material at an estimated quantity) →

Detected concentration (NJ); See Data Validation Report

None (Data conforms to QC requirements) →

Use Laboratory Qualifier

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

Analytical Quality Associates, Inc.



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

**MEMORANDUM**

DATE: 10/29/02  
TO: File  
FROM: Linda Thal  
SUBJECT: Inorganic Data Review and Validation - SNL  
Site: DSS soil sampling  
ARCOC # 605666 GEL SDG # 66454  
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 (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**

Silver was detected in the continuing calibration blank (CCB) bracketing samples 66454-011, -013, -014, -015 and -016 at a value > DL but < RL. Sample 66454-013, -014, -015 and -016 had silver values < 5X the CCB value and will be qualified "J, B3".

Selenium was detected in the ICB/CCB at a value > DL but < RL. Sample 66454-010, -012, -013 and -014 had selenium values < 5X the ICB/CCB value and will be qualified "J, B3".

The replicate RPDs for chromium (68%), lead (104%) and arsenic (68%) were > QC acceptance criteria (35%). All associated sample results were detect and will be qualified "J".

**Hg**

Mercury was detected in the ICB/CCB at a negative value, with an absolute value > DL but < RL. Sample 66454-011 and -015 had a mercury value < 5X DL and will be qualified "J, B3".

Sample 66454-013, 014 and -016 were non-detect for mercury and will be qualified "UJ, B3".

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

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

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

#### **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**

Silver was detected in the continuing calibration blank (CCB) bracketing samples 66454-011, -013, -014, -015 and -016 at a value > DL but < RL. Sample 66454-011 had a silver value > 5X the CCB value and will not be qualified.

Selenium was detected in the ICB/CCB at a value > DL but < RL. Sample 66454-009, -011, -015 and -016 were non-detect for selenium and will not be qualified.

##### **Hg**

Mercury was detected in the ICB/CCB at a negative value, with an absolute value > DL but < RL. Sample 66454-009, -010 and -012 had a mercury value > 5X DL and will not be qualified.

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

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

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

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

##### **Hg**

The sample used for the MS was of similar matrix from SNL SDG 66195. No data will be qualified as a result.

#### **Replicate Analysis**

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

Hg

The sample used for the replicate was of similar matrix from SNL SDG 66195. No data will be qualified as a result.

**ICP Interference Check Sample (ICS)**

ICP-AES: The ICS-AB met QC acceptance criteria except as follows:

The ICS-AB was not run at the end of the sequence for silver analysis on the 09/25.

All Other Analyses: No ICS required.

**ICP Serial Dilution**

ICP-AES: The serial dilutions met QC acceptance criteria.

All Other Analyses: No serial dilutions required.

**Detection Limits/Dilutions**

All Analyses: All detection limits were properly reported.

ICP-AES soils: All samples were diluted 2X. Sample 66454-009 (10X), -010 (50X) and -012 (20X) were further diluted for silver analysis in order to bring the values within the linear range of the instrument.

All Other Analyses: No dilutions were performed.

**Other QC**

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

It should be noted that the ARCOC requests the metals to be run by method 6020 (ICP-MS).

No raw data was submitted with the package.

No other specific issues were identified which affect data quality.



Analytical Quality Associates, Inc.



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

**MEMORANDUM**

DATE: 10/28/02  
TO: File  
FROM: Linda Thal  
SUBJECT: Organic Data Review and Validation - SNL  
Site: DSS soil sampling  
ARCO # 605666 GEL SDG # 66454 and 66456  
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 199914 soil

The CCV preceding samples 66454-001, -002, -003, -006 and -007 had a %D >20% with a negative bias for 2-butanone (27%). Sample 66454-001, -002 and -007 had 2-butanone values > RL and sample 66454-003 and -006 had 2-butanone values > DL. All 2-butanone values will be qualified "J".

The trip blank (TB) associated with samples 66454-001 through -008 had a toluene value > DL. Sample 66454-001 had a toluene value > DL, < RL and < 10X the TB value and will be qualified "U, B1" at the RL.

**VOC** – Batch 199493 water

No MS/MSD or replicate analysis was performed for the batch. The associated sample results will have the "P2" descriptor added due to lack of precision information.

**SVOC** – Batch 199277 soil

Bis (2-ethylhexyl) phthalate was detected in the method blank (MB) at a value > DL but < RL. Sample 66454-009 had a bis(2-ethylhexyl) phthalate value > RL but < 10X the MB value and will be qualified "U, B" at the reported value. Sample 66454-013, -014 and -015 had a bis(2-ethylhexyl) phthalate value > DL but < RL and < 10X the MB value and will be qualified "U, B" at the RL.

### PCB

The surrogate (DCB) recovery (161%) was > QC acceptance criteria (34 – 115%) in sample 66454-010 due to a dilution performed on the sample. Aroclor 1248 and -1254 had a value > RL, and aroclor 1260 had a value > DL. All will be qualified "J, A1".

Sample 66454-012 had an aroclor 1260 value > DL but < RL. The RPD (40%) between the primary and confirmation column was > QC acceptance criteria (25%). The reported value is changed to the highest detected value and will be qualified "J".

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

### Holding Times/Preservation

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

### Calibration

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

#### VOC – Batch 199914 soil

The CCV preceding samples 66454-004 and -005 had a %D >20% but < 40% with a negative bias for 2-butanone (27%). These sample results were non-detect and will not be qualified.

The CCV preceding samples 66454-001 through -007 had a %D >20% but < 40% with a negative bias for 2-hexanone (25%) and 4-methyl-2-pentanone (21%). These sample results were non-detect and will not be qualified.

#### VOC – Batch 199493 water

The CCV had a %D >20% but < 40% with a negative bias for bromomethane (24%) and chloromethane (39.6%). The sample results were non-detect and will not be qualified.

#### SVOC

The CCV had a %D > 20% but < 40% with a negative bias for hexachlorocyclopentadiene (39.9%), and with a positive bias for 4-nitroaniline (28%) and benzo(g,h,i)perylene (23%). The associated sample results were non-detect and will not be qualified.

### Blanks

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

#### VOC – Batch 199914 soil

The trip blank (TB) associated with samples 66454-001 through -008 had a toluene value > DL. Samples 66454-002 through -008 were non-detect for toluene and will not be qualified.

SVOC – Batch 199277 soil

Bis (2-ethylhexyl) phthalate was detected in the method blank (MB) at a value > DL but < RL. Sample 66454-010, -011 and -012 had a bis(2-ethylhexyl) phthalate value > RL and >10X the MB value and will not be qualified. Sample 66454-016 was non-detect and will not be qualified.

**Surrogates**

All Analysis: All surrogate acceptance criteria were met except as mentioned above in the summary section.

**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:

SVOC

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

HE

It should be noted that the sample used for the MS/MSD was of similar matrix from SNL SDG 66610. No data will be qualified as a result.

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

All Analysis: The LCS acceptance criteria were met except as mentioned above in the summary section and as follows:

VOC – Soils and Waters

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

SVOC

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

**Detection Limits/Dilutions**

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

**Confirmation Analyses**

VOC and SVOC: No confirmation analyses required.

PCB: All confirmation acceptance criteria were met except as mentioned above in the summary section.

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

**Other QC**

**VOC:** A trip blank was submitted on the ARCOC. No equipment blank or field duplicate was submitted on the ARCOC.

**SVOC, PCB and HE:** No equipment blank, field blank or field duplicate was submitted on the ARCOC.

No raw data was submitted with the package.

No other specific issues were identified which affect data quality.

---

Analytical Quality Associates, Inc.



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

**MEMORANDUM**

DATE: October 29, 2002  
TO: File  
FROM: Linda Thal  
SUBJECT: Radiochemical Data Review and Validation - SNL  
Site: DSS soil sampling  
ARCOG 605666  
GEL SDG # 66454 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 at concentrations > the associated MDAs.

**Matrix Spike (MS) Analysis**

The MS/MSD analyses met all QC acceptance criteria except as follows:

The MS/MSD was performed on a sample of similar matrix from another SNL SDG. No data will be qualified as a result.

**Laboratory Control Sample (LCS) Analysis**

The LCS analyses met all QC acceptance criteria.

**Replicates**

The replicate analyses met all QC acceptance criteria except as follows:

The replicate analysis was performed on a sample of similar matrix from another SNL SDG. No data will be qualified as a result.

**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**

No field duplicate, field blank or equipment blank was submitted on the ARCOG.

It should be noted that, according to the case narrative, sample 66454-016 did not meet the beta required detection limit. No more volume could be used due to not exceeding the maximum net weight limit. The samples counted for 500 min.

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: 16 @ 1 Matrix: Soils & TB  
 AR/COC #: 605666 Laboratory Sample IDs: 66454-001 HRU-016  
 Laboratory: CFR 66456-001 (TB-VOC)  
 Laboratory Report #: 66454

QC Element	Analysis									Hexavalent Other Chromium
	Organics				Inorganics				RAD	
	S VOC <sub>w</sub>	SVOC	Pesticide/ PCB	HPLC (HE)	ICP/AES	GFAA/ AA	CVAA (Hg)	CN		
1. Holding Times/Preservation	✓	✓	✓	✓	✓	NA	✓	✓	✓	✓
2. Calibrations	J ✓	✓	✓	✓	✓		✓	✓	✓	✓
3. Method Blanks	U, B1 ✓	U, B	✓	✓	J, B3		J, U, B3	✓	✓	✓
4. MS/MSD	✓ P2	✓	✓	✓	✓		✓	✓	✓	✓
5. Laboratory Control Samples	✓	✓	✓	✓	✓		✓	✓	✓	✓
6. Replicates					J		✓	✓	✓	✓
7. Surrogates	✓	✓	J, A1	✓						NA
8. Internal Standards	✓	✓								
9. TCL Compound Identification	✓	✓								
10. ICP Interference Check Sample					✓					
11. ICP Serial Dilution					✓					
12. Carrier/Chemical Tracer Recoveries									NA	
13. Other QC	TB	NA	NA	NA	NA		NA	NA	NA	

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

Check (✓) = Acceptable  
 Shaded Cells = Not Applicable (also "NA")  
 NP = Not Provided

Other: \* 10/11/04 RPO  
25%

Reviewed By: DWal Date: 10.29.02

Volatile Organics (SW 846 Method 8260)

Site/Project: DSS Soil Sampling AR/COC #: 605666 # of Samples: 8 & 1 Matrix: Soil & TB  
 Laboratory: GEL Laboratory Report #: 66454 Laboratory Sample IDs: 66454-001 thru -008 66456-001 (TB)  
 Methods: SW-846 8260 AIR Batch #: 199914<sup>①</sup> (Soils) 199493<sup>②</sup> (TB)

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/R <sup>2</sup>	CCV %	Method Blks	LCS	LCS <sup>1</sup>	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks
						>.05	<20% / 0.99	20%										
1	71-55-6	1,1,1-trichloroethane	✓	0.10		✓	✓	✓	✓	✓	✓	NA				NA	NA	✓
2	79-34-5	1,1,2,2-tetrachloroethane		0.30														
2	79-00-5	1,1,2-trichloroethane		0.10														
1	75-34-3	1,1-dichloroethane		0.10														
1	75-35-4	1,1-dichloroethane		0.20						✓	✓		✓	✓	✓			
1	107-06-2	1,2-dichloroethane		0.10						✓	✓							
1	540-59-0	1,2-dichloroethane (total)		0.01														
1	78-87-5	1,2-dichloropropane	✓	0.01														
1	78-93-3	2-butanone (MEK) (10xblk)	✓	0.01				2 <sup>1</sup>										
1	110-75-8	2-chloroethyl vinyl ether						✓										
2	591-78-6	2-hexanone (MBK)	✓	0.01				2 <sup>2</sup>										
2	108-10-1	4-methyl-2-pentanone (MIBK)		0.10				2 <sup>2</sup>										
1	67-64-1	acetone (10xblk)		0.01	✓	✓	✓	✓										
1	71-43-2	benzene		0.50					✓	✓			✓	✓	✓			
1	75-27-4	bromodichloromethane		0.20									✓	✓	✓			
3	75-25-2	bromoform		0.10	✓	✓	✓	✓										
1	74-83-9	bromomethane		0.10				2 <sup>1</sup>										
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				3 <sup>1</sup>										
1	10061-01-5	cis-1,3-dichloropropene		0.20				✓										
2	124-48-1	dibromochloromethane		0.10	✓	✓	✓	✓										
2	100-41-4	ethylbenzene		0.10														
1	75-09-2	methylene chloride (10xblk)		0.01	✓	✓	✓	✓										
2	100-42-5	styrene		0.30														
2	127-18-4	tetrachloroethane		0.20														
2	108-88-3	toluene (10xblk)		0.40					✓	✓			✓	✓	✓			0.4545 (3)
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														
		CIS-1,2-Dichloroethane																
		TRANS-1,2-Dichloroethane																

Comments: Vinyl Acetate (Soils only)

Notes: Shaded rows are RCRA compounds.

Reviewed By: Dhal

Date: 10-28-02



**Volatile Organics**

Site/Project: \_\_\_\_\_ AR/COC #: 605666 Batch #: \_\_\_\_\_  
 Laboratory: \_\_\_\_\_ Laboratory Report #: \_\_\_\_\_ # of Samples: \_\_\_\_\_ Matrix: \_\_\_\_\_

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

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

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

Comments: *COV soils 8.09 SA 1-7 } VOA 1*  
*20.58 SA 8. } VOA 1*

*NO new data.*

② *TB No replicate All Pa. VOA 9*  
*NO MS/MSO*

① *>20 above*

Semivolatile Organics (SW 846 Method 8270)

Site/Project: DSS Soil Sampling AR/COC #: 605666 Laboratory Sample IDs: 66454-009 thru -016

Laboratory: QEA Laboratory Report #: 66454

Methods: SW-846 8270C

# of Samples: 8 Matrix: Soils Batch #: 199277

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/R <sup>2</sup>	CCV %D	Method Blanks	LCS	LCS D	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks
							>.05	<20% / 0.99	20%										
2	BN	120-82-1	1,2,4-Trichlorobenzene	✓	0.20		✓	✓	✓	✓	✓	NA		✓	✓	✓	NA		
1	BN	95-50-1	1,2-Dichlorobenzene		0.40														
1	BN	541-73-1	1,3-Dichlorobenzene		0.60														
1	BN	106-46-7	1,4-Dichlorobenzene		0.50					✓				✓	✓	✓			
3	A	95-95-4	2,4,5-Trichlorophenol		0.20					✓				✓	✓	✓			
3	A	88-06-2	2,4,6-Trichlorophenol		0.20					✓				62	60	✓			
2	A	120-83-2	2,4-Dichlorophenol		0.20														
2	A	105-67-9	2,4-Dimethylphenol		0.20														
3	A	51-28-5	2,4-dinitrophenol		0.01	✓	✓	✓											
3	BN	121-14-2	2,4-Dinitrotoluene		0.20					✓				✓	✓	✓			
3	BN	606-20-2	2,6-Dinitrotoluene		0.20														
3	BN	91-58-7	2-Chloronaphthalene		0.80														
1	A	95-57-8	2-Chlorophenol		0.80					✓				✓	✓	✓			
2	BN	91-57-6	2-Methylnaphthalene		0.40														
1	A	95-48-7	2-Methylphenol (o-cresol)		0.70					✓				60	56	✓			
3	BN	88-74-4	2-Nitroaniline		0.01														
2	A	88-75-5	2-Nitrophenol		0.10														
5	BN	91-94-1	3,3'-Dichlorobenzidine		0.01														
3	BN	99-09-2	3-Nitroaniline		0.01														
4	A	534-52-1	4,6-Dinitro-2-methylphenol		0.01														
4	BN	101-55-3	4-Bromophenyl-phenylether		0.10														
3	BN	7005-72-3	4-Chlorophenyl-phenylether		0.40														
2	A	59-50-7	4-Chloro-3-methylphenol		0.20					✓				✓	✓	✓			
2	BN	106-47-8	4-Chloroaniline		0.01														
1	A	106-44-5	4-Methylphenol (p-cresol)		0.60														

Comments: m, p - cresol ✓

Notes: ✓ Shaded rows are RCRA compounds.

Reviewed By: 57 54 ✓  
Alhal

Date: 10.28.02

Semivolatile Organics

Site/Project: \_\_\_\_\_ AR/COC #: 605666 Batch #: \_\_\_\_\_  
 Laboratory: \_\_\_\_\_ Laboratory Report #: \_\_\_\_\_ # of Samples: \_\_\_\_\_ Matrix: \_\_\_\_\_

ID	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/R <sup>2</sup>	CCV %D	Method Blanks	LCS	LCSd	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks
							>.05	<20%/0.99	20%										
3	BN	100-01-6	4-Nitroaniline	✓	0.01		✓	✓	+28	✓		NA					NA		
3	A	100-02-7	4-Nitrophenol		0.01				✓		✓			✓	✓	✓			
3	BN	83-32-9	Acenaphthene		0.90						✓			✓	✓	✓			
3	BN	208-96-8	Acenaphthylene		0.90														
4	BN	120-12-7	Anthracene		0.70														
5	BN	56-55-3	Benzo(a)anthracene		0.80														
6	BN	50-32-8	Benzo(a)pyrene		0.70	✓	✓	✓											
6	BN	205-99-2	Benzo(b)fluoranthene		0.70														
6	BN	191-24-2	Benzo(g,h,i)perylene		0.50	✓	✓	✓	+23										
6	BN	207-08-9	Benzo(k)fluoranthene		0.70				✓										
2	BN	111-91-1	bis(2-Chloroethoxy)methane		0.30														
1	BN	111-44-4	bis(2-Chloroethyl)ether		0.70														
1	BN	108-60-1	bis(2-chloroisopropyl)ether		0.01														
5	BN	117-81-7	bis(2-Ethylhexyl)phthalate		0.01	✓	✓	✓		89.03									
5	BN	83-68-7	Butylbenzylphthalate		0.01					✓									
4	BN	86-74-8	Carbazole		0.01														
5	BN	218-01-9	Chrysene		0.70														
6	BN	53-70-3	Dibenz(a,h)anthracene		0.40	✓	✓	✓											
3	BN	132-64-9	Dibenzofuran		0.80														
3	BN	84-66-2	Diethylphthalate		0.01														
9	BN	131-11-3	Dimethylphthalate		0.01														
4	BN	84-74-2	Di-n-butylphthalate		0.01														
6	BN	117-84-0	Di-n-octylphthalate		0.01	✓	✓	✓											
4	BN	206-44-0	Fluoranthene		0.60														
3	BN	86-73-7	Fluorene		0.90														
4	BN	118-74-1	Hexachlorobenzene		0.10						✓			✓	✓	✓			
2	BN	87-68-3	Hexachlorobutadiene		0.01						✓		*	47	42	✓			
3	EN	77-47-4	Hexachlorocyclopentadiene		0.01				-29.9										
1	BN	67-72-1	Hexachloroethane		0.30				✓		✓		*	33	29	✓			

Comments:

Semivolatile Organics

Site/Project: \_\_\_\_\_ AR/COC #: 605666 Batch #: \_\_\_\_\_  
 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	LCS D	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks
							>.05	<20%/0.99	20%										
6	BN	193-39-5	Indeno(1,2,3-cd)pyrene	✓	0.50	✓	✓	✓	✓	✓		NA					NA		
2	BN	78-59-1	Isophorone		0.40														
2	BN	91-20-3	Naphthalene		0.70														
2	BN	98-95-3	Nitrobenzene		0.20					✓		X	HB	HN	✓				
4	BN	86-30-6	N-Nitrosodiphenylamine (1)		0.01														
1	BN	621-64-7	N-Nitroso-di-propylamine	✓	0.50					✓				✓	✓	✓			
4	A	87-86-5	Pentachlorophenol		0.05					✓				✓	✓	✓			
4	BN	85-01-8	Phenanthrene		0.70														
1	A	108-95-2	Phenol		0.80					✓				✓	✓	✓			
5	BN	129-00-0	Pyrene		0.60					✓				✓	✓	✓			
			<i>Diphenylamine</i>																

Surrogate Recovery Outliers

Sample	SMC 1	SMC 2	SMC 3	SMC 4	SMC 5	SMC 6	SMC 7	SMC 8
<i>IN CRITERIA</i>								

Comments: \* < 75% but > lab established % R for LCS. No Q.

- SMC 1: Nitrobenzene-d5 (BN)
- SMC 2: 2-Fluorobiphenyl (BN)
- SMC 3: p-Terphenyl-d14 (BN)
- SMC 4: Phenol-d6 (A)
- SMC 5: 2-Fluorophenol (A)
- SMC 6: 2,4,6-Tribromophenol (A)
- SMC 7: 2-2-Chlorophenol-d4 (A)
- SMC 8: 1,2-Dichlorobenzene-d4 (BN)

Internal Standard Outliers

Sample	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3-area	IS 3-RT	IS 4-area	IS 4-RT	IS 5-area	IS 5-RT	IS 6-area	IS 6-RT
<i>IN CRITERIA</i>												

- 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)

PCBs (SW 846 - Method 8082)

Site/Project: DSS Soil Sampling AR/COC #: 605666 Laboratory Sample IDs: 66454 - 009 thru -016  
 Laboratory: GEL Laboratory Report #: 66454  
 Methods: SW - 846 8082  
 # of Samples: \_\_\_\_\_ Matrix: Soil Batch #: 199<sup>LT</sup>271

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

Sample	SMC % REC	SMC RT	Sample	SMC % REC	SMC RT
66454 - 010	✓ 161%				
DF = SX					

Comments: 66454 - 010 SX  
 due to the presence  
 of over range target  
 analytes  
 No raw data available  
 to ID aroclors!

Confirmation

Sample	CAS #	RPD > 25%	Sample	CAS #	RPD > 25%
66454 - 012	1260	40			
	(1.2 & 1.8)				

① DERRIS J  
 HB  
 SX  
 60

② LT 11 11  
 DERRIS J  
 Report  
 Highest

Reviewed By: Rthal Date: 10.28.02

### High Explosives (SW 846 Method 8330)

Site/Project: DSD Soil Sampling AR/COC #: 605666 Laboratory Sample IDs: 66454-009 thru -016  
 Laboratory: GEL Laboratory Report #: 66454  
 Methods: SW-846 8330  
 # of Samples: 8 Matrix: Soil Batch #: 199935

CAS #	NAME	1 / 1	Intercept	Curve	COV	Method	LCS	LCS D	LCS	MS	MS D	MS	Field.	Equip.	Field
				R <sup>2</sup>	%D	Blanks			RPD			RPD			
				.99	20%	U			20%			20%	RPD	U	U
2691-41-0	HMX	✓	NA	✓	✓	✓	✓	NA		✓	✓	✓	NA		
121-82-4	RDX														
99-35-49	1,3,5-Trinitrobenzene														
99-65-0	1,3-dinitrobenzene														
98-95-3	Nitrobenzene														
479-45-8	Tetryl														
118-96-7	2,4,6-trinitrotoluene														
35572-78-2	2-amino-4,6-dinitrotoluene														
19406-51-0	4-amino-2,6-dinitrotoluene														
121-14-2	2,4-dinitrotoluene														
606-20-2	2,6-dinitrotoluene														
88-72-2	2-nitrotoluene														
99-99-0	4-nitrotoluene														
99-08-1	3-nitrotoluene														
78-11-5	PETN														

Sample	SMC %REC	SMC RT	Sample	SMC %REC	SMC RT
W CAUTENA					

Comments: MS/MSD 66610 SWX SD4

#### Confirmation

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

Solids-to-aqueous conversion:

mg/kg = µg/g; (µg/g) x (sample mass (g) / sample vol. (ml)) x (1000 ml / 1 liter) / Dilution Factor = µg/l

Reviewed By: D. Neal

Date: 10/29/02

### Inorganic Metals

Site/Project: DSS Soil Sampling AR/COC #: 605666 Laboratory Sample IDs: 66454 - 009 thru - 016  
 Laboratory: QEA Laboratory Report #: 66454  
 Methods: SW-846 7471 (Hg) 6010 (ICP-AES)  
 # of Samples: 8 Matrix: Soil Batch #: 199386 (14g) 199346 (Mojave)

CAS # Analyte	QC Element																	
	TAL	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	35% Rep. RPD	ICS AB	Serial Dil- Factor	Field Dep. RPD	Equip. Blanks	Field Blanks
7429-90-5 Al								NO			NA					NA		
7440-39-3 Ba	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓	✓				
7440-41-7 Be																		
7440-43-9 Cd	✓	✓	✓	✓	✓	✓	✓		✓			NA	✓	NA				
7440-70-2 Ca																		
7440-47-3 Cr	✓	✓	✓	✓	✓	✓	✓		✓			68	✓	✓				
7440-48-4 Co																		
7440-50-8 Cu																		
7439-89-6 Fe																		
7439-95-4 Mg																		
7439-96-5 Mn																		
7440-02-0 Ni																		
7440-09-7 K																		
7440-22-4 Ag	✓	✓	✓	✓	* 252	✓	✓		NA			✓	✓	✓				
7440-23-5 Na																		
7440-62-2 V																		
7440-66-6 Zn																		
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	✓		✓			104	✓	✓				
7782-49-2 Se	✓	✓	✓	1.71	3.09	✓	✓		✓			NA	✓	NA				
7440-38-2 As	✓	✓	✓	✓	✓	✓	✓		✓			68	✓	NA	NA	NA		
7440-36-0 Sb															LT			
7440-28-0 Tl																		
7439-97-6 Hg	✓	✓	✓	5.059	0.0722	✓	✓		✓			NA						
Cyanide CN																		

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

Comments: LOC 6020

Hg Dup/MS 66195 SNA 504

① As Cr Pb tail RPD All 75X RL Detect "J" No "U"

② As All SA 750X "J" LT

Ag del further to bring target into linear calibration range of instrument

Reviewed By: d/hal

Date: 10-29-02

\* Ag <sup>10x</sup> 9, 10, 12 <sup>50x</sup> NO } recs.

No end ICS-AR for Ag 9/25

### General Chemistry

Site/Project: DSJ Soil Sampling AR/COC #: 605666 Laboratory Sample IDs: 66454 - 009 thru - 016  
 Laboratory: GFL Laboratory Report #: 66454  
 Methods: SW-846 9012A (TCN) 7196A (Cr<sup>6</sup>)  
 # of Samples: 8 Matrix: Soils Batch #: 199408 (TCN) 200893 (Cr<sup>6</sup>)

CAS #	Analyte	QC Element																		
		T A L	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep- RPD	ICS AB	Serial Dis- tion	Field Dup. RPD	Equip. Blanks	Field Blanks	
	Total Cyanide		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Hexavalent Chromium		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Comments:

Reviewed By: dhua Date: 10.29.02



### Radiochemistry

Site/Project: DJJ Soil Sampling AR/COC #: 605666 Laboratory Sample IDs: 66454 - 009 thru - 016  
 Laboratory: CRZ Laboratory Report #: 66454  
 Methods: LSJ EPA 900.0  
 # of Samples: 8 Matrix: Soils Batch #: 20042

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

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

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

Comments: DUP MS/MSD 66195 SNA SDG.

Reviewed By: D/Whal Date: 10.29.02



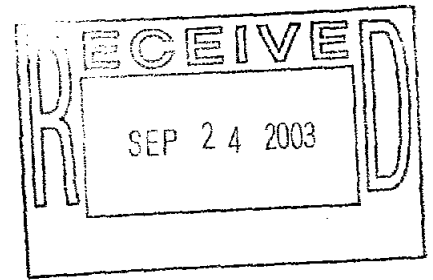


**ANNEX D**  
**DSS Site 1081**  
**Soil-Vapor Monitoring Well 1081-VW-01**  
**Analytical Results and Data Validation Report**



SEVERN  
TRENT

STL



September 19, 2003

STL LOT NUMBER: **E31150164**  
PO/CONTRACT: CF023-03

Pam Puissant  
SANDIA NATIONAL LABORATORIES  
1515 Eubank St. SE  
Mail Stop 1042  
Org 7578 Building T6 Room 8  
Albuquerque, NM 87185-0154

Dear Ms. Puissant,

This report contains the analytical results for the 6 samples received under chain of custody by STL Los Angeles on September 12, 2003. These samples are associated with your DSS SOIL VAPOR WELL SAMPLING project.

STL Los Angeles certifies that the test results provided in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in the case narrative. The case narrative is an integral part of the report. NELAP Certification Number for STL Los Angeles is E87652.

Any matrix related anomaly is footnoted within the report. Historical control limits for the LCS are used to define the estimate of uncertainty for a method. All applicable quality control procedures met method-specified acceptance criteria.

This report shall not be reproduced except in full, without the written approval of the laboratory.

This report contains 000149 pages.

Severn Trent Laboratories, Inc.  
STL Los Angeles • 1721 South Grand Avenue, Santa Ana, CA 92705-4808  
Tel 714 258 8610 Fax 714 258 0921 • [www.stl-inc.com](http://www.stl-inc.com)



If you have any questions, please feel free to call me at (714) 258-8610.

Sincerely,

*Marisol Tabirara*

Marisol Tabirara  
Project Manager

cc: Project File



000002

CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. N/A

SMO Use

AR/COC

606758

Dept. No./Mail Stop: 6132/1089	Date Samples Shipped: 9/10/03	Project/Task No.: 7223.02.02.01	<input type="checkbox"/> Waste Characterization -Send preliminary/copy report to:
Project/Task Manager: Mike Sanders	Carrier/Waybill No. 26418	SMO Authorization: <i>Jeffrey SMO</i>	
Project Name: DSS Soil Vapor Well Sampling	Lab Contact: Mark Loeb(800)333-3305	Contract #: PO 21673	
Record Center Code:	Lab Destination: Severn Trent St.Louis	570 BOTTLE ORDER	
Logbook Ref. No.:	SMO Contact/Phone: Pam Puissant(505)844-3185		
Service Order No. CF023-03	Send Report to SMO: Wendy Palencia(505)844-3132		<input type="checkbox"/> Released by COC No.:
			<input type="checkbox"/> Validation Required

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

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
063065-001	1081-VW-01-5-SV	5		9-9-03/1125	SG	SC	6L	none	G	SA	TO-14 summa#12184	
063066-001	1081-VW-01-20-SV	20		9-9-03/1130	SG	SC	6L	none	G	SA	TO-14 summa#93040	
063067-001	1081-VW-01-70-SV	70		9-9-03/1135	SG	SC	6L	none	G	SA	TO-14 summa#12631	
063068-001	1081-VW-01-100-SV	100		9-9-03/1140	SG	SC	6L	none	G	SA	TO-14 summa#93102	
063069-001	1081-VW-01-150-SV	150		9-9-03/1145	SG	SC	6L	none	G	SA	TO-14 summa#A-174	
063070-001	1081-VW-01-150-DU	150		9-9-03/1150	SG	SC	6L	none	G	DU	TO-14 summa#93124	

RMMA <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Ref. No.	Sample Tracking	SmO Use	Special Instructions/QC Requirements	Abnormal Conditions on Receipt
Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by lab		Date Entered(mm/dd/yy)		EDD <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Turnaround Time <input type="checkbox"/> 7 Day <input checked="" type="checkbox"/> 15 Day <input type="checkbox"/> 30 Day		Entered by:		Level C Package <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Return Samples By:		<input type="checkbox"/> Negotiated TAT <input type="checkbox"/> QC inits.		*Send report to:	

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	J Lee	<i>[Signature]</i>	JDL	Weston Solutions 6134 (505-284-3309)

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 <i>[Signature]</i>	Org. 6133	Date 9/10/03	Time 0805	4. Relinquished by	Org.	Date	Time
1. Received by <i>[Signature]</i>	Org. 6133	Date 9/10/03	Time 0805	4. Received by	Org.	Date	Time
2. Relinquished by <i>[Signature]</i>	Org. 6133	Date 9/10/03	Time 1100	5. Relinquished by	Org.	Date	Time
2. Received by <i>[Signature]</i>	Org. 317L	Date 9-12-03	Time 1430	5. Received by	Org.	Date	Time
3. Relinquished by	Org.	Date	Time	6. Relinquished by	Org.	Date	Time
3. Received by	Org.	Date	Time	6. Received by	Org.	Date	Time

Contract Verification Review (CVR)

Project Leader Collins

Project Name D55-NFA

Case No. 7223\_02.02.01

AR/COC No. 606758

Analytical Lab GEL

SD6 No. E3I150164

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 a) Laboratory control samples accuracy reported and met for all samples	X		
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	N/A		
c) Matrix spike recovery data reported and met	N/A		
3.4 Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	N/A		
b) Matrix spike duplicate RPD data reported and met for all organic samples	N/A		
3.5 Blank data a) Method or reagent blank data reported and met for all samples	X		
b) Sampling blank (e.g., field, trip, and equipment) data reported and met	N/A		
3.6 Contractual qualifiers provided: "J"- estimated quantity; "B"-analyte found in method blank above the MDL for organic or above the PQL for inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"-analysis done beyond the holding time	X		
3.7 Narrative addresses planchet flaming for gross alpha/beta	N/A		
3.8 Narrative included, correct, and complete	X		
3.9 Second column confirmation data provided for methods 8330 (high explosives) and 8082 (pesticides/PCBs)	N/A		



## Contract Verification Review (Continued)

## 4.0 Calibration and Validation Documentation

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

Contract Verification Review (Concluded)

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions

Were deficiencies unresolved? Yes  No

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

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

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

### CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. *N/A*

SMO Use

AR/COC

606758

Dept. No./Mail Stop: 6132/1089	Date Samples Shipped: <i>9/10/03</i>	Project/Task No.: 7223.02.02.01
Project/Task Manager: Mike Sanders	Carrier/Waybill No.: <i>26418</i>	SMO Authorization: <i>Opdy SMO</i>
Project Name: DSS Soil Vapor Well Sampling	Lab Contact: Mark Loeb(800)333-3305	Contract #: <i>PO 21673</i>
Record Center Code: _____	Lab Destination: Severn Trent St.Louis	<i>500 BOTTLE ORDER</i>
Logbook Ref. No.: _____	SMO Contact/Phone: Pam Puissant(505)844-3185	
Service Order No. CF023-03	Send Report to SMO: Wendy Palencia(505)844-3132	

<input type="checkbox"/> Waste Characterization -Send preliminary/copy report to:
<input type="checkbox"/> Released by COC No.: _____
<input type="checkbox"/> Validation Required
Bill To: Sandia National Labs (Accounts Payable) P.O. Box 5800 MS 0154 Albuquerque, NM 87185-0154

Location		Reference LOV(available at SMO)										
Tech Area 3		Room										
Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container		Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
063065-001	1081-VW-01-5-SV	5		9-9-03/1125	SG	SC	6L	none	G	SA	TO-14 summa#12184	
063066-001	1081-VW-01-20-SV	20		9-9-03/1130	SG	SC	6L	none	G	SA	TO-14 summa#93040	
063067-001	1081-VW-01-70-SV	70		9-9-03/1135	SG	SC	6L	none	G	SA	TO-14 summa#12631	
063068-001	1081-VW-01-100-SV	100		9-9-03/1140	SG	SC	6L	none	G	SA	TO-14 summa#93102	
063069-001	1081-VW-01-150-SV	150		9-9-03/1145	SG	SC	6L	none	G	SA	TO-14 summa#A-174	
063070-001	1081-VW-01-150-DU	150		9-9-03/1150	SG	SC	6L	none	G	DU	TO-14 summa#93124	

<b>RMMA</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by lab Turnaround Time <input type="checkbox"/> 7 Day <input checked="" type="checkbox"/> 15 Day <input type="checkbox"/> 30 Day Return Samples By: _____	<b>Sample Tracking</b> Date Entered(mm/dd/yy) <i>09/11/03</i> Entered by: <i>JAC</i>	<b>Special Instructions/QC Requirements</b> 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 Mall stop 1089 505-284-2478 Tim Jackson Mall stop 1087 505-284-2547 *Please list as separate report.	Abnormal Conditions on Receipt     <b>Lab Use</b>
Ref. No. _____ Negotiated TAT <input type="checkbox"/> QG Inits. <i>RK</i>	SMO Use Company/Organization/Phone/Cellular Weston Solutions 6134 (505-284-3309)		

1. Relinquished by <i>[Signature]</i> Org. <i>6133</i> Date <i>9/10/03</i> Time <i>0805</i>	4. Relinquished by _____ Org. _____ Date _____ Time _____
1. Received by <i>[Signature]</i> Org. <i>6133</i> Date <i>9/10/03</i> Time <i>0805</i>	4. Received by _____ Org. _____ Date _____ Time _____
2. Relinquished by <i>[Signature]</i> Org. <i>6133</i> Date <i>9/10/03</i> Time <i>1100</i>	5. Relinquished by _____ Org. _____ Date _____ Time _____
2. Received by _____ Org. _____ Date _____ Time _____	5. Received by _____ Org. _____ Date _____ Time _____
3. Relinquished by _____ Org. _____ Date _____ Time _____	6. Relinquished by _____ Org. _____ Date _____ Time _____
3. Received by _____ Org. _____ Date _____ Time _____	6. Received by _____ Org. _____ Date _____ Time _____

DSS Vapor Wells SUMMA CANNISTER LOG

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

SERIAL	DATE RCVD	DATE TESTED	VAC (inHg) FOR INITIAL VAC @ 5400	DATE USED	VAC AFTER SAMPLING (inHg @ 5400)	DATE RET TO SMO (AFTER SAMPLING)
--------	-----------	-------------	--------------------------------------	-----------	-------------------------------------	-------------------------------------

93408	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	↑		↑
91188	↑	↑	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>18260</del>	↑	↑		↑		↑
12620	↑	↑	24	↑		↑
* 9339B	↑	↑	18	↑		↑

# EXECUTIVE SUMMARY - Detection Highlights

E3I150164

<u>PARAMETER</u>	<u>RESULT</u>	<u>REPORTING LIMIT</u>	<u>UNITS</u>	<u>ANALYTICAL METHOD</u>
063065-001/1081-VW-01-5-SV 09/09/03 11:25 001				
Dichlorodifluoromethane	0.50 J	2.0	ppb (v/v)	EPA-21 TO-14A
Chloromethane	1.4 J	4.0	ppb (v/v)	EPA-21 TO-14A
Chloroethane	2.0 J	4.0	ppb (v/v)	EPA-21 TO-14A
Carbon disulfide	7.3 J	10	ppb (v/v)	EPA-21 TO-14A
Acetone	8.5 J	10	ppb (v/v)	EPA-21 TO-14A
Benzene	1.3 J	2.0	ppb (v/v)	EPA-21 TO-14A
Toluene	2.4	2.0	ppb (v/v)	EPA-21 TO-14A
063066-001/1081-VW-01-20-SV 09/09/03 11:30 002				
Dichlorodifluoromethane	0.51 J	2.0	ppb (v/v)	EPA-21 TO-14A
Toluene	0.89 J	2.0	ppb (v/v)	EPA-21 TO-14A
063067-001/1081-VW-01-70-SV 09/09/03 11:35 003				
Dichlorodifluoromethane	0.55 J	2.0	ppb (v/v)	EPA-21 TO-14A
Benzene	3.9	2.0	ppb (v/v)	EPA-21 TO-14A
Toluene	13	2.0	ppb (v/v)	EPA-21 TO-14A
Tetrachloroethene	0.78 J	2.0	ppb (v/v)	EPA-21 TO-14A
063068-001/1081-VW-01-100-SV 09/09/03 11:40 004				
Dichlorodifluoromethane	0.59 J	2.0	ppb (v/v)	EPA-21 TO-14A
Toluene	3.3	2.0	ppb (v/v)	EPA-21 TO-14A
Tetrachloroethene	0.89 J	2.0	ppb (v/v)	EPA-21 TO-14A
063069-001/1081-VW-01-150-SV 09/09/03 11:45 005				
Dichlorodifluoromethane	0.55 J	2.0	ppb (v/v)	EPA-21 TO-14A
Trichloroethene	1.1 J	2.0	ppb (v/v)	EPA-21 TO-14A
Toluene	3.1	2.0	ppb (v/v)	EPA-21 TO-14A
Tetrachloroethene	1.0 J	2.0	ppb (v/v)	EPA-21 TO-14A
063070-001/1081-VW-01-150-DU 09/09/03 11:50 006				
Dichlorodifluoromethane	0.60 J	2.0	ppb (v/v)	EPA-21 TO-14A
Trichloroethene	0.54 J	2.0	ppb (v/v)	EPA-21 TO-14A
Toluene	3.6	2.0	ppb (v/v)	EPA-21 TO-14A
Tetrachloroethene	1.2 J	2.0	ppb (v/v)	EPA-21 TO-14A
m-Xylene & p-Xylene	1.5 J	2.0	ppb (v/v)	EPA-21 TO-14A
o-Xylene	0.66 J	2.0	ppb (v/v)	EPA-21 TO-14A

# ANALYTICAL METHODS SUMMARY

E3I150164

<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

E3I150164

<u>WO #</u>	<u>SAMPLE#</u>	<u>CLIENT SAMPLE ID</u>	<u>SAMPLED DATE</u>	<u>SAMP TIME</u>
FOC4T	001	063065-001/1081-VW-01-5-SV	09/09/03	11:25
FOC4W	002	063066-001/1081-VW-01-20-SV	09/09/03	11:30
FOC4X	003	063067-001/1081-VW-01-70-SV	09/09/03	11:35
FOC40	004	063068-001/1081-VW-01-100-SV	09/09/03	11:40
FOC41	005	063069-001/1081-VW-01-150-SV	09/09/03	11:45
FOC42	006	063070-001/1081-VW-01-150-DU	09/09/03	11:50

## 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: 063065-001/1081-VW-01-5-SV

## GC/MS Volatiles

Lot-Sample #....: E31150164-001      Work Order #....: FOC4T1AC      Matrix.....: AIR  
Date Sampled....: 09/09/03      Date Received...: 09/12/03  
Prep Date.....: 09/15/03      Analysis Date...: 09/15/03  
Prep Batch #....: 3261409      Analysis Time...: 18:31  
Dilution Factor: 1  
Analyst ID.....: 117751      Instrument ID...: MSA  
Method.....: EPA-21 TO-14A

