3-1-2006

Justification for Class III Permit Modification March 2006 AOC 1094 Operable Unit 1295 Live Fire Range East Septic System (Lurance Canyon)

Sandia National Laboratories/NM

Sandia National Laboratories

Justification for Class III Permit Modification

March 2006

AOC 1094
Operable Unit 1295
Live Fire Range East Septic System (Lurance Canyon)

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

Environmental
Restoration
Project

United States Department of Energy
Sandia Site Office

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

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

Sandia National Laboratories

Drain and Septic Systems (DSS) Areas of Concern (AOCs) 1090, 1094, 1095, 1114, 1115, 1116, and 1117 (Poster 1 of 2)

Environmental Restoration Project

Site Histories

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

AOC Number	Site Name	Location	Year Building and System Built	Year Drain or Septic System Abandoned	Year(s) Septic Tank and/or Seepage Pits Backfilled
1090	Bldg 6721 Septic System	TA-III	1959	1991	Late 1990s
1094	Live Fire Range East Septic System	Lurance Canyon	Unknown	Unit is active	Septic system is still in use
1095	Bldg 9938 Seepage Pit	Coyote Test Field	1971	Unknown	2005
1114	Bldg 9978 Drywell	Coyote Test Field	1971	Unit is active	No septic tank or seepage pit at this site
1115	Former Offices Septic System	Solar Tower Complex	1976	1979	2005
1116	Bldg 9981A Seepage Pit	Solar Tower Complex	1981	Unit is active	Seepage pit is still in use
1117	Bldg 9982 Drywell	Solar Tower Complex	1980	1990s	No septic tank or seepage pit at this site

Depth to Groundwater

Depth to the regional aquifer at these seven AOCs is as follows:

AOC Number	Site Name	Location	Groundwater Depth (ft bgs)
1090	Bldg 6721 Septic System	TA-III	473
1094	Live Fire Range East Septic System	Lurance Canyon	107
1095	Bldg 9938 Seepage Pit	Coyote Test Field	300
1114	Bldg 9978 Drywell	Coyote Test Field	41
1115	Former Offices Septic System	Solar Tower Complex	150
1116	Bldg 9981A Seepage Pit	Solar Tower Complex	150
1117	Bldg 9982 Drywell	Solar Tower Complex	150

Constituents of Concern

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

Investigations

- A backhoe was used to positively locate buried components (drainfield drain lines, drywells, and seepage pits) so that locations for soil-vapor samplers and soil borings could be selected.
- Two of the seven AOCs were selected by NMED for passive soil-vapor sampling to screen for VOCs; no significant VOC contamination was identified at either site.
- 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.

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

Site 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
1090	Bldg 6721 Septic System	2002	2002, 2005	**Drainfield**: 4, 9	None
1094	Live Fire Range East Septic System	1999	1999, 2005	**Drainfield:** Borehole 1: 7, 12 Borehole 2: 7, 12, 17, 22 Borehole 3: 7, 11, 17, 22	2002
1095	Bldg 9938 Seepage Pit	None	1999, 2005	**Seepage Pit:** 8.5, 9.5	2002
1114	Bldg 9978 Drywell	2002	2002	**Drywell:** 6, 11	None
1115	Former Offices Septic System	1999	1999, 2005	**Drainfield:** 5, 10, 15, 20	None
1116	Bldg 9981A Seepage Pit	None	1999, 2005	**Seepage Pit:** Boreholes 1 & 3: 8, 13 Borehole 2: 8, 13.5	None
1117	Bldg 9982 Drywell	None	1999, 2005	**Drywell:** 11, 16	None

Summary of Data Used for CAC Justification

- Soil samples were analyzed at off-site laboratories for VOCs, SVOCs, PCBs, HE compounds, RCRA metals, chromium VI, cyanide, and gross alpha/beta activity, and at on- and off-site laboratories for radionuclides by gamma spectroscopy.
- VOCs were detected at AOCs 1090, 1094, 1114, 1115, and 1116. PCBs were detected at AOC 1115. Chromium VI was detected at AOCs 1094, 1095, 1115, 1116, and 1117. Cyanide was detected at AOCs 1095, 1114, and 1115. SVOCs were detected at AOCs 1090 and 1115; however, further investigation at AOC 1090, indicated that ubiquitous or widespread SVOC contamination was not present.
- Arsenic and barium were detected above background values at AOC 1090. Lead was detected above the background value at AOC 1115, and silver was detected above the background value at AOC 1094. No other metals were detected above background values.
- U-235 was detected above the background activity at AOC 1090 and, although not detected, the MDA for U-235 exceeded the background activity at all seven sites. U-238 was detected above the background activity at AOC 1115, and Th-232 was detected slightly above the background activity at AOC 1116. Gross beta activity was slightly above background activity at AOC 1090.
- For six of the sites all of the confirmatory soil sample analytical results were used for characterizing that site, for performing the risk screening assessment, and as justification for the CAC proposal. For AOC 1090, the 2005 SVOC results and the remainder of the non-SVOC 2002 analytical results were used for characterizing the site, for performing the risk screening assessment, and as justification for the proposal of CAC.

Recommended Future Land Use

- Recreational land use was established for AOC 1094.
- Industrial land use was established for AOCs 1090, 1095, 1114, 1115, 1116, and 1117.

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 levels, it was necessary to perform risk assessments for these all of these sites. The risk assessment analysis evaluated the potential for adverse health effects for the residential land-use scenario.
- The non-radiological total human health HIs for all seven sites are below NMED guidelines for a residential land-use scenario.
- For AOC 1090, the total estimated excess cancer risk is at the residential land-use scenario guideline. However, the incremental excess cancer risk value for this site is below the NMED residential land-use scenario guideline.
- The incremental human health TEDEs for the industrial land-use scenario ranged from 7.2E-4 to 2.5E-2 mrem/yr at six of the sites; at AOC 1094, the incremental human health TEDE was 1.9E-3 mrem/yr for the recreational land-use scenario. All of these incremental human health TEDEs are substantially below the EPA numerical guideline of 15 mrem/yr. The incremental human health TEDE for the residential land-use scenario for all the sites ranged from 4.8E-3 to 6.4E-2 mrem/yr, all of which are substantially below the EPA numerical guideline of 75 mrem/yr. Therefore, all of these sites are eligible for unrestricted radiological release.
- Using the SNL predictive ecological risk methodology, it was concluded that there is not a complete ecological pathway at six of the sites. Thus, a more detailed ecological risk assessment to predict the level of risk was not deemed necessary for these sites. Ecological risk for the remaining site, AOC 1090, was predicted to be low.
- In conclusion, human health risks under a residential land-use scenario and ecological risks are acceptable per NMED guidance. Thus, these sites are proposed for CAC without institutional controls.