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Dichlorodifluoromethane	0.50 J	2.0	ppb (v/v)	0.50
Chloromethane	1.4 J	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	2.0 J	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	7.3 J	10	ppb (v/v)	2.0
1,1,2-Trichloro- 1,2,2-trifluoroethane	ND	2.0	ppb (v/v)	0.50
Acetone	8.5 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	1.3 J	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	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

(Continued on next page)



## SANDIA NATIONAL LABORATORIES

Client Sample ID: 063065-001/1081-VW-01-5-SV

## GC/MS Volatiles

Lot-Sample #...: E3I150164-001 Work Order #...: FOC4T1AC 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: 063066-001/1081-VW-01-20-SV

## GC/MS Volatiles

Lot-Sample #...: E3I150164-002    Work Order #...: F0C4W1AC    Matrix.....: AIR  
 Date Sampled...: 09/09/03    Date Received...: 09/12/03  
 Prep Date.....: 09/15/03    Analysis Date...: 09/15/03  
 Prep Batch #...: 3261409    Analysis Time...: 19:17  
 Dilution Factor: 1  
 Analyst ID.....: 117751    Instrument ID...: MSA  
 Method.....: EPA-21 TO-14A

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Dichlorodifluoromethane	0.51 J	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	0.89 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: 063066-001/1081-VW-01-20-SV

GC/MS Volatiles

Lot-Sample #...: E3I150164-002 Work Order #...: F0C4W1AC 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: 063067-001/1081-VW-01-70-SV

GC/MS Volatiles

Lot-Sample #....: E3I150164-003    Work Order #....: F0C4X1AC    Matrix.....: AIR  
 Date Sampled....: 09/09/03    Date Received...: 09/12/03  
 Prep Date.....: 09/15/03    Analysis Date...: 09/15/03  
 Prep Batch #....: 3261409    Analysis Time...: 19:53  
 Dilution Factor: 1  
 Analyst ID.....: 117751    Instrument ID...: MSA  
 Method.....: EPA-21 TO-14A

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Dichlorodifluoromethane	0.55 J	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
<b>Benzene</b>	<b>3.9</b>	<b>2.0</b>	<b>ppb (v/v)</b>	<b>0.80</b>
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
<b>Toluene</b>	<b>13</b>	<b>2.0</b>	<b>ppb (v/v)</b>	<b>0.50</b>
trans-1,3-Dichloropropene	ND	2.0	ppb (v/v)	0.80
1,1,2-Trichloroethane	ND	2.0	ppb (v/v)	0.60
<b>Tetrachloroethene</b>	<b>0.78 J</b>	<b>2.0</b>	<b>ppb (v/v)</b>	<b>0.60</b>
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: 063067-001/1081-VW-01-70-SV

## GC/MS Volatiles

Lot-Sample #....: E3I150164-003 Work Order #....: F0C4X1AC 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: 063068-001/1081-VW-01-100-SV

GC/MS Volatiles

Lot-Sample #....: E3I150164-004    Work Order #....: F0C401AC    Matrix.....: AIR  
 Date Sampled....: 09/09/03    Date Received...: 09/12/03  
 Prep Date.....: 09/15/03    Analysis Date...: 09/15/03  
 Prep Batch #....: 3261409    Analysis Time...: 20:38  
 Dilution Factor: 1  
 Analyst ID.....: 117751    Instrument ID...: MSA  
 Method.....: EPA-21 TO-14A

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Dichlorodifluoromethane	0.59 J	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	3.3	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	0.89 J	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: 063068-001/1081-VW-01-100-SV

GC/MS Volatiles

Lot-Sample #...: E3I150164-004 Work Order #...: F0C401AC 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) :

1 Estimated result. Result is less than RL.

SANDIA NATIONAL LABORATORIES

Client Sample ID: 063069-001/1081-VW-01-150-SV

GC/MS Volatiles

Lot-Sample #...: E3I150164-005    Work Order #...: F0C411AC    Matrix.....: AIR  
 Date Sampled...: 09/09/03    Date Received...: 09/12/03  
 Prep Date.....: 09/15/03    Analysis Date...: 09/15/03  
 Prep Batch #...: 3261409    Analysis Time...: 21:18  
 Dilution Factor: 1  
 Analyst ID.....: 117751    Instrument ID...: MSA  
 Method.....: EPA-21 TO-14A

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Dichlorodifluoromethane	0.55 J	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	1.1 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	3.1	2.0	ppb (v/v)	0.50
trans-1,3-Dichloropropene	ND	2.0	ppb (v/v)	0.80
1,1,2-Trichloroethane	ND	2.0	ppb (v/v)	0.60
Tetrachloroethene	1.0 J	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: 063069-001/1081-VW-01-150-SV

GC/MS Volatiles

Lot-Sample #...: E3I150164-005 Work Order #...: F0C411AC Matrix.....: AIR

<u>PARAMETER</u>	<u>RESULT</u>	<u>REPORTING LIMIT</u>	<u>UNITS</u>	<u>MDL</u>
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: 063070-001/1081-VW-01-150-DU

GC/MS Volatiles

Lot-Sample #....: E3I150164-006    Work Order #....: FOC421AC    Matrix.....: AIR  
 Date Sampled....: 09/09/03    Date Received...: 09/12/03  
 Prep Date.....: 09/15/03    Analysis Date...: 09/15/03  
 Prep Batch #....: 3261409    Analysis Time...: 22:02  
 Dilution Factor: 1  
 Analyst ID.....: 117751    Instrument ID...: MSA  
 Method.....: EPA-21 TO-14A

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Dichlorodifluoromethane	0.60 J	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	0.54 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	3.6	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	1.2 J	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: 063070-001/1081-VW-01-150-DU

GC/MS Volatiles

Lot-Sample #...: E3I150164-006 Work Order #...: F0C421AC 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	1.5 J	2.0	ppb (v/v)	1.0
o-Xylene	0.66 J	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;**
- **1081-VW-01 Extended Raw Data,**

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







# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. <u>N/A</u>	SMO Use	AR/COC	<b>606758</b>
Dept. No./Mail Stop: 6132/1089	Date Samples Shipped: <u>9/10/03</u>	Project/Task No.: 7223.02.02.01	<input type="checkbox"/> Waste Characterization -Send preliminary/copy report to:
Project/Task Manager: Mike Sanders	Carrier/Waybill No.: <u>26418</u>	SMO Authorization: <u>OK by SMO</u>	
Project Name: DSS Soil Vapor Well Sampling	Lab Contact: Mark Loeb(800)333-3305	Contract #: <u>PO 21673</u>	<input type="checkbox"/> Released by COC No.: _____ <input type="checkbox"/> Validation Required
Record Center Code:	Lab Destination: <u>Sewer Trent St.Louis</u>	<u>SOB BOTTLE ORDER</u>	
Logbook Ref. No.:	SMO Contact/Phone: Pam Puissant(505)844-3185		
Service Order No. CF023-03	Send Report to SMO: Wendy Palencia(505)844-3132		

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

Location		Reference LOV (available at SMO)										
Tech Area 3												
Building Room												
Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time (hr) Collected	Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
063065-001	1081-VW-01-5-SV	5		9-9-03/1125	SG	SC	6L	none	G	SA	TO-14 summa#12184	
063066-001	1081-VW-01-20-SV	20		9-9-03/1130	SG	SC	6L	none	G	SA	TO-14 summa#93040	
063067-001	1081-VW-01-70-SV	70		9-9-03/1135	SG	SC	6L	none	G	SA	TO-14 summa#12631	
063068-001	1081-VW-01-100-SV	100		9-9-03/1140	SG	SC	6L	none	G	SA	TO-14 summa#93102	
063069-001	1081-VW-01-150-SV	150		9-9-03/1145	SG	SC	6L	none	G	SA	TO-14 summa#A-174	
063070-001	1081-VW-01-150-DU	150		9-9-03/1150	SG	SC	6L	none	G	DU	TO-14 summa#93124	

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

1. Relinquished by <u>[Signature]</u> Org. <u>6137</u> Date <u>9/10/03</u> Time <u>0805</u>	4. Relinquished by	Org.	Date	Time
1. Received by <u>[Signature]</u> Org. <u>6133</u> Date <u>9/10/03</u> Time <u>0805</u>	4. Received by	Org.	Date	Time
2. Relinquished by <u>[Signature]</u> Org. <u>6133</u> Date <u>9/10/03</u> Time <u>1100</u>	5. Relinquished by	Org.	Date	Time
2. Received by	5. Received by	Org.	Date	Time
3. Relinquished by	6. Relinquished by	Org.	Date	Time
3. Received by	6. Received by	Org.	Date	Time

Contract Verification Review (CVR)

Project Leader Collins

Project Name DSS-NFA

Case No. 7223\_02.02.01

AR/COC No. 606758

Analytical Lab GEL

SDG No. E3I150164

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 a) Laboratory control samples accuracy reported and met for all samples	X		
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	N/A		
c) Matrix spike recovery data reported and met	N/A		
3.4 Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	N/A		
b) Matrix spike duplicate RPD data reported and met for all organic samples	N/A		
3.5 Blank data a) Method or reagent blank data reported and met for all samples	X		
b) Sampling blank (e.g., field, trip, and equipment) data reported and met	N/A		
3.6 Contractual qualifiers provided: "J"- estimated quantity; "B"-analyte found in method blank above the MDL for organic or above the PQL for inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"-analysis done beyond the holding time	X		
3.7 Narrative addresses planchet flaming for gross alpha/beta	N/A		
3.8 Narrative included, correct, and complete	X		
3.9 Second column confirmation data provided for methods 8330 (high explosives) and 8082 (pesticides/PCBs)	N/A		



## Contract Verification Review (Continued)

## 4.0 Calibration and Validation Documentation

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

Contract Verification Review (Concluded)

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions

Were deficiencies unresolved? Yes

No

Based on the review, this data package is complete.

Yes

No

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

Reviewed by: Wen

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

### Sample Findings Summary

Site: DSS-NFA

AR/COC: 606758

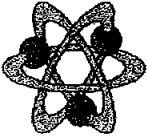
Data Type: Organic

	74-87-3 (chloromethane)												
083065-001 / 1081-VW-01-5-SV	J												

Validated By: *Kevin A Lambert*

Date: 09/28/03

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 26, 2003  
TO: File  
FROM: Kevin Lambert  
SUBJECT: Organic Data Review and Validation – SNL  
DSS-NFA, AR/COC No. 606758, SDG No. E3I150164 (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. Problems were identified with the data package that result in the qualification of data.

1. **TO-14A:** The calibration RF for chloromethane (0.089) was < the specified minimum RF (0.10). Sample results for E3I150164-001 was detect and will be qualified "J." All other associated sample results were non-detect (ND) and as a result based on professional judgment no data will be qualified.

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 noted above in the summary section and as follows.

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.

**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**

A field duplicate pair was submitted on the ARCO. There are no "required" review criteria for field duplicate analyses comparability. No equipment blank (EB) or trip blank (TB) was submitted on the ARCO.

No other specific issues were identified which affect data quality.

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

ARCOG	LAB	LAB ID	PRELIM DATE	FINAL DATE	EDD			
					EDD	ON Q	Cust CD	RC CD
606758	STCA	E31150164		9/24/2003	X	X		

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

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

**Data Validation Summary**

*Soil Gas (Air)*

Site/Project: DSS-NFA Project/Task #: 7223.02.02.01 # of Samples: 6 Matrix: 7223.02.02.01 KAL  
 AR/COC #: 606758 Laboratory Sample IDs: E3I150164-001 to -006  
 Laboratory: STCA  
 SDG #: E3I150164

QC Element	Analysis								
	Organics				Inorganics				RAD
<i>TO 14A</i>	VOC	SVOC	Pesticide/ PCB	HPLC (HE)	ICP/AES	GFAA/ AA	CVAA (Hg)	CN	
1. Holding Times/Preservation	✓								
2. Calibrations	J								
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  
 U = Not Detected  
 UJ = Not Detected, Estimated  
 R = Unrecoverable

Check (✓) = Acceptable  
 Shaded Cells = Not Applicable (also "NA")  
 NP = Not Provided  
 Other: \_\_\_\_\_

Reviewed By: Kevin A Lambert Date: 9-2-03

Volatile Organics (TO-14)

Site/Project: DSS-NFA AR/COC #: 606758  
 Laboratory: STCA Laboratory Report #: E3I150164  
 Methods: EPA 21 (TO-14A)

# of Samples: 6 Matrix: Air  
 Laboratory Sample IDs: E3I150164-001 to -006  
 Batch #: 3261409

IS	CAS #	Name	TC	Min. RF	Intercept	Calib. RF	Calib. RSD/R <sup>2</sup>	CCV %	Method Bks	LCS	LCSO	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks
						>.05	<20%/0.99	20%										
1	74-87-3	Chloromethane	✓	0.10	NA	0.089	✓	✓	✓									
1	74-83-9	Bromomethane	✓	0.10		✓	✓											
1	75-01-3	Vinyl chloride	✓	0.10		✓	✓											
1	75-00-3	Chloroethane	✓	0.01		✓	✓											
1	75-09-2	methylene chloride (10xblk)	✓	0.01		✓	✓		✓	✓	✓							
1	67-64-1	acetone (10xblk)	✓	0.01		✓	✓											
1	75-35-3	1,1-dichloroethane	✓	0.20		✓	✓		✓	✓	✓							
1	75-34-3	1,1-dichloroethane	✓	0.10		✓	✓											
1	67-66-3	Chloroform	✓	0.20		✓	✓											
1	107-06-2	1,2-dichloroethane	✓	0.10		✓	✓											
1	78-93-3	2-butanone (10xblk)	✓	0.01		✓	✓											
2	71-53-6	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	79-01-9	Trichloroethene	✓	0.30		✓	✓		✓	✓	✓							
2	79-00-5	1,1,2-trichloroethane	✓	0.10		✓	✓											
2	71-43-2	Benzene	✓	0.30		✓	✓											
2	10061-02-6	trans-1,3-dichloropropene	✓	0.10		✓	✓											
3	108-10-1	4-methyl-2-pentanone	✓	0.10		✓	✓											
3	127-18-2	Tetrachloroethane	✓	0.20		✓	✓											
3	79-34-5	1,1,2,2-tetrachloroethane	✓	0.30		✓	✓		✓	✓	✓							
3	108-88-3	toluene (10xblk)	✓	0.40		✓	✓		✓	✓	✓							
3	102-90-7	Chlorobenzene	✓	0.50		✓	✓											
3	100-41-4	Ethylbenzene	✓	0.10		✓	✓											
3	100-42-5	Styrene	✓	0.30		✓	✓											
	107-05-01	Vinyl chloride																
	100-44-7	Benzyl chloride	✓			✓	29											
	106-93-4	1,2-dibromoethane	✓			✓	✓											
	95-50-1	1,2-dichlorobenzene	✓			✓	✓											
	541-73-1	1,3-dichlorobenzene	✓			✓	✓											
	106-46-7	1,4-dichlorobenzene	✓			✓	✓											
	75-71-8	dichloro difluoromethane	✓		✓	✓	✓	✓	✓									

Comments: NA-Not Applicable

Notes: Shaded rows are RCRA compounds.

① Calib. RF < min RF for chloromethane, Sample E3I150164-001 was defect and will be qualified. All other sample results were ND and will NOT be qualified.

Reviewed By: Kevin A Lambert Date: 9-26-03



Volatile Organics (TO-14)

Site/Project: \_\_\_\_\_ AR/COC #: 606758

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

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

Laboratory Sample IDs: \_\_\_\_\_

Methods: \_\_\_\_\_

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

IS	CAS #	Name	T C L	Min RF	Intercept	Calib RF	Calib. RSD/ R <sup>2</sup>	CCV %D	Method Blks	LCS	LCS D	LCS RPD	MS	MS D	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks
						>.05	<20% / 0.99	20%										
76-14-2	1,2-dichloro-1,1,2,2-tetrafluoroethane	✓		NA	✓	✓	✓	✓										
156-59-2	cis-1,2-dichloroethene	✓			✓	✓												
156-60-3	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	✓			✓	✓												
591-78-6	2-hexanone	✓			✓	✓												
124-48-1	dibromochloromethane	✓			✓	✓												
75-25-2	bromoform	✓			✓	25												
64-17-5	ethanol																	
67-56-1	methanol																	
80-62-6	methyl methacrylate																	
141-78-6	ethyl acetate																	
107-02-8	acrolein																	
75-05-8	acetonitrile																	
67-63-0	isopropanol																	
107-13-1	acrylonitrile																	
123-91-1	1,4-dioxane																	

N/A

RSD KAE

Com: (2)  $CCV\%D > 20$  but  $< 40$  for benzyl chloride & bromoform, sample results are ND, no data will be qualified

Notes: Shaded rows are RCRA compounds.

**Volatile Organics (TO-14)**

Site/Project: \_\_\_\_\_ AR/COC #: 606758 Batch #: \_\_\_\_\_  
 Laboratory: \_\_\_\_\_ Laboratory Report #: \_\_\_\_\_ # of Samples: \_\_\_\_\_ Matrix: \_\_\_\_\_

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

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

*MET  
Criteria*

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

**Comments:**





**ANNEX E**  
**DSS Site 1081**  
**Risk Assessment**



## TABLE OF CONTENTS

I.	Site Description and History .....	E-1
II.	Data Quality Objectives .....	E-2
III.	Determination of Nature, Rate, and Extent of Contamination .....	E-5
	III.1 Introduction .....	E-5
	III.2 Nature of Contamination .....	E-5
	III.3 Rate of Contaminant Migration .....	E-5
	III.4 Extent of Contamination .....	E-6
IV.	Comparison of COCs to Background Levels .....	E-6
V.	Fate and Transport .....	E-10
VI.	Human Health Risk Assessment .....	E-11
	VI.1 Introduction .....	E-11
	VI.2 Step 1. Site Data .....	E-11
	VI.3 Step 2. Pathway Identification .....	E-12
	VI.4 Step 3. Background Screening Procedure .....	E-12
	VI.4.1 Methodology .....	E-12
	VI.4.2 Results .....	E-15
	VI.5 Step 4. Identification of Toxicological Parameters .....	E-15
	VI.6 Step 5. Exposure Assessment and Risk Characterization .....	E-17
	VI.6.1 Exposure Assessment .....	E-17
	VI.6.2 Risk Characterization .....	E-18
	VI.7 Step 6. Comparison of Risk Values to Numerical Guidelines .....	E-20
	VI.8 Step 7. Uncertainty Discussion .....	E-20
	VI.9 Summary .....	E-22
VII.	Ecological Risk Assessment .....	E-23
	VII.1 Introduction .....	E-23
	VII.2 Scoping Assessment .....	E-23
	VII.2.1 Data Assessment .....	E-24
	VII.2.2 Bioaccumulation .....	E-24
	VII.2.3 Fate and Transport Potential .....	E-24
	VII.2.4 Scoping Risk-Management Decision .....	E-24
VIII.	References .....	E-24
	Appendix 1 .....	E-29

**This page intentionally left blank.**

## LIST OF TABLES

Table		Page
1	Summary of Sampling Performed to Meet DQOs .....	E-2
2	Number of Confirmatory Soil and QA/QC Samples Collected from DSS Site 1081 .....	E-3
3	Summary of Data Quality Requirements for DSS Site 1081 .....	E-4
4	Nonradiological COCs for Human Health Risk Assessment at DSS Site 1081 with Comparison to the Associated SNL/NM Background Screening Value, BCF, and Log $K_{ow}$ .....	E-7
5	Radiological COCs for Human Health Risk Assessment at DSS Site 1081 with Comparison to the Associated SNL/NM Background Screening Value and BCF .....	E-9
6	Summary of Fate and Transport at DSS Site 1081 .....	E-11
7	Toxicological Parameter Values for DSS Site 1081 Nonradiological COCs ...	E-16
8	Radiological Toxicological Parameter Values for DSS Site 1081 COCs Obtained from RESRAD Risk Coefficients.....	E-17
9	Risk Assessment Values for DSS Site 1081 Nonradiological COCs .....	E-19
10	Risk Assessment Values for DSS Site 1081 Nonradiological Background Constituents.....	E-19
11	Summation of Incremental Nonradiological and Radiological Risks from DSS Site 1081, Building 6650 Septic System Carcinogens .....	E-23

## LIST OF FIGURES

Figure		Page
1	Conceptual Site Model Flow Diagram for DSS Site 1081, Building 6650 Septic System.....	E-13

**This page intentionally left blank.**



**DSS SITE 1081: RISK ASSESSMENT REPORT****I. Site Description and History**

Drain and Septic Systems (DSS) Site 1081, the Building 6650 Septic System at Sandia National Laboratories/New Mexico (SNL/NM), is located in Technical Area-III on federally owned land controlled by Kirtland Air Force Base (KAFB) and permitted to the U.S. Department of Energy (DOE). The abandoned system consisted of a two individual septic systems. Each system consisted of a septic tank connected to two seepage pits. Building 6650 was constructed in 1967 (SNL/NM March 2003), and it is assumed that the original (southern) system was also constructed at that time. Based upon construction details in engineering drawings (SNL/NM August 1980), it is assumed that the original system was augmented or replaced by the second (northern) system. By 1991, the septic system discharges were routed to the City of Albuquerque sanitary sewer system (Jones June 1991). The old septic system lines were disconnected and capped, and the systems were abandoned in place concurrent with this change (Romero September 2003).

Environmental concern about DSS Site 1081 is based upon the potential for the release of constituents of concern (COCs) in effluent discharged to the environment via the septic systems 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 lies south of the site and terminates in the playa just west of KAFB. No springs or perennial surface-water bodies are located within 2 miles of the site. Average annual rainfall in the SNL/NM and KAFB area, as measured at Albuquerque International Sunport, is 8.1 inches (NOAA 1990). Surface-water runoff in the vicinity of the site is minor because the surface is flat or slopes slightly to the west. Infiltration of precipitation is almost nonexistent as virtually all of the moisture subsequently undergoes evapotranspiration. The estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL/NM March 1996). Most of the area immediately surrounding DSS Site 1081 is unpaved with some native vegetation, and no storm sewers are used to direct surface water away from the site.

DSS Site 1081 lies at an average elevation of approximately 5,400 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 480 feet below ground surface (bgs). Groundwater flow is thought to be to the west in this area (SNL/NM March 2002). The nearest groundwater monitoring well is MWL-BW1 located approximately 2,000 feet northwest of the site. The nearest production wells are northwest and northeast of the site and include KAFB-4 and KAFB-11, which are approximately 3.6 and 4.0 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 1081 was effluent discharged to the environment from the seepage pits at this site.

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

DSS Site 1081 Sampling Areas	Potential COC Source	Number of Sampling Locations	Sample Density (samples/acre)	Sampling Location Rationale
Soil beneath the septic system seepage pits	Effluent discharged to the environment from the seepage pits	4	NA	Evaluate potential COC releases to the environment from effluent discharged from the seepage pits

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 3- or 4-foot-long sampling intervals at four borehole locations at DSS Site 1081. Seepage pit sampling intervals started at 10 and 15 feet bgs in SP1, 12 and 17 feet bgs in SP2, 17 and 24 feet bgs in SP3, and 20 and 25 feet bgs in SP4. The soil samples were collected in accordance with the procedures described in the SAP (SNL/NM October 1999) and FIP (SNL/NM November 2001). Table 2 summarizes the types of confirmatory and QA/QC samples collected at the site and the laboratories that performed the analyses.

**Table 2**  
**Number of Confirmatory Soil and QA/QC Samples Collected from DSS Site 1081**

Sample Type	VOCs	SVOCs	PCBs	HE	RCRA Metals	Hexavalent Chromium	Cyanide	Gamma Spectroscopy Radionuclides	Gross Alpha/Beta
Confirmatory	8	8	8	8	8	8	8	8	8
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	9	8	8	8	8	8	8	8	8
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.

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

**Table 3**  
**Summary of Data Quality Requirements for DSS Site 1081**

Analytical Method <sup>a</sup>	Data Quality Level	GEL	RPSD
VOCs EPA Method 8260	Defensible	8	None
SVOCs EPA Method 8270	Defensible	8	None
PCBs EPA Method 8082	Defensible	8	None
HE Compounds EPA Method 8330	Defensible	8	None
RCRA Metals EPA Method 6000/7000	Defensible	8	None
Hexavalent Chromium EPA Method 7196A	Defensible	8	None
Total Cyanide EPA Method 9012A	Defensible	8	None
Gamma Spectroscopy Radionuclides EPA Method 901.1	Defensible	None	8
Gross Alpha/Beta Activity EPA Method 900.0	Defensible	8	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 1081 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 1081 is based upon an initial conceptual model validated with confirmatory sampling at the site. The initial conceptual model was developed from archival site research, site inspections, soil sampling, and passive 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 1081, 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 1081 were evaluated using laboratory analyses of the soil samples. The analytical requirements included analyses for VOCs, SVOCs, PCBs, HE compounds, RCRA metals, hexavalent chromium, cyanide, radionuclides by gamma spectroscopy, and gross alpha/beta activity. The analytes and methods listed in Tables 2 and 3 are appropriate to characterize the COCs and potential degradation products at DSS Site 1081.

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

The septic systems at DSS Site 1081 were deactivated in 1991 when Building 6650 was connected to an extension of the City of Albuquerque sanitary sewer system. The migration rate of COCs that may have been introduced into the subsurface via the septic systems at this site was therefore dependent upon the volume of aqueous effluent discharged to the environment from this system when it was operational. Any migration of COCs from this site after use of the septic systems was discontinued has been predominantly dependent upon precipitation. However, it is highly unlikely that sufficient precipitation has fallen on the site to reach the depth at which COCs may have been discharged to the subsurface from this

system. Analytical data generated from the soil sampling conducted at the site are adequate to characterize the rate of COC migration at DSS Site 1081.

#### III.4 Extent of Contamination

Subsurface soil samples were collected from boreholes drilled at four locations beneath the effluent release points and areas (seepage pits) at the site to assess whether releases of effluent from the septic systems caused any environmental contamination.

The soil samples were collected at sampling depths starting at 10 and 15 feet bgs in SP1, 12 and 17 feet bgs in SP2, 17 and 24 feet bgs in SP3, and 20 and 25 feet bgs in SP4 beneath the seepage pits. Sampling intervals started at the depths at which effluent discharged from the seepage pits would have entered the subsurface environment at the site. This sampling procedure was required by New Mexico Environment Department (NMED) regulators and has been used at numerous DSS-type sites at SNL/NM. The soil samples are considered to be representative of the soil potentially contaminated with the COCs at this site and are sufficient to determine the vertical extent, if any, of COCs.

#### IV. Comparison of COCs to Background Levels

Site history and characterization activities are used to identify potential COCs. The DSS Site 1081 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 1081. All samples were collected from depths greater than 5 feet bgs; therefore, evaluation of ecological risk was not performed. Both tables show the associated SNL/NM maximum background concentration values (Dinwiddie September 1997). Section VI.4 discusses the results presented in Tables 4 and 5.

**Table 4**  
**Nonradiological COCs for Human Health Risk Assessment at DSS Site 1081 with Comparison to the Associated SNL/NM Background Screening Value, BCF, and Log K<sub>ow</sub>**

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 <sub>ow</sub> (for organic COCs)	Bioaccumulator? <sup>b</sup> (BCF>40, Log K <sub>ow</sub> >4)
<b>Inorganic</b>						
Arsenic	8.54 J	4.4	<b>No</b>	44 <sup>c</sup>	-	<b>Yes</b>
Barium	112	214	Yes	170 <sup>d</sup>	-	<b>Yes</b>
Cadmium	0.757	0.9	Yes	64 <sup>c</sup>	-	<b>Yes</b>
Chromium, total	16.7 J	15.9	<b>No</b>	16 <sup>c</sup>	-	No
Chromium VI	0.454	1	Yes	16 <sup>c</sup>	-	No
Cyanide	0.115 J	NC	<b>Unknown</b>	NC	-	<b>Unknown</b>
Lead	22.2 J	11.8	<b>No</b>	49 <sup>c</sup>	-	<b>Yes</b>
Mercury	0.126	<0.1	<b>No</b>	5,500 <sup>c</sup>	-	<b>Yes</b>
Selenium	0.66 J	<1	Yes	800 <sup>e</sup>	-	<b>Yes</b>
Silver	1,690	<1	<b>No</b>	0.5 <sup>c</sup>	-	No
<b>Organic</b>						
2-Butanone	0.011	NA	<b>NA</b>	1 <sup>f</sup>	0.29 <sup>f</sup>	No
Di-n-octyl phthalate	0.21 J	NA	<b>NA</b>	9,334 <sup>g</sup>	5.22 <sup>g</sup>	<b>Yes</b>
bis(2-Ethylhexyl) phthalate	2.29	NA	<b>NA</b>	851 <sup>h</sup>	7.6 <sup>g</sup>	<b>Yes</b>
Methylene chloride	0.00143 J	NA	<b>NA</b>	5 <sup>f</sup>	1.25 <sup>f</sup>	No
PCBs, Total <sup>i</sup>	0.0875	NA	<b>NA</b>	31,200 <sup>c</sup>	6.72 <sup>c</sup>	<b>Yes</b>

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

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

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

<sup>c</sup>Yanicak March 1997.

<sup>d</sup>Neumann 1976.

<sup>e</sup>Callahan et al. 1979.

<sup>f</sup>Howard 1990.

<sup>g</sup>Micromedex, Inc. 1998.

<sup>h</sup>Howard 1989.

<sup>i</sup>Sum of Aroclor-1248, Aroclor-1254, and Aroclor-1260 in the sample with the highest PCB concentrations.

**Table 4 (Concluded)**  
**Nonradiological COCs for Human Health Risk Assessment at DSS Site 1081 with Comparison to the Associated SNL/NM Background Screening Value, BCF, and Log  $K_{ow}$**

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



**Table 5**  
**Radiological COCs for Human Health Risk Assessment at DSS Site 1081 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 (0.0275)	0.079	Yes	3,000 <sup>d</sup>	Yes
Th-232	0.675	1.01	Yes	3,000 <sup>d</sup>	Yes
U-235	<b>ND (0.209)</b>	0.16	<b>No</b>	900 <sup>d</sup>	<b>Yes</b>
U-238	ND (0.652)	1.4	Yes	900 <sup>d</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, Southwest Area Supergroup.

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

<sup>d</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.

## V. Fate and Transport

The primary releases of COCs at DSS Site 1081 were to the subsurface soil resulting from the discharge of effluents from the Building 6650 septic systems. Wind, water, and biota are natural mechanisms of COC transport from the primary release point; however, because the discharge was to subsurface soil, none of these mechanisms are considered to be of potential significance as transport mechanisms at this site. Because the seepage pits are no longer active, additional infiltration of water is not expected. Infiltration of precipitation is essentially nonexistent at DSS Site 1081, as virtually all of the moisture either drains away from the site or evaporates. Because groundwater at this site is approximately 480 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 1081 include both inorganic and organic constituents. The inorganic COCs include both radiological and nonradiological analytes. With the exception of cyanide, the inorganic COCs are elemental in form and are not considered to be degradable. Transformations of these inorganic constituents could include changes in valence (oxidation/reduction reactions) or incorporation into organic forms (e.g., the conversion of selenite or selenate from soil to seleno-amino acids in plants). Cyanide can be metabolized by soil biota. Radiological COCs will undergo decay to stable isotopes or radioactive daughter elements. However, because of the long half-life of the radiological COC (U-235), the aridity of the environment at this site, and the lack of potential contact with biota, none of these mechanisms are expected to result in significant losses or transformations of the inorganic COCs.

The organic COCs at DSS Site 1081 are limited to VOCs, SVOCs, and PCBs. Organic COCs may be degraded through photolysis, hydrolysis, and biotransformation. Photolysis requires light and therefore takes place in the air, at the ground surface, or in surface water. Hydrolysis includes chemical transformations in water and may occur in the soil solution. Biotransformation (i.e., transformation caused by plants, animals, and microorganisms) may occur; however, biological activity may be limited by the arid environment at this site. Because of the depth of the COCs in the soil, the loss of 2-butanone and methylene chloride through volatilization is expected to be minimal.

Table 6 summarizes the fate and transport processes that can occur at DSS Site 1081. 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 1081**

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

DSS = Drain and Septic Systems.

**VI. Human Health Risk Assessment**

**VI.1 Introduction**

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

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

**VI.2 Step 1. Site Data**

Section I of this risk assessment provides the site description and history for DSS Site 1081. 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 1081 has been designated with a future land-use scenario of industrial (DOE et al. September 1995) (see Appendix 1 for default exposure pathways and parameters). However, the residential land-use scenario is also considered in the pathway analysis. Because of the location and characteristics of the potential contaminants, the primary pathway for human exposure is considered to be soil ingestion for the nonradiological COCs and direct gamma exposure for the radiological COCs. The inhalation pathway for both nonradiological and radiological COCs is included because the potential exists to inhale dust and volatiles. Soil ingestion is included for the radiological COCs as well. The dermal pathway is included for the nonradiological COCs because of the potential for the receptor to be exposed to contaminated soil. No water pathways to the groundwater are considered. Depth to groundwater at DSS Site 1081 is approximately 480 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 1081.

#### Pathway Identification

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

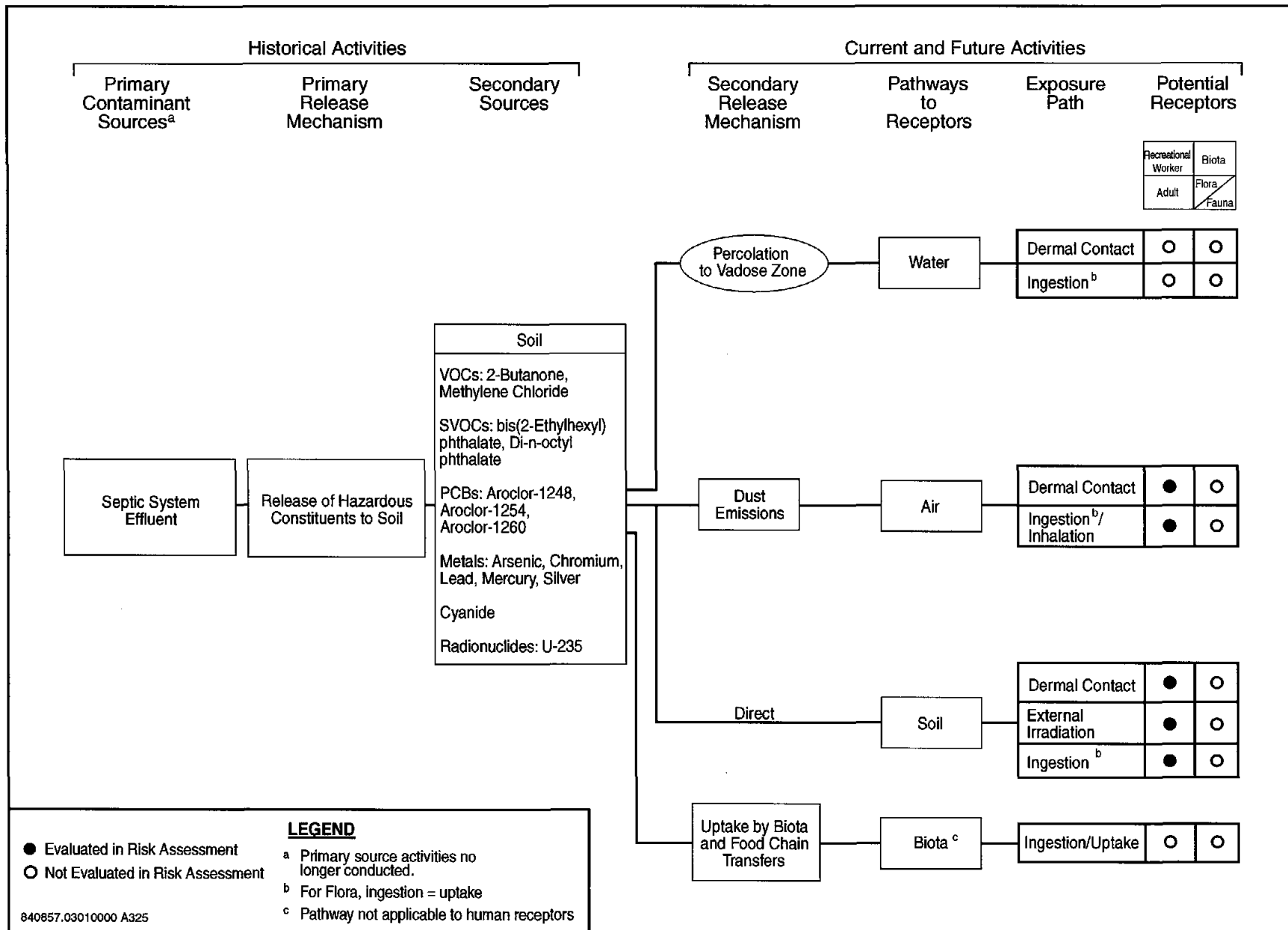
### VI.4 Step 3. Background Screening Procedure

This section discusses Step 3, the background screening procedure, which compares the maximum COC concentration to the background screening level. The methodology and results are described in the following sections.

#### VI.4.1 Methodology

Maximum concentrations of nonradiological COCs are compared to the approved SNL/NM maximum screening levels for this area. The SNL/NM maximum background concentration was selected to provide the background screen in Table 4 and used to calculate risk attributable to background in Section VI.6.2. Only the COCs that were detected above the corresponding SNL/NM maximum background screening levels or that do not have either a quantifiable or calculated background screening level are considered further in risk assessment analyses.

For radiological COCs that exceed the SNL/NM background screening levels, background values are subtracted from the individual maximum radionuclide concentrations. Those that do not exceed these background levels are not carried any further in the risk assessment. This approach is consistent with DOE Order 5400.5, "Radiation Protection of the Public and the Environment" (DOE 1993). Radiological COCs that do not have a background value and are detected above the analytical minimum detectable activity (MDA) are carried through the risk assessment at the maximum levels. The resultant radiological COCs remaining after this step are referred to as background-adjusted radiological COCs.



**Figure 1**  
**Conceptual Site Model Flow Diagram for DSS Site 1081, Building 6650 Septic System**



#### VI.4.2 Results

Tables 4 and 5 show the DSS Site 1081 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, five constituents were measured at concentrations greater than the background screening values. One constituent does not have a quantified background screening concentration; therefore it is unknown whether this COC exceeds background. Five constituents are organic compounds that do not have corresponding background screening values.

The maximum concentration value for lead is 22.2 milligrams (mg)/kilogram (kg). The EPA intentionally does not provide any human health toxicological data on lead; therefore, no risk parameter values could be calculated. However, the NMED guidance for lead screening concentrations for construction and industrial land-use scenarios are 750 and 1,500 mg/kg, respectively (Olson and Moats March 2000). The EPA screening guidance value for a residential land-use scenario is 400 mg/kg (Laws July 1994). The maximum concentration value for lead at this site is less than all the screening values; therefore, lead is eliminated from further consideration in the human health risk assessment.

The maximum concentration value for total PCBs (the sum of Aroclor-1242, Aroclor-1254, and Aroclor-1260 in the sample with the highest PCB concentrations) is 0.0875 mg/kg. This concentration is less than the EPA screening level of 1 mg/kg (Title 40, Code of Federal Regulations, Part 761). Because the maximum concentration for PCBs at this site is less than the screening value, PCBs are eliminated from further consideration in the human health risk assessment.

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

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

Tables 7 (nonradiological) and 8 (radiological) list the COCs retained in the risk assessment and the values for the available toxicological information. The toxicological values for the nonradiological COCs presented in Table 7 were obtained from the Integrated Risk Information System (IRIS) (EPA 2004a), the Health Effects Assessment Summary Tables (HEAST) (EPA 1997a), the Technical Background Document for Development of Soil Screening Levels (NMED February 2004), and the EPA Region 6 (EPA 2004b) and Risk Assessment Information System (ORNL 2003) electronic databases. Dose conversion factors (DCFs) used in determining the excess TEDE values for radiological COCs for the individual pathways were the default values provided in the RESRAD computer code (Yu et al. 1993a) as developed in the following documents:

- DCFs for ingestion and inhalation were taken from "Federal Guidance Report No. 11, Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion" (EPA 1988).
- DCFs for surface contamination (contamination on the surface of the site) were taken from DOE/EH-0070, "External Dose-Rate Conversion Factors for Calculation of Dose to the Public" (DOE 1988).

**Table 7  
Toxicological Parameter Values for DSS Site 1081 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>								
Arsenic	3E-4 <sup>c</sup>	M	-	-	1.5E+0 <sup>c</sup>	1.5E+1 <sup>c</sup>	A	0.03 <sup>d</sup>
Chromium, total	1.5E+0 <sup>c</sup>	L	-	-	-	-	D	0.01 <sup>d</sup>
Cyanide	2E-2 <sup>c</sup>	M	-	-	-	-	D	0.1 <sup>d</sup>
Mercury	3E-4 <sup>e</sup>	-	8.6E-5 <sup>c</sup>	M	-	-	D	0.01 <sup>d</sup>
Silver	5E-3 <sup>c</sup>	L	-	-	-	-	D	0.01 <sup>d</sup>
<b>Organic</b>								
2-Butanone	6E-1 <sup>c</sup>	L	2.9E-1 <sup>c</sup>	L	-	-	D	0.1 <sup>d</sup>
Di-n-octyl phthalate	2E-2 <sup>e</sup>	-	2E-2 <sup>f</sup>	-	-	-	-	0.1 <sup>g</sup>
bis(2-Ethylhexyl) phthalate	2E-2 <sup>f</sup>	-	2E-2 <sup>f</sup>	-	1.4E-2 <sup>f</sup>	1.4E-2 <sup>f</sup>	-	0.01 <sup>g</sup>
Methylene chloride	6E-2 <sup>c</sup>	M	8.6E-1 <sup>e</sup>	-	7.5E-3 <sup>c</sup>	1.6E-3 <sup>c</sup>	B2	0.1 <sup>d</sup>

E-16

<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 NMED (February 2004).

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

<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).

ABS = Gastrointestinal absorption coefficient.

COC = Constituent of concern.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

HEAST = Health Effects Assessment Summary Tables.

IRIS = Integrated Risk Information System.

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

(mg/kg-d)<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 1081 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.

- 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 estimated incremental cancer risk are provided for the background-adjusted radiological COC for both the industrial and residential land-use scenarios.

### VI.6.1 Exposure Assessment

Appendix 1 provides the equations and parameter input values used in calculating intake values and subsequent HI and excess cancer risk values for the individual exposure pathways. The appendix shows parameters for both industrial and residential land-use scenarios. The equations for nonradiological COCs are based upon the Risk Assessment Guidance for Superfund (RAGS) (EPA 1989). Parameters are based upon information from the RAGS (EPA 1989), the Technical Background Document for Development of Soil Screening Levels (NMED February 2004), as well as other EPA and NMED guidance documents, and reflect the reasonable maximum exposure (RME) approach advocated by the RAGS (EPA 1989). For the radiological COC, the coded equation provided in RESRAD computer code is used to estimate the incremental TEDE and cancer risk for individual exposure pathways. Further discussion of

this process is provided in the "Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD" (Yu et al. 1993a). Although the designated land-use scenario for this site is industrial, risk and TEDE values for a residential land-use scenario are also presented.

#### VI.6.2 Risk Characterization

Table 9 shows an HI of 0.39 for the DSS Site 1081 nonradiological COCs and an estimated excess cancer risk of  $5E-6$  for the designated industrial land-use scenario. The numbers presented include exposure from soil ingestion, dermal contact, and dust and volatile inhalation for nonradiological COCs. Table 10 shows an HI of 0.02 and an estimated excess cancer risk of  $3E-6$  for the DSS Site 1081 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  $7.0E-3$  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 1081 for the industrial land-use scenario is well below this guideline. The estimated excess cancer risk is  $5.9E-8$ .

For the nonradiological COCs under the residential land-use scenario, the HI is 4.84 with an estimated excess cancer risk of  $2E-5$  (Table 9). The numbers in the table include exposure from soil ingestion, dermal contact, and dust and volatile inhalation. Although the EPA (1991) guidelines generally recommend that inhalation not be included in a residential land-use scenario, this pathway is included because of the potential for soil in Albuquerque, New Mexico, to be eroded and for dust to be present in predominantly residential areas. Because of the nature of the local soil, other exposure pathways are not considered (see Appendix 1). Table 10 shows an HI of 0.20 and an estimated excess cancer risk of  $1E-5$  for the DSS Site 1081 associated background constituents under the residential land-use scenario.

For the radiological COC, the incremental TEDE for the residential land-use scenario is  $1.8E-2$  mrem/yr. The guideline being used is an excess TEDE of 75 mrem/yr (SNL/NM February 1998) for a complete loss of institutional controls (residential land use in this case); the calculated dose value for DSS Site 1081 for the residential land-use scenario is well below this guideline. Consequently, DSS Site 1081 is eligible for unrestricted radiological release as the residential land-use scenario resulted in an incremental TEDE of less than 75 mrem/yr to the on-site receptor. The estimated excess cancer risk is  $1.7E-7$ . 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.

**Table 9**  
**Risk Assessment Values for DSS Site 1081 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>					
Arsenic	8.54 J	0.03	5E-6	0.39	2E-5
Chromium, total	16.7 J	0.00	–	0.00	–
Cyanide	0.115 J	0.00	–	0.00	–
Mercury	0.126	0.00	–	0.01	–
Silver	1690	0.35	–	4.44	–
<b>Organic</b>					
2-Butanone	0.011	0.00	–	0.00	–
Di-n-octyl phthalate	0.21 J	0.00	–	0.00	–
bis(2-Ethylhexyl) phthalate	2.29	0.00	1E-8	0.00	5E-8
Methylene chloride	0.00143 J	0.00	9E-9	0.00	2E-8
<b>Total</b>		<b>0.39</b>	<b>5E-6</b>	<b>4.84</b>	<b>2E-5</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 1081 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
Arsenic	4.4	0.02	3E-6	0.20	1E-5
Chromium, total	15.9	0.00	–	0.00	–
Cyanide	NC	–	–	–	–
Mercury	<0.1	–	–	–	–
Selenium	<1	–	–	–	–
Silver	<1	–	–	–	–
<b>Total</b>		<b>0.02</b>	<b>3E-6</b>	<b>0.20</b>	<b>1E-5</b>

<sup>a</sup>Dinwiddie September 1997, Southwest 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.

## 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 0.39 (less than the numerical guideline of 1 suggested in the RAGS [EPA 1989]). The estimated excess cancer risk is  $5E-6$ . NMED guidance states that cumulative excess lifetime cancer risk must be less than  $1E-5$  (Bearzi January 2001); thus the excess cancer risk for this site is below the suggested acceptable risk value. This assessment also determines risks 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 0.37 and the estimated incremental excess cancer risk is  $2.62E-6$  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 COCs under the industrial land-use scenario, the incremental TEDE is  $7.0E-3$  mrem/yr, which is significantly lower than EPA's numerical guideline of 15 mrem/yr (EPA 1997b). The estimated incremental excess cancer risk is  $5.9E-8$ .

The calculated HI for the nonradiological COCs under the residential land-use scenario is 4.84, which is above numerical guidance. The estimated excess cancer risk is  $2E-5$ . NMED guidance states that cumulative excess lifetime cancer risk must be less than  $1E-5$  (Bearzi January 2001); thus the excess cancer risk for this site is slightly above the suggested acceptable risk value. The incremental HI is 4.64 and the estimated incremental cancer risk is  $1.07E-5$  for the residential land-use scenario. These incremental risk calculations indicate risk to human health from nonradiological COCs under the residential land-use scenario.

The incremental TEDE for a residential land-use scenario from the radiological component is  $1.8E-2$  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  $1.7E-7$ .

## VI.8 Step 7. Uncertainty Discussion

The determination of the nature, rate, and extent of contamination at DSS Site 1081 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) and 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 1081.

Because of the location, history of the site, and future land use (DOE et al. September 1995), there is low uncertainty in the land-use scenario and the potentially affected populations that were considered in performing the risk assessment analysis. Based upon the COCs found in the near-surface soil and the location and physical characteristics of the site, there is little uncertainty in the exposure pathways relevant to the analysis.

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

Table 7 shows the uncertainties (confidence levels) in nonradiological toxicological parameter values. There is a combination of estimated values and values from the IRIS (EPA 2004a), HEAST (EPA 1997a), EPA Region 6 (EPA 2004b), Technical Background Document for Development of Soil Screening Levels (NMED February 2004), and the Risk Assessment Information System (ORNL 2003). Where values are not provided, information is not available from the 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.

Although both the HI and estimated excess cancer risk are above the NMED guidelines for the residential land-use scenario, maximum concentrations were used in the risk calculation. Because the site has been adequately characterized, average concentrations are more representative of actual site conditions. Using the mean concentrations for the main contributors to excess cancer risk and hazards, arsenic (3.6 mg/kg, which is below background and eliminates arsenic from further evaluation) and silver (319 mg/kg), reduces the total HI and estimated excess cancer risk to 0.85 and 7E-8, respectively. The incremental HI and excess cancer risk are reduced to 0.85 and 7.15E-8, respectively. Thus, by using realistic concentrations in the risk calculations that more accurately depict site conditions, both the total and incremental HI and estimated excess cancer risk are below NMED guidelines.

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

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

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

## VI.9 Summary

DSS Site 1081 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 (0.39) is lower than the accepted numerical guidance from the EPA. The estimated excess cancer risk is  $5E-6$ ; thus, excess cancer risk is also below the acceptable risk value provided by the NMED for an industrial land-use scenario (Bearzi January 2001). The incremental HI is 0.37 and the estimated incremental excess cancer risk is  $2.62E-6$  for the industrial land-use scenario. The incremental risk calculations indicate insignificant risk to human health for the industrial land-use scenario.

Using conservative assumptions and an RME approach to risk assessment, calculations for the nonradiological COCs show that for the residential land-use scenario the HI (4.84) is above the accepted numerical guidance from the EPA. The estimated excess cancer risk is  $2E-5$ . Thus, excess cancer risk is slightly above the acceptable risk value provided by the NMED for a residential land-use scenario (Bearzi January 2001). The incremental HI is 4.64 and the estimated incremental excess cancer risk is  $1.07E-5$  for the residential land-use scenario. The incremental risk calculations indicate risk to human health for the residential land-use scenario.

Although both the HI and estimated excess cancer risk are above the NMED guidelines for the residential land-use scenario, maximum concentrations were used in the risk calculation. Because the site has been adequately characterized, average concentrations are more representative of actual site conditions. Using the mean concentrations for the main contributors to excess cancer risk and hazards, arsenic (3.6 mg/kg, which is below background and eliminates arsenic from further evaluation) and silver (319 mg/kg), reduces the total HI and estimated excess cancer risk to 0.85 and  $7E-8$ , respectively. The incremental HI and excess cancer risk are reduced to 0.85 and  $7.15E-8$ , respectively. Thus, by using realistic concentrations in the risk calculations that more accurately depict site conditions, both the total and incremental HI and estimated excess cancer risk are below NMED guidelines.

The incremental TEDE and corresponding estimated cancer risk from the radiological COC are much lower than EPA guidance values. The estimated TEDE is  $7.0E-3$  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 cancer risk value is  $5.9E-8$  for the industrial land-use scenario. Furthermore, the incremental TEDE for the residential land-use scenario that results from a complete loss of institutional control is  $1.8E-2$  mrem/yr with an associated risk of  $1.7E-7$ . The guideline for this scenario is 75 mrem/yr (SNL/NM February 1998). Therefore, DSS Site 1081 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 1081, Building 6650 Septic System Carcinogens**

Scenario	Nonradiological Risk	Radiological Risk	Total Risk
Industrial	2.62E-6	5.9E-8	2.7E-6
Residential	7.15E-8 <sup>a</sup>	1.7E-7	2.4E-7

<sup>a</sup>Incremental risk when using average concentrations for the primary risk drivers.  
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 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 1081. 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 1081 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.

## VIII. References

- Baker, D.A., and J.K. Soldat, 1992. "Methods for Estimating Doses to Organisms from Radioactive Materials Released into the Aquatic Environment," PNL-8150, Pacific Northwest Laboratory, Richland, Washington.
- Bearzi, J.P. (New Mexico Environment Department), January 2001. Memorandum to RCRA-Regulated Facilities, "Risk-Based Screening Levels for RCRA Corrective Action Sites in New Mexico," Hazardous Waste Bureau, New Mexico Environment Department, Santa Fe, New Mexico. January 23, 2001.
- Callahan, M.A., M.W. Slimak, N.W. Gabel, I.P. May, C.F. Fowler, J.R. Freed, P. Jennings, R.L. Durfee, F.C. Whitmore, B. Maestri, W.R. Mabey, B.R. Holt, and C. Gould, 1979. "Water-Related Environmental Fate of 129 Priority Pollutants," EPA-440/4-79-029, Office of Water and Waste Management, Office of Water Planning and Standards, U.S. Environmental Protection Agency, Washington, D.C.
- Dinwiddie, R.S. (New Mexico Environment Department), September 1997. Letter to M.J. Zamorski (U.S. Department of Energy), "Request for Supplemental Information: Background Concentrations Report, SNL/KAFB." September 24, 1997.



DOE, see U.S. Department of Energy.

EPA, see U.S. Environmental Protection Agency.

Howard, P.H., 1989. Volume I: "Large Production and Priority Pollutants," *Handbook of Environmental Fate and Exposure Data for Organic Chemicals*, Lewis Publishers, Inc., Chelsea, Michigan.

Howard, P.H., 1990. Volume II: "Solvents," *Handbook of Environmental Fate and Exposure Data for Organic Chemicals*, Lewis Publishers, Inc., Chelsea, Michigan.

Jones, J. (Sandia National Laboratories/New Mexico), June 1991. Internal memorandum to D. Dionne listing the septic tanks that were removed from service with the construction of the Area III sanitary sewer system. June 21, 1991.

Kocher, D.C. 1983. "Dose-Rate Conversion Factors for External Exposure to Photon Emitters in Soil," *Health Physics*, Vol. 28, pp. 193-205.

Laws, E. (U.S. Environmental Protection Agency), July 1994. Memorandum to Region Administrators I-X, "Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities," U.S. Environmental Protection Agency, Washington, D.C. July 14, 1994.

Micromedex, Inc., 1998, Hazardous Substances Databank.

National Council on Radiation Protection and Measurements (NCRP), 1987. "Exposure of the Population in the United States and Canada from Natural Background Radiation," *NCRP Report No. 94*, National Council on Radiation Protection and Measurements, Bethesda, Maryland.

National Oceanic and Atmospheric Administration (NOAA), 1990. "Local Climatological Data, Annual Summary with Comparative Data," Albuquerque, New Mexico.

NCRP, see National Council on Radiation Protection and Measurements.

Neumann, G., 1976. "Concentration Factors for Stable Metals and Radionuclides in Fish, Mussels and Crustaceans—A Literature Survey," Report 85-04-24, National Swedish Environmental Protection Board.

New Mexico Environment Department (NMED), March 1998. "Risk-Based Decision Tree Description," in New Mexico Environment Department, "RPMP Document Requirement Guide," RCRA Permits Management Program, Hazardous and Radioactive Materials Bureau, New Mexico Environment Department, Santa Fe, New Mexico.

New Mexico Environment Department (NMED), February 2004. "Technical Background Document for Development of Soil Screening Levels, Revision 2," Hazardous Waste Bureau and Ground Water Quality Bureau Voluntary Remediation Program, New Mexico Environment Department, Santa Fe, New Mexico.

NMED, see New Mexico Environment Department.

NOAA, see National Oceanographic and Atmospheric Administration.

Oak Ridge National Laboratory (ORNL), 2003. "Risk Assessment Information System," electronic database maintained by Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Olson, K., and W. Moats (New Mexico Environment Department), March 2000. Memorandum to File, "Proposed ER Site 8 Cleanup Levels," Hazardous and Radioactive Materials Bureau, New Mexico Environment Department, Santa Fe, New Mexico.

ORNL, see Oak Ridge National Laboratory.

Romero, T. (Sandia National Laboratories/New Mexico), September 2003. Internal communication to M. Sanders stating that during the connection of septic systems to the new City of Albuquerque sewer system, the old systems were disconnected and the lines capped. September 16, 2003.

Sandia National Laboratories/New Mexico (SNL/NM), August 1980. SNL/NM Facilities Engineering Drawing 89453 showing the Building 6650 Septic System, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), July 1994. "Verification and Validation of Chemical and Radiochemical Data," Technical Operating Procedure (TOP) 94-03, Rev. 0, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), March 1996. "Site-Wide Hydrogeologic Characterization Project, Calendar Year 1995 Annual Report," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), July 1996. "Laboratory Data Review Guidelines," Radiation Protection Diagnostics Procedure No. RPSD-02-11, Issue No. 2, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), February 1998. "RESRAD Input Parameter Assumptions and Justification," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), October 1999. "Sampling and Analysis Plan for Characterizing and Assessing Potential Releases to the Environment From Septic and Other Miscellaneous Drain Systems at Sandia National Laboratories/New Mexico," Sandia National Laboratories, Albuquerque, New Mexico. October 19, 1999.

Sandia National Laboratories/New Mexico (SNL/NM), December 1999. "Data Validation Procedure for Chemical and Radiochemical Data," Administrative Operating Procedure (AOP) 00-03, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), November 2001. "Field Implementation Plan, Characterization of Non-Environmental Restoration Drain and Septic Systems," Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), March 2002. "Annual Groundwater Monitoring Report, Fiscal Year 2000," Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), March 2003. Database printout provided by SNL/NM Facilities Engineering showing the year that numerous SNL/NM buildings were constructed, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), April 2003. "DSS Sites Mean Elevation Report," GIS Group, Environmental Restoration Department, Sandia National Laboratories, Albuquerque, New Mexico.

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

U.S. Department of Energy (DOE), 1988. "External Dose-Rate Conversion Factors for Calculation of Dose to the Public," DOE/EH-0070, Assistant Secretary for Environment, Safety and Health, U.S. Department of Energy, Washington, D.C.

U.S. Department of Energy (DOE), 1993. "Radiation Protection of the Public and the Environment," DOE Order 5400.5, U.S. Department of Energy, Washington, D.C.

U.S. Department of Energy (DOE), U.S. Air Force, and U.S. Forest Service, September 1995. "Workbook: Future Use Management Area 2," prepared by the Future Use Logistics and Support Working Group in cooperation with U.S. Department of Energy Affiliates, the U.S. Air Force, and the U.S. Forest Service.

U.S. Environmental Protection Agency (EPA), November 1986. "Test Methods for Evaluating Solid Waste," 3rd ed., Update 3, SW-846, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 1988. "Federal Guidance Report No. 11, Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion," Office of Radiation Programs, U.S. Environmental Protection Agency, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 1989. "Risk Assessment Guidance for Superfund, Vol. I: Human Health Evaluation Manual," EPA/540-1089/002, Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 1991. "Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part B)," Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 1997a. "Health Effects Assessment Summary Tables (HEAST), FY 1997 Update," EPA-540-R-97-036, Office of Research and Development and Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 1997b. "Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination," OSWER Directive No. 9200.4-18, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 1997c. "Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risks," Interim Final, U.S. Environmental Protection Agency, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 2002a. "Region 9 Preliminary Remediation Goals (PRGs) 2002," electronic database maintained by Region 9, U.S. Environmental Protection Agency, San Francisco, California.

U.S. Environmental Protection Agency (EPA), 2002b. "Risk-Based Concentration Table," electronic database maintained by Region 3, U.S. Environmental Protection Agency, Philadelphia, Pennsylvania.

U.S. Environmental Protection Agency (EPA), 2004a. Integrated Risk Information System (IRIS) electronic database, maintained by the U.S. Environmental Protection Agency, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 2004b. "Region 6 Preliminary Remediation Goals (PRGs) 2004," electronic database maintained by Region 6, U.S. Environmental Protection Agency, Dallas, Texas.

Whicker, F.W., and V. Schultz, 1982. *Radioecology: Nuclear Energy and the Environment*, Volume II, CRC Press, Boca Raton, Florida.

Yanicak, S. (Oversight Bureau, Department of Energy, New Mexico Environment Department), March 1997. Letter to M. Johansen (DOE/AIP/POC Los Alamos National Laboratory), "(Tentative) list of constituents of potential ecological concern (COPECs) which are considered to be bioconcentrators and/or biomagnifiers." March 3, 1997.

Yu, C., A.J. Zielen, J.-J. Cheng, Y.C. Yuan, L.G. Jones, D.J. LePoire, Y.Y. Wang, C.O. Loureiro, E. Gnanapragasam, E. Faillace, A. Wallo III, W.A. Williams, and H. Peterson, 1993a. "Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD," Version 5.0. Environmental Assessment Division, Argonne National Laboratory, Argonne, Illinois.

Yu, C., C. Loureiro, J.-J. Cheng, L.G. Jones, Y.Y. Wang, Y.P. Chia, and E. Faillace, 1993b. "Data Collection Handbook to Support Modeling the Impacts of Radioactive Material in Soil," ANL/EAIS-8, Argonne National Laboratory, Argonne, Illinois.

## 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  $1 \times 10^{-5}$  and with a molecular weight of 200 grams/mole or less (EPA 1991).

Tables 2 and 3 show the default parameter values suggested for use by SNL/NM at SWMUs, based upon the selected land-use scenarios for nonradiological and radiological COCs,

respectively. References are given at the end of the table indicating the source for the chosen parameter values. SNL/NM uses default values that are consistent with both regulatory guidance and the RME approach. Therefore, the values chosen will, in general, provide a conservative estimate of the actual risk parameter. These parameter values are suggested for use for the various exposure pathways, based upon the assumption that a particular site has no unusual characteristics that contradict the default assumptions. For sites for which the assumptions are not valid, the parameter values will be modified and documented.

### Summary

SNL/NM will use the described default exposure routes and parameter values in risk assessments at sites that have an industrial, recreational, or residential future land-use scenario. There are no current residential land-use designations at SNL/NM ER sites, but NMED has requested this scenario to be considered to provide perspective of the risk under the more restrictive land-use scenario. For sites designated as industrial or recreational land use, SNL/NM will provide risk parameter values based upon a residential land-use scenario to indicate the effects of data uncertainty on risk value calculations or in order to potentially mitigate the need for institutional controls or restrictions on SNL/NM ER sites. The parameter values are based upon EPA guidance and supplemented by information from other government sources. If these exposure routes and parameters are acceptable, SNL/NM will use them in risk assessments for all sites where the assumptions are consistent with site-specific conditions. All deviations will be documented.

**Table 2**  
**Default Nonradiological Exposure Parameter Values for Various Land-Use Scenarios**

Parameter	Industrial	Recreational	Residential
<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) for Noncarcinogenic Compounds (= ED x 365 day/yr)	25,550 <sup>a,b</sup>  9,125 <sup>a,b</sup>	25,550 <sup>a,b</sup>  10,950 <sup>a,b</sup>	25,550 <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).

## References

ANL, see Argonne National Laboratory.

Argonne National Laboratory (ANL), 1993. *Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD*, Version 5.0, ANL/EAD/LD-2, Argonne National Laboratory, Argonne, IL.

DOE, see U.S. Department of Energy.

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

EPA, see U.S. Environmental Protection Agency.

New Mexico Environment Department (NMED), March 2000. "Assessing Human Health Risks Posed by Chemical: Screening-level Risk Assessment," Hazardous and Radioactive Materials Bureau, NMED, March 6, 2000.

New Mexico Environment Department (NMED), December 2000. "Technical Background Document for Development of Soil Screening Levels," Hazardous Waste Bureau and Ground Water Quality Bureau Voluntary Remediation Program, December 18, 2000.

Sandia National Laboratories/New Mexico (SNL/NM), February 1998. "RESRAD Input Parameter Assumptions and Justification," Sandia National Laboratories/New Mexico Environmental Restoration Project, Albuquerque, New Mexico.

U.S. Department of Energy (DOE), 1993. DOE Order 5400.5, "Radiation Protection of the Public and the Environment," U.S. Department of Energy, Washington, D.C.

U.S. Department of Energy (DOE), 1996. "Environmental Assessment of the Environmental Restoration Project at Sandia National Laboratories/New Mexico," U.S. Department of Energy, Kirtland Area Office.

U.S. Department of Energy, U.S. Air Force, and U.S. Forest Service, September 1995. "Workbook: Future Use Management Area 2," prepared by the Future Use Logistics and Support Working Group in cooperation with U.S. Department of Energy Affiliates, the U.S. Air Force, and the U.S. Forest Service.

U.S. Department of Energy, U.S. Air Force, and U.S. Forest Service, October 1995. "Workbook: Future Use Management Area 1," prepared by the Future Use Logistics and Support Working Group in cooperation with U.S. Department of Energy Affiliates, the U.S. Air Force, and the U.S. Forest Service.

U.S. Department of Energy and U.S. Air Force (DOE and USAF), January 1996. "Workbook: Future Use Management Areas 3,4,5,and 6," prepared by the Future Use Logistics and Support Working Group in cooperation with U.S. Department of Energy Affiliates, and the U.S. Air Force.

U.S. Department of Energy and U.S. Air Force (DOE and USAF), March 1996. "Workbook: Future Use Management Area 7," prepared by the Future Use Logistics and Support Working Group in cooperation with U.S. Department of Energy Affiliates and the U.S. Air Force.

U.S. Environmental Protection Agency (EPA), 1989. "Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual," EPA/540-1089/002, U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 1991. "Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part B)," EPA/540/R-92/003, U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 1992. "Dermal Exposure Assessment: Principles and Applications," EPA/600/8-91/011B, Office of Research and Development, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 1996. "Soil Screening Guidance: Technical Background Document," EPA/540/1295/128, Office of Solid Waste and Emergency Response, Washington, D.C.

U.S. Environmental Protection Agency (EPA), August 1997. *Exposure Factors Handbook*, EPA/600/8-89/043, U.S. Environmental Protection Agency, Office of Health and Environmental Assessment, Washington, D.C.

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





RSI



National Nuclear Security Administration

Sandia Site Office  
P.O. Box 5400  
Albuquerque, New Mexico 87185-5400



APR 7 2005

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

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

Dear Mr. Bearzi,

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

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

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

Sincerely,

Patty Wagner  
Manager

Enclosure

Mr. J. Bearzi

(2)

APR 7 2005

cc w/ enclosure:

W. Moats, NMED-HWB (via Certified Mail)

L. King, EPA, Region 6 (Via Certified Mail)

M. Gardipe, NNSA/SC/ERD

J. Volkerding, DOE-NMED-OB

cc w/o enclosure:

D. Pepe, NMED-OB

J. Estrada, NNSA/SSO, MS 0184

F. Nimick, SNL, MS 1089

R. E. Fate, SNL, MS 1089

M. J. Davis, SNL, MS 1089

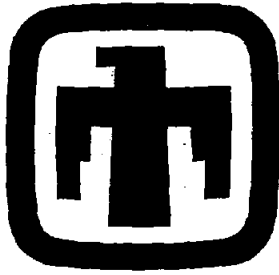
D. Stockham, SNL, MS 1087

~~B. Langkopf~~, SNL, MS 1087

P. Puissant, SNL, MS 1087

M. Sanders, SNL, MS 1087

A. Blumberg, SNL, MS 0141



Sandia National Laboratories

---

Drain and Septic Systems Project  
Quality Control (QC) Report

April 2005

Volume 1 of 7

Master Index

and

Field Duplicate Relative Percent Difference Tables

Environmental  
Restoration  
Project



United States Department of Energy  
Sandia Site Office

---

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

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

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

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

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

Site #	Site Name	Binder #	COC#	ER Sample ID	Sample #	SAMPLE DATE	MATRIX	LAB TEST	Lab	BATCH #
1080	Bldg. 6644 SS	Volume 3	605654	6644/1080-DF1-BH2-10-S	059708-002	26-AUG-02	SOIL	RCRA METALS	GEL	197718, 197762
1080	Bldg. 6644 SS	Volume 3	605654	6644/1080-DF1-BH2-5-S	059707-002	26-AUG-02	SOIL	RCRA METALS	GEL	197718, 197762
1080	Bldg. 6644 SS	Volume 3	605654	6644/1080-DF1-BH3-6-S	059709-002	26-AUG-02	SOIL	RCRA METALS	GEL	197718, 197762
1080	Bldg. 6644 SS	Volume 3	605654	6644/1080-DF1-BH3-11-S	059710-002	26-AUG-02	SOIL	HE-8330	GEL	198044, 203606
1080	Bldg. 6644 SS	Volume 3	605654	6644/1080-DF1-BH3-11-S	059710-002	26-AUG-02	SOIL	RCRA METALS	GEL	199132, 199386
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP1-BH1-10-S	059776-002	29-AUG-02	SOIL	PCB-8082	GEL	199271
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP1-BH1-15-S	059775-002	29-AUG-02	SOIL	PCB-8082	GEL	199271
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP2-BH1-12-S	059778-002	29-AUG-02	SOIL	PCB-8082	GEL	199271
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP2-BH1-17-S	059777-002	29-AUG-02	SOIL	PCB-8082	GEL	199271
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP3-BH1-17-S	059779-002	29-AUG-02	SOIL	PCB-8082	GEL	199271
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP3-BH1-24-S	059780-002	29-AUG-02	SOIL	PCB-8082	GEL	199271
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP4-BH1-20-S	059781-002	30-AUG-02	SOIL	PCB-8082	GEL	199271
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP4-BH1-25-S	059782-002	30-AUG-02	SOIL	PCB-8082	GEL	199271
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP1-BH1-10-S	059776-002	29-AUG-02	SOIL	BNA-8270	GEL	199277
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP1-BH1-15-S	059775-002	29-AUG-02	SOIL	BNA-8270	GEL	199277
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP2-BH1-12-S	059778-002	29-AUG-02	SOIL	BNA-8270	GEL	199277
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP2-BH1-17-S	059777-002	29-AUG-02	SOIL	BNA-8270	GEL	199277
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP3-BH1-17-S	059779-002	29-AUG-02	SOIL	BNA-8270	GEL	199277
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP3-BH1-24-S	059780-002	29-AUG-02	SOIL	BNA-8270	GEL	199277
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP4-BH1-20-S	059781-002	30-AUG-02	SOIL	BNA-8270	GEL	199277
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP4-BH1-25-S	059782-002	30-AUG-02	SOIL	BNA-8270	GEL	199277
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP1-BH1-10-S	059776-002	29-AUG-02	SOIL	TOTAL-CN	GEL	199408
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP1-BH1-15-S	059775-002	29-AUG-02	SOIL	TOTAL-CN	GEL	199408
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP2-BH1-12-S	059778-002	29-AUG-02	SOIL	TOTAL-CN	GEL	199408
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP2-BH1-17-S	059777-002	29-AUG-02	SOIL	TOTAL-CN	GEL	199408
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP3-BH1-17-S	059779-002	29-AUG-02	SOIL	TOTAL-CN	GEL	199408
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP3-BH1-24-S	059780-002	29-AUG-02	SOIL	TOTAL-CN	GEL	199408
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP4-BH1-20-S	059781-002	30-AUG-02	SOIL	TOTAL-CN	GEL	199408
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP4-BH1-25-S	059782-002	30-AUG-02	SOIL	TOTAL-CN	GEL	199408
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP-TB	059783-001	30-AUG-02	AQUEOUS	VOA-8260	GEL	199493
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP1-BH1-10-S	059775-001	29-AUG-02	SOIL	VOA-8260	GEL	199914
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP1-BH1-15-S	059776-001	29-AUG-02	SOIL	VOA-8260	GEL	199914
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP2-BH1-12-S	059777-001	29-AUG-02	SOIL	VOA-8260	GEL	199914
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP2-BH1-17-S	059778-001	29-AUG-02	SOIL	VOA-8260	GEL	199914
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP3-BH1-17-S	059779-001	29-AUG-02	SOIL	VOA-8260	GEL	199914
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP3-BH1-24-S	059780-001	29-AUG-02	SOIL	VOA-8260	GEL	199914
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP4-BH1-20-S	059781-001	30-AUG-02	SOIL	VOA-8260	GEL	199914
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP4-BH1-25-S	059782-001	30-AUG-02	SOIL	VOA-8260	GEL	199914
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP1-BH1-10-S	059776-002	29-AUG-02	SOIL	HE-8330	GEL	199935
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP1-BH1-15-S	059775-002	29-AUG-02	SOIL	HE-8330	GEL	199935
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP2-BH1-12-S	059778-002	29-AUG-02	SOIL	HE-8330	GEL	199935
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP2-BH1-17-S	059777-002	29-AUG-02	SOIL	HE-8330	GEL	199935

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

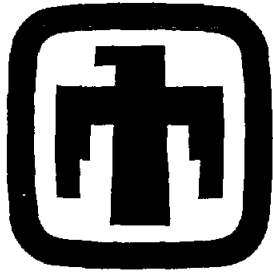
**DRAIN AND SEPTIC SYSTEMS PROJECT QC MASTER INDEX**

Site #	Site Name	Binder #	COC#	ER Sample ID	Sample #	SAMPLE DATE	MATRIX	LAB TEST	Lab	BATCH #
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP3-BH1-17-S	059779-002	29-AUG-02	SOIL	HE-8330	GEL	199935
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP3-BH1-24-S	059780-002	29-AUG-02	SOIL	HE-8330	GEL	199935
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP4-BH1-20-S	059781-002	30-AUG-02	SOIL	HE-8330	GEL	199935
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP4-BH1-25-S	059782-002	30-AUG-02	SOIL	HE-8330	GEL	199935
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP1-BH1-10-S	059776-002	29-AUG-02	SOIL	GROSS-A/B	GEL	200142
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP1-BH1-15-S	059775-002	29-AUG-02	SOIL	GROSS-A/B	GEL	200142
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP2-BH1-12-S	059778-002	29-AUG-02	SOIL	GROSS-A/B	GEL	200142
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP2-BH1-17-S	059777-002	29-AUG-02	SOIL	GROSS-A/B	GEL	200142
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP3-BH1-17-S	059779-002	29-AUG-02	SOIL	GROSS-A/B	GEL	200142
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP3-BH1-24-S	059780-002	29-AUG-02	SOIL	GROSS-A/B	GEL	200142
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP4-BH1-20-S	059781-002	30-AUG-02	SOIL	GROSS-A/B	GEL	200142
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP4-BH1-25-S	059782-002	30-AUG-02	SOIL	GROSS-A/B	GEL	200142
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP1-BH1-10-S	059776-002	29-AUG-02	SOIL	Cr+6	GEL	200893
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP1-BH1-15-S	059775-002	29-AUG-02	SOIL	Cr+6	GEL	200893
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP2-BH1-12-S	059778-002	29-AUG-02	SOIL	Cr+6	GEL	200893
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP2-BH1-17-S	059777-002	29-AUG-02	SOIL	Cr+6	GEL	200893
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP3-BH1-17-S	059779-002	29-AUG-02	SOIL	Cr+6	GEL	200893
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP3-BH1-24-S	059780-002	29-AUG-02	SOIL	Cr+6	GEL	200893
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP4-BH1-20-S	059781-002	30-AUG-02	SOIL	Cr+6	GEL	200893
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP4-BH1-25-S	059782-002	30-AUG-02	SOIL	Cr+6	GEL	200893
1081	Bldg. 6650 SS	Volume 7	605747	6650/1081-SP1-BH1-10-S	059775-003	29-AUG-02	SOIL	GAMMA SPEC	RPSD	201248
1081	Bldg. 6650 SS	Volume 7	605747	6650/1081-SP1-BH1-15-S	059776-003	29-AUG-02	SOIL	GAMMA SPEC	RPSD	201248
1081	Bldg. 6650 SS	Volume 7	605747	6650/1081-SP2-BH1-12-S	059777-003	29-AUG-02	SOIL	GAMMA SPEC	RPSD	201248
1081	Bldg. 6650 SS	Volume 7	605747	6650/1081-SP2-BH1-17-S	059778-003	29-AUG-02	SOIL	GAMMA SPEC	RPSD	201248
1081	Bldg. 6650 SS	Volume 7	605747	6650/1081-SP3-BH1-17-S	059779-003	29-AUG-02	SOIL	GAMMA SPEC	RPSD	201248
1081	Bldg. 6650 SS	Volume 7	605747	6650/1081-SP3-BH1-24-S	059780-003	29-AUG-02	SOIL	GAMMA SPEC	RPSD	201248
1081	Bldg. 6650 SS	Volume 7	605747	6650/1081-SP4-BH1-20-S	059781-003	30-AUG-02	SOIL	GAMMA SPEC	RPSD	201248
1081	Bldg. 6650 SS	Volume 7	605747	6650/1081-SP4-BH1-25-S	059782-003	30-AUG-02	SOIL	GAMMA SPEC	RPSD	201248
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP1-BH1-10-S	059776-002	29-AUG-02	SOIL	RCRA METALS	GEL	199346, 199386
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP1-BH1-15-S	059775-002	29-AUG-02	SOIL	RCRA METALS	GEL	199346, 199386
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP2-BH1-12-S	059778-002	29-AUG-02	SOIL	RCRA METALS	GEL	199346, 199386
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP2-BH1-17-S	059777-002	29-AUG-02	SOIL	RCRA METALS	GEL	199346, 199386
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP3-BH1-17-S	059779-002	29-AUG-02	SOIL	RCRA METALS	GEL	199346, 199386
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP3-BH1-24-S	059780-002	29-AUG-02	SOIL	RCRA METALS	GEL	199346, 199386
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP4-BH1-20-S	059781-002	30-AUG-02	SOIL	RCRA METALS	GEL	199346, 199386
1081	Bldg. 6650 SS	Volume 4	605666	6650/1081-SP4-BH1-25-S	059782-002	30-AUG-02	SOIL	RCRA METALS	GEL	199346, 199386
1082	Bldg. 6620 SS	Volume 2	600396	ER-1295-6620-DF1-BH1-10-S	041078-002	23-JUN-98	SOIL	BNA-8270	GEL	125102
1082	Bldg. 6620 SS	Volume 2	600396	ER-1295-6620-DF1-BH1-5-S	041077-002	23-JUN-98	SOIL	BNA-8270	GEL	125102
1082	Bldg. 6620 SS	Volume 2	600396	ER-1295-6620-DF1-BH2-10-S	041252-002	23-JUN-98	SOIL	BNA-8270	GEL	125102
1082	Bldg. 6620 SS	Volume 2	600396	ER-1295-6620-DF1-BH2-5-S	041079-002	23-JUN-98	SOIL	BNA-8270	GEL	125102
1082	Bldg. 6620 SS	Volume 2	600396	ER-1295-6620-DF1-BH3-10-S	041254-002	23-JUN-98	SOIL	BNA-8270	GEL	125102
1082	Bldg. 6620 SS	Volume 2	600396	ER-1295-6620-DF1-BH3-5-S	041253-002	23-JUN-98	SOIL	BNA-8270	GEL	125102

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







Sandia National Laboratories

---

Drain and Septic Systems Project  
Quality Control (QC) Report

April 2005

Volume 4 of 7

General Engineering Laboratories, Inc. (GEL) QC Data

Environmental  
Restoration  
Project



United States Department of Energy  
Sandia Site Office

---

## GEL QC CROSS REFERENCE

COC 605666

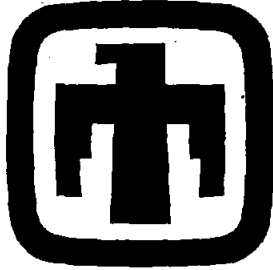
Site #	Site Name	SAMPLE#	F#	DISP_ER_SAMP_LOC	SAMPLE DATE	MATRIX	LAB TEST	BATCH #
1081	Bldg. 6650 SS	059775	001	6650/1081-SP1-BH1-10-S	29-AUG-02	SOIL	VOA-8260	199914
1081	Bldg. 6650 SS	059775	002	6650/1081-SP1-BH1-15-S	29-AUG-02	SOIL	BNA-8270	199277
1081	Bldg. 6650 SS	059775	002	6650/1081-SP1-BH1-15-S	29-AUG-02	SOIL	Cr+6	200893
1081	Bldg. 6650 SS	059775	002	6650/1081-SP1-BH1-15-S	29-AUG-02	SOIL	GROSS-A/B	200142
1081	Bldg. 6650 SS	059775	002	6650/1081-SP1-BH1-15-S	29-AUG-02	SOIL	HE-8330	199935
1081	Bldg. 6650 SS	059775	002	6650/1081-SP1-BH1-15-S	29-AUG-02	SOIL	PCB-8082	199271
1081	Bldg. 6650 SS	059775	002	6650/1081-SP1-BH1-15-S	29-AUG-02	SOIL	RCRA METALS	199346, 199386
1081	Bldg. 6650 SS	059775	002	6650/1081-SP1-BH1-15-S	29-AUG-02	SOIL	TOTAL-CN	199408
1081	Bldg. 6650 SS	059776	001	6650/1081-SP1-BH1-15-S	29-AUG-02	SOIL	VOA-8260	199914
1081	Bldg. 6650 SS	059776	002	6650/1081-SP1-BH1-10-S	29-AUG-02	SOIL	BNA-8270	199277
1081	Bldg. 6650 SS	059776	002	6650/1081-SP1-BH1-10-S	29-AUG-02	SOIL	Cr+6	200893
1081	Bldg. 6650 SS	059776	002	6650/1081-SP1-BH1-10-S	29-AUG-02	SOIL	GROSS-A/B	200142
1081	Bldg. 6650 SS	059776	002	6650/1081-SP1-BH1-10-S	29-AUG-02	SOIL	HE-8330	199935
1081	Bldg. 6650 SS	059776	002	6650/1081-SP1-BH1-10-S	29-AUG-02	SOIL	PCB-8082	199271
1081	Bldg. 6650 SS	059776	002	6650/1081-SP1-BH1-10-S	29-AUG-02	SOIL	RCRA METALS	199346, 199386
1081	Bldg. 6650 SS	059776	002	6650/1081-SP1-BH1-10-S	29-AUG-02	SOIL	TOTAL-CN	199408
1081	Bldg. 6650 SS	059777	001	6650/1081-SP2-BH1-12-S	29-AUG-02	SOIL	VOA-8260	199914
1081	Bldg. 6650 SS	059777	002	6650/1081-SP2-BH1-17-S	29-AUG-02	SOIL	BNA-8270	199277
1081	Bldg. 6650 SS	059777	002	6650/1081-SP2-BH1-17-S	29-AUG-02	SOIL	Cr+6	200893
1081	Bldg. 6650 SS	059777	002	6650/1081-SP2-BH1-17-S	29-AUG-02	SOIL	GROSS-A/B	200142
1081	Bldg. 6650 SS	059777	002	6650/1081-SP2-BH1-17-S	29-AUG-02	SOIL	HE-8330	199935
1081	Bldg. 6650 SS	059777	002	6650/1081-SP2-BH1-17-S	29-AUG-02	SOIL	PCB-8082	199271
1081	Bldg. 6650 SS	059777	002	6650/1081-SP2-BH1-17-S	29-AUG-02	SOIL	RCRA METALS	199346, 199386
1081	Bldg. 6650 SS	059777	002	6650/1081-SP2-BH1-17-S	29-AUG-02	SOIL	TOTAL-CN	199408
1081	Bldg. 6650 SS	059778	001	6650/1081-SP2-BH1-17-S	29-AUG-02	SOIL	VOA-8260	199914
1081	Bldg. 6650 SS	059778	002	6650/1081-SP2-BH1-12-S	29-AUG-02	SOIL	BNA-8270	199277
1081	Bldg. 6650 SS	059778	002	6650/1081-SP2-BH1-12-S	29-AUG-02	SOIL	Cr+6	200893
1081	Bldg. 6650 SS	059778	002	6650/1081-SP2-BH1-12-S	29-AUG-02	SOIL	GROSS-A/B	200142
1081	Bldg. 6650 SS	059778	002	6650/1081-SP2-BH1-12-S	29-AUG-02	SOIL	HE-8330	199935

## GEL QC CROSS REFERENCE

COC 605666

Site #	Site Name	SAMPLE#	F#	DISP_ER_SAMP_LOC	SAMPLE DATE	MATRIX	LAB TEST	BATCH #
1081	Bldg. 6650 SS	059782	002	6650/1081-SP4-BH1-25-S	30-AUG-02	SOIL	Cr+6	200893
1081	Bldg. 6650 SS	059782	002	6650/1081-SP4-BH1-25-S	30-AUG-02	SOIL	GROSS-A/B	200142
1081	Bldg. 6650 SS	059782	002	6650/1081-SP4-BH1-25-S	30-AUG-02	SOIL	HE-8330	199935
1081	Bldg. 6650 SS	059782	002	6650/1081-SP4-BH1-25-S	30-AUG-02	SOIL	PCB-8082	199271
1081	Bldg. 6650 SS	059782	002	6650/1081-SP4-BH1-25-S	30-AUG-02	SOIL	RCRA METALS	199346, 199386
1081	Bldg. 6650 SS	059782	002	6650/1081-SP4-BH1-25-S	30-AUG-02	SOIL	TOTAL-CN	199408
1081	Bldg. 6650 SS	059783	001	6650/1081-SP-TB	30-AUG-02	AQUEOUS	VOA-8260	199493





Sandia National Laboratories

---

Drain and Septic Systems Project  
Quality Control (QC) Report

April 2005

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

Environmental  
Restoration  
Project



United States Department of Energy  
Sandia Site Office

---

## RPSD QC CROSS REFERENCE

COC 605747  
BATCH NO. 201248

Site #	Site Name	SAMPLE#	F#	ER SAMPLE ID	SAMPLE DATE	MATRIX	LAB TEST
1081	Bldg. 6650 SS	059775	003	6650/1081-SP1-BH1-10-S	29-AUG-02	SOIL	GAMMA SPEC
1081	Bldg. 6650 SS	059776	003	6650/1081-SP1-BH1-15-S	29-AUG-02	SOIL	GAMMA SPEC
1081	Bldg. 6650 SS	059777	003	6650/1081-SP2-BH1-12-S	29-AUG-02	SOIL	GAMMA SPEC
1081	Bldg. 6650 SS	059778	003	6650/1081-SP2-BH1-17-S	29-AUG-02	SOIL	GAMMA SPEC
1081	Bldg. 6650 SS	059779	003	6650/1081-SP3-BH1-17-S	29-AUG-02	SOIL	GAMMA SPEC
1081	Bldg. 6650 SS	059780	003	6650/1081-SP3-BH1-24-S	29-AUG-02	SOIL	GAMMA SPEC
1081	Bldg. 6650 SS	059781	003	6650/1081-SP4-BH1-20-S	30-AUG-02	SOIL	GAMMA SPEC
1081	Bldg. 6650 SS	059782	003	6650/1081-SP4-BH1-25-S	30-AUG-02	SOIL	GAMMA SPEC
1083	Bldg. 6570 SS	059784	003	6570/1083-DW1-BH1-9-S	03-SEP-02	SOIL	GAMMA SPEC
1083	Bldg. 6570 SS	059785	003	6570/1083-DW1-BH1-14-S	03-SEP-02	SOIL	GAMMA SPEC
1031	Bldg. 6589/660 SS	059788	003	6589-6600/1031-SP1-BH1-15-S	05-SEP-02	SOIL	GAMMA SPEC
1031	Bldg. 6589/660 SS	059789	003	6589-6600/1031-SP1-BH1-20-S	05-SEP-02	SOIL	GAMMA SPEC
1031	Bldg. 6589/660 SS	059790	003	6589-6600/1031-SP2-BH1-10-S	05-SEP-02	SOIL	GAMMA SPEC
1031	Bldg. 6589/660 SS	059791	003	6589-6600/1031-SP2-BH1-15-S	05-SEP-02	SOIL	GAMMA SPEC
1086	Bldg. 6523 SS	059793	003	6523/1086-SP1-BH1-10-S	06-SEP-02	SOIL	GAMMA SPEC
1086	Bldg. 6523 SS	059794	003	6523/1086-SP1-BH1-15-S	06-SEP-02	SOIL	GAMMA SPEC
1102	F. Bldg 889 SS	059795	003	889/1102-SP1-BH1-25-S	06-SEP-02	SOIL	GAMMA SPEC
1102	F. Bldg 889 SS	059796	003	889/1102-SP1-BH1-30-S	06-SEP-02	SOIL	GAMMA SPEC
1083	Bldg. 6570 SS	059858	001	6570/1083-DW1-BH1-9-DU	03-SEP-02	SOIL	GAMMA SPEC

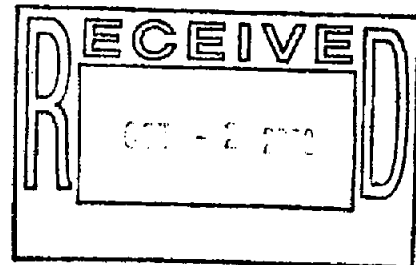


COC# 605666



RECORDS CENTER/  
ORIGINAL COPY

CASE NARRATIVE  
for  
Sandia National Laboratories  
ARCO-605666  
SDG#66454  
Case No. 7223.02.03.02



October 1, 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 sixteen soil samples and one aqueous sample on August 29<sup>th</sup> and 30<sup>th</sup>, 2002. The samples arrived at General Engineering Laboratories, Inc., (GEL) Charleston, South Carolina on September 4<sup>th</sup>, 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 2.4°C, as measured from the temperature control bottles.