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

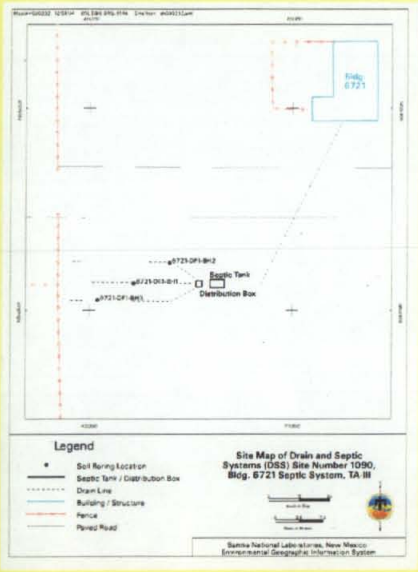
Site Number	Site Name	Residential Land-Use Scenario: Total Hazard Index	Residential Land-Use Scenario: Excess Cancer Risk
1090	Bldg 6721 Septic System	0.28	1E-5[a] Total / 1.44E-6 Incremental
1094	Live Fire Range East Septic System	0.00	7E-10 Total
1095	Bldg 9938 Seepage Pit	0.00	6E-10 Total
1114	Bldg 9978 Drywell	0.00	1E-10 Total
1115	Former Offices Septic System	0.00	7E-10 Total
1116	Bldg 9981A Seepage Pit	0.00	7E-10 Total
1117	Bldg 9982 Drywell	0.00	5E-10 Total
	NMED Guidance	< 1	<1E-5

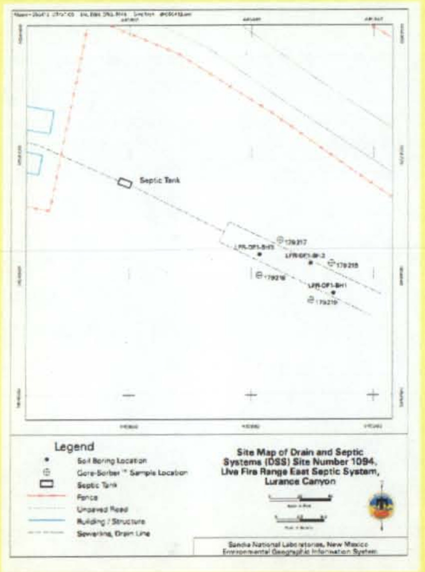
[a]Value exceeds NMED guidance for residential land-use scenario; therefore, incremental values are shown.

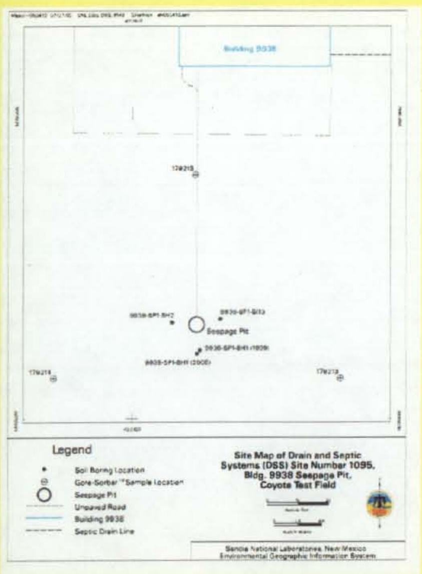
Drain and Septic Systems (DSS) Areas of Concern (AOCs) 1090, 1094, 1095, 1114, 1115, 1116, 1117, (Poster 2 of 2)

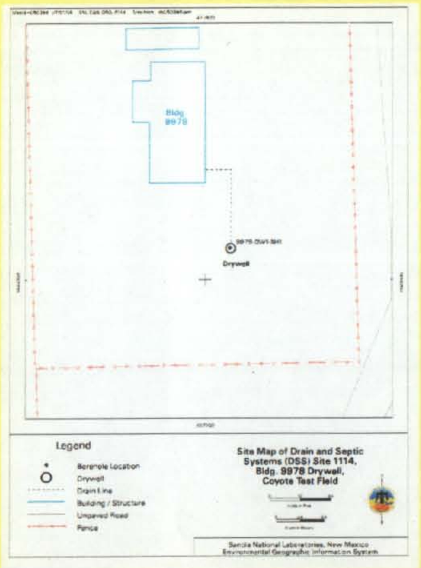
This work supported by the
United States Department of Energy
under contract DE-AC04-94I85000.

Environmental Restoration Project





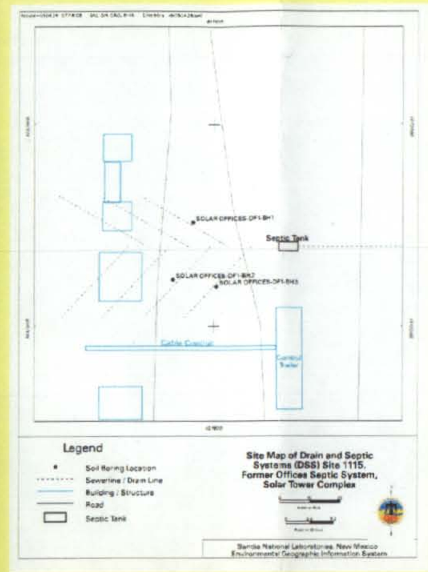


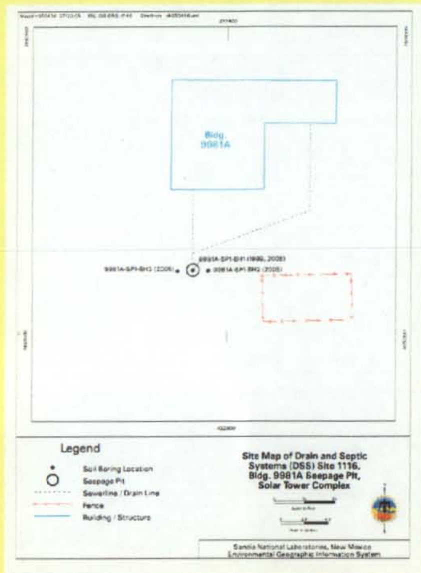


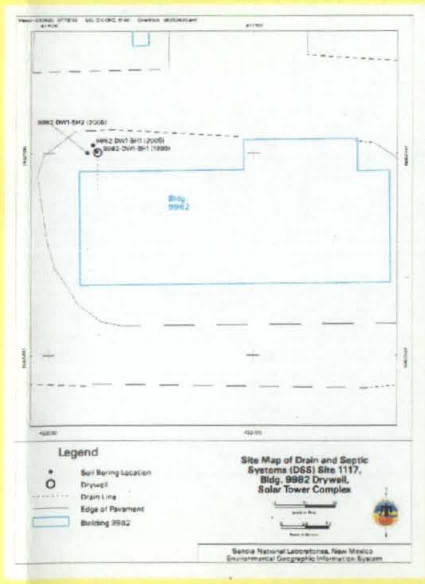
Auger drilling through the gravel aggregate to collect additional soil samples for VOC analysis at the AOC 1117 Drywell.

Backfilling the seepage pit excavation at AOC 1095. The section of metal culvert that was removed from the seepage pit is next to the worker in the foreground. The Solar Tower is in the background.

Collecting additional soil samples for VOCs from a borehole drilled adjacent to the seepage pit at AOC 1116 with the Solar Tower in background.







For More Information Contact

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Sandia National Laboratories

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United States Department of Energy
Sandia Site Office

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

Patty Wagner
Manager

Enclosure

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

cc w/o enclosure:
D. Pepe, NMED-OB
J. Estrada, NNSA/SSO, MS 0184
F. Nimick, SNL, MS 1089
R. E. Fate, SNL, MS 1089
M. J. Davis, SNL, MS 1089
D. Stockham, SNL, MS 1087
B. Langkopf, SNL, MS 1087
P. Puissant, SNL, MS 1087
M. Sanders, SNL, MS 1087
A. Blumberg, SNL, MS 0141

Sandia National Laboratories

Drain and Septic Systems Project Quality Control (QC) Report

April 2005

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

Environmental
Restoration
Project

United States Department of Energy
Sandia Site Office

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

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

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

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

DRAIN AND SEPTIC SYSTEMS PROJECT QC MASTER INDEX

Site #	Site Name	Binder #	COC#	ER Sample ID	Sample #	SAMPLE DATE	MATRIX	LAB TEST	Lab	BATCH #
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH3-10-S	048410-002	20-AUG-99	SOIL	TOTAL-CN	GEL	157237
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH3-5-S	048409-002	20-AUG-99	SOIL	TOTAL-CN	GEL	157237
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH1-10-S	048404-002	20-AUG-99	SOIL	Cr+6	GEL	157969
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH1-5-S	048403-002	19-AUG-99	SOIL	Cr+6	GEL	157969
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH2-10-DU	048407-002	20-AUG-99	SOIL	Cr+6	GEL	157969
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH2-10-MSDS	048408-002	20-AUG-99	SOIL	Cr+6	GEL	157969
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH2-10-S	048406-002	20-AUG-99	SOIL	Cr+6	GEL	157969
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH2-5-S	048405-002	20-AUG-99	SOIL	Cr+6	GEL	157969
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH3-10-S	048410-002	20-AUG-99	SOIL	Cr+6	GEL	157969
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH3-5-S	048409-002	20-AUG-99	SOIL	Cr+6	GEL	157969
1093	Bldg. 6584 W. SS	Volume 7	600442	ER-1295-W6584-DF1-BH1-10-S	041488-005	01-JUL-98	SOIL	GAMMA SPEC	RPSD	801348
1093	Bldg. 6584 W. SS	Volume 7	600442	ER-1295-W6584-DF1-BH1-5-S	041487-005	01-JUL-98	SOIL	GAMMA SPEC	RPSD	801348
1093	Bldg. 6584 W. SS	Volume 7	600442	ER-1295-W6584-DF1-BH2-5-S	041489-005	01-JUL-98	SOIL	GAMMA SPEC	RPSD	801348
1093	Bldg. 6584 W. SS	Volume 7	600442	ER-1295-W6584-DF1-BH3-10-S	041492-005	01-JUL-98	SOIL	GAMMA SPEC	RPSD	801348
1093	Bldg. 6584 W. SS	Volume 7	600442	ER-1295-W6584-DF1-BH3-5-S	041491-005	01-JUL-98	SOIL	GAMMA SPEC	RPSD	801348
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1093	Bldg. 6584 W. SS	Volume 6	600440	ER-1295-W6584-DF1-BH1-10-S	041488-004	01-JUL-98	SOIL	MEKC_HE	ERCL	HE-027
1093	Bldg. 6584 W. SS	Volume 6	600440	ER-1295-W6584-DF1-BH1-5-S	041487-004	01-JUL-98	SOIL	MEKC_HE	ERCL	HE-027
1093	Bldg. 6584 W. SS	Volume 6	600440	ER-1295-W6584-DF1-BH2-5-S	041489-004	01-JUL-98	SOIL	MEKC_HE	ERCL	HE-027
1093	Bldg. 6584 W. SS	Volume 6	600440	ER-1295-W6584-DF1-BH3-10-S	041492-004	01-JUL-98	SOIL	MEKC_HE	ERCL	HE-027
1093	Bldg. 6584 W. SS	Volume 6	600440	ER-1295-W6584-DF1-BH3-5-S	041491-004	01-JUL-98	SOIL	MEKC_HE	ERCL	HE-027
1093	Bldg. 6584 W. SS	Volume 6	600440	ER-1295-W6584-EB	041503-008	01-JUL-98	WATER	MEKC_HE	ERCL	HE-027
1093	Bldg. 6584 W. SS	Volume 6	600450	ER-1295-W6584-DF1-BH4-10-S	041490-004	13-JUL-98	SOIL	MEKC_HE	ERCL	HE-029
1093	Bldg. 6584 W. SS	Volume 6	600440	ER-1295-W6584-DF1-BH1-10-S	041488-004	01-JUL-98	SOIL	EPA6020	ERCL	SI98-19
1093	Bldg. 6584 W. SS	Volume 6	600440	ER-1295-W6584-DF1-BH1-5-S	041487-004	01-JUL-98	SOIL	EPA6020	ERCL	SI98-19
1093	Bldg. 6584 W. SS	Volume 6	600440	ER-1295-W6584-DF1-BH2-5-S	041489-004	01-JUL-98	SOIL	EPA6020	ERCL	SI98-19
1093	Bldg. 6584 W. SS	Volume 6	600440	ER-1295-W6584-DF1-BH3-10-S	041492-004	01-JUL-98	SOIL	EPA6020	ERCL	SI98-19
1093	Bldg. 6584 W. SS	Volume 6	600440	ER-1295-W6584-DF1-BH3-5-S	041491-004	01-JUL-98	SOIL	EPA6020	ERCL	SI98-19
1093	Bldg. 6584 W. SS	Volume 6	600450	ER-1295-W6584-DF1-BH4-10-S	041490-004	13-JUL-98	SOIL	EPA6020	ERCL	SI98-24
1093	Bldg. 6584 W. SS	Volume 6	600440	ER-1295-W6584-DF1-BH1-10-S	041488-001	01-JUL-98	SOIL	EPA8260	ERCL	SVOC-043
1093	Bldg. 6584 W. SS	Volume 6	600440	ER-1295-W6584-DF1-BH1-5-S	041487-001	01-JUL-98	SOIL	EPA8260	ERCL	SVOC-043
1093	Bldg. 6584 W. SS	Volume 6	600440	ER-1295-W6584-DF1-BH2-5-S	041489-001	01-JUL-98	SOIL	EPA8260	ERCL	SVOC-043
1093	Bldg. 6584 W. SS	Volume 6	600440	ER-1295-W6584-DF1-BH3-10-S	041492-001	01-JUL-98	SOIL	EPA8260	ERCL	SVOC-043
1093	Bldg. 6584 W. SS	Volume 6	600440	ER-1295-W6584-DF1-BH3-5-S	041491-001	01-JUL-98	SOIL	EPA8260	ERCL	SVOC-043
1093	Bldg. 6584 W. SS	Volume 6	600450	ER-1295-W6584-DF1-BH4-10-S	041490-001	13-JUL-98	SOIL	EPA8260	ERCL	SVOC-049
1093	Bldg. 6584 W. SS	Volume 6	600440	ER-1295-W6584-EB	041503-007	01-JUL-98	WATER	EPA6020	ERCL	WI98-12
1094	LFR E. SS	Volume 3	602817	LFR-DF1-BH3-Cr6+	050069-011	07-SEP-99	AQUEOUS	Cr+6	GEL	157999
1094	LFR E. SS	Volume 3	602817	LFR-DF1-BH3-CN	050069-010	07-SEP-99	AQUEOUS	TOTAL-CN	GEL	158008
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH1-12-S	050063-003	01-SEP-99	SOIL	HE-8330	GEL	158012
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH1-7-MSMSD	050064-003	02-SEP-99	SOIL	HE-8330	GEL	158012
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH1-7-S	050062-003	01-SEP-99	SOIL	HE-8330	GEL	158012
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH2-12-S	050066-003	02-SEP-99	SOIL	HE-8330	GEL	158012