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 laboratory received the following samples:

<u>Laboratory ID</u>	<u>Description</u>
66454001	059775-001
66454002	059776-001
66454003	059777-001
66454004	059778-001
66454005	059779-001
66454006	059780-001
66454007	059781-001
66454008	059782-001
66454009	059775-002
66454010	059776-002
66454011	059777-002
66454012	059778-002
66454013	059779-002
66454014	059780-002
66454015	059781-002
66454016	059782-002
66456001	059783-001

#### 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

GENERAL ENGINEERING LABORATORIES

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

(843) 556-8171 • Fax (843) 766-1178

GC/MS Volatile Organics  
Sandia National Labs (SNLS)  
SDG # 66454

Method/Analysis Information

Procedure: Volatile Organic Compounds (VOC) by Gas Chromatograph/Mass Spectrometer  
Analytical Method: SW846 8260A  
Prep Method: SW846 5030A  
Analytical Batch Number: 199914  
Prep Batch Number: 199910

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
66454001	059775-001
66454002	059776-001
66454003	059777-001
66454004	059778-001
66454005	059779-001
66454006	059780-001
66454007	059781-001
66454008	059782-001
1200296531	VBLK01 (Blank)
1200296539	VBLK01LCS (Laboratory Control Sample)
1200296532	VBLK02 (Blank)

SDG#66454 -VOA

Page 1 of 4

1200296540 VBLK02LCS (Laboratory Control Sample)  
1200296535 059775-001MS (Matrix Spike)  
1200296538 059775-001MSD (Matrix Spike Duplicate)

**Preparation/Analytical Method Verification**

**SOP Reference**

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

**Calibration Information**

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

**Initial Calibration**

All the initial calibration requirements were met.

**CCV Requirements**

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

**Quality Control (QC) Information**

**Surrogate Recoveries**

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

**Blank Acceptance**

Target analytes were not detected above the reporting limit in the 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:  
66454001 059775-001

**MS Recovery Statement**

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

**MSD Recovery Statement**

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

**MS/MSD RPD Statement**

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

**Internal Standard (ISTD) Acceptance**

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

**Technical Information**

**Holding Time Specifications**

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

**Sample Preservation and Integrity**

All samples met the sample preservation and integrity requirements.

**Preparation/Analytical Method Verification**

All procedures were performed as stated in the SOP.

**Sample Dilutions**

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

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

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

**Miscellaneous Information**

**Nonconformance (NCR) Documentation**

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

**Manual Integrations**

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

**Additional Comments**

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

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

**System Configuration**

The laboratory utilizes the following GC/MS configurations:

**Chromatographic Columns**

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

<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 SDG#66454 -VOA

### 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

### Review Validation:

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

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

Reviewer: Charles Wilson Date: 09-27-02

**REVISED**

QC Summary

Report Date: October 11, 2002  
Page 1 of 4

Client : Sandia National Laboratories  
MS-0756  
P.O. Box 5800  
Albuquerque, New Mexico  
Contact: Pamela M. Pulsant  
Workorder: 66454

Parname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Volatile-GC/MS Federal									
Batch 199914									
QC1200296539 LCS									
1,1-Dichloroethylene	50.0		40.3	ug/kg		81	(75%-134%)	RMB	09/09/02 08:43
Benzene	50.0		44.8	ug/kg		90	(80%-120%)		
Chlorobenzene	50.0		48.4	ug/kg		97	(82%-118%)		
Toluene	50.0		47.2	ug/kg		94	(74%-115%)		
Trichloroethylene	50.0		44.6	ug/kg		89	(80%-119%)		
**Bromofluorobenzene	50.0		49.2	ug/kg		98	(69%-138%)		
**Dibromofluoromethane	50.0		49.3	ug/kg		99	(67%-137%)		
**Toluene-d8	50.0		46.1	ug/kg		92	(67%-139%)		
QC1200296540 LCS									
1,1-Dichloroethylene	50.0		38.7	ug/kg		77	(75% 134%)		09/09/02 21:24
Benzene	50.0		43.4	ug/kg		87	(80%-120%)		
Chlorobenzene	50.0		44.6	ug/kg		89	(82%-118%)		
Toluene	50.0		44.2	ug/kg		88	(74%-115%)		
Trichloroethylene	50.0		42.9	ug/kg		86	(80%-119%)		
**Bromofluorobenzene	50.0		46.8	ug/kg		94	(69%-138%)		
**Dibromofluoromethane	50.0		49.2	ug/kg		98	(67%-137%)		
**Toluene-d8	50.0		45.2	ug/kg		90	(67%-139%)		
QC1200296551 MB									
1,1,1-Trichloroethane		U	ND	ug/kg					09/09/02 11:13
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					

**REVISED**

QC Summary

Workorder: 66454

Page 2 of 4

Pharmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anst	Date	Time
Volatile GC/MS Federal											
Baich 199914											
Styrene			U	ND	ug/kg						
Tetrachloroethylene			U	ND	ug/kg						
Toluene			U	ND	ug/kg						
Trichloroethylene			U	ND	ug/kg						
Vinyl acetate			U	ND	ug/kg						
Vinyl chloride			U	ND	ug/kg						
Xylenes (total)			U	ND	ug/kg						
cis-1,2-Dichloroethylene			U	ND	ug/kg						
cis-1,3-Dichloropropylene			U	ND	ug/kg						
trans-1,2-Dichloroethylene			U	ND	ug/kg						
trans-1,3-Dichloropropylene			U	ND	ug/kg						
**Bromofluorobenzene	50.0			55.9	ug/kg		112	(69%-138%)			
**Dibromofluoromethane	50.0			48.0	ug/kg		96	(67%-137%)			
**Toluene-d8	50.0			47.0	ug/kg		94	(67%-139%)			
QC1200296532 MB											
1,1,1-Trichloroethane			U	ND	ug/kg					09/09/02	23:09
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-Dichloromethane			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: 66454

Page 3 of 4

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anst	Date	Time
Volatile-QC/MS Federal											
Batch 199914											
trans-1,2-Dichloroethylene			U	ND	ug/kg						
trans-1,3-Dichloropropylene			U	ND	ug/kg						
**Bromofluorobenzene	50.0			53.0	ug/kg		106	(69%-138%)			
**Dibromofluoromethane	50.0			46.9	ug/kg		94	(67%-137%)			
**Toluene-d8	50.0			46.0	ug/kg		92	(67%-139%)			
QC1200296713 MB											
1,1,1-Trichloroethane			U	ND	ug/kg					09/09/02	10:44
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						
trans-1,2-Dichloroethylene			U	ND	ug/kg						
trans-1,3-Dichloropropylene			U	ND	ug/kg						
**Bromofluorobenzene	50.0			5080	ug/kg		102	(69%-138%)			
**Dibromofluoromethane	50.0			4570	ug/kg		91	(67%-137%)			
**Toluene-d8	50.0			4570	ug/kg		91	(67%-139%)			
QC1200296535 66454001 PS											
1,1-Dichloroethylene	50.0	U	ND	35.5	ug/L		71	(55%-128%)		09/09/02	17:10
Benzene	50.0	U	ND	41.1	ug/L		82	(53%-118%)			
Chlorobenzene	50.0	U	ND	43.7	ug/L		88	(53%-116%)			



## QC Summary

Workorder: 66454

Page 4 of 4

Paramname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Rauge	Anfst	Date Time
Volatile-GC/MS Federal										
Batch 199914										
Toluene	50.0	J	0.349	43.2	ug/L		86	(56%-113%)		
Trichloroethylene	50.0	U	ND	40.8	ug/L		82	(54%-119%)		
**Bromofluorobenzene	50.0		53.3	49.0	ug/L		98	(69%-138%)		
**Dibromofluoromethane	50.0		47.8	49.1	ug/L		98	(67%-137%)		
**Toluene-d8	50.0		46.9	45.8	ug/L		92	(67%-139%)		
QC1200296558 66454001 PSD										
1,1-Dichloroethylene	50.0	U	ND	35.2	ug/L	1	70	(0%-21%)		09/09/02 17:36
Benzene	50.0	U	ND	40.3	ug/L	2	81	(0%-17%)		
Chlorobenzene	50.0	U	ND	43.4	ug/L	1	87	(0%-21%)		
Toluene	50.0	J	0.349	42.7	ug/L	1	85	(0%-25%)		
Trichloroethylene	50.0	U	ND	40.2	ug/L	2	80	(0%-25%)		
**Bromofluorobenzene	50.0		53.3	47.2	ug/L		95	(69%-138%)		
**Dibromofluoromethane	50.0		47.8	49.1	ug/L		98	(67%-137%)		
**Toluene-d8	50.0		46.9	45.7	ug/L		92	(67%-139%)		

**Notes:**

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

The Qualifiers in this report are defined as follows:

- \* Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where d
- \*\* Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- H Holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
- P The response between the confirmation column and the primary column is >40%Δ
- 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.

GC/MS Volatile Organics  
Sandia National Labs (SNLS)  
SDG 66454-1

Method/Analysis Information

Procedure: Volatile Organic Compounds (VOC) by Gas Chromatograph/Mass Spectrometer  
Analytical Method: SW846 8260B  
Prep Method: SW846 5030B  
Analytical Batch Number: 199493

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
66456001	059783-001
1200295591	VBLK01 (Blank)
1200295594	VBLK01LCS (Laboratory Control Sample)

Preparation/Analytical Method Verification

**SOP Reference**

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

Calibration Information

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

**Initial Calibration**

All the initial calibration requirements were met.

**CCV Requirements**

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

SDG#66454-1 -VOA

Page 1 of 4

### Quality Control (QC) Information

#### **Surrogate Recoveries**

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

#### **Blank Acceptance**

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

#### **LCS Recovery Statement**

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

#### **QC Sample Designation**

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.

#### **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

SDG#66454-1 -VOA

Page 2 of 4

generate all data packages electronically. The following change from "traditional" packages should be noted:

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

#### System Configuration

The laboratory utilizes the following GC/MS configurations:

#### **Chromatographic Columns**

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

<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 </Paragraph>**

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

#### Comments

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

**Review Validation:**

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

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

Reviewer: Charles Wilson Date: 09-27-02

## QC Summary

Report Date: September 27, 2002  
Page 1 of 2

Client: Sandia National Laboratories  
MS-0756  
P.O. Box 5800  
Albuquerque, New Mexico  
Contact: Pamela M. Puissant  
Workorder: 66456

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analst	Date Time
Volatile-GC/MS Federal										
Batch 199493										
QC1200295594 LCS										
1,1-Dichloroethylene	50.0			49.8	ug/L		100	(78%-140%)	SHJ	09/05/02 10:41
Benzene	50.0			52.1	ug/L		104	(78%-119%)		
Chlorobenzene	50.0			52.8	ug/L		106	(82%-120%)		
Toluene	50.0			52.6	ug/L		105	(68%-133%)		
Trichloroethylene	50.0			50.8	ug/L		102	(80%-123%)		
**Bromofluorobenzene	50.0			46.9	ug/L		94	(67%-136%)		
**Dibromofluoromethane	50.0			48.7	ug/L		97	(62%-148%)		
**Toluene-d8	50.0			48.3	ug/L		97	(58%-139%)		
QC1200295591 MB										
1,1,1-Trichloroethane			U	ND	ug/L					09/05/02 12:20
1,1,2,2-Tetrachloroethane			U	ND	ug/L					
1,1,2-Trichloroethane			U	ND	ug/L					
1,1-Dichloroethane			U	ND	ug/L					
1,1-Dichloroethylene			U	ND	ug/L					
1,2-Dichloroethane			U	ND	ug/L					
1,2-Dichloropropane			U	ND	ug/L					
2-Butanone			U	ND	ug/L					
2-Hexanone			U	ND	ug/L					
4-Methyl-2-pentanone			U	ND	ug/L					
Acetone			U	ND	ug/L					
Benzene			U	ND	ug/L					
Bromodichloromethane			U	ND	ug/L					
Bromoform			U	ND	ug/L					
Bromomethane			U	ND	ug/L					
Carbon disulfide			U	ND	ug/L					
Carbon tetrachloride			U	ND	ug/L					
Chlorobenzene			U	ND	ug/L					
Chloroethane			U	ND	ug/L					
Chloroform			U	ND	ug/L					
Chloromethane			U	ND	ug/L					
Dibromochloromethane			U	ND	ug/L					
Ethylbenzene			U	ND	ug/L					
Methylene chloride			U	ND	ug/L					
Styrene			U	ND	ug/L					
Tetrachloroethylene			U	ND	ug/L					
Toluene			U	ND	ug/L					
Trichloroethylene			U	ND	ug/L					
Vinyl chloride			U	ND	ug/L					
Xylenes (total)			U	ND	ug/L					
cis-1,2-Dichloroethylene			U	ND	ug/L					
cis-1,3-Dichloropropylene			U	ND	ug/L					
trans-1,2-Dichloroethylene			U	ND	ug/L					

## QC Summary

Workorder: 66456

Page 2 of 2

Parname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Volatile-GC/MS Federal									
Batch 199493									
trans-1,3-Dichloropropylene		U	ND	ug/L					
**Bromofluorobenzene	50.0		48.9	ug/L		98	(67%-136%)		
**Dibromofluoromethane	50.0		47.3	ug/L		95	(62%-148%)		
**Toluene-d8	50.0		48.4	ug/L		97	(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 d
- \*\* Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- H Holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
- P The response between the confirmation column and the primary column is >40%D
- U The analyte was analyzed for but not detected below this concentration. For Organic and Inorganic analytes the result is less than the effective MDL. I
- X Presumptive evidence that the analyte is not present. Please see narrative for further information.
- X Presumptive evidence that the analyte is not present. Please see narrative for further information.
- X Uncertain identification for gamma spectroscopy.

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.

**Semi-Volatile Case Narrative  
Sandia National Labs (SNLS)  
SDG 66454**

**Method/Analysis Information**

**Procedure:** Semivolatle Analysis by Gas Chromatograph/Mass Spectrometer  
**Analytical Method:** SW846 8270C  
**Prep Method:** SW846 3550B  
**Analytical Batch Number:** 199277  
**Prep Batch Number:** 199276

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
66454009	059775-002
66454010	059776-002
66454011	059777-002
66454012	059778-002
66454013	059779-002
66454014	059780-002
66454015	059781-002
66454016	059782-002
1200295103	SBLK01 (Blank)
1200295104	SBLK01LCS (Laboratory Control Sample)
1200295105	059775-002MS (Matrix Spike)
1200295106	059775-002MSD (Matrix Spike Duplicate)



### **Preparation/Analytical Method Verification**

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

### **Calibration Information**

Due to the limited capacity of software we do not display all of the current initial calibration files here. If necessary, a calibration history will be inserted in the package prior to the appropriate Form 6.

Diphenylamine has now superseded N-Nitroso-diphenylamine as a CCC on Quantitation Reports, Initial Calibration Reports, Calibration Check Standard Reports, etc. Previous versions of EPA Method 8270 (prior to 8270C) listed N-Nitroso-diphenylamine as a CCC. However, as stated in EPA Method 8270C, Revision 3, December, 1996, Section 1.4.5, "N-Nitroso-diphenylamine decomposes in the gas chromatographic inlet and cannot be separated from Diphenylamine." Studies of these two compounds at GEL, both independent of each other and together, show that they not only coelute, but also have similar mass spectra. N-Nitroso-diphenylamine and Diphenylamine will be reported as Diphenylamine on all reports and forms.

When calibrations are performed for Appendix IX compounds some of the compounds may not be calibrated exactly according to the criteria in Method 8270C. If the %RSD is greater than 15% or the correlation coefficient is less than 0.99 then the analyte is quantitated using the response factor. If the analyte is detected then the sample is reanalyzed for that analyte on an instrument that is compliant with the criteria in the method.

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

### **CCV Requirements**

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

### **Quality Control (QC) Information**

#### **Surrogate Recoveries**

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

#### **Blank Acceptance**

Target analytes were detected in the blank below the reporting limit.

#### **LCS Recovery Statement**

The laboratory control sample (LCS) spike recoveries 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:  
66454009(059775-002).

**MS Recovery Statement**

The matrix spike (MS) 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.

**Additional Comments**

No additional comments are needed for this SDG.

### System Configuration

The laboratory utilizes a HP 6890 Series gas chromatograph and a HP 5973 Mass Selective Detector. The configuration is equipped with the electronic pressure control. All MS interfaces are capillary direct.

### Chromatographic Columns

Chromatographic separation of semivolatile components is accomplished through analysis on one or more of the following columns (all with dimensions of 30 meters x 0.25 millimeters ID and 0.25 micron film except J&W DB-5MS2 which is 25 meters x 0.20 mm ID and 0.33 micron film):

<b>Column ID</b>	<b>Column Description</b>
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: HERBERT L. WENZ Date: 09/26/02

## QC Summary

Report Date: September 25, 2002

Page 1 of 4

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

Contact: Pamela M. Prissant

Workorder: 66454

Parname	NOM	Sample	Qual	QC	Units	RPF%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-GC/MS Federal											
Batch 199277											
QC1200295104 LCS											
1,2,4-Trichlorobenzene	1670			742	ug/kg		45	(27%-91%)	CAK	09/09/02	15:15
1,4-Dichlorobenzene	1670			511	ug/kg		31	(25%-85%)			
2,4,5-Trichlorophenol	3330			2250	ug/kg		68	(42%-96%)			
2,4,6-Trichlorophenol	3330			1890	ug/kg		57	(32%-91%)			
2,4-Dinitrotoluene	1670			1240	ug/kg		75	(50%-109%)			
2-Chlorophenol	3330			1360	ug/kg		41	(31%-85%)			
4-Chloro-3-methylphenol	3330			2020	ug/kg		61	(34%-97%)			
4-Nitrophenol	3330			1980	ug/kg		59	(22%-128%)			
Acenaphthene	1670			1050	ug/kg		63	(39%-98%)			
Hexachlorobenzene	1670			1260	ug/kg		76	(41%-105%)			
Hexachlorobutadiene	1670			693	ug/kg		42	(21%-94%)			
Hexachloroethane	1670			462	ug/kg		28	(25%-86%)			
N-Nitrosodipropylamine	1670			731	ug/kg		44	(34%-90%)			
Nitrobenzene	1670			689	ug/kg		41	(30%-84%)			
Pentachlorophenol	3330			2570	ug/kg		77	(27%-109%)			
Phenol	3330			1500	ug/kg		45	(31%-83%)			
Pyrene	1670			1130	ug/kg		68	(37%-110%)			
m,p-Cresols	3330			1740	ug/kg		52	(40%-83%)			
o-Cresol	3330			1660	ug/kg		50	(34%-86%)			
**2,4,6-Tribromophenol	3330			2610	ug/kg		78	(23%-111%)			
**2-Fluorobiphenyl	1670			858	ug/kg		52	(21%-104%)			
**2-Fluorophenol	3330			1330	ug/kg		40	(22%-93%)			
**Nitrobenzene-d5	1670			624	ug/kg		37	(24%-97%)			
**Phenol-d5	3330			1580	ug/kg		48	(22%-99%)			
**p-Terphenyl-d14	1670			1190	ug/kg		71	(30%-133%)			
QC1200295103 MB											
1,2,4-Trichlorobenzene			U	ND	ug/kg					09/09/02	21:48
1,2-Dichlorobenzene			U	ND	ug/kg						
1,3-Dichlorobenzene			U	ND	ug/kg						
1,4-Dichlorobenzene			U	ND	ug/kg						
2,4,5-Trichlorophenol			U	ND	ug/kg						
2,4,6-Trichlorophenol			U	ND	ug/kg						
2,4-Dichlorophenol			U	ND	ug/kg						
2,4-Dimethylphenol			U	ND	ug/kg						
2,4-Dinitrophenol			U	ND	ug/kg						
2,4-Dinitrotoluene			U	ND	ug/kg						
2,6-Dinitrotoluene			U	ND	ug/kg						
2-Chloronaphthalene			U	ND	ug/kg						
2-Chlorophenol			U	ND	ug/kg						
2-Methyl-4,6-dinitrophenol			U	ND	ug/kg						
2-Methylnaphthalene			U	ND	ug/kg						
2-Nitrophenol			U	ND	ug/kg						

## QC Summary

Workorder: 66454

Page 2 of 4

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Ankt	Date	Time
Semi-Volatiles-GC/MS Federal											
Batch 199277											
3,3'-Dichlorobenzidine			U	ND	ug/kg						
4-Bromophenylphenylether			U	ND	ug/kg						
4-Chloro-3-methylphenol			U	ND	ug/kg						
4-Chloroaniline			U	ND	ug/kg						
4-Chlorophenylphenylether			U	ND	ug/kg						
4-Nitrophenol			U	ND	ug/kg						
Acenaphthene			U	ND	ug/kg						
Acenaphthylene			U	ND	ug/kg						
Anthracene			U	ND	ug/kg						
Benzo(a)anthracene			U	ND	ug/kg						
Benzo(a)pyrene			U	ND	ug/kg						
Benzo(b)fluoranthene			U	ND	ug/kg						
Benzo(ghi)perylene			U	ND	ug/kg						
Benzo(k)fluoranthene			U	ND	ug/kg						
Butylbenzylphthalate			U	ND	ug/kg						
Carbazole			U	ND	ug/kg						
Chrysene			U	ND	ug/kg						
Di-n-butylphthalate			U	ND	ug/kg						
Di-n-octylphthalate			U	ND	ug/kg						
Dibenzo(a,h)anthracene			U	ND	ug/kg						
Dibenzofuran			U	ND	ug/kg						
Diethylphthalate			U	ND	ug/kg						
Dimethylphthalate			U	ND	ug/kg						
Diphenylamine			U	ND	ug/kg						
Fluoranthene			U	ND	ug/kg						
Fluorene			U	ND	ug/kg						
Hexachlorobenzene			U	ND	ug/kg						
Hexachlorobutadiene			U	ND	ug/kg						
Hexachlorocyclopentadiene			U	ND	ug/kg						
Hexachloroethane			U	ND	ug/kg						
Indeno(1,2,3-cd)pyrene			U	ND	ug/kg						
Isophorone			U	ND	ug/kg						
N-Nitrosodipropylamine			U	ND	ug/kg						
Naphthalene			U	ND	ug/kg						
Nitrobenzene			U	ND	ug/kg						
Pentachlorophenol			U	ND	ug/kg						
Phenanthrene			U	ND	ug/kg						
Phenol			U	ND	ug/kg						
Pyrene			U	ND	ug/kg						
bis(2-Chloroethoxy)methane			U	ND	ug/kg						
bis(2-Chloroethyl) ether			U	ND	ug/kg						
bis(2-Chloroisopropyl)ether			U	ND	ug/kg						
bis(2-Ethylhexyl)phthalate			J	89.0	ug/kg						
m,p-Cresols			U	ND	ug/kg						
m-Nitroaniline			U	ND	ug/kg						
o-Cresol			U	ND	ug/kg						
o-Nitroaniline			U	ND	ug/kg						
p-Nitroaniline			U	ND	ug/kg						

## QC Summary

Workorder: 66454

Page 3 of 4

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-GC/MS Federal											
Batch 199277											
**2,4,6-Tribromophenol	3330			2050	ug/kg		62	(23%-111%)			
**2-Fluorobiphenyl	1670			805	ug/kg		48	(21%-104%)			
**2-Fluorophenol	3330			1590	ug/kg		48	(22%-93%)			
**Nitrobenzene-d5	1670			689	ug/kg		41	(24%-97%)			
**Phenol-d5	3330			1360	ug/kg		41	(22%-99%)			
**p-Terphenyl-d14	1670			1180	ug/kg		71	(30%-133%)			
QC1200295105 66454009 MS											
1,2,4-Trichlorobenzene	1670	U	ND	785	ug/kg		47	(15%-112%)		09/09/02	16:51
1,4-Dichlorobenzene	1670	U	ND	624	ug/kg		37	(19%-89%)			
2,4,5-Trichlorophenol	3330	U	ND	2650	ug/kg		80				
2,4,6-Trichlorophenol	3330	U	ND	2060	ug/kg		62				
2,4-Dinitrotoluene	1670	U	ND	1390	ug/kg		83	(32%-117%)			
2-Chlorophenol	3330	U	ND	1660	ug/kg		50	(13%-101%)			
4-Chloro-3-methylphenol	3330	U	ND	2410	ug/kg		72	(23%-114%)			
4-Nitrophenol	3330	U	ND	2150	ug/kg		65	(20%-126%)			
Acenaphthene	1670	U	ND	1040	ug/kg		62	(15%-114%)			
Hexachlorobenzene	1670	U	ND	1400	ug/kg		84				
Hexachlorobutadiene	1670	U	ND	786	ug/kg		47				
Hexachloroethane	1670	U	ND	555	ug/kg		33				
N-Nitrosodipropylamine	1670	U	ND	826	ug/kg		50	(18%-106%)			
Nitrobenzene	1670	U	ND	803	ug/kg		48				
Pentachlorophenol	3330	U	ND	2860	ug/kg		86	(34%-110%)			
Phenol	3330	U	ND	1740	ug/kg		52	(17%-104%)			
Pyrene	1670	U	ND	1310	ug/kg		78	(26%-130%)			
m,p-Cresols	3330	U	ND	1890	ug/kg		57				
o-Cresol	3330	U	ND	2010	ug/kg		60				
**2,4,6-Tribromophenol	3330			2950	ug/kg		88	(23%-111%)			
**2-Fluorobiphenyl	1670			819	ug/kg		49	(21%-104%)			
**2-Fluorophenol	3330			1680	ug/kg		50	(22%-93%)			
**Nitrobenzene-d5	1670			709	ug/kg		43	(24%-97%)			
**Phenol-d5	3330			1740	ug/kg		52	(22%-99%)			
**p-Terphenyl-d14	1670			1350	ug/kg		81	(30%-133%)			
QC1200295106 66454009 MSD											
1,2,4-Trichlorobenzene	1670	U	ND	742	ug/kg	6	45	(0%-31%)		09/09/02	17:10
1,4-Dichlorobenzene	1670	U	ND	547	ug/kg	13	33	(0%-36%)			
2,4,5-Trichlorophenol	3330	U	ND	2450	ug/kg	8	73				
2,4,6-Trichlorophenol	3330	U	ND	1990	ug/kg	4	60				
2,4-Dinitrotoluene	1670	U	ND	1330	ug/kg	5	80	(0%-37%)			
2-Chlorophenol	3330	U	ND	1600	ug/kg	3	48	(0%-34%)			
4-Chloro-3-methylphenol	3330	U	ND	2390	ug/kg	1	72	(0%-34%)			
4-Nitrophenol	3330	U	ND	2470	ug/kg	14	74	(0%-35%)			
Acenaphthene	1670	U	ND	925	ug/kg	11	56	(0%-33%)			
Hexachlorobenzene	1670	U	ND	1330	ug/kg	5	80				
Hexachlorobutadiene	1670	U	ND	702	ug/kg	11	42				
Hexachloroethane	1670	U	ND	480	ug/kg	14	29				
N-Nitrosodipropylamine	1670	U	ND	775	ug/kg	6	47	(0%-29%)			
Nitrobenzene	1670	U	ND	738	ug/kg	9	44				
Pentachlorophenol	3330	U	ND	2590	ug/kg	10	78	(0%-40%)			

## QC Summary

Workorder: 66454

Page 4 of 4

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Ansl	Date	Time
Semi-Volatiles-GC/MS Federal											
Batch 199277											
Phenol	3330	U	ND	1650	ug/kg	5	50	(0%-37%)			
Pyrene	1670	U	ND	1210	ug/kg	8	75	(0%-39%)			
m,p-Cresols	3330	U	ND	1790	ug/kg	6	54				
o-Cresol	3330	U	ND	1850	ug/kg	8	56				
**2,4,6-Tribromophenol	3330			2900	ug/kg		87	(23%-111%)			
**2-Fluorobiphenyl	1670			792	ug/kg		48	(21%-104%)			
**2-Fluorophenol	3330			1570	ug/kg		47	(22%-93%)			
**Nitrobenzene-d5	1670			666	ug/kg		40	(24%-97%)			
**Phenol-d5	3330			1680	ug/kg		51	(22%-99%)			
**p-Terphenyl-d14	1670			1260	ug/kg		76	(30%-133%)			

**Notes:**

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

The Qualifiers in this report are defined as follows:

- \* Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where 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. 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.



**HPLC Narrative  
Sandia National Labs (SNLS)  
SDG 66454**

**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:** 199935  
**Prep Batch Number:** 199934

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
66454009	059775-002
66454010	059776-002
66454011	059777-002
66454012	059778-002
66454013	059779-002
66454014	059780-002
66454015	059781-002
66454016	059782-002
1200296584	XBLK01 (Blank)
1200296585	XBLK01LCS (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**

One of the required spiking analytes was not within the SNLS 80-120 acceptance limits in the laboratory control sample (LCS). 4-Amino-2,6DNT failed at 79.9% but passed the GEL SPC limit. The SPC limits are on the Certificate of Analysis. The data is reported per the client without reextraction. Please see the email in the Miscellaneous Section. Please see nonconformance report 4307.

### **QC Sample Designation**

A matrix spike was performed on a client sample in SDG 66610

### **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**

Nonconformance report 4307 was generated for this SDG.

One of the required spiking analytes was not within the SNLS 80-120 acceptance limits in the laboratory control sample (LCS). 4-Amino-2,6DNT failed at 79.9% but passed the GEL SPC limit. The SPC limits are on the Certificate of Analysis. The data is reported per the client without reextraction. Please see the email in the Miscellaneous Section. Please see nonconformance report 4307.

#### **Manual Integration**

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

#### **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.

### Certification Statement

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

#### **Review Validation:**

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

Reviewer: Herbert Maller Date: 10/01/02

## QC Summary

Report Date: October 1, 2002

Page 1 of 2

Client : Sandia National Laboratories  
 MS-0756  
 P.O. Box 5800  
 Albuquerque, New Mexico  
 Contact: Pamela M. Puissant  
 Workorder: 66454

Parmaame	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>HPLC Explosives Federal</b>											
Batch	199935										
QC1200296585	LCS										
1,3,5-Trinitrobenzene	800			723	ug/kg		90	(77%-124%)	JLW	09/14/02	21:57
2,4,6-Trinitrotoluene	800			735	ug/kg		92	(80%-120%)			
2,4-Dinitrotoluene	800			693	ug/kg		87	(77%-122%)			
2,6-Dinitrotoluene	800			740	ug/kg		93	(74%-121%)			
2-Amino-4,6-dinitrotoluene	800			711	ug/kg		89	(81%-125%)			
4-Amino-2,6-dinitrotoluene	800			639	ug/kg		80	(79%-123%)			
HMX	800			776	ug/kg		97	(84%-131%)			
Nitrobenzene	800			684	ug/kg		86	(75%-125%)			
RDX	800			755	ug/kg		94	(80%-123%)			
Tetryl	800			586	ug/kg		73	(65%-124%)			
m-Dinitrobenzenc	800			717	ug/kg		90	(77%-124%)			
m-Nitrotoluene	800			689	ug/kg		86	(77%-117%)			
o-Nitrotoluene	800			688	ug/kg		86	(75%-119%)			
p-Nitrotoluene	800			701	ug/kg		88	(76%-121%)			
**1,2-dinitrobenzene	400			373	ug/kg		93	(71%-118%)			
QC1200296584	MB										
1,3,5-Trinitrobenzene			U	ND	ug/kg					09/14/02	21:16
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			378	ug/kg		94	(71%-118%)			
QC1200296586	66610009 MS										
1,3,5-Trinitrobenzene	800	U	ND	760	ug/kg		95	(66%-133%)		09/14/02	23:21
2,4,6-Trinitrotoluene	800	U	ND	761	ug/kg		95	(77%-132%)			
2,4-Dinitrotoluene	800	U	ND	744	ug/kg		93	(61%-134%)			
2,6-Dinitrotoluene	800	U	ND	811	ug/kg		101	(70%-121%)			
2-Amino-4,6-dinitrotoluene	800	U	ND	729	ug/kg		91	(79%-124%)			
4-Amino-2,6-dinitrotoluene	800	U	ND	629	ug/kg		79	(71%-120%)			
HMX	800	U	ND	789	ug/kg		99	(75%-138%)			
Nitrobenzene	800	U	ND	732	ug/kg		92	(72%-120%)			
RDX	800	U	ND	760	ug/kg		95	(61%-136%)			
Tetryl	800	U	ND	654	ug/kg		82	(65%-135%)			

## QC Summary

Workorder: 66454

Page 2 of 2

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anst	Date	Time
HPLC Explosives Federal											
Batch 199935											
m-Dinitrobenzene	800	U	ND	770	ug/kg		96	(75%-125%)			
m-Nitrotoluene	800	U	ND	741	ug/kg		93	(73%-116%)			
o-Nitrotoluene	800	U	ND	740	ug/kg		93	(68%-122%)			
p-Nitrotoluene	800	U	ND	769	ug/kg		96	(67%-125%)			
**1,2-dinitrobenzene	800		377	726	ug/kg		91	(71%-118%)			
QC1200296587 66610009 MSD											
1,3,5-Trinitrobenzene	800	U	ND	797	ug/kg	5	100	(0%-20%)		09/15/02	00:03
2,4,6-Trinitrotoluene	800	U	ND	805	ug/kg	6	101	(0%-20%)			
2,4-Dinitrotoluene	800	U	ND	777	ug/kg	4	97	(0%-24%)			
2,6-Dinitrotoluene	800	U	ND	845	ug/kg	4	106	(0%-21%)			
2-Amino-4,6-dinitrotoluene	800	U	ND	757	ug/kg	4	95	(0%-20%)			
4-Amino-2,6-dinitrotoluene	800	U	ND	631	ug/kg	0	79	(0%-20%)			
HMX	800	U	ND	825	ug/kg	4	103	(0%-38%)			
Nitrobenzene	800	U	ND	759	ug/kg	4	95	(0%-21%)			
RDX	800	U	ND	788	ug/kg	4	99	(0%-35%)			
Tetryl	800	U	ND	663	ug/kg	1	83	(0%-30%)			
m-Dinitrobenzene	800	U	ND	814	ug/kg	5	102	(0%-23%)			
m-Nitrotoluene	800	U	ND	764	ug/kg	3	96	(0%-20%)			
o-Nitrotoluene	800	U	ND	763	ug/kg	3	95	(0%-23%)			
p-Nitrotoluene	800	U	ND	786	ug/kg	2	98	(0%-22%)			
**1,2-dinitrobenzene	400		377	454	ug/kg		113	(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 ti
- \*\* 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.

**PCB Case Narrative  
Sandia National Labs (SNLS)  
SDG 66454**

**Method/Analysis Information**

**Procedure:** Polychlorinated Biphenyls by Method 8082  
**Analytical Method:** SW846 8082  
**Prep Method:** SW846 3550B  
**Analytical Batch Number:** 199271  
**Prep Batch Number:** 199270

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
66454009	059775-002
66454010	059776-002
66454011	059777-002
66454012	059778-002
66454013	059779-002
66454014	059780-002
66454015	059781-002
66454016	059782-002
1200295091	PBLK01(method Blank)
1200295092	PBLK01LCS(Laboratory Control Sample)
1200295093	059781-002MS(Matrix Spike)
1200295094	059781-002MSD(Matrix Spike Duplicate)

## System Configuration

### Chromatographic Columns

Column ID	Column Description
J&W1	DB-5(5%-Phenyl)-methylsiloxane 30m x 0.53mm x 1.5um DB-608 Durabond stationary phase* 30m x 0.53mm x 0.5um
J&W2	DB-5(5%-Phenyl)-methylsiloxane 30m x 0.32mm x 1.0um DB-1701 Durabond stationary phase* 30m x 0.32mm x 0.5um
J&W3	DB-5(5%-Phenyl)-methylsiloxane 30m x 0.53mm x 1.5um DB-1701(14% Cyanopropylphenyl)-methylsiloxane 30m x 0.53mm x 0.5um
J&W4	DB-608 Durabond stationary phase* 30m x 0.53mm x .83um DB-XLB* 30m x 0.53mm x 1.5um
J&W5	DB-XLB* 30m x 0.25mm x 0.25um DB-17MS(50%-Phenyl)-methylsiloxane 30m x 0.25mm x 0.25um
J&W6	DB-5(5%-Phenyl)-methylsiloxane 30m x 0.25mm x 0.25um DB-17MS(50%-Phenyl)-methylsiloxane 30m x 0.25mm x 0.25um
RESTEK	Rtx-CLPesticides 30m x 0.25mm x 0.25um Rtx-CLPesticides II 30m x 0.25mm x 0.20um

\* Durabond and DB-XLB are trademarks of J & W.

### Instrument Configuration

The samples reported in this SDG were analyzed on one or more of the following instrument systems. Instrument systems are referenced in the raw data and individual form headers by the Instrument ID designations listed below.

Instrument ID	System Configuration	Chromatographic Column
ECD1	HP 6890 Series GC ECD/ECD	RESTEK
ECD2	HP 6890 Series GC ECD/ECD	RESTEK
ECD3	HP 6890 Series GC ECD/ECD	RESTEK
ECD4	HP 5890 Series II Plus GC ECD/ECD	J&W5
ECD5	HP 6890 Series GC ECD/ECD	J&W5
ECD7	HP 6890 Series GC ECD/ECD	J&W5
ECD8	HP 6890 Series GC ECD/ECD	RESTEK

SNLS SDG#66454 - PCB



### Preparation/Analytical Method Verification

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

### Calibration Information

#### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

#### **CVS Requirements**

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

### Quality Control (QC) Information

#### **Surrogate Recoveries**

All the surrogate recoveries were not within the established acceptance criteria for this SDG. The surrogate recovery for sample 66459010 was outside the surrogate recovery criteria due to dilution.

#### **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>
059781-002	66454015

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.

SNLS SDG#66454 - PCB

## Technical Information

### **Holding Time Specifications**

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

### **Preparation/Analytical Method Verification**

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

### **Sample Dilutions**

The following sample was diluted due to the presence of over range target analytes in the sample:

Sample ID	Dilutions
66454010	5X

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

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

## Miscellaneous Information

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

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

### **Manual Integrations**

Certain standards and 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". Some samples contained more than one PCB. The quantitation of PCB may be elevated due to overlapping PCB patterns.

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

**Review Validation:**

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

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

Reviewer: Jimi Cao Date: 9/26/02

## QC Summary

Report Date: September 26, 2002

Page 1 of 2

Client : Sandia National Laboratories  
 MS-0756  
 P.O. Box 5800  
 Albuquerque, New Mexico  
 Contact: Pamela M. Puissant  
 Workorder: 66454

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-PCB Federal											
Batch 199271											
QC1200295092	LCS										
Aroclor-1260	33.3			25.9	ug/kg		78	(48%-116%)	GH1	09/13/02	15:49
**4cmx	6.67			4.77	ug/kg		72	(31%-120%)			
**Decachlorobiphenyl	6.67			5.10	ug/kg		77	(34%-115%)			
QC1200295091	MB										
Aroclor-1016			U	ND	ug/kg					09/13/02	15:37
Aroclor-1221			U	ND	ug/kg						
Aroclor-1232			U	ND	ug/kg						
Aroclor-1242			U	ND	ug/kg						
Aroclor-1248			U	ND	ug/kg						
Aroclor-1254			U	ND	ug/kg						
Aroclor-1260			U	ND	ug/kg						
**4cmx	6.67			4.64	ug/kg		70	(31%-120%)			
**Decachlorobiphenyl	6.67			5.30	ug/kg		80	(34%-115%)			
QC1200295093	66454015	MS									
Aroclor-1260	33.3	U	ND	28.1	ug/kg		84	(36%-134%)		09/13/02	18:51
**4cmx	6.67			4.30	ug/kg		65	(31%-120%)			
**Decachlorobiphenyl	6.67			5.99	ug/kg		90	(34%-115%)			
QC1200295094	66454015	MSD									
Aroclor-1260	33.3	U	ND	27.3	ug/kg	3	82	(0%-30%)		09/13/02	19:04
**4cmx	6.67			4.68	ug/kg		70	(31%-120%)			
**Decachlorobiphenyl	6.67			5.06	ug/kg		76	(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 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. )
- 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: 66454

Page 2 of 2

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

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

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

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

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

**Inorganic Case Narrative for  
Sandia National Laboratory  
SDG# 66454**

**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>
66454009	059775-002
66454010	059776-002
66454011	059777-002
66454012	059778-002
66454013	059779-002
66454014	059780-002
66454015	059781-002
66454016	059782-002
1200295257	Method Blank (MB) ICP-199346/ 199345
1200295261	Laboratory Control Sample (LCS)
1200295259	059775-002L (66454009) Serial Dilution (SD)
1200295258	059775-002D (66454009) Sample Duplicate (DUP)
1200295260	059775-002S (66454009) Matrix Spike (MS)
1200295327	Method Blank (MB) CVAA-199386/199385
1200295330	Laboratory Control Sample (LCS)

**Method/Analysis Information:**

<b>Analytical Batch #:</b>	199346, 199386
<b>Prep Batch #:</b>	199345, 199385
<b>Standard Operating Procedure:</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

**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 except selenium.

#### **Continuing Calibration (CCV) Requirements**

All CCV standards associated with samples from this SDG met the established recovery acceptance criteria.

#### **Continuing Calibration Blanks (CCB) Requirements**

All continuing calibration blanks (CCB) associated with samples from this SDG met the established acceptance criteria.

#### **ICSA/ICSAB Requirements**

All interference check standard (ICSA and ICSAB) elements associated with this SDG met the established acceptance criteria.

### **Quality Control (QC) Information:**

#### **Method Blank Acceptance**

The preparation blanks analyzed with this SDG did not contain analytes of interest at concentrations greater than the required detection limits (RDL).

#### **LCS Recovery Statement**

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

#### **QC Sample Designation**

Sample 059775-002(66454009) was designated as the quality control sample for the ICP batch. Sample 059710-002(66195002) from SNLS SDG 66189-1 was designated as the quality control sample for ICP and the CVAA batches. Each batch included a sample duplicate (DUP) and a matrix spike (MS). The ICP batch included a serial dilution (SD).

#### **MS Recovery Statement**

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

#### **RPD Statement**

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

#### **Serial Dilution % Difference Statement**

The serial dilution is used to assess interference caused by matrix suppression or enhancement. Raw





## QC Summary

Report Date: September 27, 2002

Page 1 of 2

Client : Sandia National Laboratories  
 MS-0756  
 P.O. Box 5800  
 Albuquerque, New Mexico  
 Contact: Pamela M. Puissant  
 Workorder: 66454

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP Federal											
Batch 199346											
QC1200295258 66454009 DUP											
Arsenic		3.03		6.14	mg/kg	68*		(0%-20%)	HSC	09/23/02	22:44
Barium		59.2		58.6	mg/kg	1		(0%-20%)			
Cadmium	J	0.151	J	0.281	mg/kg	N/A ^		(+/-0.495)			
Chromium		12.3		24.9	mg/kg	68*		(0%-20%)			
Lead		22.2		70.2	mg/kg	104*		(0%-20%)			
Selenium	U	ND	J	0.380	mg/kg	N/A		(+/-0.495)			
Silver		184		241	mg/kg	27*		(0%-20%)		09/25/02	22:43
QC1200295261 LCS											
Arsenic	132			138	mg/kg		104	(79%-121%)		09/23/02	22:26
Barium	781			813	mg/kg		104	(80%-120%)			
Cadmium	51.5			53.1	mg/kg		103	(81%-119%)			
Chromium	142			149	mg/kg		105	(77%-123%)			
Lead	52.9			59.4	mg/kg		112	(78%-123%)			
Selenium	60.9			66.1	mg/kg		109	(72%-128%)			
Silver	125			138	mg/kg		111	(55%-145%)			
QC1200295257 MB											
Arsenic			U	ND	mg/kg					09/23/02	22:20
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						
QC1200295260 66454009 MS											
Arsenic	24.3	3.03		27.3	mg/kg		100	(75%-125%)		09/23/02	22:50
Barium	24.3	59.2		82.9	mg/kg		98	(75%-125%)			
Cadmium	24.3	J 0.151		23.5	mg/kg		96	(75%-125%)			
Chromium	24.3	12.3		40.0	mg/kg		114	(75%-125%)			
Lead	24.3	22.2		49.9	mg/kg		114	(75%-125%)			
Selenium	24.3	U ND		23.1	mg/kg		94	(75%-125%)			
Silver	24.3	184		217	mg/kg		N/A	(75%-125%)		09/25/02	22:49
QC1200295259 66454009 SDILT											
Arsenic		31.5		5.53	ug/L	12.3				09/23/02	22:38
Barium		616		121	ug/L	1.53					
Cadmium	J	1.58	U	ND	ug/L	N/A					
Chromium		128		26.2	ug/L	1.93					
Lead		231		46.9	ug/L	1.55					
Selenium	U	ND	J	2.86	ug/L	N/A					
Silver		383		74.1	ug/L	3.26				09/25/02	22:37
Metals Analysis-Mercury Federal											
Batch 199386											
QC1200295328 66195002 DUP											

## QC Summary

Workorder: 66454

Page 2 of 2

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

**Notes:**

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

The Qualifiers in this report are defined as follows:

- \* Recovery or %RPD not within acceptance limits and/or spike amount not 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.

General Chemistry Narrative  
Sandia National Labs (SNLS)  
SDG 66454

Method/Analysis Information

<b>Procedure:</b>	<b>Total Cyanide</b>
Analytical Method:	SW846 9012A
Prep Method:	SW846 9010B Prep
Analytical Batch Number:	199408
Prep Batch Number:	199407

Sample Analysis

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

<b>Sample ID</b>	<b>Client ID</b>
66454009	059775-002
66454010	059776-002
66454011	059777-002
66454012	059778-002
66454013	059779-002
66454014	059780-002
66454015	059781-002
66454016	059782-002
1200295377	MB for batch 199408
1200295378	LCS for batch 199408
1200295379	DUP of 66454009
1200295380	MS of 66454009
1200295392	LCS for batch 199407

## **SOP Reference**

Procedure(s) for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure(s) (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-095 Rev. 1.

## **Preparation/Analytical Method Verification**

The SOP stated above has been prepared based on technical research and testing conducted by General Engineering Laboratories, Inc. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

## **Calibration Information:**

The instrument used in this analysis was the following: Lachat QuickChem FIA+

### **Initial Calibration**

The instrument was properly calibrated.

### **Calibration Verification Information**

All calibration verification standards were within the required limits.

## **Quality Control (QC) Information:**

### **Blank Acceptance**

The method and calibration blanks associated with this data were within the required acceptance limits.

### **Laboratory Control Sample Recovery**

The recovery for the laboratory control sample was within the required acceptance limits.

### **Quality Control**

The following sample was designated for Quality Control: 66454009.

### **Sample Spike Recovery**

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

### **Sample Duplicate Acceptance**

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

**Technical Information:**

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

**Holding Times**

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

**Preparation/Analytical Method Verification**

All procedures were performed as stated in the SOP.

**Sample Dilutions**

The following QC sample in this sample group was diluted 1:50 due to high concentration for this analysis: 1200295392.

**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:** 200893  
**Prep Batch Number:** 200892

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
66454009	059775-002
66454010	059776-002
66454011	059777-002
66454012	059778-002
66454013	059779-002
66454014	059780-002
66454015	059781-002
66454016	059782-002
1200298925	MB for batch 200893
1200298926	DUP of 66454009
1200298927	DUP of 66610011
1200298928	MS of 66454009
1200298929	MS of 66610011
1200298930	LCS for batch 200893

## **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 SNLS samples were designated for Quality Control: 66454009, 66610011.

### **Sample Spike Recovery**

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

### **Sample Duplicate Acceptance**

The values for the sample and duplicate for sample 66610011 are less than the Practical Quantitation Limit (PQL); therefore, the RPD is not applicable. The Relative Percent Difference between the sample and duplicate for sample 66454009 was within the required acceptance limits.

**Technical Information:**

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

**Holding Times**

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

**Preparation/Analytical Method Verification**

All procedures were performed as stated in the SOP.

**Sample Dilutions**

No samples in this sample group required dilutions.

**Miscellaneous Information:**

**Nonconformance Reports**

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: 9/24/0



## QC Summary

Report Date: September 25, 2002

Page 1 of 2

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

Contact: Pamela M. Poissant

Workorder: 66454

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rapid Flow Analysis Federal											
Batch 199408											
QC1200295379	66454009	DUP									
Cyanide, Total		J	0.0573	J	0.0664	mg/kg	N/A ^	(+/-0.208)	ADF	09/09/02	10:27
QC1200295378	LCS										
Cyanide, Total	2.50				2.27	mg/kg		91 (81%-125%)		09/09/02	10:23
QC1200295392	LCS										
Cyanide, Total	277				286	mg/kg		103 (81%-125%)		09/09/02	10:25
QC1200295377	MB										
Cyanide, Total				U	ND	mg/kg				09/09/02	10:22
QC1200295380	66454009	MS									
Cyanide, Total	4.17	J	0.0573		4.27	mg/kg		101 (55%-145%)		09/09/02	10:28
Spectrometric Analysis Federal											
Batch 200893											
QC1200298926	66454009	DUP									
Hexavalent Chromium			0.454		0.412	mg/kg	10 ^	(+/-0.0959)	BEP2	09/21/02	07:00
QC1200298927	66610011	DUP									
Hexavalent Chromium		J	0.0704	J	0.0593	mg/kg	N/A ^	(+/-0.0988)			
QC1200298930	LCS										
Hexavalent Chromium	0.971				0.932	mg/kg		96 (72%-121%)			
QC1200298925	MB										
Hexavalent Chromium				U	ND	mg/kg					
QC1200298928	66454009	MS									
Hexavalent Chromium	1.01		0.454		1.54	mg/kg		108 (49%-130%)			
QC1200298929	66610011	MS									
Hexavalent Chromium	0.998	J	0.0704		0.928	mg/kg		86 (49%-130%)			

**Notes:**

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

The Qualifiers in this report are defined as follows:

- \* Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where it
- \*\* Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- H Holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
- P The response between the confirmation column and the primary column is >40%D
- U The analyte was analyzed for but not detected below this concentration. For Organic and Inorganic analytes the result is less than the effective MDL. 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: 66454

Page 2 of 2

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

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

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

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

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

**Radiochemistry Case Narrative  
Sandia National Labs (SNLS)  
Workorder 66454**

**Method/Analysis Information**

Batch Number: 200142  
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>
66454009	059775-002
66454010	059776-002
66454011	059777-002
66454012	059778-002
66454013	059779-002
66454014	059780-002
66454015	059781-002
66454016	059782-002
1200297097	MB for batch 200142
1200297098	059710-002(66195002DUP)
1200297099	059710-002(66195002MS)
1200297100	059710-002(66195002MSD)
1200297101	LCS for batch 200142

**SOP Reference**

Procedure(s) for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure(s) (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-001 REV.6.

**Calibration Information:**

**Calibration Information**

All initial and continuing calibration requirements have been met. The initial calibration was performed on June 13, 2002.

**Standards Information**

Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

**Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

**Quality Control (QC) Information:**

**Blank Information**

The blank volume is representative of the sample volume(s) in this batch.

**Designated QC**

The following sample(s) was used for QC: 66195002. The QC sample is from SNLS work order 66195.

**QC Information**

All of the QC samples met the required acceptance limits.

**Technical Information:**

**Holding Time**

All sample procedures for this sample set were performed within the required holding time.

**Preparation Information**

All preparation criteria have been met for these analyses.

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

None of the samples in this sample set required reprep or reanalysis.

**Gross Alpha/Beta Preparation Information**

High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating, especially to a dull red heat. For this sample set, the prepared planchet was counted for beta activity before being flamed. After flaming, the planchet was counted for alpha activity. This sequence causes the alpha count run data to record over the beta count run data in AlphaLims, therefore only the alpha count data will appear on the instrument runlog.

**Miscellaneous Information:****NCR Documentation**

No NCR were generated for the preparation or analysis of this sample set.

**Additional Comments**

Sample 66454016 did not meet the beta required detection limit. No more volume could be used due to not exceeding the maximum net weight limit. The samples counted for 500 min.

**Comments**

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

**Review Validation:**

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

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

Reviewer: \_\_\_\_\_

*M. Moore*

Date: \_\_\_\_\_

*25 Sep 2002*



# GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

## QC Summary

Report Date: September 25, 2002  
Page 1 of 2

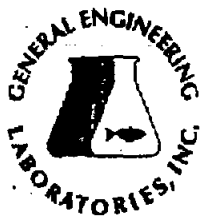
Client : Sandia National Laboratories  
MS-0756  
P.O. Box 5800  
Albuquerque, New Mexico  
Contact: Pamela M. Pussant  
Workorder: 66454

Paramname	NOM	Sample Qual	QC	Units	RER	REC%	Range	Asst	Date Time		
Gravimetric Solids											
Batch	199224										
QC1200295000	66454009	DOP									
Moisture		3.90	3.59	percent	8		(0%-24%)	MLA	09/04/02 14:30		
Rad Gas Flow											
Batch	200142										
QC1200297098	66195002	DUP									
Alpha		19.3	20.8	pCi/g	0.271		(0%-20%)	JS1	09/18/02 01:56		
	Uncert:	+/-2.30	+/-2.42								
	TPU:	2.73	2.86								
Beta		20.8	20.5	pCi/g	0.0654		(0%-20%)				
	Uncert:	+/-1.94	+/-2.10								
	TPU:	2.12	2.29								
QC1200297101	LCS										
Alpha	9.89		10.3	pCi/g		104	(75%-125%)		09/18/02 09:53		
	Uncert:		+/-1.10								
	TPU:		1.43								
Beta	39.7		42.2	pCi/g		106	(75%-125%)				
	Uncert:		+/-2.58								
	TPU:		3.07								
QC1200297097	MB										
Alpha		U	0.0251	pCi/g							
	Uncert:		+/-0.145								
	TPU:		0.145								
Beta		U	-0.0009	pCi/g							
	Uncert:		+/-0.139								
	TPU:		0.139								
QC1200297099	66195002	MS									
Alpha	96.9	19.3	97.9	pCi/g		81	(75%-125%)				
	Uncert:	+/-2.30	+/-13.5								
	TPU:	2.73	14.6								
Beta	390	20.8	389	pCi/g		95	(75%-125%)				
	Uncert:	+/-1.94	+/-24.4								
	TPU:	2.12	27.7								
QC1200297100	66195002	MSD									
Alpha	95.1	19.3	94.0	pCi/g		79					
	Uncert:	+/-2.30	+/-13.0								
	TPU:	2.73	13.8								
Beta	382	20.8	380	pCi/g		94					
	Uncert:	+/-1.94	+/-23.9								
	TPU:	2.12	29.3								

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

(843) 556-8171 • Fax (843) 766-1178





# GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

## QC Summary

Workorder: 66454

Page 2 of 2

Parname	NOM	Sample Qual	QC	Units	RER	REC%	Range	Analst	Date Time
---------	-----	-------------	----	-------	-----	------	-------	--------	-----------

**Notes:**

The Qualifiers in this report are defined as follows:

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

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

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

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

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

## GEL QC CROSS REFERENCE

COC 605666

Site #	Site Name	SAMPLE#	F#	DISP_ER_SAMP_LOC	SAMPLE DATE	MATRIX	LAB TEST	BATCH #
1081	Bldg. 6650 SS	059775	001	6650/1081-SP1-BH1-10-S	29-AUG-02	SOIL	VOA-8260	199914
1081	Bldg. 6650 SS	059775	002	6650/1081-SP1-BH1-15-S	29-AUG-02	SOIL	BNA-8270	199277
1081	Bldg. 6650 SS	059775	002	6650/1081-SP1-BH1-15-S	29-AUG-02	SOIL	Cr+6	200893
1081	Bldg. 6650 SS	059775	002	6650/1081-SP1-BH1-15-S	29-AUG-02	SOIL	GROSS-A/B	200142
1081	Bldg. 6650 SS	059775	002	6650/1081-SP1-BH1-15-S	29-AUG-02	SOIL	HE-8330	199935
1081	Bldg. 6650 SS	059775	002	6650/1081-SP1-BH1-15-S	29-AUG-02	SOIL	PCB-8082	199271
1081	Bldg. 6650 SS	059775	002	6650/1081-SP1-BH1-15-S	29-AUG-02	SOIL	RCRA METALS	199346, 199386
1081	Bldg. 6650 SS	059775	002	6650/1081-SP1-BH1-15-S	29-AUG-02	SOIL	TOTAL-CN	199408
1081	Bldg. 6650 SS	059776	001	6650/1081-SP1-BH1-15-S	29-AUG-02	SOIL	VOA-8260	199914
1081	Bldg. 6650 SS	059776	002	6650/1081-SP1-BH1-10-S	29-AUG-02	SOIL	BNA-8270	199277
1081	Bldg. 6650 SS	059776	002	6650/1081-SP1-BH1-10-S	29-AUG-02	SOIL	Cr+6	200893
1081	Bldg. 6650 SS	059776	002	6650/1081-SP1-BH1-10-S	29-AUG-02	SOIL	GROSS-A/B	200142
1081	Bldg. 6650 SS	059776	002	6650/1081-SP1-BH1-10-S	29-AUG-02	SOIL	HE-8330	199935
1081	Bldg. 6650 SS	059776	002	6650/1081-SP1-BH1-10-S	29-AUG-02	SOIL	PCB-8082	199271
1081	Bldg. 6650 SS	059776	002	6650/1081-SP1-BH1-10-S	29-AUG-02	SOIL	RCRA METALS	199346, 199386
1081	Bldg. 6650 SS	059776	002	6650/1081-SP1-BH1-10-S	29-AUG-02	SOIL	TOTAL-CN	199408
1081	Bldg. 6650 SS	059777	001	6650/1081-SP2-BH1-12-S	29-AUG-02	SOIL	VOA-8260	199914
1081	Bldg. 6650 SS	059777	002	6650/1081-SP2-BH1-17-S	29-AUG-02	SOIL	BNA-8270	199277
1081	Bldg. 6650 SS	059777	002	6650/1081-SP2-BH1-17-S	29-AUG-02	SOIL	Cr+6	200893
1081	Bldg. 6650 SS	059777	002	6650/1081-SP2-BH1-17-S	29-AUG-02	SOIL	GROSS-A/B	200142
1081	Bldg. 6650 SS	059777	002	6650/1081-SP2-BH1-17-S	29-AUG-02	SOIL	HE-8330	199935
1081	Bldg. 6650 SS	059777	002	6650/1081-SP2-BH1-17-S	29-AUG-02	SOIL	PCB-8082	199271
1081	Bldg. 6650 SS	059777	002	6650/1081-SP2-BH1-17-S	29-AUG-02	SOIL	RCRA METALS	199346, 199386
1081	Bldg. 6650 SS	059777	002	6650/1081-SP2-BH1-17-S	29-AUG-02	SOIL	TOTAL-CN	199408
1081	Bldg. 6650 SS	059778	001	6650/1081-SP2-BH1-17-S	29-AUG-02	SOIL	VOA-8260	199914
1081	Bldg. 6650 SS	059778	002	6650/1081-SP2-BH1-12-S	29-AUG-02	SOIL	BNA-8270	199277
1081	Bldg. 6650 SS	059778	002	6650/1081-SP2-BH1-12-S	29-AUG-02	SOIL	Cr+6	200893
1081	Bldg. 6650 SS	059778	002	6650/1081-SP2-BH1-12-S	29-AUG-02	SOIL	GROSS-A/B	200142
1081	Bldg. 6650 SS	059778	002	6650/1081-SP2-BH1-12-S	29-AUG-02	SOIL	HE-8330	199935

SDG 66454

## GEL QC CROSS REFERENCE

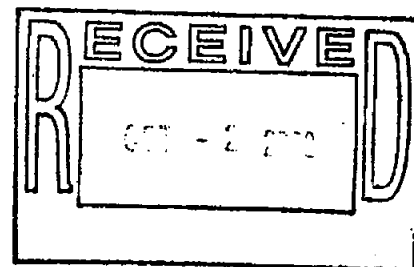
COC 605666

Site #	Site Name	SAMPLE#	F#	DISP_ER_SAMP_LOC	SAMPLE DATE	MATRIX	LAB TEST	BATCH #
1081	Bldg. 6650 SS	059782	002	6650/1081-SP4-BH1-25-S	30-AUG-02	SOIL	Cr+6	200893
1081	Bldg. 6650 SS	059782	002	6650/1081-SP4-BH1-25-S	30-AUG-02	SOIL	GROSS-A/B	200142
1081	Bldg. 6650 SS	059782	002	6650/1081-SP4-BH1-25-S	30-AUG-02	SOIL	HE-8330	199935
1081	Bldg. 6650 SS	059782	002	6650/1081-SP4-BH1-25-S	30-AUG-02	SOIL	PCB-8082	199271
1081	Bldg. 6650 SS	059782	002	6650/1081-SP4-BH1-25-S	30-AUG-02	SOIL	RCRA METALS	199346, 199386
1081	Bldg. 6650 SS	059782	002	6650/1081-SP4-BH1-25-S	30-AUG-02	SOIL	TOTAL-CN	199408
1081	Bldg. 6650 SS	059783	001	6650/1081-SP-TB	30-AUG-02	AQUEOUS	VOA-8260	199493



RECORDS CENTER/  
ORIGINAL COPY

CASE NARRATIVE  
for  
Sandia National Laboratories  
ARCOC-605666  
SDG#66454  
Case No. 7223.02.03.02



October 1, 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 sixteen soil samples and one aqueous sample on August 29<sup>th</sup> and 30<sup>th</sup>, 2002. The samples arrived at General Engineering Laboratories, Inc., (GEL) Charleston, South Carolina on September 4<sup>th</sup>, 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 2.4°C, as measured from the temperature control bottles.

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 laboratory received the following samples:

<u>Laboratory ID</u>	<u>Description</u>
66454001	059775-001
66454002	059776-001
66454003	059777-001
66454004	059778-001
66454005	059779-001
66454006	059780-001
66454007	059781-001
66454008	059782-001
66454009	059775-002
66454010	059776-002
66454011	059777-002
66454012	059778-002
66454013	059779-002
66454014	059780-002
66454015	059781-002
66454016	059782-002
66456001	059783-001

### 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:

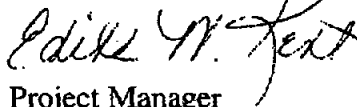
Custody was maintained for the samples.

### 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

GENERAL ENGINEERING LABORATORIES

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

(843) 556-8171 • Fax (843) 766-1178



GC/MS Volatile Organics  
Sandia National Labs (SNLS)  
SDG # 66454

Method/Analysis Information

Procedure: Volatile Organic Compounds (VOC) by Gas Chromatograph/Mass Spectrometer  
Analytical Method: SW846 8260A  
Prep Method: SW846 5030A  
Analytical Batch Number: 199914  
Prep Batch Number: 199910

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
66454001	059775-001
66454002	059776-001
66454003	059777-001
66454004	059778-001
66454005	059779-001
66454006	059780-001
66454007	059781-001
66454008	059782-001
1200296531	VBLK01 (Blank)
1200296539	VBLK01LCS (Laboratory Control Sample)
1200296532	VBLK02 (Blank)

SDG#66454 -VOA

Page 1 of 4

1200296540                   VBLK02LCS (Laboratory Control Sample)  
1200296535                   059775-001MS (Matrix Spike)  
1200296538                   059775-001MSD (Matrix Spike Duplicate)

**Preparation/Analytical Method Verification**

**SOP Reference**

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

**Calibration Information**

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

**Initial Calibration**

All the initial calibration requirements were met.

**CCV Requirements**

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

**Quality Control (QC) Information**

**Surrogate Recoveries**

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

**Blank Acceptance**

Target analytes were not detected above the reporting limit in the 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:

66454001           059775-001

**MS Recovery Statement**

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

**MSD Recovery Statement**

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

**MS/MSD RPD Statement**

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

**Internal Standard (ISTD) Acceptance**

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

SDG#66454 -VOA

Page 2 of 4

**Technical Information**

**Holding Time Specifications**

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

**Sample Preservation and Integrity**

All samples met the sample preservation and integrity requirements.

**Preparation/Analytical Method Verification**

All procedures were performed as stated in the SOP.

**Sample Dilutions**

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

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

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

**Miscellaneous Information**

**Nonconformance (NCR) Documentation**

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

**Manual Integrations**

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

**Additional Comments**

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

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

**System Configuration**

The laboratory utilizes the following GC/MS configurations:

**Chromatographic Columns**

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

<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 SDG#66454 -VOA

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

**Review Validation:**

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

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

Reviewer: Charles Wilson Date: 09-27-02

**REVISED**

QC Summary

Report Date: October 11, 2002  
Page 1 of 4

Client : Sandia National Laboratories  
MS-0756  
P.O. Box 5800  
Albuquerque, New Mexico  
Contact: Pamela M. Puissant  
Workorder: 66454

Parname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anst	Date Time
Volatile-GC/MS Federal									
Batch 199914									
QC1200296539 LCS									
1,1-Dichloroethylene	50.0		40.3	ug/kg		81	(75%-134%)	RMB	09/09/02 08:43
Benzene	50.0		44.8	ug/kg		90	(80%-120%)		
Chlorobenzene	50.0		48.4	ug/kg		97	(82%-118%)		
Toluene	50.0		47.2	ug/kg		94	(74%-115%)		
Trichloroethylene	50.0		44.6	ug/kg		89	(80%-119%)		
**Bromofluorobenzene	50.0		49.2	ug/kg		98	(69%-138%)		
**Dibromofluoromethane	50.0		49.3	ug/kg		99	(67%-137%)		
**Toluene-d8	50.0		46.1	ug/kg		92	(67%-139%)		
QC1200296540 LCS									
1,1-Dichloroethylene	50.0		38.7	ug/kg		77	(75% 134%)		09/09/02 21:24
Benzene	50.0		43.4	ug/kg		87	(80%-120%)		
Chlorobenzene	50.0		44.6	ug/kg		89	(82%-118%)		
Toluene	50.0		44.2	ug/kg		88	(74%-115%)		
Trichloroethylene	50.0		42.9	ug/kg		86	(80%-119%)		
**Bromofluorobenzene	50.0		46.8	ug/kg		94	(69%-138%)		
**Dibromofluoromethane	50.0		49.2	ug/kg		98	(67%-137%)		
**Toluene-d8	50.0		45.2	ug/kg		90	(67%-139%)		
QC1200296551 MB									
1,1,1-Trichloroethane		U	ND	ug/kg					09/09/02 11:13
1,1,2,2-Tetrachloroethane		U	ND	ug/kg					
1,1,2-Trichloroethane		U	ND	ug/kg					
1,1-Dichloroethane		U	ND	ug/kg					
1,1-Dichloroethylene		U	ND	ug/kg					
1,2-Dichloroethane		U	ND	ug/kg					
1,2-Dichloropropane		U	ND	ug/kg					
2-Butanone		U	ND	ug/kg					
2-Hexanone		U	ND	ug/kg					
4-Methyl-2-pentanone		U	ND	ug/kg					
Acetone		U	ND	ug/kg					
Benzene		U	ND	ug/kg					
Bromodichloromethane		U	ND	ug/kg					
Bromoforn		U	ND	ug/kg					
Bromomethane		U	ND	ug/kg					
Carbon disulfide		U	ND	ug/kg					
Carbon tetrachloride		U	ND	ug/kg					
Chlorobenzene		U	ND	ug/kg					
Chloroethane		U	ND	ug/kg					
Chloroform		U	ND	ug/kg					
Chloromethane		U	ND	ug/kg					
Dibromochloromethane		U	ND	ug/kg					
Ethylbenzene		U	ND	ug/kg					
Methylene chloride		U	ND	ug/kg					

**REVISED**

QC Summary

Workorder: 66484

Page 2 of 4

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analst	Date	Time
Volatile-GCMS Federal											
Batch 199914											
Styrene			U	ND	ug/kg						
Tetrachloroethylene			U	ND	ug/kg						
Toluene			U	ND	ug/kg						
Trichloroethylene			U	ND	ug/kg						
Vinyl acetate			U	ND	ug/kg						
Vinyl chloride			U	ND	ug/kg						
Xylenes (total)			U	ND	ug/kg						
cis-1,2-Dichloroethylene			U	ND	ug/kg						
cis-1,3-Dichloropropylene			U	ND	ug/kg						
trans-1,2-Dichloroethylene			U	ND	ug/kg						
trans-1,3-Dichloropropylene			U	ND	ug/kg						
**Bromofluorobenzene	50.0			55.9	ug/kg		112	(69%-138%)			
**Dibromofluoromethane	50.0			48.0	ug/kg		96	(67%-137%)			
**Toluene-d8	50.0			47.0	ug/kg		94	(67%-139%)			
QC1200296332 MB											
1,1,1-Trichloroethane			U	ND	ug/kg						09/09/02 23:09
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-Dichloromethane			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: 66454

Page 3 of 4

Parmaame	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anist	Date	Time
Volatile-GC/MS Federal											
Batch 199914											
trans-1,2-Dichloroethylene			U	ND	ug/kg						
trans-1,3-Dichloropropylene			U	ND	ug/kg						
**Bromofluorobenzene	50.0			53.0	ug/kg		106	(69%-138%)			
**Dibromofluoromethane	50.0			46.9	ug/kg		94	(67%-137%)			
**Toluene-d8	50.0			46.0	ug/kg		92	(67%-139%)			
QC1200296713 MB											
1,1,1-Trichloroethane			U	ND	ug/kg					09/09/02	10:44
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						
trans-1,2-Dichloroethylene			U	ND	ug/kg						
trans-1,3-Dichloropropylene			U	ND	ug/kg						
**Bromofluorobenzene	50.0			5080	ug/kg		102	(69%-138%)			
**Dibromofluoromethane	50.0			4570	ug/kg		91	(67%-137%)			
**Toluene-d8	50.0			4570	ug/kg		91	(67%-139%)			
QC1200296535 66454001 PS											
1,1-Dichloroethylene	50.0	U	ND	35.5	ug/L		71	(55%-128%)		09/09/02	17:10
Benzene	50.0	U	ND	41.1	ug/L		82	(53%-118%)			
Chlorobenzene	50.0	U	ND	43.7	ug/L		88	(53%-116%)			

## QC Summary

Workorder: 66454

Page 4 of 4

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Rauge	Anst	Date	Time
Volatile-QC/MS Federal											
Batch 199914											
Toluene	50.0	J	0.349	43.2	ug/L		86	(56%-113%)			
Trichloroethylene	50.0	U	ND	40.8	ug/L		82	(54%-119%)			
**Bromofluorobenzene	50.0		53.3	49.0	ug/L		98	(69%-138%)			
**Dibromofluoromethane	50.0		47.8	49.1	ug/L		98	(67%-137%)			
**Toluene-d8	50.0		46.9	45.8	ug/L		92	(67%-139%)			
QC1200296538 66454001 PSD											
1,1-Dichloroethylene	50.0	U	ND	35.2	ug/L	1	70	(0%-21%)		09/09/02	17:36
Benzene	50.0	U	ND	40.3	ug/L	2	81	(0%-17%)			
Chlorobenzene	50.0	U	ND	43.4	ug/L	1	87	(0%-21%)			
Toluene	50.0	J	0.349	42.7	ug/L	1	85	(0%-25%)			
Trichloroethylene	50.0	U	ND	40.2	ug/L	2	80	(0%-25%)			
**Bromofluorobenzene	50.0		53.3	47.2	ug/L		95	(69%-138%)			
**Dibromofluoromethane	50.0		47.8	49.1	ug/L		98	(67%-137%)			
**Toluene-d8	50.0		46.9	45.7	ug/L		92	(67%-139%)			

**Notes:**

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

The Qualifiers in this report are defined as follows:

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

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

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

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

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

**GC/MS Volatile Organics  
Sandia National Labs (SNLS)  
SDG 66454-1**

**Method/Analysis Information**

Procedure: Volatile Organic Compounds (VOC) by Gas Chromatograph/Mass Spectrometer  
Analytical Method: SW846 8260B  
Prep Method: SW846 5030B  
Analytical Batch Number: 199493

**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>
66456001	059783-001
1200295591	VBLK01 (Blank)
1200295594	VBLK01LCS (Laboratory Control Sample)

**Preparation/Analytical Method Verification**

**SOP Reference**

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

**Calibration Information**

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

**Initial Calibration**

All the initial calibration requirements were met.

**CCV Requirements**

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

SDG#66454-1 -VOA

Page 1 of 4

## Quality Control (QC) Information

### **Surrogate Recoveries**

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

### **Blank Acceptance**

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

### **LCS Recovery Statement**

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

### **QC Sample Designation**

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.

### **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

SDG#66454-1 -VOA

Page 2 of 4

generate all data packages electronically. The following change from "traditional" packages should be noted:

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

### System Configuration

The laboratory utilizes the following GC/MS configurations:

#### **Chromatographic Columns**

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

<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 </Paragraph>**

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

### Comments

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

SDG#66454-1 -VOA

Page 3 of 4

**Review Validation:**

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

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

Reviewer: Charles Wilson Date: 09-27-02

## QC Summary

Report Date: September 27, 2002

Page 1 of 2

Client : Sandia National Laboratories  
 MS-0756  
 P.O. Box 5800  
 Albuquerque, New Mexico  
 Contact: Pamela M. Puissant  
 Workorder: 66456

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Volatile-GC/MS Federal											
Batch 199493											
QC1200295594 LCS											
1,1-Dichloroethylene	50.0			49.8	ug/L		100	(78%-140%)	SHJ	09/05/02	10:41
Benzene	50.0			52.1	ug/L		104	(78%-119%)			
Chlorobenzene	50.0			52.8	ug/L		106	(82%-120%)			
Toluene	50.0			52.6	ug/L		105	(68%-133%)			
Trichloroethylene	50.0			50.8	ug/L		102	(80%-123%)			
**Bromofluorobenzene	50.0			46.9	ug/L		94	(67%-136%)			
**Dibromofluoromethane	50.0			48.7	ug/L		97	(62%-148%)			
**Toluene-d8	50.0			48.3	ug/L		97	(58%-139%)			
QC1200295591 MB											
1,1,1-Trichloroethane			U	ND	ug/L					09/05/02	12:20
1,1,2,2-Tetrachloroethane			U	ND	ug/L						
1,1,2-Trichloroethane			U	ND	ug/L						
1,1-Dichloroethane			U	ND	ug/L						
1,1-Dichloroethylene			U	ND	ug/L						
1,2-Dichloroethane			U	ND	ug/L						
1,2-Dichloropropane			U	ND	ug/L						
2-Butanone			U	ND	ug/L						
2-Hexanone			U	ND	ug/L						
4-Methyl-2-pentanone			U	ND	ug/L						
Acetone			U	ND	ug/L						
Benzene			U	ND	ug/L						
Bromodichloromethane			U	ND	ug/L						
Bromoform			U	ND	ug/L						
Bromomethane			U	ND	ug/L						
Carbon disulfide			U	ND	ug/L						
Carbon tetrachloride			U	ND	ug/L						
Chlorobenzene			U	ND	ug/L						
Chloroethane			U	ND	ug/L						
Chloroform			U	ND	ug/L						
Chloromethane			U	ND	ug/L						
Dibromochloromethane			U	ND	ug/L						
Ethylbenzene			U	ND	ug/L						
Methylene chloride			U	ND	ug/L						
Styrene			U	ND	ug/L						
Tetrachloroethylene			U	ND	ug/L						
Toluene			U	ND	ug/L						
Trichloroethylene			U	ND	ug/L						
Vinyl chloride			U	ND	ug/L						
Xylenes (total)			U	ND	ug/L						
cis-1,2-Dichloroethylene			U	ND	ug/L						
cis-1,3-Dichloropropylene			U	ND	ug/L						
trans-1,2-Dichloroethylene			U	ND	ug/L						

## QC Summary

Workorder: 66456

Page 2 of 2

Parameter	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Volatile-GC/MS Federal										
Batch 199493										
trans-1,3-Dichloropropylene			U	ND	ug/L					
**Bromofluorobenzene	50.0			48.9	ug/L		98	(67%-136%)		
**Dibromofluoromethane	50.0			47.3	ug/L		95	(62%-148%)		
**Toluene-d8	50.0			48.4	ug/L		97	(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 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%
- 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.



**Semi-Volatile Case Narrative  
Sandia National Labs (SNLS)  
SDG 66454**

**Method/Analysis Information**

**Procedure:** Semivolatile Analysis by Gas Chromatograph/Mass Spectrometer  
**Analytical Method:** SW846 8270C  
**Prep Method:** SW846 3550B  
**Analytical Batch Number:** 199277  
**Prep Batch Number:** 199276

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
66454009	059775-002
66454010	059776-002
66454011	059777-002
66454012	059778-002
66454013	059779-002
66454014	059780-002
66454015	059781-002
66454016	059782-002
1200295103	SBLK01 (Blank)
1200295104	SBLK01LCS (Laboratory Control Sample)
1200295105	059775-002MS (Matrix Spike)
1200295106	059775-002MSD (Matrix Spike Duplicate)

### **Preparation/Analytical Method Verification**

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

### **Calibration Information**

Due to the limited capacity of software we do not display all of the current initial calibration files here. If necessary, a calibration history will be inserted in the package prior to the appropriate Form 6.

Diphenylamine has now superseded N-Nitroso-diphenylamine as a CCC on Quantitation Reports, Initial Calibration Reports, Calibration Check Standard Reports, etc. Previous versions of EPA Method 8270 (prior to 8270C) listed N-Nitroso-diphenylamine as a CCC. However, as stated in EPA Method 8270C, Revision 3, December, 1996, Section 1.4.5, "N-Nitroso-diphenylamine decomposes in the gas chromatographic inlet and cannot be separated from Diphenylamine." Studies of these two compounds at GEL, both independent of each other and together, show that they not only coelute, but also have similar mass spectra. N-Nitroso-diphenylamine and Diphenylamine will be reported as Diphenylamine on all reports and forms.

When calibrations are performed for Appendix IX compounds some of the compounds may not be calibrated exactly according to the criteria in Method 8270C. If the %RSD is greater than 15% or the correlation coefficient is less than 0.99 then the analyte is quantitated using the response factor. If the analyte is detected then the sample is reanalyzed for that analyte on an instrument that is compliant with the criteria in the method.

### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

### **CCV Requirements**

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

### **Quality Control (QC) Information**

#### **Surrogate Recoveries**

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

#### **Blank Acceptance**

Target analytes were detected in the blank below the reporting limit.

#### **LCS Recovery Statement**

The laboratory control sample (LCS) spike recoveries 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:  
66454009(059775-002).