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 #
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH2-7-S	050065-003	02-SEP-99	SOIL	HE-8330	GEL	158012
1094	LFR E. SS	Volume 3	602817	LFR-DF1-BH3-12-S	050068-003	02-SEP-99	SOIL	HE-8330	GEL	158012
1094	LFR E. SS	Volume 3	602817	LFR-DF1-BH3-7-S	050067-003	02-SEP-99	SOIL	HE-8330	GEL	158012
1094	LFR E. SS	Volume 3	602817	LFR-DF1-BH3-HE	050069-009	07-SEP-99	AQUEOUS	HE-8330	GEL	158013
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH1-12-S	050063-003	01-SEP-99	SOIL	BNA-8270	GEL	158016
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH1-7-MSMSD	050064-003	02-SEP-99	SOIL	BNA-8270	GEL	158016
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH1-7-S	050062-003	01-SEP-99	SOIL	BNA-8270	GEL	158016
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH2-12-S	050066-003	02-SEP-99	SOIL	BNA-8270	GEL	158016
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH2-7-S	050065-003	02-SEP-99	SOIL	BNA-8270	GEL	158016
1094	LFR E. SS	Volume 3	602817	LFR-DF1-BH3-12-S	050068-003	02-SEP-99	SOIL	BNA-8270	GEL	158016
1094	LFR E. SS	Volume 3	602817	LFR-DF1-BH3-7-S	050067-003	02-SEP-99	SOIL	BNA-8270	GEL	158016
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH1-12-S	050063-001	01-SEP-99	SOIL	VOA-8260	GEL	158044
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH1-7-MSMSD	050064-001	02-SEP-99	SOIL	VOA-8260	GEL	158044
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH1-7-S	050062-001	01-SEP-99	SOIL	VOA-8260	GEL	158044
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH2-12-S	050066-001	02-SEP-99	SOIL	VOA-8260	GEL	158044
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH2-7-S	050065-001	02-SEP-99	SOIL	VOA-8260	GEL	158044
1094	LFR E. SS	Volume 3	602817	LFR-DF1-BH3-12-S	050068-001	02-SEP-99	SOIL	VOA-8260	GEL	158044
1094	LFR E. SS	Volume 3	602817	LFR-DF1-BH3-7-S	050067-001	02-SEP-99	SOIL	VOA-8260	GEL	158044
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH1-12-S	050063-003	01-SEP-99	SOIL	PCB-8082	GEL	158065
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH1-7-MSMSD	050064-003	02-SEP-99	SOIL	PCB-8082	GEL	158065
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH1-7-S	050062-003	01-SEP-99	SOIL	PCB-8082	GEL	158065
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH2-12-S	050066-003	02-SEP-99	SOIL	PCB-8082	GEL	158065
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH2-7-S	050065-003	02-SEP-99	SOIL	PCB-8082	GEL	158065
1094	LFR E. SS	Volume 3	602817	LFR-DF1-BH3-12-S	050068-003	02-SEP-99	SOIL	PCB-8082	GEL	158065
1094	LFR E. SS	Volume 3	602817	LFR-DF1-BH3-7-S	050067-003	02-SEP-99	SOIL	PCB-8082	GEL	158065
1094	LFR E. SS	Volume 3	602817	LFR-DF1-BH3-EB	050069-013	07-SEP-99	AQUEOUS	VOA-8260	GEL	158072
1094	LFR E. SS	Volume 3	602817	LFR-DF1-BH3-TB	050069-014	07-SEP-99	AQUEOUS	VOA-8260	GEL	158072
1094	LFR E. SS	Volume 3	602817	LFR-DF1-BH3-BNA	050069-008	07-SEP-99	AQUEOUS	BNA-8270	GEL	158075
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH1-12-S	050063-003	01-SEP-99	SOIL	TOTAL-CN	GEL	158110
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH1-7-MSMSD	050064-003	02-SEP-99	SOIL	TOTAL-CN	GEL	158110
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH1-7-S	050062-003	01-SEP-99	SOIL	TOTAL-CN	GEL	158110
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH2-12-S	050066-003	02-SEP-99	SOIL	TOTAL-CN	GEL	158110
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH2-7-S	050065-003	02-SEP-99	SOIL	TOTAL-CN	GEL	158110
1094	LFR E. SS	Volume 3	602817	LFR-DF1-BH3-12-S	050068-003	02-SEP-99	SOIL	TOTAL-CN	GEL	158110
1094	LFR E. SS	Volume 3	602817	LFR-DF1-BH3-7-S	050067-003	02-SEP-99	SOIL	TOTAL-CN	GEL	158110
1094	LFR E. SS	Volume 3	602817	LFR-DF1-BH3-GRAB	050069-006	07-SEP-99	AQUEOUS	GROSS-A/B	GEL	158539
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH1-12-S	050063-004	01-SEP-99	SOIL	GAMMA SPEC	GEL	158553
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH1-7-MSMSD	050064-004	02-SEP-99	SOIL	GAMMA SPEC	GEL	158553
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH1-7-S	050062-004	01-SEP-99	SOIL	GAMMA SPEC	GEL	158553
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH2-12-S	050066-004	02-SEP-99	SOIL	GAMMA SPEC	GEL	158553
1094	LFR E. SS	Volume 3	602817	LFB-DF1-BH2-7-S	050065-004	02-SEP-99	SOIL	GAMMA SPEC	GEL	158553
1094	LFR E. SS	Volume 3	602817	LFR-DF1-BH3-12-S	050068-004	02-SEP-99	SOIL	GAMMA SPEC	GEL	158553

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 3 of 7

General Engineering Laboratories, Inc. (GEL) QC Data

Environmental
Restoration
Project

United States Department of Energy
Sandia Site Office

COC #602817

GEL QC CROSS REFERENCE

COC 602817

Site #	Site Name	SAMPLE#	F#	DISP_ER_SAMP_LOC	SAMPLE DATE	MATRIX	LAB TEST	BATCH #
1117	Bldg. 9982 DW	050060	003	SOLAR 9982-DW1-BH1-11-DU	30-AUG-99	SOIL	TOTAL-CN	158099, 158110
1117	Bldg. 9982 DW	050060	004	SOLAR 9982-DW1-BH1-11-DU	30-AUG-99	SOIL	GAMMA SPEC	158553
1117	Bldg. 9982 DW	050060	004	SOLAR 9982-DW1-BH1-11-DU	30-AUG-99	SOIL	GROSS-A/B	158646, 158647
1117	Bldg. 9982 DW	050061	001	SOLAR 9982-DW1-BH1-16-S	31-AUG-99	SOIL	VOA-8260	158044
1117	Bldg. 9982 DW	050061	003	SOLAR 9982-DW1-BH1-16-S	31-AUG-99	SOIL	BNA-8270	158016
1117	Bldg. 9982 DW	050061	003	SOLAR 9982-DW1-BH1-16-S	31-AUG-99	SOIL	Cr+6	158555, 158556
1117	Bldg. 9982 DW	050061	003	SOLAR 9982-DW1-BH1-16-S	31-AUG-99	SOIL	HE-8330	158012
1117	Bldg. 9982 DW	050061	003	SOLAR 9982-DW1-BH1-16-S	31-AUG-99	SOIL	PCB-8082	158065
1117	Bldg. 9982 DW	050061	003	SOLAR 9982-DW1-BH1-16-S	31-AUG-99	SOIL	RCRA METALS	158059, 158023
1117	Bldg. 9982 DW	050061	003	SOLAR 9982-DW1-BH1-16-S	31-AUG-99	SOIL	TOTAL-CN	158099, 158110
1117	Bldg. 9982 DW	050061	004	SOLAR 9982-DW1-BH1-16-S	31-AUG-99	SOIL	GAMMA SPEC	158553
1117	Bldg. 9982 DW	050061	004	SOLAR 9982-DW1-BH1-16-S	31-AUG-99	SOIL	GROSS-A/B	158646, 158647
1094	LFR E. SS	050062	001	LFB-DF1-BH1-7-S	01-SEP-99	SOIL	VOA-8260	158044
1094	LFR E. SS	050062	003	LFB-DF1-BH1-7-S	01-SEP-99	SOIL	BNA-8270	158016
1094	LFR E. SS	050062	003	LFB-DF1-BH1-7-S	01-SEP-99	SOIL	Cr+6	158555, 158556
1094	LFR E. SS	050062	003	LFB-DF1-BH1-7-S	01-SEP-99	SOIL	HE-8330	158012
1094	LFR E. SS	050062	003	LFB-DF1-BH1-7-S	01-SEP-99	SOIL	PCB-8082	158065
1094	LFR E. SS	050062	003	LFB-DF1-BH1-7-S	01-SEP-99	SOIL	RCRA METALS	158059, 158023
1094	LFR E. SS	050062	003	LFB-DF1-BH1-7-S	01-SEP-99	SOIL	TOTAL-CN	158099, 158110
1094	LFR E. SS	050062	004	LFB-DF1-BH1-7-S	01-SEP-99	SOIL	GAMMA SPEC	158553
1094	LFR E. SS	050062	004	LFB-DF1-BH1-7-S	01-SEP-99	SOIL	GROSS-A/B	158646, 158647
1094	LFR E. SS	050063	001	LFB-DF1-BH1-12-S	01-SEP-99	SOIL	VOA-8260	158044
1094	LFR E. SS	050063	003	LFB-DF1-BH1-12-S	01-SEP-99	SOIL	BNA-8270	158016
1094	LFR E. SS	050063	003	LFB-DF1-BH1-12-S	01-SEP-99	SOIL	Cr+6	158555, 158556
1094	LFR E. SS	050063	003	LFB-DF1-BH1-12-S	01-SEP-99	SOIL	HE-8330	158012
1094	LFR E. SS	050063	003	LFB-DF1-BH1-12-S	01-SEP-99	SOIL	PCB-8082	158065
1094	LFR E. SS	050063	003	LFB-DF1-BH1-12-S	01-SEP-99	SOIL	RCRA METALS	158059, 158023
1094	LFR E. SS	050063	003	LFB-DF1-BH1-12-S	01-SEP-99	SOIL	TOTAL-CN	158099, 158110
1094	LFR E. SS	050063	004	LFB-DF1-BH1-12-S	01-SEP-99	SOIL	GAMMA SPEC	158553