**MS Recovery Statement**

The matrix spike (MS) 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.

**Additional Comments**

No additional comments are needed for this SDG.

### System Configuration

The laboratory utilizes a HP 6890 Series gas chromatograph and a HP 5973 Mass Selective Detector. The configuration is equipped with the electronic pressure control. All MS interfaces are capillary direct.

### Chromatographic Columns

Chromatographic separation of semivolatile components is accomplished through analysis on one or more of the following columns (all with dimensions of 30 meters x 0.25 millimeters ID and 0.25 micron film except J&W DB-5MS2 which is 25 meters x 0.20 mm ID and 0.33 micron film):

<b>Column ID</b>	<b>Column Description</b>
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: DERRETT L. CLARKE Date: 09/26/02

## QC Summary

Report Date: September 25, 2002

Page 1 of 4

Client : Sandia National Laboratories  
 MS-0756  
 P.O. Box 5800  
 Albuquerque, New Mexico  
 Contact: Pamela M. Prissant  
 Workorder: 66454

Parameter	NOM	Sample	Qual	QC	Units	RPD%	RBC%	Range	Analst	Date	Time
Semi-Volatiles-GC/MS Federal											
Batch 199277											
QC1200295104 LCS											
1,2,4-Trichlorobenzene	1670			742	ug/kg		45	(27%-91%)	CAK	09/09/02	15:15
1,4-Dichlorobenzene	1670			511	ug/kg		31	(25%-85%)			
2,4,5-Trichlorophenol	3330			2250	ug/kg		68	(42%-96%)			
2,4,6-Trichlorophenol	3330			1890	ug/kg		57	(32%-91%)			
2,4-Dinitrotoluene	1670			1240	ug/kg		75	(50%-109%)			
2-Chlorophenol	3330			1360	ug/kg		41	(31%-85%)			
4-Chloro-3-methylphenol	3330			2020	ug/kg		61	(34%-97%)			
4-Nitrophenol	3330			1980	ug/kg		59	(22%-128%)			
Acenaphthene	1670			1050	ug/kg		63	(39%-98%)			
Hexachlorobenzene	1670			1260	ug/kg		76	(41%-105%)			
Hexachlorobutadiene	1670			693	ug/kg		42	(21%-94%)			
Hexachloroethane	1670			462	ug/kg		28	(25%-86%)			
N-Nitrosodipropylamine	1670			731	ug/kg		44	(34%-90%)			
Nitrobenzene	1670			689	ug/kg		41	(30%-84%)			
Pentachlorophenol	3330			2570	ug/kg		77	(27%-109%)			
Phenol	3330			1500	ug/kg		45	(31%-83%)			
Pyrene	1670			1130	ug/kg		68	(37%-110%)			
m,p-Cresols	3330			1740	ug/kg		52	(40%-83%)			
o-Cresol	3330			1660	ug/kg		50	(34%-86%)			
**2,4,6-Tribromophenol	3330			2610	ug/kg		78	(23%-111%)			
**2-Fluorobiphenyl	1670			858	ug/kg		52	(21%-104%)			
**2-Fluorophenol	3330			1330	ug/kg		40	(22%-93%)			
**Nitrobenzene-d5	1670			624	ug/kg		37	(24%-97%)			
**Phenol-d5	3330			1580	ug/kg		48	(22%-99%)			
**p-Terphenyl-d14	1670			1190	ug/kg		71	(30%-133%)			
QC1200295103 MB											
1,2,4-Trichlorobenzene			U	ND	ug/kg					09/09/02	21:48
1,2-Dichlorobenzene			U	ND	ug/kg						
1,3-Dichlorobenzene			U	ND	ug/kg						
1,4-Dichlorobenzene			U	ND	ug/kg						
2,4,5-Trichlorophenol			U	ND	ug/kg						
2,4,6-Trichlorophenol			U	ND	ug/kg						
2,4-Dichlorophenol			U	ND	ug/kg						
2,4-Dimethylphenol			U	ND	ug/kg						
2,4-Dinitrophenol			U	ND	ug/kg						
2,4-Dinitrotoluene			U	ND	ug/kg						
2,6-Dinitrotoluene			U	ND	ug/kg						
2-Chloronaphthalene			U	ND	ug/kg						
2-Chlorophenol			U	ND	ug/kg						
2-Methyl-4,6-dinitrophenol			U	ND	ug/kg						
2-Methylnaphthalene			U	ND	ug/kg						
2-Nitrophenol			U	ND	ug/kg						

## QC Summary

Workorder: 66454

Page 2 of 4

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-GC/MS Federal											
Batch 199277											
3,3'-Dichlorobenzidine			U	ND	ug/kg						
4-Bromophenylphenylether			U	ND	ug/kg						
4-Chloro-3-methylphenol			U	ND	ug/kg						
4-Chloroaniline			U	ND	ug/kg						
4-Chlorophenylphenylether			U	ND	ug/kg						
4-Nitrophenol			U	ND	ug/kg						
Acenaphthene			U	ND	ug/kg						
Acenaphthylene			U	ND	ug/kg						
Anthracene			U	ND	ug/kg						
Benzo(a)anthracene			U	ND	ug/kg						
Benzo(a)pyrene			U	ND	ug/kg						
Benzo(b)fluoranthene			U	ND	ug/kg						
Benzo(ghi)perylene			U	ND	ug/kg						
Benzo(k)fluoranthene			U	ND	ug/kg						
Butylbenzylphthalate			U	ND	ug/kg						
Carbazole			U	ND	ug/kg						
Chrysene			U	ND	ug/kg						
Di-n-butylphthalate			U	ND	ug/kg						
Di-n-octylphthalate			U	ND	ug/kg						
Dibenzo(a,h)anthracene			U	ND	ug/kg						
Dibenzofuran			U	ND	ug/kg						
Diethylphthalate			U	ND	ug/kg						
Dimethylphthalate			U	ND	ug/kg						
Diphenylamine			U	ND	ug/kg						
Fluoranthene			U	ND	ug/kg						
Fluorene			U	ND	ug/kg						
Hexachlorobenzene			U	ND	ug/kg						
Hexachlorobutadiene			U	ND	ug/kg						
Hexachlorocyclopentadiene			U	ND	ug/kg						
Hexachloroethane			U	ND	ug/kg						
Indeno(1,2,3-cd)pyrene			U	ND	ug/kg						
Isophorone			U	ND	ug/kg						
N-Nitrosodipropylamine			U	ND	ug/kg						
Naphthalene			U	ND	ug/kg						
Nitrobenzene			U	ND	ug/kg						
Pentachlorophenol			U	ND	ug/kg						
Phenanthrene			U	ND	ug/kg						
Phenol			U	ND	ug/kg						
Pyrene			U	ND	ug/kg						
bis(2-Chloroethoxy)methane			U	ND	ug/kg						
bis(2-Chloroethyl) ether			U	ND	ug/kg						
bis(2-Chloroisopropyl)ether			U	ND	ug/kg						
bis(2-Ethylhexyl)phthalate			J	89.0	ug/kg						
m,p-Cresols			U	ND	ug/kg						
m-Nitroaniline			U	ND	ug/kg						
o-Cresol			U	ND	ug/kg						
o-Nitroaniline			U	ND	ug/kg						
p-Nitroaniline			U	ND	ug/kg						

## QC Summary

Workorder: 66454

Page 3 of 4

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-GC/MS Federal											
Batch 199277											
**2,4,6-Tribromophenol	3330			2050	ug/kg		62	(23%-111%)			
**2-Fluorobiphenyl	1670			805	ug/kg		48	(21%-104%)			
**2-Fluorophenol	3330			1590	ug/kg		48	(22%-93%)			
**Nitrobenzene-d5	1670			689	ug/kg		41	(24%-97%)			
**Phenol-d5	3330			1360	ug/kg		41	(22%-99%)			
**p-Terphenyl-d14	1670			1180	ug/kg		71	(30%-133%)			
QC1200295105 66454009 MS											
1,2,4-Trichlorobenzene	1670	U	ND	785	ug/kg		47	(15%-112%)		09/09/02	16:51
1,4-Dichlorobenzene	1670	U	ND	624	ug/kg		37	(19%-89%)			
2,4,5-Trichlorophenol	3330	U	ND	2650	ug/kg		80				
2,4,6-Trichlorophenol	3330	U	ND	2060	ug/kg		62				
2,4-Dinitrotoluene	1670	U	ND	1390	ug/kg		83	(32%-117%)			
2-Chlorophenol	3330	U	ND	1660	ug/kg		50	(13%-101%)			
4-Chloro-3-methylphenol	3330	U	ND	2410	ug/kg		72	(23%-114%)			
4-Nitrophenol	3330	U	ND	2150	ug/kg		65	(20%-126%)			
Acenaphthene	1670	U	ND	1040	ug/kg		62	(15%-114%)			
Hexachlorobenzene	1670	U	ND	1400	ug/kg		84				
Hexachlorobutadiene	1670	U	ND	786	ug/kg		47				
Hexachloroethane	1670	U	ND	555	ug/kg		33				
N-Nitrosodipropylamine	1670	U	ND	826	ug/kg		50	(18%-106%)			
Nitrobenzene	1670	U	ND	803	ug/kg		48				
Pentachlorophenol	3330	U	ND	2860	ug/kg		86	(34%-110%)			
Phenol	3330	U	ND	1740	ug/kg		52	(17%-104%)			
Pyrene	1670	U	ND	1310	ug/kg		78	(26%-130%)			
m,p-Cresols	3330	U	ND	1890	ug/kg		57				
o-Cresol	3330	U	ND	2010	ug/kg		60				
**2,4,6-Tribromophenol	3330			2950	ug/kg		88	(23%-111%)			
**2-Fluorobiphenyl	1670			819	ug/kg		49	(21%-104%)			
**2-Fluorophenol	3330			1680	ug/kg		50	(22%-93%)			
**Nitrobenzene-d5	1670			709	ug/kg		43	(24%-97%)			
**Phenol-d5	3330			1740	ug/kg		52	(22%-99%)			
**p-Terphenyl-d14	1670			1350	ug/kg		81	(30%-133%)			
QC1200295106 66454009 MSD											
1,2,4-Trichlorobenzene	1670	U	ND	742	ug/kg	6	45	(0%-31%)		09/09/02	17:10
1,4-Dichlorobenzene	1670	U	ND	547	ug/kg	13	33	(0%-36%)			
2,4,5-Trichlorophenol	3330	U	ND	2450	ug/kg	8	73				
2,4,6-Trichlorophenol	3330	U	ND	1990	ug/kg	4	60				
2,4-Dinitrotoluene	1670	U	ND	1330	ug/kg	5	80	(0%-37%)			
2-Chlorophenol	3330	U	ND	1600	ug/kg	3	48	(0%-34%)			
4-Chloro-3-methylphenol	3330	U	ND	2390	ug/kg	1	72	(0%-34%)			
4-Nitrophenol	3330	U	ND	2470	ug/kg	14	74	(0%-35%)			
Acenaphthene	1670	U	ND	925	ug/kg	11	56	(0%-33%)			
Hexachlorobenzene	1670	U	ND	1330	ug/kg	5	80				
Hexachlorobutadiene	1670	U	ND	702	ug/kg	11	42				
Hexachloroethane	1670	U	ND	480	ug/kg	14	29				
N-Nitrosodipropylamine	1670	U	ND	775	ug/kg	6	47	(0%-29%)			
Nitrobenzene	1670	U	ND	738	ug/kg	9	44				
Pentachlorophenol	3330	U	ND	2590	ug/kg	10	78	(0%-40%)			



## QC Summary

Workorder: 66454

Page 4 of 4

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-GC/MS Federal											
Batch 199277											
Phenol	3330	U	ND	1650	ug/kg	5	50	(0%-37%)			
Pyrene	1670	U	ND	1210	ug/kg	8	73	(0%-39%)			
m,p-Cresols	3330	U	ND	1790	ug/kg	6	54				
o-Cresol	3330	U	ND	1850	ug/kg	8	56				
**2,4,6-Tribromophenol	3330			2900	ug/kg		87	(23%-111%)			
**2-Fluorobiphenyl	1670			792	ug/kg		48	(21%-104%)			
**2-Fluorophenol	3330			1570	ug/kg		47	(22%-93%)			
**Nitrobenzene-d5	1670			666	ug/kg		40	(24%-97%)			
**Phenol-d5	3330			1680	ug/kg		51	(22%-99%)			
**p-Terphenyl-d14	1670			1260	ug/kg		76	(30%-133%)			

**Notes:**

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

The Qualifiers in this report are defined as follows:

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

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 66454**

**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:** 199935  
**Prep Batch Number:** 199934

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
66454009	059775-002
66454010	059776-002
66454011	059777-002
66454012	059778-002
66454013	059779-002
66454014	059780-002
66454015	059781-002
66454016	059782-002
1200296584	XBLK01 (Blank)
1200296585	XBLK01LCS (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**

One of the required spiking analytes was not within the SNLS 80-120 acceptance limits in the laboratory control sample (LCS). 4-Amino-2,6DNT failed at 79.9% but passed the GEL SPC limit. The SPC limits are on the Certificate of Analysis. The data is reported per the client without reextraction. Please see the email in the Miscellaneous Section. Please see nonconformance report 4307.

### **QC Sample Designation**

A matrix spike was performed on a client sample in SDG 66610

### **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**

Nonconformance report 4307 was generated for this SDG.

One of the required spiking analytes was not within the SNLS 80-120 acceptance limits in the laboratory control sample (LCS). 4-Amino-2,6DNT failed at 79.9% but passed the GEL SPC limit. The SPC limits are on the Certificate of Analysis. The data is reported per the client without reextraction. Please see the email in the Miscellaneous Section. Please see nonconformance report 4307.

#### **Manual Integration**

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

#### **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.

### 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: Isabel Mauer Date: 10/01/02

## QC Summary

Report Date: October 1, 2002

Page 1 of 2

Client : Sandia National Laboratories  
 MS-0756  
 P.O. Box 5800  
 Albuquerque, New Mexico  
 Contact: Pamela M. Pulsant  
 Workorder: 66454

Parmaoaze	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC Explosives Federal											
Batch 199935											
QC1200296585 LCS											
1,3,5-Trinitrobenzene	800			723	ug/kg		90	(77%-124%)	JLW	09/14/02	21:57
2,4,6-Trinitrotoluene	800			735	ug/kg		92	(80%-120%)			
2,4-Dinitrotoluene	800			693	ug/kg		87	(77%-122%)			
2,6-Dinitrotoluene	800			740	ug/kg		93	(74%-121%)			
2-Amino-4,6-dinitrotoluene	800			711	ug/kg		89	(81%-125%)			
4-Amino-2,6-dinitrotoluene	800			639	ug/kg		80	(79%-123%)			
HMX	800			776	ug/kg		97	(84%-131%)			
Nitrobenzene	800			684	ug/kg		86	(75%-125%)			
RDX	800			755	ug/kg		94	(80%-123%)			
Tetryl	800			586	ug/kg		73	(65%-124%)			
m-Dinitrobenzene	800			717	ug/kg		90	(77%-124%)			
m-Nitrotoluene	800			689	ug/kg		86	(77%-117%)			
o-Nitrotoluene	800			688	ug/kg		86	(75%-119%)			
p-Nitrotoluene	800			701	ug/kg		88	(76%-121%)			
**1,2-dinitrobenzene	400			373	ug/kg		93	(71%-118%)			
QC1200296584 MB											
1,3,5-Trinitrobenzene			U	ND	ug/kg					09/14/02	21:16
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			378	ug/kg		94	(71%-118%)			
QC1200296586 66610009 MS											
1,3,5-Trinitrobenzene	800	U	ND	760	ug/kg		95	(66%-133%)		09/14/02	23:21
2,4,6-Trinitrotoluene	800	U	ND	761	ug/kg		95	(77%-132%)			
2,4-Dinitrotoluene	800	U	ND	744	ug/kg		93	(61%-134%)			
2,6-Dinitrotoluene	800	U	ND	811	ug/kg		101	(70%-121%)			
2-Amino-4,6-dinitrotoluene	800	U	ND	729	ug/kg		91	(79%-124%)			
4-Amino-2,6-dinitrotoluene	800	U	ND	629	ug/kg		79	(71%-120%)			
HMX	800	U	ND	789	ug/kg		99	(75%-138%)			
Nitrobenzene	800	U	ND	732	ug/kg		92	(72%-120%)			
RDX	800	U	ND	760	ug/kg		95	(61%-136%)			
Tetryl	800	U	ND	654	ug/kg		82	(65%-135%)			

## QC Summary

Workorder: 66454

Page 2 of 2

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anst	Date	Time
HPLC Explosives Federal											
Batch 199935											
m-Dinitrobenzene	800	U	ND	770	ug/kg		96	(75%-125%)			
m-Nitrotoluene	800	U	ND	741	ug/kg		93	(73%-116%)			
o-Nitrotoluene	800	U	ND	740	ug/kg		93	(68%-122%)			
p-Nitrotoluene	800	U	ND	769	ug/kg		96	(67%-125%)			
**1,2-dinitrobenzene	800		377	726	ug/kg		91	(71%-118%)			
QC1200296587 66610009 MSD											
1,3,5-Trinitrobenzene	800	U	ND	797	ug/kg	5	100	(0%-20%)		09/15/02	00:03
2,4,6-Trinitrotoluene	800	U	ND	805	ug/kg	6	101	(0%-20%)			
2,4-Dinitrotoluene	800	U	ND	777	ug/kg	4	97	(0%-24%)			
2,6-Dinitrotoluene	800	U	ND	845	ug/kg	4	106	(0%-21%)			
2-Amino-4,6-dinitrotoluene	800	U	ND	757	ug/kg	4	95	(0%-20%)			
4-Amino-2,6-dinitrotoluene	800	U	ND	631	ug/kg	0	79	(0%-20%)			
HMX	800	U	ND	825	ug/kg	4	103	(0%-38%)			
Nitrobenzene	800	U	ND	759	ug/kg	4	95	(0%-21%)			
RDX	800	U	ND	788	ug/kg	4	99	(0%-35%)			
Tetryl	800	U	ND	663	ug/kg	1	83	(0%-30%)			
m-Dinitrobenzene	800	U	ND	814	ug/kg	5	102	(0%-23%)			
m-Nitrotoluene	800	U	ND	764	ug/kg	3	96	(0%-20%)			
o-Nitrotoluene	800	U	ND	763	ug/kg	3	95	(0%-23%)			
p-Nitrotoluene	800	U	ND	786	ug/kg	2	98	(0%-22%)			
**1,2-dinitrobenzene	400		377	454	ug/kg		113	(71%-118%)			

**Notes:**

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

The Qualifiers in this report are defined as follows:

- \* Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where it
- \*\* Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- 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.

**PCB Case Narrative  
Sandia National Labs (SNLS)  
SDG 66454**

**Method/Analysis Information**

**Procedure:** Polychlorinated Biphenyls by Method 8082  
**Analytical Method:** SW846 8082  
**Prep Method:** SW846 3550B  
**Analytical Batch Number:** 199271  
**Prep Batch Number:** 199270

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
66454009	059775-002
66454010	059776-002
66454011	059777-002
66454012	059778-002
66454013	059779-002
66454014	059780-002
66454015	059781-002
66454016	059782-002
1200295091	PBLK01(method Blank)
1200295092	PBLK01LCS(Laboratory Control Sample)
1200295093	059781-002MS(Matrix Spike)
1200295094	059781-002MSD(Matrix Spike Duplicate)



## System Configuration

### Chromatographic Columns

Column ID	Column Description
J&W1	DB-5(5%-Phenyl)-methylsiloxane 30m x 0.53mm x 1.5um DB-608 Durabond stationary phase* 30m x 0.53mm x 0.5um
J&W2	DB-5(5%-Phenyl)-methylsiloxane 30m x 0.32mm x 1.0um DB-1701 Durabond stationary phase* 30m x 0.32mm x 0.5um
J&W3	DB-5(5%-Phenyl)-methylsiloxane 30m x 0.53mm x 1.5um DB-1701(14% Cyanopropylphenyl)-methylsiloxane 30m x 0.53mm x 0.5um
J&W4	DB-608 Durabond stationary phase* 30m x 0.53mm x .83um DB-XLB* 30m x 0.53mm x 1.5um
J&W5	DB-XLB* 30m x 0.25mm x 0.25um DB-17MS(50%-Phenyl)-methylsiloxane 30m x 0.25mm x 0.25um
J&W6	DB-5(5%-Phenyl)-methylsiloxane 30m x 0.25mm x 0.25um DB-17MS(50%-Phenyl)-methylsiloxane 30m x 0.25mm x 0.25um
RESTEK	Rtx-CLPesticides 30m x 0.25mm x 0.25um Rtx-CLPesticides II 30m x 0.25mm x 0.20um

\* Durabond and DB-XLB are trademarks of J & W.

### Instrument Configuration

The samples reported in this SDG were analyzed on one or more of the following instrument systems. Instrument systems are referenced in the raw data and individual form headers by the Instrument ID designations listed below.

Instrument ID	System Configuration	Chromatographic Column
ECD1	HP 6890 Series GC ECD/ECD	RESTEK
ECD2	HP 6890 Series GC ECD/ECD	RESTEK
ECD3	HP 6890 Series GC ECD/ECD	RESTEK
ECD4	HP 5890 Series II Plus GC ECD/ECD	J&W5
ECD5	HP 6890 Series GC ECD/ECD	J&W5
ECD7	HP 6890 Series GC ECD/ECD	J&W5
ECD8	HP 6890 Series GC ECD/ECD	RESTEK

SNLS SDG#66454 - PCB

### **Preparation/Analytical Method Verification**

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

### **Calibration Information**

#### **Initial Calibration**

All initial calibration requirements have been met for this SDG.

#### **CVS Requirements**

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

### **Quality Control (QC) Information**

#### **Surrogate Recoveries**

All the surrogate recoveries were not within the established acceptance criteria for this SDG. The surrogate recovery for sample 66459010 was outside the surrogate recovery criteria due to dilution.

#### **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>
059781-002	66454015

The method QC included a Matrix Spike (MS) and Matrix Spike Duplicate (MSD).

#### **MS Recovery Statement**

The matrix spike recoveries for this SDG were within the established acceptance limits.

#### **MSD Recovery Statement**

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

#### **MS/MSD RPD Statement**

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

## Technical Information

### **Holding Time Specifications**

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

### **Preparation/Analytical Method Verification**

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

### **Sample Dilutions**

The following sample was diluted due to the presence of over range target analytes in the sample:

Sample ID	Dilutions
66454010	5X

### **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". Some samples contained more than one PCB. The quantitation of PCB may be elevated due to overlapping PCB patterns.

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

**Review Validation:**

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

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

Reviewer: Jimi Cao Date: 9/26/02

## QC Summary

Client : Sandia National Laboratories  
 MS-0756  
 P.O. Box 5800  
 Albuquerque, New Mexico  
 Contact: Pamela M. Puissant  
 Workorder: 66454

Report Date: September 26, 2002  
 Page 1 of 2

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analst	Date	Time
Semi-Volatiles-PCB Federal											
Batch 199271											
QC1200295092	LCS										
Aroclor-1260	33.3			25.9	ug/kg		78	(48%-116%)	GH1	09/13/02	15:49
**4cmx	6.67			4.77	ug/kg		72	(31%-120%)			
**Decachlorobiphenyl	6.67			5.10	ug/kg		77	(34%-115%)			
QC1200295091	MB										
Aroclor-1016			U	ND	ug/kg					09/13/02	15:37
Aroclor-1221			U	ND	ug/kg						
Aroclor-1232			U	ND	ug/kg						
Aroclor-1242			U	ND	ug/kg						
Aroclor-1248			U	ND	ug/kg						
Aroclor-1254			U	ND	ug/kg						
Aroclor-1260			U	ND	ug/kg						
**4cmx	6.67			4.64	ug/kg		70	(31%-120%)			
**Decachlorobiphenyl	6.67			5.30	ug/kg		80	(34%-115%)			
QC1200295093	66454015	MS									
Aroclor-1260	33.3	U	ND	28.1	ug/kg		84	(36%-134%)		09/13/02	18:51
**4cmx	6.67			4.30	ug/kg		65	(31%-120%)			
**Decachlorobiphenyl	6.67			5.99	ug/kg		90	(34%-115%)			
QC1200295094	66454015	MSD									
Aroclor-1260	33.3	U	ND	27.3	ug/kg	3	82	(0%-30%)		09/13/02	19:04
**4cmx	6.67			4.68	ug/kg		70	(31%-120%)			
**Decachlorobiphenyl	6.67			5.06	ug/kg		76	(34%-115%)			

**Notes:**

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

- \* Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where it
- \*\* Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- H Holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
- P The response between the confirmation column and the primary column is >40%D
- U The analyte was analyzed for but not detected below this concentration. For Organic and Inorganic analytes the result is less than the effective MDL. 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: 66454

Page 1 of 2

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

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

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

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

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

**Inorganic Case Narrative for  
Sandia National Laboratory  
SDG# 66454**

**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>
66454009	059775-002
66454010	059776-002
66454011	059777-002
66454012	059778-002
66454013	059779-002
66454014	059780-002
66454015	059781-002
66454016	059782-002
1200295257	Method Blank (MB) ICP-199346/ 199345
1200295261	Laboratory Control Sample (LCS)
1200295259	059775-002L (66454009) Serial Dilution (SD)
1200295258	059775-002D (66454009) Sample Duplicate (DUP)
1200295260	059775-002S (66454009) Matrix Spike (MS)
1200295327	Method Blank (MB) CVAA-199386/199385
1200295330	Laboratory Control Sample (LCS)

**Method/Analysis Information:**

<b>Analytical Batch #:</b>	199346, 199386
<b>Prep Batch #:</b>	199345, 199385
<b>Standard Operating Procedure:</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

**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 except selenium.

#### **Continuing Calibration (CCV) Requirements**

All CCV standards associated with samples from this SDG met the established recovery acceptance criteria.

#### **Continuing Calibration Blanks (CCB) Requirements**

All continuing calibration blanks (CCB) associated with samples from this SDG met the established acceptance criteria.

#### **ICSA/ICSAB Requirements**

All interference check standard (ICSA and ICSAB) elements associated with this SDG met the established acceptance criteria.

### Quality Control (QC) Information:

#### **Method Blank Acceptance**

The preparation blanks analyzed with this SDG did not contain analytes of interest at concentrations greater than the required detection limits (RDL).

#### **LCS Recovery Statement**

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

#### **QC Sample Designation**

Sample 059775-002(66454009) was designated as the quality control sample for the ICP batch. Sample 059710-002(66195002) from SNLS SDG 66189-1 was designated as the quality control sample for ICP and the CVAA batches. Each batch included a sample duplicate (DUP) and a matrix spike (MS). The ICP batch included a serial dilution (SD).

#### **MS Recovery Statement**

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

#### **RPD Statement**

The relative percent difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria of 20% when the sample is greater than five times (5X) the contract required detection limit (RDL). In cases where either the sample or duplicate value is less than 5X the RDL, a control limit of +/- the RDL is used to evaluate the DUP results. All applicable elements met the DUP acceptance criteria, with the exceptions of arsenic, chromium, lead, and silver, as indicated by the "\*" qualifiers 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. Several samples required further dilution for silver in order to bring the raw values within the linear range of the instrument. 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: ACCIS/OLL/CSJ

Date: 9/30/12

**QC Summary**

Report Date: September 27, 2002  
Page 1 of 2

Client : Sandia National Laboratories  
MS-0756  
P.O. Box 5800  
Albuquerque, New Mexico  
Contact: Pamela M. Puissant  
Workorder: 66454

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP Federal											
Batch 199346											
QC1200295258 66454009 DUP											
Arsenic		3.03		6.14	mg/kg	68*		(0%-20%)	HSC	09/23/02	22:44
Barium		59.2		58.6	mg/kg	1		(0%-20%)			
Cadmium	J	0.151	J	0.281	mg/kg	N/A ^		(+/-0.495)			
Chromium		12.3		24.9	mg/kg	68*		(0%-20%)			
Lead		22.2		70.2	mg/kg	104*		(0%-20%)			
Selenium	U	ND	J	0.380	mg/kg	N/A		(+/-0.495)			
Silver		184		241	mg/kg	27*		(0%-20%)		09/25/02	22:43
QC1200295261 LCS											
Arsenic	132			138	mg/kg		104	(79%-121%)		09/23/02	22:26
Barium	781			813	mg/kg		104	(80%-120%)			
Cadmium	51.5			53.1	mg/kg		103	(81%-119%)			
Chromium	142			149	mg/kg		105	(77%-123%)			
Lead	52.9			59.4	mg/kg		112	(78%-123%)			
Selenium	60.9			66.1	mg/kg		109	(72%-128%)			
Silver	125			138	mg/kg		111	(55%-145%)			
QC1200295257 MB											
Arsenic			U	ND	mg/kg					09/23/02	22:20
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						
QC1200295260 66454009 MS											
Arsenic	24.3	3.03		27.3	mg/kg		100	(75%-125%)		09/23/02	22:50
Barium	24.3	59.2		82.9	mg/kg		98	(75%-125%)			
Cadmium	24.3	0.151	J	23.5	mg/kg		96	(75%-125%)			
Chromium	24.3	12.3		40.0	mg/kg		114	(75%-125%)			
Lead	24.3	22.2		49.9	mg/kg		114	(75%-125%)			
Selenium	24.3	ND	U	23.1	mg/kg		94	(75%-125%)			
Silver	24.3	184		217	mg/kg		N/A	(75%-125%)		09/25/02	22:49
QC1200295259 66454009 SDILT											
Arsenic		31.5		5.53	ug/L	12.3				09/23/02	22:38
Barium		616		121	ug/L	1.53					
Cadmium	J	1.58	U	ND	ug/L	N/A					
Chromium		128		26.2	ug/L	1.93					
Lead		231		46.9	ug/L	1.55					
Selenium	U	ND	J	2.86	ug/L	N/A					
Silver		383		74.1	ug/L	3.26				09/25/02	22:37
Metals Analysis-Mercury Federal											
Batch 199386											
QC1200295328 66195002 DUP											

## QC Summary

Workorder: 66454

Page 2 of 2

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

**Notes:**

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

The Qualifiers in this report are defined as follows:

- \* Recovery or %RPD not within acceptance limits and/or spike amount not 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.

**General Chemistry Narrative  
Sandia National Labs (SNLS)  
SDG 66454**

**Method/Analysis Information**

<b>Procedure:</b>	<b>Total Cyanide</b>
Analytical Method:	SW846 9012A
Prep Method:	SW846 9010B Prep
Analytical Batch Number:	199408
Prep Batch Number:	199407

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
66454009	059775-002
66454010	059776-002
66454011	059777-002
66454012	059778-002
66454013	059779-002
66454014	059780-002
66454015	059781-002
66454016	059782-002
1200295377	MB for batch 199408
1200295378	LCS for batch 199408
1200295379	DUP of 66454009
1200295380	MS of 66454009
1200295392	LCS for batch 199407

## **SOP Reference**

Procedure(s) for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure(s) (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-095 Rev. 1.

## **Preparation/Analytical Method Verification**

The SOP stated above has been prepared based on technical research and testing conducted by General Engineering Laboratories, Inc. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

## **Calibration Information:**

The instrument used in this analysis was the following: Lachat QuickChem FIA+

### **Initial Calibration**

The instrument was properly calibrated.

### **Calibration Verification Information**

All calibration verification standards were within the required limits.

## **Quality Control (QC) Information:**

### **Blank Acceptance**

The method and calibration blanks associated with this data were within the required acceptance limits.

### **Laboratory Control Sample Recovery**

The recovery for the laboratory control sample was within the required acceptance limits.

### **Quality Control**

The following sample was designated for Quality Control: 66454009.

### **Sample Spike Recovery**

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

### **Sample Duplicate Acceptance**

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

**Technical Information:**

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

**Holding Times**

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

**Preparation/Analytical Method Verification**

All procedures were performed as stated in the SOP.

**Sample Dilutions**

The following QC sample in this sample group was diluted 1:50 due to high concentration for this analysis: 1200295392.

**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:** 200893  
**Prep Batch Number:** 200892

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
66454009	059775-002
66454010	059776-002
66454011	059777-002
66454012	059778-002
66454013	059779-002
66454014	059780-002
66454015	059781-002
66454016	059782-002
1200298925	MB for batch 200893
1200298926	DUP of 66454009
1200298927	DUP of 66610011
1200298928	MS of 66454009
1200298929	MS of 66610011
1200298930	LCS for batch 200893

## **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 SNLS samples were designated for Quality Control: 66454009, 66610011.

### **Sample Spike Recovery**

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

### **Sample Duplicate Acceptance**

The values for the sample and duplicate for sample 66610011 are less than the Practical Quantitation Limit (PQL); therefore, the RPD is not applicable. The Relative Percent Difference between the sample and duplicate for sample 66454009 was within the required acceptance limits.



**Technical Information:**

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

**Holding Times**

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

**Preparation/Analytical Method Verification**

All procedures were performed as stated in the SOP.

**Sample Dilutions**

No samples in this sample group required dilutions.

**Miscellaneous Information:**

**Nonconformance Reports**

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: 9/24/02

## QC Summary

Report Date: September 25, 2002

Page 1 of 2

Client: Sandia National Laboratories  
MS-0756  
P.O. Box 5800  
Albuquerque, New Mexico  
Contact: Pamela M. Puissant  
Workorder: 66454

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rapid Flow Analysis Federal											
Batch 199408											
QC1200295379 66454009 DUP											
Cyanide, Total		J	0.0573	J	0.0664	mg/kg	N/A ^	(+/-0.208)	ADP	09/09/02	10:27
QC1200295378 LCS	2.50				2.27	mg/kg	91	(81%-125%)		09/09/02	10:23
Cyanide, Total					286	mg/kg	103	(81%-125%)		09/09/02	10:25
QC1200295392 LCS	277										
Cyanide, Total											
QC1200295377 MB				U	ND	mg/kg				09/09/02	10:22
Cyanide, Total											
QC1200295380 66454009 MS	4.17	J	0.0573		4.27	mg/kg	101	(55%-145%)		09/09/02	10:28
Cyanide, Total											
Spectrometric Analysis Federal											
Batch 200893											
QC1200298926 66454009 DUP											
Hexavalent Chromium			0.454		0.412	mg/kg	10 ^	(+/-0.0959)	BEP2	09/21/02	07:00
QC1200298927 66610011 DUP											
Hexavalent Chromium		J	0.0704	J	0.0593	mg/kg	N/A ^	(+/-0.0988)			
QC1200298930 LCS	0.971				0.932	mg/kg	96	(72%-121%)			
Hexavalent Chromium											
QC1200298925 MB				U	ND	mg/kg					
Hexavalent Chromium											
QC1200298928 66454009 MS	1.01		0.454		1.54	mg/kg	108	(49%-130%)			
Hexavalent Chromium											
QC1200298929 66610011 MS	0.998	J	0.0704		0.928	mg/kg	86	(49%-130%)			
Hexavalent Chromium											

**Notes:**

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

The Qualifiers in this report are defined as follows:

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

## QC Summary

Workorder: 66454

Page 2 of 2

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

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

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

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

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

**Radiochemistry Case Narrative  
Sandia National Labs (SNLS)  
Workorder 66454**

**Method/Analysis Information**

Batch Number: 200142  
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>
66454009	059775-002
66454010	059776-002
66454011	059777-002
66454012	059778-002
66454013	059779-002
66454014	059780-002
66454015	059781-002
66454016	059782-002
1200297097	MB for batch 200142
1200297098	059710-002(66195002DUP)
1200297099	059710-002(66195002MS)
1200297100	059710-002(66195002MSD)
1200297101	LCS for batch 200142

**SOP Reference**

Procedure(s) for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure(s) (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-001 REV.6.

**Calibration Information:**

**Calibration Information**

All initial and continuing calibration requirements have been met. The initial calibration was performed on June 13, 2002.

**Standards Information**

Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

**Sample Geometry**

All counting sources were prepared in the same geometry as the calibration standards.

**Quality Control (QC) Information:**

**Blank Information**

The blank volume is representative of the sample volume(s) in this batch.

**Designated QC**

The following sample(s) was used for QC: 66195002. The QC sample is from SNLS work order 66195.

**QC Information**

All of the QC samples met the required acceptance limits.

**Technical Information:**

**Holding Time**

All sample procedures for this sample set were performed within the required holding time.

**Preparation Information**

All preparation criteria have been met for these analyses.

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

None of the samples in this sample set required reprep or reanalysis.

**Gross Alpha/Beta Preparation Information**

High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating, especially to a dull red heat. For this sample set, the prepared planchet was counted for beta activity before being flamed. After flaming, the planchet was counted for alpha activity. This sequence causes the alpha count run data to record over the beta count run data in AlphaLims, therefore only the alpha count data will appear on the instrument runlog.

**Miscellaneous Information:****NCR Documentation**

No NCR were generated for the preparation or analysis of this sample set.

**Additional Comments**

Sample 66454016 did not meet the beta required detection limit. No more volume could be used due to not exceeding the maximum net weight limit. The samples counted for 500 min.

**Comments**

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

**Review Validation:**

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

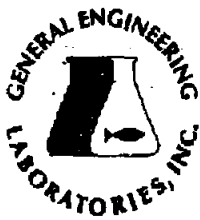
The following data validator verified the information presented in this case narrative:

Reviewer: \_\_\_\_\_

*M. Moore*

Date: \_\_\_\_\_

*25 Sep 2002*



# GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

## QC Summary

Report Date: September 25, 2002  
Page 1 of 2

Client: Sandia National Laboratories  
MS-0756  
P.O. Box 5800  
Albuquerque, New Mexico  
Contact: Pamela M. Palsant  
Workorder: 66454

Partname	NOM	Sample Qual	QC	Units	RER	REC%	Range	Anst	Date Time
Gravimetric Solids									
Batch	199224								
QC1200295000 66454009 DUP									
Moisture		3.90	3.59	percent	8		(0%-24%)	MLA	09/04/02 14:30
Rad Gas Flow									
Batch	200142								
QC1200297098 66195002 DUP									
Alpha		19.3	20.8	pCi/g	0.271		(0%-20%)	IS1	09/18/02 01:56
	Uncert:	+/-2.30	+/-2.42						
	TPU:	2.73	2.86						
Beta		20.8	20.5	pCi/g	0.0654		(0%-20%)		
	Uncert:	+/-1.94	+/-2.10						
	TPU:	2.12	2.29						
QC1200297101 LCS									
Alpha	9.89		10.3	pCi/g		104	(75%-125%)		09/18/02 09:53
	Uncert:		+/-1.10						
	TPU:		1.43						
Beta	39.7		42.2	pCi/g		106	(75%-125%)		
	Uncert:		+/-2.58						
	TPU:		3.07						
QC1200297097 MB									
Alpha		U	0.0251	pCi/g					
	Uncert:		+/-0.145						
	TPU:		0.145						
Beta		U	-0.0009	pCi/g					
	Uncert:		+/-0.139						
	TPU:		0.139						
QC1200297099 66195002 MS									
Alpha	96.9	19.3	97.9	pCi/g		81	(75%-125%)		
	Uncert:	+/-2.30	+/-13.5						
	TPU:	2.73	14.6						
Beta	390	20.8	389	pCi/g		95	(75%-125%)		
	Uncert:	+/-1.94	+/-24.4						
	TPU:	2.12	27.7						
QC1200297100 66195002 MSD									
Alpha	95.1	19.3	94.0	pCi/g		79			
	Uncert:	+/-2.30	+/-13.0						
	TPU:	2.73	13.8						
Beta	382	20.8	380	pCi/g		94			
	Uncert:	+/-1.94	+/-23.9						
	TPU:	2.12	29.3						

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

(843) 556-8171 • Fax (843) 766-1178

Printed on Recycled Paper.



# GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

## QC Summary

Workorder: 66454

Page 2 of 2

Paramname	NOM	Sample Qual	QC	Units	RER	REC%	Range	Analst	Date	Time
-----------	-----	-------------	----	-------	-----	------	-------	--------	------	------

**Notes:**

The Qualifiers in this report are defined as follows:

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

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

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

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

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

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

(843) 556-8171 • Fax (843) 766-1178





COC #605747





Sandia National Laboratories  
 Radiation Protection Sample Diagnostics Program  
 9/11/02 4:25:38 PM

\* Analyzed by: *h 9/11/02* Reviewed by: *[Signature] 9/12/02*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059775-003  
 Lab Sample ID : 20124801  
  
 Sample Description : 6650/1081-SP1-BH1-10-S  
 Sample Quantity : 828.070 gram  
 Sample Date/Time : 8/29/02 9:20:00 AM  
 Acquire Start Date/Time : 9/09/02 1:17:02 PM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	5.90E-001
RA-226	1.43E+000	4.50E-001	6.07E-001
PB-214	5.59E-001	8.54E-002	5.32E-002
BI-214	4.78E-001	7.89E-002	4.32E-002
PB-210	Not Detected	-----	2.27E+001
TH-232	5.61E-001	2.74E-001	1.75E-001
RA-228	7.30E-001	1.32E-001	1.03E-001
AC-228	6.68E-001	1.26E-001	7.97E-002
TH-228	7.04E-001	3.77E-001	5.63E-001
RA-224	8.55E-001	1.86E-001	6.33E-002
PB-212	6.76E-001	9.87E-002	3.34E-002
BI-212	6.23E-001	2.42E-001	3.27E-001
TL-208	6.14E-001	1.02E-001	6.72E-002
U-235	Not Detected	-----	1.88E-001
TH-231	Not Detected	-----	9.18E+000
PA-231	Not Detected	-----	1.14E+000
TH-227	Not Detected	-----	2.90E-001
RA-223	Not Detected	-----	2.78E-001
RN-219	Not Detected	-----	2.94E-001
PB-211	Not Detected	-----	6.45E-001
TL-207	Not Detected	-----	1.04E+001
AM-241	Not Detected	-----	3.50E-001
PU-239	Not Detected	-----	3.49E+002
NP-237	Not Detected	-----	1.84E+000
PA-233	Not Detected	-----	4.41E-002
TH-229	Not Detected	-----	2.02E-001

[Summary Report] - Sample ID: : 20124801

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	2.88E-002
AG-110m	Not Detected	-----	2.20E-002
BA-133	Not Detected	-----	3.95E-002
BE-7	Not Detected	-----	2.16E-001
CD-115	Not Detected	-----	1.67E+000
CE-139	Not Detected	-----	2.43E-002
CE-141	Not Detected	-----	5.24E-002
CE-144	Not Detected	-----	1.92E-001
CM-243	Not Detected	-----	1.41E-001
CO-56	Not Detected	-----	2.75E-002
CO-57	Not Detected	-----	2.51E-002
CO-58	Not Detected	-----	2.70E-002
CO-60	Not Detected	-----	2.87E-002
CR-51	Not Detected	-----	2.39E-001
CS-134	Not Detected	-----	3.17E-002
CS-137	Not Detected	-----	2.38E-002
EU-152	Not Detected	-----	7.37E-002
EU-154	Not Detected	-----	1.33E-001
EU-155	Not Detected	-----	1.09E-001
FE-59	Not Detected	-----	6.65E-002
GD-153	Not Detected	-----	8.33E-002
HG-203	Not Detected	-----	2.99E-002
I-131	Not Detected	-----	5.77E-002
IR-192	Not Detected	-----	2.37E-002
K-40	1.55E+001	2.09E+000	2.48E-001
MN-52	Not Detected	-----	9.00E-002
MN-54	Not Detected	-----	2.61E-002
MO-99	Not Detected	-----	3.04E+000
NA-22	Not Detected	-----	3.11E-002
NA-24	Not Detected	-----	5.81E+003
ND-147	Not Detected	-----	3.06E-001
NI-57	Not Detected	-----	6.85E+000
RU-103	Not Detected	-----	2.51E-002
RU-106	Not Detected	-----	2.24E-001
SB-122	Not Detected	-----	5.13E-001
SB-124	Not Detected	-----	2.49E-002
SB-125	Not Detected	-----	6.46E-002
SN-113	Not Detected	-----	3.14E-002
SR-85	Not Detected	-----	3.08E-002
TA-182	Not Detected	-----	1.20E-001
TA-183	Not Detected	-----	1.37E+000
TL-201	Not Detected	-----	1.66E+000
Y-88	Not Detected	-----	2.12E-002
ZN-65	Not Detected	-----	7.68E-002
ZR-95	Not Detected	-----	4.69E-002

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program \*  
 \* 9/11/02 4:26:52 PM \*  
 \*\*\*\*\*

\* Analyzed by: *h* 9/11/02 Reviewed by: *[Signature]* 9/12/02  
 \*\*\*\*\*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059776-003  
 Lab Sample ID : 20124802

Sample Description : 6650/1081-SP1-BH1-15-S  
 Sample Quantity : 881.110 gram  
 Sample Date/Time : 8/29/02 10:05:00 AM  
 Acquire Start Date/Time : 9/09/02 2:59:06 PM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	5.74E-001
RA-226	1.64E+000	4.49E-001	5.73E-001
PB-214	6.09E-001	9.02E-002	5.08E-002
BI-214	5.04E-001	8.23E-002	4.50E-002
PB-210	Not Detected	-----	2.32E+001
TH-232	6.75E-001	3.20E-001	1.76E-001
RA-228	6.22E-001	1.16E-001	9.95E-002
AC-228	6.79E-001	1.30E-001	9.17E-002
TH-228	4.99E-001	3.63E-001	5.63E-001
RA-224	7.61E-001	1.67E-001	5.88E-002
PB-212	6.44E-001	9.40E-002	3.27E-002
BI-212	5.36E-001	2.22E-001	3.05E-001
TL-208	6.00E-001	9.99E-002	6.63E-002
U-235	Not Detected	-----	1.90E-001
TH-231	Not Detected	-----	9.29E+000
PA-231	Not Detected	-----	1.10E+000
TH-227	Not Detected	-----	2.80E-001
RA-223	Not Detected	-----	2.82E-001
RN-219	Not Detected	-----	2.85E-001
PB-211	Not Detected	-----	6.51E-001
TL-207	Not Detected	-----	1.03E+001
AM-241	Not Detected	-----	3.48E-001
PU-239	Not Detected	-----	3.38E+002
NP-237	Not Detected	-----	1.86E+000
PA-233	Not Detected	-----	4.37E-002
TH-229	Not Detected	-----	1.99E-001

[Summary Report] - Sample ID: : 20124802

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	2.73E-002
AG-110m	Not Detected	-----	2.19E-002
BA-133	Not Detected	-----	3.88E-002
BE-7	Not Detected	-----	2.07E-001
CD-115	Not Detected	-----	1.71E+000
CE-139	Not Detected	-----	2.39E-002
CE-141	Not Detected	-----	5.26E-002
CE-144	Not Detected	-----	1.88E-001
CM-243	Not Detected	-----	1.34E-001
CO-56	Not Detected	-----	2.78E-002
CO-57	Not Detected	-----	2.56E-002
CO-58	Not Detected	-----	2.68E-002
CO-60	Not Detected	-----	2.94E-002
CR-51	Not Detected	-----	2.27E-001
CS-134	Not Detected	-----	3.08E-002
CS-137	Not Detected	-----	2.37E-002
EU-152	Not Detected	-----	7.53E-002
EU-154	Not Detected	-----	1.26E-001
EU-155	Not Detected	-----	1.10E-001
FE-59	Not Detected	-----	6.52E-002
GD-153	Not Detected	-----	8.32E-002
HG-203	Not Detected	-----	2.85E-002
I-131	Not Detected	-----	5.62E-002
IR-192	Not Detected	-----	2.25E-002
K-40	1.81E+001	2.41E+000	2.21E-001
MN-52	Not Detected	-----	8.37E-002
MN-54	Not Detected	-----	1.39E-002
MO-99	Not Detected	-----	2.95E+000
NA-22	Not Detected	-----	3.34E-002
NA-24	Not Detected	-----	6.53E+003
ND-147	Not Detected	-----	2.89E-001
NI-57	Not Detected	-----	7.48E+000
RU-103	Not Detected	-----	2.40E-002
RU-106	Not Detected	-----	2.12E-001
SB-122	Not Detected	-----	5.11E-001
SB-124	Not Detected	-----	2.42E-002
SB-125	Not Detected	-----	6.53E-002
SN-113	Not Detected	-----	3.02E-002
SR-85	Not Detected	-----	2.99E-002
TA-182	Not Detected	-----	1.24E-001
TA-183	Not Detected	-----	1.37E+000
TL-201	Not Detected	-----	1.67E+000
Y-88	Not Detected	-----	2.27E-002
ZN-65	Not Detected	-----	8.07E-002
ZR-95	Not Detected	-----	4.49E-002

Sandia National Laboratories  
 Radiation Protection Sample Diagnostics Program  
 9/09/02 6:21:42 PM

\* Analyzed by: *[Signature]* 9/10/02 Reviewed by: *[Signature]*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059777-003  
 Lab Sample ID : 20124803  
  
 Sample Description : 6650/1081-SP2-BH1-12-S  
 Sample Quantity : 791.740 gram  
 Sample Date/Time : 8/29/02 11:00:00 AM  
 Acquire Start Date/Time : 9/09/02 4:41:14 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	-----	6.07E-001
RA-226	1.03E+000	4.48E-001	6.55E-001
PB-214	5.90E-001	9.00E-002	5.59E-002
BI-214	4.97E-001	8.29E-002	4.79E-002
PB-210	Not Detected	-----	2.37E+001
TH-232	5.52E-001	2.73E-001	1.87E-001
RA-228	6.35E-001	1.24E-001	1.19E-001
AC-228	5.80E-001	1.19E-001	9.51E-002
TH-228	4.98E-001	3.67E-001	5.69E-001
RA-224	5.42E-001	1.34E-001	7.60E-002
PB-212	6.10E-001	8.99E-002	3.34E-002
BI-212	7.08E-001	2.34E-001	2.92E-001
TL-208	5.20E-001	9.26E-002	7.06E-002
U-235	Not Detected	-----	1.92E-001
TH-231	Not Detected	-----	9.55E+000
PA-231	Not Detected	-----	1.12E+000
TH-227	Not Detected	-----	2.90E-001
RA-223	Not Detected	-----	2.89E-001
RN-219	Not Detected	-----	3.07E-001
PB-211	Not Detected	-----	6.93E-001
TL-207	Not Detected	-----	1.09E+001
AM-241	Not Detected	-----	3.55E-001
PU-239	Not Detected	-----	3.53E+002
NP-237	Not Detected	-----	1.88E+000
PA-233	Not Detected	-----	4.77E-002
TH-229	Not Detected	-----	2.03E-001

[Summary Report] - Sample ID: : 20124803

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	3.14E-002
AG-110m	Not Detected	-----	2.36E-002
BA-133	Not Detected	-----	4.07E-002
BE-7	Not Detected	-----	2.20E-001
CD-115	Not Detected	-----	1.76E+000
CE-139	Not Detected	-----	2.50E-002
CE-141	Not Detected	-----	5.23E-002
CE-144	Not Detected	-----	2.02E-001
CM-243	Not Detected	-----	1.40E-001
CO-56	Not Detected	-----	2.92E-002
CO-57	Not Detected	-----	2.57E-002
CO-58	Not Detected	-----	2.85E-002
CO-60	Not Detected	-----	3.15E-002
CR-51	Not Detected	-----	2.45E-001
CS-134	Not Detected	-----	3.27E-002
CS-137	Not Detected	-----	2.52E-002
EU-152	Not Detected	-----	7.49E-002
EU-154	Not Detected	-----	1.45E-001
EU-155	Not Detected	-----	1.11E-001
FE-59	Not Detected	-----	6.97E-002
GD-153	Not Detected	-----	8.53E-002
HG-203	Not Detected	-----	2.95E-002
I-131	Not Detected	-----	6.02E-002
IR-192	Not Detected	-----	2.44E-002
K-40	1.86E+001	2.49E+000	2.79E-001
MN-52	Not Detected	-----	9.70E-002
MN-54	Not Detected	-----	2.84E-002
MO-99	Not Detected	-----	3.09E+000
NA-22	Not Detected	-----	3.48E-002
NA-24	Not Detected	-----	6.92E+003
ND-147	Not Detected	-----	3.05E-001
NI-57	Not Detected	-----	7.65E+000
RU-103	Not Detected	-----	2.71E-002
RU-106	Not Detected	-----	2.20E-001
SB-122	Not Detected	-----	5.86E-001
SB-124	Not Detected	-----	2.59E-002
SB-125	Not Detected	-----	6.83E-002
SN-113	Not Detected	-----	3.20E-002
SR-85	Not Detected	-----	3.26E-002
TA-182	Not Detected	-----	1.34E-001
TA-183	Not Detected	-----	1.41E+000
TL-201	Not Detected	-----	1.70E+000
Y-88	Not Detected	-----	2.11E-002
ZN-65	Not Detected	-----	8.40E-002
ZR-95	Not Detected	-----	4.52E-002

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 Radiation Protection Sample Diagnostics Program \*  
 9/09/02 8:03:50 PM \*  
 \*\*\*\*\*

\* Analyzed by: *h* 9/19/02 Reviewed by: *[Signature]* 9/11/02 \*  
 \*\*\*\*\*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059778-003  
 Lab Sample ID : 20124804

Sample Description : 6650/1081-SP2-BH1-17-S  
 Sample Quantity : 772.690 gram  
 Sample Date/Time : 8/29/02 11:55:00 AM  
 Acquire Start Date/Time : 9/09/02 6:23:32 PM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	5.72E-001
RA-226	1.44E+000	4.28E-001	5.60E-001
PB-214	4.66E-001	7.57E-002	5.52E-002
BI-214	4.36E-001	7.40E-002	4.30E-002
PB-210	Not Detected	-----	2.25E+001
TH-232	5.89E-001	2.81E-001	1.57E-001
RA-228	5.32E-001	1.09E-001	1.07E-001
AC-228	4.74E-001	1.01E-001	8.20E-002
TH-228	3.60E-001	3.65E-001	5.81E-001
RA-224	6.04E-001	1.44E-001	6.82E-002
PB-212	5.41E-001	8.07E-002	3.04E-002
BI-212	5.78E-001	1.94E-001	2.34E-001
TL-208	4.71E-001	8.62E-002	6.75E-002
U-235	Not Detected	-----	1.90E-001
TH-231	Not Detected	-----	9.08E+000
PA-231	Not Detected	-----	1.10E+000
TH-227	Not Detected	-----	2.73E-001
RA-223	Not Detected	-----	2.83E-001
RN-219	Not Detected	-----	2.82E-001
PB-211	Not Detected	-----	6.35E-001
TL-207	Not Detected	-----	1.10E+001
AM-241	Not Detected	-----	3.51E-001
PU-239	Not Detected	-----	3.35E+002
NP-237	Not Detected	-----	1.84E+000
PA-233	Not Detected	-----	4.42E-002
TH-229	Not Detected	-----	1.90E-001

[Summary Report] - Sample ID: : 20124804

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	2.83E-002
AG-110m	Not Detected	-----	2.28E-002
BA-133	Not Detected	-----	3.85E-002
BE-7	Not Detected	-----	2.05E-001
CD-115	Not Detected	-----	1.68E+000
CE-139	Not Detected	-----	2.42E-002
CE-141	Not Detected	-----	5.25E-002
CE-144	Not Detected	-----	1.91E-001
CM-243	Not Detected	-----	1.32E-001
CO-56	Not Detected	-----	2.75E-002
CO-57	Not Detected	-----	2.44E-002
CO-58	Not Detected	-----	2.78E-002
CO-60	Not Detected	-----	2.78E-002
CR-51	Not Detected	-----	2.29E-001
CS-134	Not Detected	-----	3.10E-002
CS-137	Not Detected	-----	2.35E-002
EU-152	Not Detected	-----	7.13E-002
EU-154	Not Detected	-----	1.30E-001
EU-155	Not Detected	-----	1.10E-001
FE-59	Not Detected	-----	6.51E-002
GD-153	Not Detected	-----	8.09E-002
HG-203	Not Detected	-----	2.83E-002
I-131	Not Detected	-----	5.61E-002
IR-192	Not Detected	-----	2.27E-002
K-40	1.57E+001	2.12E+000	2.44E-001
MN-52	Not Detected	-----	9.98E-002
MN-54	Not Detected	-----	2.64E-002
MO-99	Not Detected	-----	2.94E+000
NA-22	Not Detected	-----	3.27E-002
NA-24	Not Detected	-----	7.02E+003
ND-147	Not Detected	-----	2.97E-001
NI-57	Not Detected	-----	7.76E+000
RU-103	Not Detected	-----	2.74E-002
RU-106	Not Detected	-----	2.11E-001
SB-122	Not Detected	-----	5.43E-001
SB-124	Not Detected	-----	2.46E-002
SB-125	Not Detected	-----	6.39E-002
SN-113	Not Detected	-----	2.92E-002
SR-85	Not Detected	-----	3.00E-002
TA-182	Not Detected	-----	1.21E-001
TA-183	Not Detected	-----	1.40E+000
TL-201	Not Detected	-----	1.66E+000
Y-88	Not Detected	-----	1.99E-002
ZN-65	Not Detected	-----	7.81E-002
ZR-95	Not Detected	-----	4.72E-002



\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program \*  
 \* 9/09/02 9:45:54 PM \*  
 \*\*\*\*\*

\* Analyzed by: *[Signature]* 9/11/02 Reviewed by: *[Signature]* 9/11/02 \*  
 \*\*\*\*\*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059779-003  
 Lab Sample ID : 20124805

Sample Description : 6650/1081-SP3-BH1-17-S  
 Sample Quantity : 703.790 gram  
 Sample Date/Time : 8/29/02 2:55:00 PM  
 Acquire Start Date/Time : 9/09/02 8:05:35 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	-----	6.11E-001
RA-226	1.08E+000	4.35E-001	6.22E-001
PB-214	5.14E-001	8.19E-002	5.56E-002
BI-214	4.90E-001	8.21E-002	4.50E-002
PB-210	Not Detected	-----	2.50E+001
TH-232	5.57E-001	2.75E-001	1.82E-001
RA-228	5.33E-001	1.13E-001	1.15E-001
AC-228	5.38E-001	1.10E-001	7.76E-002
TH-228	3.16E-001	3.42E-001	5.46E-001
RA-224	6.41E-001	1.57E-001	8.84E-002
PB-212	5.59E-001	8.40E-002	3.40E-002
BI-212	4.58E-001	2.26E-001	3.21E-001
TL-208	4.84E-001	8.89E-002	6.79E-002
U-235	Not Detected	-----	1.94E-001
TH-231	Not Detected	-----	9.61E+000
PA-231	Not Detected	-----	1.14E+000
TH-227	Not Detected	-----	2.90E-001
RA-223	Not Detected	-----	3.01E-001
RN-219	Not Detected	-----	3.15E-001
PB-211	Not Detected	-----	6.90E-001
TL-207	Not Detected	-----	1.08E+001
AM-241	Not Detected	-----	3.74E-001
PU-239	Not Detected	-----	3.59E+002
NP-237	Not Detected	-----	1.97E+000
PA-233	Not Detected	-----	4.71E-002
TH-229	Not Detected	-----	2.10E-001

[Summary Report] - Sample ID: : 20124805

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	2.91E-002
AG-110m	Not Detected	-----	2.38E-002
BA-133	Not Detected	-----	4.16E-002
BE-7	Not Detected	-----	2.25E-001
CD-115	Not Detected	-----	1.77E+000
CE-139	Not Detected	-----	2.55E-002
CE-141	Not Detected	-----	5.48E-002
CE-144	Not Detected	-----	1.96E-001
CM-243	Not Detected	-----	1.43E-001
CO-56	Not Detected	-----	2.85E-002
CO-57	Not Detected	-----	2.60E-002
CO-58	Not Detected	-----	2.91E-002
CO-60	Not Detected	-----	2.69E-002
CR-51	Not Detected	-----	2.52E-001
CS-134	Not Detected	-----	3.43E-002
CS-137	Not Detected	-----	2.47E-002
EU-152	Not Detected	-----	7.65E-002
EU-154	Not Detected	-----	1.34E-001
EU-155	Not Detected	-----	1.14E-001
FE-59	Not Detected	-----	6.67E-002
GD-153	Not Detected	-----	8.80E-002
HG-203	Not Detected	-----	2.99E-002
I-131	Not Detected	-----	6.08E-002
IR-192	Not Detected	-----	2.47E-002
K-40	1.50E+001	2.03E+000	2.72E-001
MN-52	Not Detected	-----	1.03E-001
MN-54	Not Detected	-----	2.91E-002
MO-99	Not Detected	-----	3.02E+000
NA-22	Not Detected	-----	3.59E-002
NA-24	Not Detected	-----	6.74E+003
ND-147	Not Detected	-----	3.10E-001
NI-57	Not Detected	-----	7.82E+000
RU-103	Not Detected	-----	2.78E-002
RU-106	Not Detected	-----	2.18E-001
SB-122	Not Detected	-----	5.61E-001
SB-124	Not Detected	-----	2.65E-002
SB-125	Not Detected	-----	6.81E-002
SN-113	Not Detected	-----	3.16E-002
SR-85	Not Detected	-----	3.32E-002
TA-182	Not Detected	-----	1.29E-001
TA-183	Not Detected	-----	1.48E+000
TL-201	Not Detected	-----	1.69E+000
Y-88	Not Detected	-----	1.89E-002
ZN-65	Not Detected	-----	8.25E-002
ZR-95	Not Detected	-----	5.04E-002

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program \*  
 \* 9/09/02 11:27:58 PM \*  
 \*\*\*\*\*

\* Analyzed by: *ku 9/10/02* Reviewed by: *[Signature]* \*  
 \*\*\*\*\*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059780-003  
 Lab Sample ID : 20124806  
  
 Sample Description : 6650/1081-SP3-BH1-24-S  
 Sample Quantity : 901.820 gram  
 Sample Date/Time : 8/29/02 3:35:00 PM  
 Acquire Start Date/Time : 9/09/02 9:47:39 PM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	5.49E-001
RA-226	1.08E+000	3.95E-001	5.56E-001
PB-214	5.17E-001	7.93E-002	5.06E-002
BI-214	4.55E-001	7.52E-002	4.19E-002
PB-210	Not Detected	-----	2.13E+001
TH-232	5.10E-001	2.48E-001	1.56E-001
RA-228	4.39E-001	9.30E-002	1.05E-001
AC-228	4.39E-001	9.14E-002	7.09E-002
TH-228	3.67E-001	3.29E-001	5.19E-001
RA-224	4.59E-001	1.13E-001	6.09E-002
PB-212	4.82E-001	7.17E-002	2.98E-002
BI-212	5.41E-001	2.07E-001	2.76E-001
TL-208	4.51E-001	7.99E-002	5.92E-002
U-235	Not Detected	-----	1.75E-001
TH-231	Not Detected	-----	8.46E+000
PA-231	Not Detected	-----	1.04E+000
TH-227	Not Detected	-----	2.48E-001
RA-223	Not Detected	-----	2.65E-001
RN-219	Not Detected	-----	2.60E-001
PB-211	Not Detected	-----	5.95E-001
TL-207	Not Detected	-----	9.96E+000
AM-241	Not Detected	-----	3.09E-001
PU-239	Not Detected	-----	3.16E+002
NP-237	Not Detected	-----	1.66E+000
PA-233	Not Detected	-----	4.25E-002
TH-229	Not Detected	-----	1.71E-001

[Summary Report] - Sample ID: : 20124806

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	2.59E-002
AG-110m	Not Detected	-----	2.03E-002
BA-133	Not Detected	-----	3.68E-002
BE-7	Not Detected	-----	1.99E-001
CD-115	Not Detected	-----	1.53E+000
CE-139	Not Detected	-----	2.20E-002
CE-141	Not Detected	-----	4.76E-002
CE-144	Not Detected	-----	1.76E-001
CM-243	Not Detected	-----	1.27E-001
CO-56	Not Detected	-----	2.51E-002
CO-57	Not Detected	-----	2.33E-002
CO-58	Not Detected	-----	2.43E-002
CO-60	Not Detected	-----	2.62E-002
CR-51	Not Detected	-----	2.14E-001
CS-134	Not Detected	-----	2.96E-002
CS-137	Not Detected	-----	2.25E-002
EU-152	Not Detected	-----	6.83E-002
EU-154	Not Detected	-----	1.19E-001
EU-155	Not Detected	-----	1.03E-001
FE-59	Not Detected	-----	6.16E-002
GD-153	Not Detected	-----	7.40E-002
HG-203	Not Detected	-----	2.69E-002
I-131	Not Detected	-----	5.24E-002
IR-192	Not Detected	-----	2.19E-002
K-40	1.76E+001	2.36E+000	2.47E-001
MN-52	Not Detected	-----	9.13E-002
MN-54	Not Detected	-----	1.36E-002
MO-99	Not Detected	-----	2.66E+000
NA-22	Not Detected	-----	3.20E-002
NA-24	Not Detected	-----	6.17E+003
ND-147	Not Detected	-----	2.57E-001
NI-57	Not Detected	-----	6.79E+000
RU-103	Not Detected	-----	2.28E-002
RU-106	Not Detected	-----	2.06E-001
SB-122	Not Detected	-----	5.04E-001
SB-124	Not Detected	-----	2.32E-002
SB-125	Not Detected	-----	6.02E-002
SN-113	Not Detected	-----	2.75E-002
SR-85	Not Detected	-----	2.86E-002
TA-182	Not Detected	-----	1.17E-001
TA-183	Not Detected	-----	1.23E+000
TL-201	Not Detected	-----	1.50E+000
Y-88	Not Detected	-----	2.01E-002
ZN-65	Not Detected	-----	7.44E-002
ZR-95	Not Detected	-----	4.34E-002

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program \*  
 \* 9/10/02 7:52:53 AM \*  
 \*\*\*\*\*

\* Analyzed by: *h* 9/19/02 Reviewed by: *R. J. Taylor* \*  
 \*\*\*\*\*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059781-003  
 Lab Sample ID : 20124807  
  
 Sample Description : 6650/1081-SP4-BH1-20-S  
 Sample Quantity : 834.540 gram  
 Sample Date/Time : 8/30/02 9:10:00 AM  
 Acquire Start Date/Time : 9/09/02 11:29:43 PM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
U-238	Not Detected	-----	5.89E-001
RA-226	1.82E+000	4.63E-001	5.68E-001
PB-214	5.61E-001	8.50E-002	5.11E-002
BI-214	5.11E-001	8.34E-002	4.39E-002
PB-210	Not Detected	-----	2.25E+001
TH-232	6.58E-001	3.11E-001	1.65E-001
RA-228	6.12E-001	1.16E-001	9.81E-002
AC-228	6.00E-001	1.16E-001	7.89E-002
TH-228	6.31E-001	3.69E-001	5.58E-001
RA-224	5.61E-001	1.37E-001	8.00E-002
PB-212	6.13E-001	9.01E-002	3.31E-002
BI-212	6.21E-001	2.34E-001	3.12E-001
TL-208	5.24E-001	9.13E-002	6.63E-002
U-235	8.58E-002	1.50E-001	1.92E-001
TH-231	Not Detected	-----	9.17E+000
PA-231	Not Detected	-----	1.11E+000
TH-227	Not Detected	-----	2.79E-001
RA-223	Not Detected	-----	2.68E-001
RN-219	Not Detected	-----	2.98E-001
PB-211	Not Detected	-----	6.75E-001
TL-207	Not Detected	-----	9.80E+000
AM-241	Not Detected	-----	3.40E-001
PU-239	Not Detected	-----	3.37E+002
NP-237	Not Detected	-----	1.74E+000
PA-233	Not Detected	-----	4.45E-002
TH-229	Not Detected	-----	1.97E-001

[Summary Report] - Sample ID: : 20124807

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	2.66E-002
AG-110m	Not Detected	-----	2.19E-002
BA-133	Not Detected	-----	3.93E-002
BE-7	Not Detected	-----	2.17E-001
CD-115	Not Detected	-----	1.37E+000
CE-139	Not Detected	-----	2.43E-002
CE-141	Not Detected	-----	5.11E-002
CE-144	Not Detected	-----	1.91E-001
CM-243	Not Detected	-----	1.37E-001
CO-56	Not Detected	-----	2.78E-002
CO-57	Not Detected	-----	2.54E-002
CO-58	Not Detected	-----	2.60E-002
CO-60	Not Detected	-----	3.03E-002
CR-51	Not Detected	-----	2.31E-001
CS-134	Not Detected	-----	3.12E-002
CS-137	Not Detected	-----	2.37E-002
EU-152	Not Detected	-----	7.41E-002
EU-154	Not Detected	-----	1.22E-001
EU-155	Not Detected	-----	1.08E-001
FE-59	Not Detected	-----	6.52E-002
GD-153	Not Detected	-----	8.09E-002
HG-203	Not Detected	-----	2.88E-002
I-131	Not Detected	-----	5.53E-002
IR-192	Not Detected	-----	2.32E-002
K-40	1.67E+001	2.24E+000	2.39E-001
MN-52	Not Detected	-----	8.06E-002
MN-54	Not Detected	-----	2.68E-002
MO-99	Not Detected	-----	2.54E+000
NA-22	Not Detected	-----	3.08E-002
NA-24	Not Detected	-----	3.29E+003
ND-147	Not Detected	-----	2.90E-001
NI-57	Not Detected	-----	5.39E+000
RU-103	Not Detected	-----	2.53E-002
RU-106	Not Detected	-----	2.15E-001
SB-122	Not Detected	-----	4.58E-001
SB-124	Not Detected	-----	2.30E-002
SB-125	Not Detected	-----	6.48E-002
SN-113	Not Detected	-----	3.02E-002
SR-85	Not Detected	-----	3.02E-002
TA-182	Not Detected	-----	1.30E-001
TA-183	Not Detected	-----	1.23E+000
TL-201	Not Detected	-----	1.39E+000
Y-88	Not Detected	-----	2.26E-002
ZN-65	Not Detected	-----	7.94E-002
ZR-95	Not Detected	-----	4.75E-002

\*\*\*\*\*  
 Sandia National Laboratories  
 Radiation Protection Sample Diagnostics Program  
 9/10/02 2:52:11 AM  
 \*\*\*\*\*

\* Analyzed by: *for 9/10/02* Reviewed by: *[Signature] 9/12/02*  
 \*\*\*\*\*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059782-003  
 Lab Sample ID : 20124808

Sample Description : 6650/1081-SP4-BH1-25-S  
 Sample Quantity : 679.100 gram  
 Sample Date/Time : 8/30/02 9:55:00 AM  
 Acquire Start Date/Time : 9/10/02 1:11:56 AM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
U-238	Not Detected	-----	6.52E-001
RA-226	1.07E+000	4.69E-001	6.84E-001
PB-214	5.30E-001	8.58E-002	6.16E-002
BI-214	4.84E-001	8.35E-002	5.23E-002
PB-210	Not Detected	-----	2.58E+001
TH-232	6.37E-001	3.10E-001	1.92E-001
RA-228	5.69E-001	1.19E-001	1.18E-001
AC-228	5.76E-001	1.25E-001	1.08E-001
TH-228	6.28E-001	3.99E-001	6.07E-001
RA-224	7.42E-001	1.72E-001	6.67E-002
PB-212	6.04E-001	9.04E-002	3.75E-002
BI-212	8.05E-001	2.79E-001	3.58E-001
TL-208	5.15E-001	9.31E-002	6.89E-002
U-235	Not Detected	-----	2.09E-001
TH-231	Not Detected	-----	9.80E+000
PA-231	Not Detected	-----	1.20E+000
TH-227	Not Detected	-----	3.10E-001
RA-223	Not Detected	-----	2.96E-001
RN-219	Not Detected	-----	3.18E-001
PB-211	Not Detected	-----	6.97E-001
TL-207	Not Detected	-----	1.11E+001
AM-241	Not Detected	-----	3.74E-001
PU-239	Not Detected	-----	3.70E+002
NP-237	Not Detected	-----	2.04E+000
PA-233	Not Detected	-----	4.99E-002
TH-229	Not Detected	-----	2.09E-001

[Summary Report] - Sample ID: : 20124808

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	2.95E-002
AG-110m	Not Detected	-----	2.48E-002
BA-133	Not Detected	-----	4.48E-002
BE-7	Not Detected	-----	2.33E-001
CD-115	Not Detected	-----	1.58E+000
CE-139	Not Detected	-----	2.70E-002
CE-141	Not Detected	-----	5.61E-002
CE-144	Not Detected	-----	2.04E-001
CM-243	Not Detected	-----	1.49E-001
CO-56	Not Detected	-----	3.17E-002
CO-57	Not Detected	-----	2.76E-002
CO-58	Not Detected	-----	2.90E-002
CO-60	Not Detected	-----	3.46E-002
CR-51	Not Detected	-----	2.63E-001
CS-134	Not Detected	-----	3.55E-002
CS-137	Not Detected	-----	2.75E-002
EU-152	Not Detected	-----	8.08E-002
EU-154	Not Detected	-----	1.36E-001
EU-155	Not Detected	-----	1.22E-001
FE-59	Not Detected	-----	6.80E-002
GD-153	Not Detected	-----	8.60E-002
HG-203	Not Detected	-----	3.10E-002
I-131	Not Detected	-----	6.05E-002
IR-192	Not Detected	-----	2.58E-002
K-40	1.59E+001	2.16E+000	2.66E-001
MN-52	Not Detected	-----	8.73E-002
MN-54	Not Detected	-----	2.79E-002
MO-99	Not Detected	-----	2.78E+000
NA-22	Not Detected	-----	3.49E-002
NA-24	Not Detected	-----	3.96E+003
ND-147	Not Detected	-----	3.10E-001
NI-57	Not Detected	-----	5.73E+000
RU-103	Not Detected	-----	2.80E-002
RU-106	Not Detected	-----	2.44E-001
SB-122	Not Detected	-----	4.81E-001
SB-124	Not Detected	-----	2.74E-002
SB-125	Not Detected	-----	6.94E-002
SN-113	Not Detected	-----	3.20E-002
SR-85	Not Detected	-----	3.50E-002
TA-182	Not Detected	-----	1.35E-001
TA-183	Not Detected	-----	1.37E+000
TL-201	Not Detected	-----	1.58E+000
Y-88	Not Detected	-----	2.48E-002
ZN-65	Not Detected	-----	8.76E-002
ZR-95	Not Detected	-----	4.99E-002



\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program \*  
 \* 9/10/02 4:34:09 AM \*  
 \*\*\*\*\*

\* Analyzed by: *du 9/10/02* Reviewed by: *[Signature]* \*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059784-003  
 Lab Sample ID : 20124809

Sample Description : 6570/1083-DW1-BH1-9-S  
 Sample Quantity : 615.440 gram  
 Sample Date/Time : 9/03/02 8:55:00 AM  
 Acquire Start Date/Time : 9/10/02 2:53:54 AM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

\*\*\*\*\*

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
U-238	Not Detected	-----	7.83E-001
RA-226	Not Detected	-----	7.63E-001
PB-214	8.27E-001	1.23E-001	6.90E-002
BI-214	7.84E-001	1.24E-001	5.45E-002
PB-210	Not Detected	-----	3.08E+001
TH-232	7.86E-001	3.82E-001	2.42E-001
RA-228	8.37E-001	1.60E-001	1.43E-001
AC-228	9.47E-001	1.75E-001	1.01E-001
TH-228	5.66E-001	3.81E-001	5.83E-001
RA-224	9.90E-001	2.21E-001	7.83E-002
PB-212	8.71E-001	1.27E-001	4.17E-002
BI-212	8.19E-001	3.06E-001	4.05E-001
TL-208	7.78E-001	1.31E-001	8.51E-002
U-235	2.11E-001	1.95E-001	2.50E-001
TH-231	Not Detected	-----	1.22E+001
PA-231	Not Detected	-----	1.43E+000
TH-227	Not Detected	-----	3.81E-001
RA-223	Not Detected	-----	2.85E-001
RN-219	Not Detected	-----	3.85E-001
PB-211	Not Detected	-----	8.69E-001
TL-207	Not Detected	-----	1.30E+001
AM-241	Not Detected	-----	4.60E-001
PU-239	Not Detected	-----	4.29E+002
NP-237	Not Detected	-----	2.38E+000
PA-233	Not Detected	-----	5.86E-002
TH-229	Not Detected	-----	2.54E-001

[Summary Report] - Sample ID: . : 20124809

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	3.83E-002
AG-110m	Not Detected	-----	2.91E-002
BA-133	Not Detected	-----	5.52E-002
BE-7	Not Detected	-----	2.50E-001
CD-115	Not Detected	-----	5.64E-001
CE-139	Not Detected	-----	3.08E-002
CE-141	Not Detected	-----	6.14E-002
CE-144	Not Detected	-----	2.43E-001
CM-243	Not Detected	-----	1.80E-001
CO-56	Not Detected	-----	3.57E-002
CO-57	Not Detected	-----	3.15E-002
CO-58	Not Detected	-----	3.30E-002
CO-60	Not Detected	-----	3.35E-002
CR-51	Not Detected	-----	2.68E-001
CS-134	Not Detected	-----	4.26E-002
CS-137	Not Detected	-----	3.00E-002
EU-152	Not Detected	-----	9.29E-002
EU-154	Not Detected	-----	1.76E-001
EU-155	Not Detected	-----	1.40E-001
FE-59	Not Detected	-----	7.13E-002
GD-153	Not Detected	-----	1.02E-001
HG-203	Not Detected	-----	3.56E-002
I-131	Not Detected	-----	5.17E-002
IR-192	Not Detected	-----	2.88E-002
K-40	1.64E+001	2.24E+000	3.34E-001
MN-52	Not Detected	-----	6.34E-002
MN-54	Not Detected	-----	2.17E-002
MO-99	Not Detected	-----	1.21E+000
NA-22	Not Detected	-----	3.98E-002
NA-24	Not Detected	-----	6.00E+001
ND-147	Not Detected	-----	2.76E-001
NI-57	Not Detected	-----	1.11E+000
RU-103	Not Detected	-----	2.88E-002
RU-106	Not Detected	-----	2.81E-001
SB-122	Not Detected	-----	2.19E-001
SB-124	Not Detected	-----	3.01E-002
SB-125	Not Detected	-----	8.47E-002
SN-113	Not Detected	-----	3.83E-002
SR-85	Not Detected	-----	3.88E-002
TA-182	Not Detected	-----	1.59E-001
TA-183	Not Detected	-----	9.89E-001
TL-201	Not Detected	-----	7.94E-001
Y-88	Not Detected	-----	2.42E-002
ZN-65	Not Detected	-----	1.02E-001
ZR-95	Not Detected	-----	5.68E-002

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program \*  
 \* 9/10/02 6:16:08 AM \*  
 \*\*\*\*\*

\* Analyzed by: *ha 9/10/02* Reviewed by: *[Signature]* \*  
 \*\*\*\*\*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059785-003  
 Lab Sample ID : 20124810  
  
 Sample Description : 6570/1083-DW1-BH1-14-S  
 Sample Quantity : 1002.730 gram ✓  
 Sample Date/Time : 9/03/02 9:25:00 AM  
 Acquire Start Date/Time : 9/10/02 4:35:53 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	-----	5.29E-001
RA-226	9.41E-001	3.74E-001	5.38E-001
PB-214	4.89E-001	7.42E-002	4.60E-002
BI-214	4.65E-001	7.53E-002	4.03E-002
PB-210	Not Detected	-----	1.93E+001
TH-232	4.87E-001	2.48E-001	1.94E-001
RA-228	4.81E-001	9.57E-002	9.56E-002
AC-228	5.06E-001	1.01E-001	7.76E-002
TH-228	2.97E-001	3.13E-001	5.00E-001
RA-224	6.20E-001	1.39E-001	5.71E-002
PB-212	5.23E-001	7.67E-002	2.82E-002
BI-212	4.58E-001	1.77E-001	2.37E-001
TL-208	4.42E-001	7.48E-002	4.82E-002
U-235	1.28E-001	1.36E-001	1.73E-001
TH-231	Not Detected	-----	8.27E+000
PA-231	Not Detected	-----	9.78E-001
TH-227	Not Detected	-----	2.42E-001
RA-223	Not Detected	-----	1.95E-001
RN-219	Not Detected	-----	2.54E-001
PB-211	Not Detected	-----	5.85E-001
TL-207	Not Detected	-----	8.87E+000
AM-241	Not Detected	-----	3.08E-001
PU-239	Not Detected	-----	3.08E+002
NP-237	Not Detected	-----	1.63E+000
FA-233	Not Detected	-----	3.99E-002
TH-229	Not Detected	-----	1.75E-001

[Summary Report] - Sample ID: : 20124810

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	2.29E-002
AG-110m	Not Detected	-----	1.93E-002
BA-133	Not Detected	-----	3.46E-002
BE-7	Not Detected	-----	1.85E-001
CD-115	Not Detected	-----	3.73E-001
CE-139	Not Detected	-----	2.10E-002
CE-141	Not Detected	-----	4.35E-002
CE-144	Not Detected	-----	1.67E-001
CM-243	Not Detected	-----	1.26E-001
CO-56	Not Detected	-----	2.24E-002
CO-57	Not Detected	-----	2.18E-002
CO-58	Not Detected	-----	2.27E-002
CO-60	Not Detected	-----	2.53E-002
CR-51	Not Detected	-----	1.84E-001
CS-134	Not Detected	-----	2.82E-002
CS-137	Not Detected	-----	2.17E-002
EU-152	Not Detected	-----	6.43E-002
EU-154	Not Detected	-----	1.06E-001
EU-155	Not Detected	-----	9.76E-002
FE-59	Not Detected	-----	5.44E-002
GD-153	Not Detected	-----	7.19E-002
HG-203	Not Detected	-----	2.45E-002
I-131	Not Detected	-----	3.51E-002
IR-192	Not Detected	-----	1.93E-002
K-40	1.75E+001	2.33E+000	1.97E-001
MN-52	Not Detected	-----	4.73E-002
MN-54	Not Detected	-----	2.28E-002
MO-99	Not Detected	-----	8.07E-001
NA-22	Not Detected	-----	2.84E-002
NA-24	Not Detected	-----	4.59E+001
ND-147	Not Detected	-----	1.93E-001
NI-57	Not Detected	-----	8.04E-001
RU-103	Not Detected	-----	2.00E-002
RU-106	Not Detected	-----	1.83E-001
SB-122	Not Detected	-----	1.51E-001
SB-124	Not Detected	-----	2.19E-002
SB-125	Not Detected	-----	5.78E-002
SN-113	Not Detected	-----	2.63E-002
SR-85	Not Detected	-----	2.46E-002
TA-182	Not Detected	-----	1.08E-001
TA-183	Not Detected	-----	6.67E-001
TL-201	Not Detected	-----	5.30E-001
Y-88	Not Detected	-----	1.70E-002
ZN-65	Not Detected	-----	6.59E-002
ZR-95	Not Detected	-----	3.74E-002

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program \*  
 \* 9/10/02 9:40:19 AM \*  
 \*\*\*\*\*

\* Analyzed by: *mu* 9/10/02 Reviewed by: *[Signature]* 9/11/02 \*  
 \*\*\*\*\*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059788-003  
 Lab Sample ID : 20124812  
  