GEL QC CROSS REFERENCE

COC 602817

Site #	Site Name	SAMPLE#	F#	DISP_ER_SAMP_LOC	SAMPLE DATE	MATRIX	LAB TEST	BATCH #
1094	LFR E. SS	050063	004	LFB-DF1-BH1-12-S	01-SEP-99	SOIL	GROSS-A/B	158646, 158647
1094	LFR E. SS	050064	001	LFB-DF1-BH1-7-MSMSD	02-SEP-99	SOIL	VOA-8260	158044
1094	LFR E. SS	050064	003	LFB-DF1-BH1-7-MSMSD	02-SEP-99	SOIL	BNA-8270	158016
1094	LFR E. SS	050064	003	LFB-DF1-BH1-7-MSMSD	02-SEP-99	SOIL	Cr+6	158555, 158556
1094	LFR E. SS	050064	003	LFB-DF1-BH1-7-MSMSD	02-SEP-99	SOIL	HE-8330	158012
1094	LFR E. SS	050064	003	LFB-DF1-BH1-7-MSMSD	02-SEP-99	SOIL	PCB-8082	158065
1094	LFR E. SS	050064	003	LFB-DF1-BH1-7-MSMSD	02-SEP-99	SOIL	RCRA METALS	158059, 158023
1094	LFR E. SS	050064	003	LFB-DF1-BH1-7-MSMSD	02-SEP-99	SOIL	TOTAL-CN	158099, 158110
1094	LFR E. SS	050064	004	LFB-DF1-BH1-7-MSMSD	02-SEP-99	SOIL	GAMMA SPEC	158553
1094	LFR E. SS	050064	004	LFB-DF1-BH1-7-MSMSD	02-SEP-99	SOIL	GROSS-A/B	158646, 158647
1094	LFR E. SS	050065	001	LFB-DF1-BH2-7-S	02-SEP-99	SOIL	VOA-8260	158044
1094	LFR E. SS	050065	003	LFB-DF1-BH2-7-S	02-SEP-99	SOIL	BNA-8270	158016
1094	LFR E. SS	050065	003	LFB-DF1-BH2-7-S	02-SEP-99	SOIL	Cr+6	158555, 158556
1094	LFR E. SS	050065	003	LFB-DF1-BH2-7-S	02-SEP-99	SOIL	HE-8330	158012
1094	LFR E. SS	050065	003	LFB-DF1-BH2-7-S	02-SEP-99	SOIL	PCB-8082	158065
1094	LFR E. SS	050065	003	LFB-DF1-BH2-7-S	02-SEP-99	SOIL	RCRA METALS	158059, 158023
1094	LFR E. SS	050065	003	LFB-DF1-BH2-7-S	02-SEP-99	SOIL	TOTAL-CN	158099, 158110
1094	LFR E. SS	050065	004	LFB-DF1-BH2-7-S	02-SEP-99	SOIL	GAMMA SPEC	158553
1094	LFR E. SS	050065	004	LFB-DF1-BH2-7-S	02-SEP-99	SOIL	GROSS-A/B	158646, 158647
1094	LFR E. SS	050066	001	LFB-DF1-BH2-12-S	02-SEP-99	SOIL	VOA-8260	158044
1094	LFR E. SS	050066	003	LFB-DF1-BH2-12-S	02-SEP-99	SOIL	BNA-8270	158016
1094	LFR E. SS	050066	003	LFB-DF1-BH2-12-S	02-SEP-99	SOIL	Cr+6	158555, 158556
1094	LFR E. SS	050066	003	LFB-DF1-BH2-12-S	02-SEP-99	SOIL	HE-8330	158012
1094	LFR E. SS	050066	003	LFB-DF1-BH2-12-S	02-SEP-99	SOIL	PCB-8082	158065
1094	LFR E. SS	050066	003	LFB-DF1-BH2-12-S	02-SEP-99	SOIL	RCRA METALS	158059, 158023
1094	LFR E. SS	050066	003	LFB-DF1-BH2-12-S	02-SEP-99	SOIL	TOTAL-CN	158099, 158110
1094	LFR E. SS	050066	004	LFB-DF1-BH2-12-S	02-SEP-99	SOIL	GAMMA SPEC	158553
1094	LFR E. SS	050066	004	LFB-DF1-BH2-12-S	02-SEP-99	SOIL	GROSS-A/B	158646, 158647
1094	LFR E. SS	050067	001	LFR-DF1-BH3-7-S	02-SEP-99	SOIL	VOA-8260	158044

GEL QC CROSS REFERENCE

COC 602817

Site #	Site Name	SAMPLE#	F#	DISP_ER_SAMP_LOC	SAMPLE DATE	MATRIX	LAB TEST	BATCH #
1094	LFR E. SS	050067	003	LFR-DF1-BH3-7-S	02-SEP-99	SOIL	BNA-8270	158016
1094	LFR E. SS	050067	003	LFR-DF1-BH3-7-S	02-SEP-99	SOIL	Cr+6	158555, 158556
1094	LFR E. SS	050067	003	LFR-DF1-BH3-7-S	02-SEP-99	SOIL	HE-8330	158012
1094	LFR E. SS	050067	003	LFR-DF1-BH3-7-S	02-SEP-99	SOIL	PCB-8082	158065
1094	LFR E. SS	050067	003	LFR-DF1-BH3-7-S	02-SEP-99	SOIL	RCRA METALS	158059, 158023
1094	LFR E. SS	050067	003	LFR-DF1-BH3-7-S	02-SEP-99	SOIL	TOTAL-CN	158099, 158110
1094	LFR E. SS	050067	004	LFR-DF1-BH3-7-S	02-SEP-99	SOIL	GAMMA SPEC	158553
1094	LFR E. SS	050067	004	LFR-DF1-BH3-7-S	02-SEP-99	SOIL	GROSS-A/B	158646, 158647
1094	LFR E. SS	050068	001	LFR-DF1-BH3-12-S	02-SEP-99	SOIL	VOA-8260	158044
1094	LFR E. SS	050068	003	LFR-DF1-BH3-12-S	02-SEP-99	SOIL	BNA-8270	158016
1094	LFR E. SS	050068	003	LFR-DF1-BH3-12-S	02-SEP-99	SOIL	Cr+6	158555, 158556
1094	LFR E. SS	050068	003	LFR-DF1-BH3-12-S	02-SEP-99	SOIL	HE-8330	158012
1094	LFR E. SS	050068	003	LFR-DF1-BH3-12-S	02-SEP-99	SOIL	PCB-8082	158065
1094	LFR E. SS	050068	003	LFR-DF1-BH3-12-S	02-SEP-99	SOIL	RCRA METALS	158059, 158023
1094	LFR E. SS	050068	003	LFR-DF1-BH3-12-S	02-SEP-99	SOIL	TOTAL-CN	158099, 158110
1094	LFR E. SS	050068	004	LFR-DF1-BH3-12-S	02-SEP-99	SOIL	GAMMA SPEC	158553
1094	LFR E. SS	050068	004	LFR-DF1-BH3-12-S	02-SEP-99	SOIL	GROSS-A/B	158646, 158647
1094	LFR E. SS	050069	005	LFR-DF1-BH3-GS	07-SEP-99	AQUEOUS	GAMMA SPEC	158575
1094	LFR E. SS	050069	006	LFR-DF1-BH3-GRAB	07-SEP-99	AQUEOUS	GROSS-A/B	158539
1094	LFR E. SS	050069	007	LFR-DF1-BH3-RCRA	07-SEP-99	AQUEOUS	RCRA METALS	158086, 158015
1094	LFR E. SS	050069	008	LFR-DF1-BH3-BNA	07-SEP-99	AQUEOUS	BNA-8270	158075
1094	LFR E. SS	050069	009	LFR-DF1-BH3-HE	07-SEP-99	AQUEOUS	HE-8330	158013
1094	LFR E. SS	050069	010	LFR-DF1-BH3-CN	07-SEP-99	AQUEOUS	TOTAL-CN	158008
1094	LFR E. SS	050069	011	LFR-DF1-BH3-Cr6+	07-SEP-99	AQUEOUS	Cr+6	157999
1094	LFR E. SS	050069	012	LFR-DF1-BH3-PCB	07-SEP-99	AQUEOUS	PCB-8082	158568
1094	LFR E. SS	050069	013	LFR-DF1-BH3-EB	07-SEP-99	AQUEOUS	VOA-8260	158072
1094	LFR E. SS	050069	014	LFR-DF1-BH3-TB	07-SEP-99	AQUEOUS	VOA-8260	158072

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CASE NARRATIVE
for
Sandia National Laboratories
ARCOC- 602820
9909228A
ARCOC- 602817
9909228B
Case No. 7223.230

RECEIVED
OCT 11 1999
SNL/SMO

October 1, 1999

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

Fifty-seven soils and eleven aqueous samples were collected by Sandia on August 27, 30 and 31. September 1st, 2nd and 7,1999. The samples arrived at General Engineering Laboratories, Inc., (GEL) Charleston, South Carolina on September 8, 1999, for Environmental Analyses. Cooler clearance (screening, temperature check, etc.) was done upon login. The cooler arrived without any visible signs of tampering or breakage and with custody seals intact. The samples were delivered with chain of custody documentation and signatures.

The temperature of the samples was 4°C. The samples were screened according to GEL Standard Operating Procedures (SOP) EPI SOP S-007 rev. 2 "The Receiving of Radioactive Samples." The samples were stored properly according to SW-846 procedures and GEL SOP.

The samples were received as follows:

ARCOC	SDG#	#of samples	Collection Date	Date Rec'd by Lab
602820	9909228A	4	08/31/99	09/8/99
602817	9909228B	64	08/27,30,31/99 9/1 9/2/99	09/8/99

The laboratory received the following samples:

Laboratory ID	Description
602820:	
9909228-01	**050109-001 B9938-SP1-BH1-9.5-S**
9909228-02	**050109-003 B9938-SP1-BH1-9.5-S**
9909228-03	**050109-004 B9938-SP1-BH1-9.5-S**
9909228-04	**050110-005 B9938-SP1-BH1-9.5-TB**
602817:	
9909228-05	**050049-001 SOLARDETOX-DF1-BH3-**
9909228-06	**050049-003 SOLARDETOX-DF1-BH3-**
9909228-07	**050049-004 SOLARDETOX-DF1-BH3-**
9909228-08	**050050-001 SOLARDETOX-DF1-BH3-**
9909228-09	**050050-003 SOLARDETOX-DF1-BH3-**
9909228-10	**050050-004 SOLADEXTOX-DF1-BH3-**
9909228-11	**050052-001 SOLARDETOX-DF1-BH2**
9909228-12	**050052-003 SOLARDETOX-DF1-BH2-**
9909228-13	**050052-004 SOLARDETOX-DF1-BH2-**
9909228-14	**050053-001 SOLARDETOX-DF1-BH2-**
9909228-15	**050053-003 SOLARDETOX-DF1-BH2-**
9909228-16	**050053-004 SOLARDETOX-DF1-BH2-**
9909228-17	**050055-001 SOLARDETOX-DF1-BH1-**
9909228-18	**050055-003 SOLARDETOX-DF1-BH1-**
9909228-19	**050055-004 SOLARDETOX-DF1-BH1-**
9909228-20	**050056-001 SOLARDETOX-DF1-BH1-**
9909228-21	**050056-003 SOLARDETOX-DF1-BH1-**
9909228-22	**050056-004 SOLARDETOX-DF1-BH1-**
9909228-23	**050057-001 SOLAR-9981A-SP1-BH1-**
9909228-24	**050057-003 SOLAR 9981A-SP1-BHI**
9909228-25	**050057-004 SOLAR 9981A-SP1-BH1**
9909228-26	**050058-001 SOLAR 9981A-SP1-BH1**
9909228-27	**050058-003 SOLAR 9981A-SP1-BH1**
9909228-28	**050058-004 SOLAR 9981A-SP1-BH1**
9909228-29	**050059-001 SOLAR 9982-DW1-BH1-**
9909228-30	**050059-003 SOLAR 9982-DW1-BH1-**
9909228-31	**050059-004 SOLAR 9982-DW1-BH1-**
9909228-32	**050060-001 SOLAR 9982-DW1-BH1**
9909228-33	**050060-003 SOLAR 9982-DW1-BH1**

The laboratory received the following samples:

Laboratory ID	Description
602817:	
9909228-34	050060-004 SOLAR 9982-DW1-BH1
9909228-35	050061-001 SOLAR 9982-DW1-BH1
9909228-36	050061-003 SOLAR 9982-DW1-BH1
9909228-37	050061-004 SOLAR 9982-DW1-BH1
9909228-38	050062-001 LFR-DF1-BH1-7-S
9909228-39	050062-003 LFR-DF1-BH1-7-S
9909228-40	050062-004 LFR-DF1-BH1-7-S
9909228-41	050063-001 LFR-DF1-BH1-12-S
9909228-42	050063-003 LFR-DF1-BH1-12-S
9909228-43	050063-004 LFR-DF1-BH1-12-S
9909228-44	050064-001 LFR-DF1-BH1-7-MS/MD
9909228-45	050064-003 LFR-DF1-BH1-7-MS/MD
9909228-46	050064-004 LFR-DF1-BH1-7-MS/MD
9909228-47	050065-001 LFR-DF1-BH2-7-S
9909228-48	050065-003 LFR-DF1-BH2-7-S
9909228-49	050065-004 LFR-DF1-BH2-7-S
9909228-50	050066-001 LFR-DF1-BH2-12-S
9909228-51	050066-003 LFR-DF1-BH2-12-S
9909228-52	050066-004 LFR-DF1-BH2-12-S
9909228-53	050067-001 LFR-DF1-BH3-7-S
9909228-54	050067-003 LFR-DF1-BH3-7-S
9909228-55	050067-004 LFR-DF1-BH3-7-S
9909228-56	050068-001 LFR-DF1-BH3-12-S
9909228-57	050068-003 LFR-DF1-BH3-12-S
9909228-58	050068-004 LFR-DF1-BH3-12-S
9909228-59	050069-005 LFR-DF1-BH3-GS
9909228-60	050069-006 LFR-DF1-BH3-GRAB
9909228-61	050069-007 LFR-DF1-BH3-RCRA
9909228-62	050069-008 LFR-DF1-BH3-SVOC
9909228-63	050069-009 LFR-DF1-BH3-HE
9909228-64	050069-010 LFR-DF1-BH3-CN
9909228-65	050069-011 LFR-DF1-BH3-CR6+
9909228-66	050069-012 LFR-DF1-BH3-PCB
9909228-67	050069-013 LFR-DF1-BH3-EB
9909228-68	050069-014 LFR-DF1-BH3-TB

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 all 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, Sample Data, QC Summary and Raw Data.