 Sample Description : 6589/6600-1031-SP1-BH1-15-S  
 Sample Quantity : 761.010 gram  
 Sample Date/Time : 9/05/02 10:50:00 AM  
 Acquire Start Date/Time : 9/10/02 7:59:57 AM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	6.79E-001
RA-226	1.74E+000	5.11E-001	6.74E-001
PB-214	6.96E-001	1.04E-001	5.96E-002
BI-214	6.85E-001	1.08E-001	5.13E-002
PB-210	Not Detected	-----	2.59E+001
TH-232	8.72E-001	4.06E-001	1.91E-001
RA-228	7.81E-001	1.44E-001	1.24E-001
AC-228	7.94E-001	1.49E-001	9.61E-002
TH-228	1.03E+000	4.15E-001	5.83E-001
RA-224	9.21E-001	2.01E-001	7.10E-002
PB-212	7.99E-001	1.16E-001	3.65E-002
BI-212	5.83E-001	2.86E-001	4.14E-001
TL-208	6.91E-001	1.14E-001	7.36E-002
U-235	Not Detected	-----	2.05E-001
TH-231	Not Detected	-----	1.06E+001
PA-231	Not Detected	-----	1.26E+000
TH-227	Not Detected	-----	3.29E-001
RA-223	Not Detected	-----	2.22E-001
RN-219	Not Detected	-----	3.15E-001
PB-211	Not Detected	-----	7.32E-001
TL-207	Not Detected	-----	1.11E+001
AM-241	Not Detected	-----	3.85E-001
PU-239	Not Detected	-----	3.87E+002
NP-237	Not Detected	-----	2.05E+000
PA-233	Not Detected	-----	5.13E-002
TH-229	Not Detected	-----	2.24E-001

[Summary Report] - Sample ID: : 20124812

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	3.17E-002
AG-110m	Not Detected	-----	2.40E-002
BA-133	Not Detected	-----	4.55E-002
BE-7	Not Detected	-----	2.16E-001
CD-115	Not Detected	-----	2.76E-001
CE-139	Not Detected	-----	2.67E-002
CE-141	Not Detected	-----	4.92E-002
CE-144	Not Detected	-----	2.13E-001
CM-243	Not Detected	-----	1.53E-001
CO-56	Not Detected	-----	2.82E-002
CO-57	Not Detected	-----	2.74E-002
CO-58	Not Detected	-----	2.79E-002
CO-60	Not Detected	-----	2.93E-002
CR-51	Not Detected	-----	2.23E-001
CS-134	Not Detected	-----	3.65E-002
CS-137	Not Detected	-----	2.73E-002
EU-152	Not Detected	-----	8.20E-002
EU-154	Not Detected	-----	1.46E-001
EU-155	Not Detected	-----	1.21E-001
FE-59	Not Detected	-----	5.94E-002
GD-153	Not Detected	-----	9.05E-002
HG-203	Not Detected	-----	2.99E-002
I-131	Not Detected	-----	3.66E-002
IR-192	Not Detected	-----	2.45E-002
K-40	1.53E+001	2.06E+000	2.67E-001
MN-52	Not Detected	-----	4.87E-002
MN-54	Not Detected	-----	3.01E-002
MO-99	Not Detected	-----	6.43E-001
NA-22	Not Detected	-----	3.48E-002
NA-24	Not Detected	-----	6.06E+000
ND-147	Not Detected	-----	2.18E-001
NI-57	Not Detected	-----	2.78E-001
RU-103	Not Detected	-----	2.73E-002
RU-106	Not Detected	-----	2.28E-001
SB-122	Not Detected	-----	1.22E-001
SB-124	Not Detected	-----	2.49E-002
SB-125	Not Detected	-----	7.00E-002
SN-113	Not Detected	-----	3.30E-002
SR-85	Not Detected	-----	3.31E-002
TA-182	Not Detected	-----	1.36E-001
TA-183	Not Detected	-----	6.43E-001
TL-201	Not Detected	-----	4.28E-001
Y-88	Not Detected	-----	2.29E-002
ZN-65	Not Detected	-----	8.65E-002
ZR-95	Not Detected	-----	4.87E-002

Sandia National Laboratories  
 Radiation Protection Sample Diagnostics Program  
 9/9/02 3:05:14 PM

\* Analyzed by: *for 9/10/02* Reviewed by: *[Signature]*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059789-003  
 Lab Sample ID : 20124813

Sample Description : 6589-6600-1031-SP1-BH1-20-S  
 Sample Quantity : 694.690 gram  
 Sample Date/Time : 9/5/02 11:10:00 AM  
 Acquire Start Date/Time : 9/9/02 1:24:59 PM  
 Detector Name : LAB01  
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	5.46E-001
RA-226	1.47E+000	5.49E-001	7.71E-001
PB-214	7.73E-001	1.17E-001	6.26E-002
BI-214	6.49E-001	1.09E-001	5.62E-002
PB-210	Not Detected	-----	8.91E+000
TH-232	7.45E-001	3.44E-001	1.41E-001
RA-228	7.32E-001	1.59E-001	1.63E-001
AC-228	7.72E-001	1.59E-001	1.11E-001
TH-228	6.30E-001	2.32E-001	5.06E-001
RA-224	8.46E-001	2.10E-001	8.09E-002
PB-212	7.30E-001	1.10E-001	4.38E-002
BI-212	5.55E-001	2.80E-001	3.95E-001
TL-208	7.37E-001	1.31E-001	9.21E-002
U-235	Not Detected	-----	2.14E-001
TH-231	Not Detected	-----	6.81E+000
PA-231	Not Detected	-----	1.51E+000
TH-227	Not Detected	-----	3.33E-001
RA-223	Not Detected	-----	1.48E-001
RN-219	Not Detected	-----	4.01E-001
PB-211	Not Detected	-----	9.48E-001
TL-207	Not Detected	-----	1.59E+001
AM-241	Not Detected	-----	1.82E-001
PU-239	Not Detected	-----	3.71E+002
NP-237	Not Detected	-----	2.04E+000
PA-233	Not Detected	-----	6.21E-002
TH-229	Not Detected	-----	1.98E-001

[Summary Report] - Sample ID: : 20124813

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	4.45E-002
AG-110m	Not Detected	-----	3.29E-002
BA-133	Not Detected	-----	4.70E-002
BE-7	Not Detected	-----	2.69E-001
CD-115	Not Detected	-----	2.56E-001
CE-139	Not Detected	-----	2.69E-002
CE-141	Not Detected	-----	5.04E-002
CE-144	Not Detected	-----	2.12E-001
CM-243	Not Detected	-----	1.88E-001
CO-56	Not Detected	-----	3.60E-002
CO-57	Not Detected	-----	2.54E-002
CO-58	Not Detected	-----	3.61E-002
CO-60	Not Detected	-----	4.21E-002
CR-51	Not Detected	-----	2.67E-001
CS-134	Not Detected	-----	4.68E-002
CS-137	Not Detected	-----	3.55E-002
EU-152	Not Detected	-----	7.57E-002
EU-154	Not Detected	-----	2.06E-001
EU-155	Not Detected	-----	1.18E-001
FE-59	Not Detected	-----	8.75E-002
GD-153	Not Detected	-----	6.82E-002
HG-203	Not Detected	-----	3.62E-002
I-131	Not Detected	-----	4.13E-002
IR-192	Not Detected	-----	2.90E-002
K-40	1.57E+001	2.19E+000	3.24E-001
MN-52	Not Detected	-----	6.46E-002
MN-54	Not Detected	-----	3.92E-002
MO-99	Not Detected	-----	7.78E-001
NA-22	Not Detected	-----	5.32E-002
NA-24	Not Detected	-----	3.96E+000
ND-147	Not Detected	-----	2.62E-001
NI-57	Not Detected	-----	3.92E-001
RU-103	Not Detected	-----	3.38E-002
RU-106	Not Detected	-----	3.02E-001
SB-122	Not Detected	-----	1.25E-001
SB-124	Not Detected	-----	3.45E-002
SB-125	Not Detected	-----	8.63E-002
SN-113	Not Detected	-----	4.01E-002
SR-85	Not Detected	-----	4.09E-002
TA-182	Not Detected	-----	1.84E-001
TA-183	Not Detected	-----	2.69E-001
TL-201	Not Detected	-----	2.06E-001
Y-88	Not Detected	-----	3.38E-002
ZN-65	Not Detected	-----	1.22E-001
ZR-95	Not Detected	-----	6.74E-002



\*\*\*\*\*  
 Sandia National Laboratories  
 Radiation Protection Sample Diagnostics Program  
 9/9/02 4:47:42 PM  
 \*\*\*\*\*

\* Analyzed by: *Am 9/9/02* Reviewed by: *[Signature] 9/11/02*  
 \*\*\*\*\*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059790-003  
 Lab Sample ID : 20124814

Sample Description : 6589-6600-1031-SP2-BH1-10-S  
 Sample Quantity : 682.150 gram  
 Sample Date/Time : 9/5/02 11:40:00 AM  
 Acquire Start Date/Time : 9/9/02 3:07:20 PM  
 Detector Name : LAB01  
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	5.45E-001
RA-226	2.03E+000	5.96E-001	7.76E-001
PB-214	7.06E-001	1.11E-001	6.78E-002
BI-214	6.56E-001	1.14E-001	7.01E-002
PB-210	Not Detected	-----	9.34E+000
TH-232	6.47E-001	3.23E-001	2.23E-001
RA-228	7.87E-001	1.64E-001	1.41E-001
AC-228	7.00E-001	1.49E-001	1.12E-001
TH-228	6.97E-001	2.44E-001	5.11E-001
RA-224	7.95E-001	2.03E-001	9.10E-002
PB-212	7.61E-001	1.14E-001	3.75E-002
BI-212	4.82E-001	2.72E-001	3.92E-001
TL-208	6.62E-001	1.23E-001	9.32E-002
U-235	Not Detected	-----	2.09E-001
TH-231	Not Detected	-----	6.96E+000
PA-231	Not Detected	-----	1.45E+000
TH-227	Not Detected	-----	3.46E-001
RA-223	Not Detected	-----	1.54E-001
RN-219	Not Detected	-----	4.13E-001
PB-211	Not Detected	-----	9.11E-001
TL-207	Not Detected	-----	1.64E+001
AM-241	Not Detected	-----	1.82E-001
PU-239	Not Detected	-----	3.70E+002
NP-237	Not Detected	-----	2.02E+000
PA-233	Not Detected	-----	6.12E-002
TH-229	Not Detected	-----	2.08E-001

[Summary Report] - Sample ID: : 20124814

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	4.40E-002
AG-110m	Not Detected	-----	3.26E-002
BA-133	Not Detected	-----	4.75E-002
BE-7	Not Detected	-----	2.76E-001
CD-115	Not Detected	-----	2.64E-001
CE-139	Not Detected	-----	2.65E-002
CE-141	Not Detected	-----	4.92E-002
CE-144	Not Detected	-----	2.11E-001
CM-243	Not Detected	-----	1.86E-001
CO-56	Not Detected	-----	3.96E-002
CO-57	Not Detected	-----	2.62E-002
CO-58	Not Detected	-----	3.62E-002
CO-60	Not Detected	-----	4.25E-002
CR-51	Not Detected	-----	2.89E-001
CS-134	Not Detected	-----	4.65E-002
CS-137	Not Detected	-----	3.55E-002
EU-152	Not Detected	-----	7.82E-002
EU-154	Not Detected	-----	2.07E-001
EU-155	Not Detected	-----	1.21E-001
FE-59	Not Detected	-----	9.45E-002
GD-153	Not Detected	-----	7.13E-002
HG-203	Not Detected	-----	3.53E-002
I-131	Not Detected	-----	4.39E-002
IR-192	Not Detected	-----	3.06E-002
K-40	1.64E+001	2.27E+000	3.27E-001
MN-52	Not Detected	-----	6.02E-002
MN-54	Not Detected	-----	4.01E-002
MO-99	Not Detected	-----	8.13E-001
NA-22	Not Detected	-----	5.16E-002
NA-24	Not Detected	-----	4.09E+000
ND-147	Not Detected	-----	3.00E-001
NI-57	Not Detected	-----	4.14E-001
RU-103	Not Detected	-----	3.44E-002
RU-106	Not Detected	-----	3.17E-001
SB-122	Not Detected	-----	1.26E-001
SB-124	Not Detected	-----	3.35E-002
SB-125	Not Detected	-----	9.16E-002
SN-113	Not Detected	-----	4.17E-002
SR-85	Not Detected	-----	4.08E-002
TA-182	Not Detected	-----	1.91E-001
TA-183	Not Detected	-----	2.71E-001
TL-201	Not Detected	-----	2.21E-001
Y-88	Not Detected	-----	3.44E-002
ZN-65	Not Detected	-----	1.29E-001
ZR-95	Not Detected	-----	6.96E-002

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program \*  
 \* 9/9/02 6:30:11 PM \*  
 \*\*\*\*\*

\* Analyzed by: *h 9/10/02* Reviewed by: *[Signature] 9/11/02*  
 \*\*\*\*\*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059791-003  
 Lab Sample ID : 20124815 ✓

Sample Description : 6589-6600-1031-SP2-BH1-15-S  
 Sample Quantity : 670.400 gram  
 Sample Date/Time : 9/5/02 12:10:00 PM  
 Acquire Start Date/Time : 9/9/02 4:49:50 PM  
 Detector Name : LAB01  
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	5.55E-001
RA-226	1.69E+000	5.46E-001	7.32E-001
PB-214	8.06E-001	1.24E-001	7.26E-002
BI-214	7.70E-001	1.27E-001	6.30E-002
PB-210	Not Detected	-----	9.74E+000
TH-232	7.27E-001	3.56E-001	2.24E-001
RA-228	7.88E-001	1.66E-001	1.52E-001
AC-228	7.51E-001	1.58E-001	1.18E-001
TH-228	9.14E-001	2.76E-001	5.28E-001
RA-224	8.99E-001	2.26E-001	1.10E-001
PB-212	7.66E-001	1.15E-001	4.10E-002
BI-212	7.47E-001	2.99E-001	3.89E-001
TL-208	7.59E-001	1.38E-001	1.05E-001
U-235	Not Detected	-----	2.16E-001
TH-231	Not Detected	-----	7.15E+000
PA-231	Not Detected	-----	1.55E+000
TH-227	Not Detected	-----	3.53E-001
RA-223	Not Detected	-----	1.57E-001
RN-219	Not Detected	-----	4.25E-001
PB-211	Not Detected	-----	9.74E-001
TL-207	Not Detected	-----	1.56E+001
AM-241	Not Detected	-----	1.83E-001
PU-239	Not Detected	-----	3.87E+002
NP-237	Not Detected	-----	2.00E+000
PA-233	Not Detected	-----	6.20E-002
TH-229	Not Detected	-----	2.04E-001

[Summary Report] - Sample ID: : 20124815

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	4.63E-002
AG-110m	Not Detected	-----	3.40E-002
BA-133	Not Detected	-----	5.24E-002
BE-7	Not Detected	-----	2.85E-001
CD-115	Not Detected	-----	2.76E-001
CE-139	Not Detected	-----	2.70E-002
CE-141	Not Detected	-----	5.11E-002
CE-144	Not Detected	-----	2.10E-001
CM-243	Not Detected	-----	1.97E-001
CO-56	Not Detected	-----	3.79E-002
CO-57	Not Detected	-----	2.69E-002
CO-58	Not Detected	-----	3.89E-002
CO-60	Not Detected	-----	4.20E-002
CR-51	Not Detected	-----	2.80E-001
CS-134	Not Detected	-----	4.95E-002
CS-137	Not Detected	-----	3.78E-002
EU-152	Not Detected	-----	8.01E-002
EU-154	Not Detected	-----	2.17E-001
EU-155	Not Detected	-----	1.19E-001
FE-59	Not Detected	-----	9.31E-002
GD-153	Not Detected	-----	6.87E-002
HG-203	Not Detected	-----	3.68E-002
I-131	Not Detected	-----	4.31E-002
IR-192	Not Detected	-----	3.02E-002
K-40	1.56E+001	2.18E+000	3.60E-001
MN-52	Not Detected	-----	6.65E-002
MN-54	Not Detected	-----	4.06E-002
MO-99	Not Detected	-----	7.80E-001
NA-22	Not Detected	-----	5.33E-002
NA-24	Not Detected	-----	4.54E+000
ND-147	Not Detected	-----	2.85E-001
NI-57	Not Detected	-----	4.59E-001
RU-103	Not Detected	-----	3.51E-002
RU-106	Not Detected	-----	3.31E-001
SB-122	Not Detected	-----	1.30E-001
SB-124	Not Detected	-----	3.42E-002
SB-125	Not Detected	-----	9.62E-002
SN-113	Not Detected	-----	4.42E-002
SR-85	Not Detected	-----	4.22E-002
TA-182	Not Detected	-----	1.94E-001
TA-183	Not Detected	-----	2.75E-001
TL-201	Not Detected	-----	2.28E-001
Y-88	Not Detected	-----	2.92E-002
ZN-65	Not Detected	-----	1.27E-001
ZR-95	Not Detected	-----	6.55E-002

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program \*  
 \* 9/9/02 8:12:40 PM \*  
 \*\*\*\*\*

\* Analyzed by: *9/10/02* Reviewed by: *[Signature]*  
 \*\*\*\*\*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059793-003  
 Lab Sample ID : 20124816  
  
 Sample Description : 6523-1086-SP1-BH1-10-S  
 Sample Quantity : 691.450 gram  
 Sample Date/Time : 9/6/02 9:20:00 AM  
 Acquire Start Date/Time : 9/9/02 6:32:19 PM  
 Detector Name : LAB01  
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	5.41E-001
RA-226	1.52E+000	5.91E-001	8.42E-001
PB-214	7.89E-001	1.20E-001	6.74E-002
BI-214	6.88E-001	1.17E-001	6.95E-002
PB-210	Not Detected	-----	9.69E+000
TH-232	6.19E-001	3.17E-001	2.40E-001
RA-228	7.93E-001	1.64E-001	1.50E-001
AC-228	7.78E-001	1.59E-001	1.09E-001
TH-228	5.96E-001	2.36E-001	5.31E-001
RA-224	8.11E-001	2.02E-001	7.02E-002
PB-212	8.46E-001	1.25E-001	4.23E-002
BI-212	1.24E+000	3.96E-001	4.87E-001
TL-208	7.66E-001	1.34E-001	8.86E-002
U-235	9.12E-002	1.78E-001	2.09E-001
TH-231	Not Detected	-----	7.06E+000
PA-231	Not Detected	-----	1.57E+000
TH-227	Not Detected	-----	3.50E-001
RA-223	Not Detected	-----	1.42E-001
RN-219	Not Detected	-----	4.11E-001
PB-211	Not Detected	-----	9.48E-001
TL-207	Not Detected	-----	1.61E+001
AM-241	Not Detected	-----	1.83E-001
PU-239	Not Detected	-----	3.81E+002
NP-237	Not Detected	-----	2.02E+000
PA-233	Not Detected	-----	6.24E-002
TH-229	Not Detected	-----	1.99E-001

[Summary Report] - Sample ID: : 20124816

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	4.71E-002
AG-110m	Not Detected	-----	3.05E-002
BA-133	Not Detected	-----	5.05E-002
BE-7	Not Detected	-----	2.80E-001
CD-115	Not Detected	-----	2.14E-001
CE-139	Not Detected	-----	2.72E-002
CE-141	Not Detected	-----	4.88E-002
CE-144	Not Detected	-----	2.05E-001
CM-243	Not Detected	-----	1.87E-001
CO-56	Not Detected	-----	3.90E-002
CO-57	Not Detected	-----	2.61E-002
CO-58	Not Detected	-----	3.79E-002
CO-60	Not Detected	-----	4.59E-002
CR-51	Not Detected	-----	2.47E-001
CS-134	Not Detected	-----	4.82E-002
CS-137	Not Detected	-----	3.53E-002
EU-152	Not Detected	-----	7.79E-002
EU-154	Not Detected	-----	2.21E-001
EU-155	Not Detected	-----	1.19E-001
FE-59	Not Detected	-----	9.19E-002
GD-153	Not Detected	-----	6.77E-002
HG-203	Not Detected	-----	3.59E-002
I-131	Not Detected	-----	3.96E-002
IR-192	Not Detected	-----	2.93E-002
K-40	1.60E+001	2.22E+000	2.99E-001
MN-52	Not Detected	-----	5.72E-002
MN-54	Not Detected	-----	4.15E-002
MO-99	Not Detected	-----	6.31E-001
NA-22	Not Detected	-----	5.18E-002
NA-24	Not Detected	-----	1.71E+000
ND-147	Not Detected	-----	2.70E-001
NI-57	Not Detected	-----	2.97E-001
RU-103	Not Detected	-----	3.33E-002
RU-106	Not Detected	-----	3.01E-001
SB-122	Not Detected	-----	1.06E-001
SB-124	Not Detected	-----	3.39E-002
SB-125	Not Detected	-----	9.20E-002
SN-113	Not Detected	-----	3.91E-002
SR-85	Not Detected	-----	4.14E-002
TA-182	Not Detected	-----	1.90E-001
TA-183	Not Detected	-----	2.50E-001
TL-201	Not Detected	-----	1.90E-001
Y-88	Not Detected	-----	3.11E-002
ZN-65	Not Detected	-----	1.27E-001
ZR-95	Not Detected	-----	6.69E-002

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program \*  
 \* 9/9/02 9:55:08 PM \*  
 \*\*\*\*\*

\* Analyzed by: *[Signature]* 9/9/02 Reviewed by: *[Signature]* 9/11/02 \*  
 \*\*\*\*\*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059794-003  
 Lab Sample ID : 20124817  
 Sample Description : 6523-1086-SP1-BH1-15-S  
 Sample Quantity : 676.410 gram  
 Sample Date/Time : 9/6/02 9:40:00 AM  
 Acquire Start Date/Time : 9/9/02 8:14:48 PM  
 Detector Name : LAB01  
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	5.22E-001
RA-226	1.78E+000	5.83E-001	7.90E-001
PB-214	7.05E-001	1.10E-001	6.76E-002
BI-214	6.44E-001	1.11E-001	6.49E-002
PB-210	Not Detected	-----	9.63E+000
TH-232	6.63E-001	3.33E-001	2.37E-001
RA-228	6.69E-001	1.51E-001	1.53E-001
AC-228	7.78E-001	1.60E-001	1.09E-001
TH-228	8.06E-001	2.46E-001	4.56E-001
RA-224	8.44E-001	2.16E-001	1.14E-001
PB-212	7.86E-001	1.17E-001	4.21E-002
BI-212	9.32E-001	3.43E-001	4.42E-001
TL-208	6.66E-001	1.24E-001	9.62E-002
U-235	1.34E-001	1.86E-001	2.19E-001
TH-231	Not Detected	-----	6.81E+000
PA-231	Not Detected	-----	1.56E+000
TH-227	Not Detected	-----	3.44E-001
RA-223	Not Detected	-----	1.35E-001
RN-219	Not Detected	-----	4.12E-001
PB-211	Not Detected	-----	9.20E-001
TL-207	Not Detected	-----	1.66E+001
AM-241	Not Detected	-----	1.74E-001
PU-239	Not Detected	-----	3.89E+002
NP-237	Not Detected	-----	2.01E+000
PA-233	Not Detected	-----	6.09E-002
TH-229	Not Detected	-----	2.12E-001

[Summary Report] - Sample ID: : 20124817

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	4.48E-002
AG-110m	Not Detected	-----	3.42E-002
BA-133	Not Detected	-----	4.93E-002
BE-7	Not Detected	-----	2.79E-001
CD-115	Not Detected	-----	2.09E-001
CE-139	Not Detected	-----	2.63E-002
CE-141	Not Detected	-----	5.03E-002
CE-144	Not Detected	-----	2.06E-001
CM-243	Not Detected	-----	1.85E-001
CO-56	Not Detected	-----	3.81E-002
CO-57	Not Detected	-----	2.64E-002
CO-58	Not Detected	-----	3.60E-002
CO-60	Not Detected	-----	4.82E-002
CR-51	Not Detected	-----	2.52E-001
CS-134	Not Detected	-----	4.57E-002
CS-137	Not Detected	-----	3.60E-002
EU-152	Not Detected	-----	7.87E-002
EU-154	Not Detected	-----	2.11E-001
EU-155	Not Detected	-----	1.20E-001
FE-59	Not Detected	-----	9.05E-002
GD-153	Not Detected	-----	6.96E-002
HG-203	Not Detected	-----	3.47E-002
I-131	Not Detected	-----	3.95E-002
IR-192	Not Detected	-----	2.88E-002
K-40	1.63E+001	2.27E+000	3.18E-001
MN-52	Not Detected	-----	5.56E-002
MN-54	Not Detected	-----	4.04E-002
MO-99	Not Detected	-----	6.21E-001
NA-22	Not Detected	-----	4.98E-002
NA-24	Not Detected	-----	1.65E+000
ND-147	Not Detected	-----	2.83E-001
NI-57	Not Detected	-----	3.03E-001
RU-103	Not Detected	-----	3.29E-002
RU-106	Not Detected	-----	3.31E-001
SB-122	Not Detected	-----	1.06E-001
SB-124	Not Detected	-----	3.23E-002
SB-125	Not Detected	-----	8.62E-002
SN-113	Not Detected	-----	4.15E-002
SR-85	Not Detected	-----	4.02E-002
TA-182	Not Detected	-----	1.81E-001
TA-183	Not Detected	-----	2.37E-001
TL-201	Not Detected	-----	1.93E-001
Y-88	Not Detected	-----	3.71E-002
ZN-65	Not Detected	-----	1.27E-001
ZR-95	Not Detected	-----	6.62E-002



\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program \*  
 \* 9/9/02 11:37:37 PM \*  
 \*\*\*\*\*

\* Analyzed by: *[Signature]* 9/11/02 Reviewed by: *[Signature]* 9/11/02 \*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059795-003  
 Lab Sample ID : 20124818

Sample Description : 889/1102-SP1-BH1-25-S  
 Sample Quantity : 776.900 gram  
 Sample Date/Time : 9/6/02 1:50:00 PM  
 Acquire Start Date/Time : 9/9/02 9:57:15 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	-----	5.55E-001
RA-226	1.72E+000	5.94E-001	8.24E-001
PB-214	8.45E-001	1.25E-001	6.62E-002
BI-214	7.68E-001	1.25E-001	6.09E-002
PB-210	Not Detected	-----	9.49E+000
TH-232	8.28E-001	4.01E-001	2.48E-001
RA-228	9.70E-001	1.87E-001	1.70E-001
AC-228	9.93E-001	1.87E-001	1.09E-001
TH-228	9.25E-001	2.58E-001	4.55E-001
RA-224	1.07E+000	2.46E-001	7.97E-002
PB-212	1.01E+000	1.47E-001	4.33E-002
BI-212	8.67E-001	2.87E-001	3.47E-001
TL-208	9.05E-001	1.50E-001	9.25E-002
U-235	3.51E-001	1.84E-001	2.17E-001
TH-231	Not Detected	-----	7.24E+000
PA-231	Not Detected	-----	1.50E+000
TH-227	Not Detected	-----	3.53E-001
RA-223	Not Detected	-----	1.50E-001
RN-219	Not Detected	-----	4.10E-001
PB-211	Not Detected	-----	9.29E-001
TL-207	Not Detected	-----	1.56E+001
AM-241	Not Detected	-----	1.83E-001
PU-239	Not Detected	-----	3.83E+002
NP-237	Not Detected	-----	2.05E+000
PA-233	Not Detected	-----	6.04E-002
TH-229	Not Detected	-----	2.11E-001

[Summary Report] - Sample ID: : 20124818

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	4.55E-002
AG-110m	Not Detected	-----	3.46E-002
BA-133	Not Detected	-----	5.02E-002
BE-7	Not Detected	-----	2.68E-001
CD-115	Not Detected	-----	2.14E-001
CE-139	Not Detected	-----	2.80E-002
CE-141	Not Detected	-----	4.90E-002
CE-144	Not Detected	-----	2.11E-001
CM-243	Not Detected	-----	1.85E-001
CO-56	Not Detected	-----	3.76E-002
CO-57	Not Detected	-----	2.61E-002
CO-58	Not Detected	-----	3.55E-002
CO-60	Not Detected	-----	4.10E-002
CR-51	Not Detected	-----	2.63E-001
CS-134	Not Detected	-----	4.61E-002
CS-137	Not Detected	-----	3.62E-002
EU-152	Not Detected	-----	7.79E-002
EU-154	Not Detected	-----	2.15E-001
EU-155	Not Detected	-----	1.19E-001
FE-59	Not Detected	-----	8.77E-002
GD-153	Not Detected	-----	6.82E-002
HG-203	Not Detected	-----	3.50E-002
I-131	Not Detected	-----	3.92E-002
IR-192	Not Detected	-----	3.02E-002
K-40	1.63E+001	2.25E+000	3.00E-001
MN-52	Not Detected	-----	5.61E-002
MN-54	Not Detected	-----	4.00E-002
MO-99	Not Detected	-----	6.42E-001
NA-22	Not Detected	-----	4.82E-002
NA-24	Not Detected	-----	1.49E+000
ND-147	Not Detected	-----	2.72E-001
NI-57	Not Detected	-----	2.82E-001
RU-103	Not Detected	-----	3.10E-002
RU-106	Not Detected	-----	3.06E-001
SB-122	Not Detected	-----	1.03E-001
SB-124	Not Detected	-----	3.22E-002
SB-125	Not Detected	-----	9.58E-002
SN-113	Not Detected	-----	3.85E-002
SR-85	Not Detected	-----	3.91E-002
TA-182	Not Detected	-----	1.81E-001
TA-183	Not Detected	-----	2.45E-001
TL-201	Not Detected	-----	1.85E-001
Y-88	Not Detected	-----	3.47E-002
ZN-65	Not Detected	-----	1.25E-001
ZR-95	Not Detected	-----	6.21E-002

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program \*  
 \* 9/10/02 1:19:58 AM \*  
 \*\*\*\*\*

\* Analyzed by: *h* 9/10/02 Reviewed by: *W. J. U.*  
 \*\*\*\*\*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059796-003  
 Lab Sample ID : 20124819  
 Sample Description : 889/1102-SP1-BH1-30-S  
 Sample Quantity : 761.200 gram  
 Sample Date/Time : 9/6/02 2:35:00 PM  
 Acquire Start Date/Time : 9/9/02 11:39:44 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	-----	5.32E-001
RA-226	1.84E+000	5.32E-001	6.86E-001
PB-214	7.05E-001	1.09E-001	6.55E-002
BI-214	7.07E-001	1.15E-001	5.39E-002
PB-210	Not Detected	-----	9.13E+000
TH-232	7.97E-001	3.75E-001	1.82E-001
RA-228	8.86E-001	1.77E-001	1.64E-001
AC-228	8.15E-001	1.63E-001	1.12E-001
TH-228	7.03E-001	2.26E-001	4.43E-001
RA-224	9.33E-001	2.27E-001	1.15E-001
PB-212	8.70E-001	1.28E-001	3.90E-002
BI-212	1.11E+000	3.55E-001	4.35E-001
TL-208	8.32E-001	1.40E-001	8.83E-002
U-235	Not Detected	-----	2.06E-001
TH-231	Not Detected	-----	6.80E+000
PA-231	Not Detected	-----	1.45E+000
TH-227	Not Detected	-----	3.32E-001
RA-223	Not Detected	-----	1.39E-001
RN-219	Not Detected	-----	3.89E-001
PB-211	Not Detected	-----	8.75E-001
TL-207	Not Detected	-----	1.58E+001
AM-241	Not Detected	-----	1.82E-001
PU-239	Not Detected	-----	3.72E+002
NP-237	Not Detected	-----	1.97E+000
PA-233	Not Detected	-----	5.95E-002
TH-229	Not Detected	-----	1.98E-001

[Summary Report] - Sample ID: : 20124819

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	4.55E-002
AG-110m	Not Detected	-----	3.30E-002
BA-133	Not Detected	-----	4.58E-002
BE-7	Not Detected	-----	2.74E-001
CD-115	Not Detected	-----	2.00E-001
CE-139	Not Detected	-----	2.58E-002
CE-141	Not Detected	-----	4.83E-002
CE-144	Not Detected	-----	2.03E-001
CM-243	Not Detected	-----	1.78E-001
CO-56	Not Detected	-----	3.61E-002
CO-57	Not Detected	-----	2.63E-002
CO-58	Not Detected	-----	3.67E-002
CO-60	Not Detected	-----	3.97E-002
CR-51	Not Detected	-----	2.54E-001
CS-134	Not Detected	-----	4.41E-002
CS-137	Not Detected	-----	3.67E-002
EU-152	Not Detected	-----	7.87E-002
EU-154	Not Detected	-----	2.13E-001
EU-155	Not Detected	-----	1.18E-001
FE-59	Not Detected	-----	8.59E-002
GD-153	Not Detected	-----	6.92E-002
HG-203	Not Detected	-----	3.39E-002
I-131	Not Detected	-----	3.66E-002
IR-192	Not Detected	-----	2.84E-002
K-40	1.61E+001	2.22E+000	2.93E-001
MN-52	Not Detected	-----	5.30E-002
MN-54	Not Detected	-----	3.77E-002
MO-99	Not Detected	-----	6.66E-001
NA-22	Not Detected	-----	4.95E-002
NA-24	Not Detected	-----	1.65E+000
ND-147	Not Detected	-----	2.67E-001
NI-57	Not Detected	-----	2.85E-001
RU-103	Not Detected	-----	3.10E-002
RU-106	Not Detected	-----	3.07E-001
SB-122	Not Detected	-----	1.03E-001
SB-124	Not Detected	-----	3.09E-002
SB-125	Not Detected	-----	8.86E-002
SN-113	Not Detected	-----	4.02E-002
SR-85	Not Detected	-----	4.01E-002
TA-182	Not Detected	-----	1.82E-001
TA-183	Not Detected	-----	2.47E-001
TL-201	Not Detected	-----	1.82E-001
Y-88	Not Detected	-----	3.42E-002
ZN-65	Not Detected	-----	1.27E-001
ZR-95	Not Detected	-----	6.51E-002

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program \*  
 \* 9/10/02 7:58:13 AM \*  
 \*\*\*\*\*

\* Analyzed by: *h* 9/10/02 Reviewed by: *[Signature]* 9/11/02 \*  
 \*\*\*\*\*

Customer : SANDERS, M (6135)  
 Customer Sample ID : 059858-001  
 Lab Sample ID : 20124811

Sample Description : 6570/1083-DW1-BH1-9-DU  
 Sample Quantity : 704.530 gram  
 Sample Date/Time : 9/03/02 9:10:00 AM  
 Acquire Start Date/Time : 9/10/02 6:17:52 AM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:  
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	6.93E-001
RA-226	2.11E+000	5.51E-001	6.87E-001
PB-214	9.65E-001	1.36E-001	5.96E-002
BI-214	8.12E-001	1.26E-001	4.87E-002
PB-210	Not Detected	-----	2.60E+001
TH-232	7.27E-001	3.43E-001	1.79E-001
RA-228	6.42E-001	1.28E-001	1.18E-001
AC-228	6.05E-001	1.25E-001	9.76E-002
TH-228	4.17E-001	3.36E-001	5.24E-001
RA-224	6.32E-001	1.54E-001	8.51E-002
PB-212	6.34E-001	9.41E-002	3.65E-002
BI-212	7.47E-001	2.61E-001	3.35E-001
TL-208	4.75E-001	9.26E-002	8.28E-002
U-235	Not Detected	-----	2.13E-001
TH-231	Not Detected	-----	1.03E+001
PA-231	Not Detected	-----	1.29E+000
TH-227	Not Detected	-----	3.13E-001
RA-223	Not Detected	-----	2.47E-001
RN-219	Not Detected	-----	3.26E-001
PB-211	Not Detected	-----	7.17E-001
TL-207	Not Detected	-----	1.11E+001
AM-241	Not Detected	-----	3.88E-001
PU-239	Not Detected	-----	3.87E+002
NP-237	Not Detected	-----	2.05E+000
PA-233	Not Detected	-----	5.15E-002
TH-229	Not Detected	-----	2.12E-001

[Summary Report] - Sample ID: : 20124811

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.10E-002
AG-110m	Not Detected	-----	2.60E-002
BA-133	Not Detected	-----	5.06E-002
BE-7	Not Detected	-----	2.19E-001
CD-115	Not Detected	-----	4.92E-001
CE-139	Not Detected	-----	2.68E-002
CE-141	Not Detected	-----	5.29E-002
CE-144	Not Detected	-----	2.12E-001
CM-243	Not Detected	-----	1.54E-001
CO-56	Not Detected	-----	2.86E-002
CO-57	Not Detected	-----	2.84E-002
CO-58	Not Detected	-----	2.89E-002
CO-60	Not Detected	-----	3.01E-002
CR-51	Not Detected	-----	2.41E-001
CS-134	Not Detected	-----	3.98E-002
CS-137	Not Detected	-----	2.72E-002
EU-152	Not Detected	-----	8.44E-002
EU-154	Not Detected	-----	1.42E-001
EU-155	Not Detected	-----	1.25E-001
FE-59	Not Detected	-----	6.52E-002
GD-153	Not Detected	-----	9.16E-002
HG-203	Not Detected	-----	3.08E-002
I-131	Not Detected	-----	4.42E-002
IR-192	Not Detected	-----	2.52E-002
K-40	1.25E+001	1.72E+000	2.55E-001
MN-52	Not Detected	-----	5.91E-002
MN-54	Not Detected	-----	2.90E-002
MO-99	Not Detected	-----	1.09E+000
NA-22	Not Detected	-----	3.36E-002
NA-24	Not Detected	-----	5.78E+001
ND-147	Not Detected	-----	2.53E-001
NI-57	Not Detected	-----	1.08E+000
RU-103	Not Detected	-----	2.50E-002
RU-106	Not Detected	-----	2.28E-001
SB-122	Not Detected	-----	1.96E-001
SB-124	Not Detected	-----	2.63E-002
SB-125	Not Detected	-----	7.40E-002
SN-113	Not Detected	-----	3.40E-002
SR-85	Not Detected	-----	3.27E-002
TA-182	Not Detected	-----	1.45E-001
TA-183	Not Detected	-----	8.49E-001
TL-201	Not Detected	-----	6.78E-001
Y-88	Not Detected	-----	2.56E-002
ZN-65	Not Detected	-----	9.17E-002
ZR-95	Not Detected	-----	4.76E-002

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 Radiation Protection Sample Diagnostics Program \*  
 9/10/02 7:58:01 AM \*  
 \*\*\*\*\*

\* Analyzed by:

Reviewed by:

*9/10/02* *[Signature]*

Customer : SANDERS M (6135)  
 Customer Sample ID : LAB\_CONTROL\_SAMPLE\_USING\_CG-134  
 Lab Sample ID : 20124820

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 : 9/10/02 7:47:41 AM  
 Detector Name : LAB01  
 Elapsed Live/Real Time : 600 / 604 seconds

Comments:

\*\*\*\*\*

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
U-238	Not Detected	-----	2.57E+003
RA-226	Not Detected	-----	5.69E+003
PB-214	Not Detected	-----	6.61E+002
BI-214	Not Detected	-----	5.81E+002
PB-210	Not Detected	-----	9.56E+004
TH-232	Not Detected	-----	2.08E+003
RA-228	Not Detected	-----	2.49E+003
AC-228	Not Detected	-----	1.44E+003
TH-228	Not Detected	-----	4.90E+005
RA-224	Not Detected	-----	6.73E+003
PB-212	Not Detected	-----	3.41E+004
BI-212	Not Detected	-----	3.03E+005
TL-208	Not Detected	-----	6.40E+004
U-235	Not Detected	-----	1.39E+003
TH-231	Not Detected	-----	4.03E+004
PA-231	Not Detected	-----	1.38E+004
TH-227	Not Detected	-----	2.69E+003
RA-223	Not Detected	-----	1.00E+026
RN-219	Not Detected	-----	6.60E+003
PB-211	Not Detected	-----	1.50E+004
TL-207	Not Detected	-----	2.33E+005
AM-241	8.90E+004	1.28E+004	1.87E+003
PU-239	Not Detected	-----	2.32E+006
NP-237	Not Detected	-----	1.24E+004
PA-233	Not Detected	-----	5.98E+002
TH-229	Not Detected	-----	1.28E+003

[Summary Report] - Sample ID: : 20124820

Nuclide Name	Activity (pCi/Each )	2-sigma Error	MDA (pCi/Each )
AG-108m	Not Detected	-----	3.23E+002
AG-110m	Not Detected	-----	2.51E+008
BA-133	Not Detected	-----	9.30E+002
BE-7	Not Detected	-----	1.00E+026
CD-115	Not Detected	-----	1.00E+026
CE-139	Not Detected	-----	5.30E+011
CE-141	Not Detected	-----	1.00E+026
CE-144	Not Detected	-----	5.04E+007
CM-243	Not Detected	-----	2.17E+003
CO-56	Not Detected	-----	2.70E+019
CO-57	Not Detected	-----	1.06E+007
CO-58	Not Detected	-----	7.54E+020
CO-60	7.90E+004	1.05E+004	9.60E+002
CR-51	Not Detected	-----	1.00E+026
CS-134	Not Detected	-----	1.50E+004
CS-137	6.76E+004	8.58E+003	4.27E+002
EU-152	Not Detected	-----	9.40E+002
EU-154	Not Detected	-----	3.62E+003
EU-155	Not Detected	-----	4.30E+003
FE-59	Not Detected	-----	1.00E+026
GD-153	Not Detected	-----	1.07E+008
HG-203	Not Detected	-----	1.00E+026
I-131	Not Detected	-----	1.00E+026
IR-192	Not Detected	-----	1.25E+020
K-40	Not Detected	-----	1.57E+003
MN-52	Not Detected	-----	1.00E+026
MN-54	Not Detected	-----	4.89E+006
MO-99	Not Detected	-----	1.00E+026
NA-22	Not Detected	-----	4.20E+003
NA-24	Not Detected	-----	1.00E+026
ND-147	Not Detected	-----	1.00E+026
NI-57	Not Detected	-----	1.00E+026
RU-103	Not Detected	-----	1.00E+026
RU-106	Not Detected	-----	9.40E+006
SB-122	Not Detected	-----	1.00E+026
SB-124	Not Detected	-----	1.00E+026
SB-125	Not Detected	-----	2.30E+004
SN-113	Not Detected	-----	9.64E+013
SR-85	Not Detected	-----	1.00E+026
TA-182	Not Detected	-----	2.32E+014
TA-183	Not Detected	-----	1.00E+026
TL-201	Not Detected	-----	1.00E+026
Y-88	Not Detected	-----	2.57E+014
ZN-65	Not Detected	-----	1.75E+008
ZR-95	Not Detected	-----	1.00E+026