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

Suitten S. Davis
for Edith M. Kent

Project Manager

fc:snls9909228

GENERAL ENGINEERING LABORATORIES
PO Box 30712 • Charleston, SC 29417 • 2040 Savage Road • 29407
(803) 556-8171 • Fax (803) 766-1178

GC/MS
VOLATILE
ANALYSIS

CASE NARRATIVE
SNLS
SDG# 99228S-VOA
Analysis by GC/MS

Sample Analysis:

The following samples were analyzed for Volatile Organic Compounds using the analytical protocol from EPA SW-846 Third Edition, Method 8260A, Revision 1, September 1994:

Laboratory Number	Sample Description
9909228-01	050109-001 B9938-SP1-BH1-9.5-S
9909228-05	050049-001 SOLARDETOX-DF1-BH3-
9909228-08	050050-001 SOLARDETOX-DF1-BH3-
9909228-11	050-052-001 SOLARDETOX-DF1-BH2
9909228-14	050053-001 SOLARDETOX-DF1-BH2-
9909228-17	050055-001 SOLARDETOX-DF1-BH1-
9909228-20	050056-001 SOLARDETOX-DF1-BH1-
9909228-23	050057-001SOLAR-9981A-SP1-BH1-
9909228-26	050058-001 SOLAR 9981A-SP1-BH1
9909228-29	050059-001 SOLAR 9982-DW1-BH1-
9909228-32	050060-001 SOLAR 9982-DW1-BH1
9909228-35	050061-001 SOLAR 9982-DW1-BH1
9909228-38	050062-001 LFR-DF1-BH1-7-S
9909228-41	050063-001 LFR-DF1-BH1-12-S
9909228-44	050064-001 LFR-DF1-BH1-7-MS/MD
9909228-47	050065-001 LFR-DF1-BH2-7-S
9909228-50	050066-001 LFR-DF1-BH2-12-S
9909228-53	050067-001 LFR-DF1-BH3-7-S
9909228-56	050068-001 LFR-DF1-BH3-12-S
QC646985	VBLK01 (Blank)
QC646986	VBLK01LCS (Laboratory Control Sample)
QC646987	050064-001MS (Matrix Spike)
QC646988	050064-001MSD (Matrix Spike Duplicate)
QC646989	VBLK02LCSD (Laboratory Control Sample Duplicate)
QC647288	VBLK02 (Blank)
QC647289	VBLK02LCS (Laboratory Control Sample)
QC647660	VBLK03 (Blank)
QC647661	VBLK03LCS (Laboratory Control Sample)

System Configuration:

The laboratory utilizes a variety of instrument configurations for volatile analyses. These analyses are accomplished using one or more of the GC and MS couplings, as follows:

GC/MS	Interface	Purge and Trap-Concentrator / Autosampler
5890 Series II / 5970	Jet Separator	Tekmar 2000 / Archon
5890 Series II / 5972	Direct	OI 4560 / Archon
6890 Series / 5973	Direct	Tekmar 3000 / Precept

6890 Series / 5973	Direct	OI 4560 / DPM-16
6890 Series / 5973	Direct	Tekmar 2000 / Archon

Chromatographic Column:

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

J&W1	DB - 624, 60 m x 0.32 mm, 1.8um (identified by the J&W1 designation)
J&W2:	DB - 624, 75 m x 0.53 mm, 3 um (identified by the J&W2 designation)
Rtx1	Rtx Volatiles, 60 m x 0.53 mm, 1.5 um (identified by the Rtx VOA designation)
J&W3	DB-624, 60 m x 0.25 mm, 1.4 um (identified by the J&W3 designation)

Samples are prepared using Purge and Trap samplers containing the following P & T trap:

VOCARB 3000: Carbopack B/ Carboxen 1000 &1001

Instrument Configuration:

The samples reported in this SDG were analyzed on one or more of the following instrument systems (instrument systems are identified by the instrument ID designations listed below which can be found on the raw data or individual form headers):

Instrument ID	System Configuration	Chromatographic Column	P & T Trap
VOA1	HP5890/HP5970	J&W2	VOCARB 3000
VOA2	HP6890/HP5973	J&W3	VOCARB 3000
VOA4	HP5890/HP5972	Rtx VOA	VOCARB 3000
VOA5	HP5890/HP5972	J&W3	VOCARB 3000
VOA7	HP5890/HP5972	Rtx VOA	VOCARB 3000
VOA8	HP6890/HP5973	J&W3	VOCARB 3000
VOA9	HP6890/HP5973	J&W3	Tenax/Silicagel/ Charcoal

Instrument Calibration:

The instrument was properly calibrated.

For a complete list of data files for the initial calibration, see the Calibration History Report.

Holding Time:

All samples were analyzed within the required holding time.

Surrogates:

Surrogate recoveries in all samples were within the required acceptance limits.

Internal Standards:

Internal Standard areas in all samples were within the required acceptance limits.

Blanks:

There were no target analytes detected in the method blanks above the required reporting limit.

Spike Analyses:

The matrix spike (MS) and matrix spike duplicate (MSD) were analyzed on the following Sample Number:

9909228-44 050064-001 LFR-DF1-BH1-7-MS/MD

All analytes in the MS and MSD were within the required acceptance limits for percent recovery.

All analytes in the MS/MSD set were within the required acceptance limits for relative percent difference.

Laboratory Control Samples:

All analytes in the laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) were within the required acceptance limits for percent recovery.

All analytes in the LCS/LCSD set were within the required acceptance limits for relative percent difference.

Dilutions:

The samples in this SDG did not require dilutions.

Non Conformance Reports:

There were no Nonconformance Reports associated with this SDG.

General Comments:

Data files associated with both the initial calibration and continuing calibration check may have been manually integrated to correct misidentification of peaks by the integration software. Manual integrations are performed because of poor peak shapes exhibited by selective compounds at low concentrations, or as a result of overlapping retention time windows of similar isomeric compounds contained on the extended reporting list. If applicable, peak profiles for the affected compounds are contained in the raw data section.

The preceding narrative has been reviewed by: Charles Wilson Date: 10-04-99

GC/MS VOLATILE ANALYSIS

CASE NARRATIVE
SNLS
SDG# 99228W-VOA
Analysis by GC/MS

Sample Analysis:

The following samples were analyzed for Volatile Organic Compounds using the analytical protocol from EPA SW-846 Third Edition, Method 8260A, Revision 1, September 1994:

Laboratory Number	Sample Description
9909228-04	050110-005 B9938-SP1-BH1-9.5-T
9909228-67	050069-013 LFR-DF1-BH3-EB
9909228-68	050069-014 LFR-DF1-BH3-TB
QC647130	VBLK01LCSD (Laboratory Control Sample Duplicate)
QC647662	VBLK01 (Blank)
QC647663	VBLK01LCS (Laboratory Control Sample)

System Configuration:

The laboratory utilizes a variety of instrument configurations for volatile analyses. These analyses are accomplished using one or more of the GC and MS couplings, as follows:

GC/MS	Interface	Purge and Trap-Concentrator / Autosampler
5890 Series II / 5970	Jet Separator	Tekmar 2000 / Archon
5890 Series II / 5972	Direct	OI 4560 / Archon
6890 Series / 5973	Direct	Tekmar 3000 / Precept
6890 Series / 5973	Direct	OI 4560 / DPM-16
6890 Series / 5973	Direct	Tekmar 2000 / Archon

Chromatographic Column:

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

J&W1	DB - 624, 60 m x 0.32 mm, 1.8um (identified by the J&W1 designation)
J&W2:	DB - 624, 75 m x 0.53 mm, 3 um (identified by the J&W2 designation)
Rtx1	Rtx Volatiles, 60 m x 0.53 mm, 1.5 um (identified by the Rtx VOA designation)
J&W3	DB-624, 60 m x 0.25 mm, 1.4 um (identified by the J&W3 designation)

Samples are prepared using Purge and Trap samplers containing the following P & T trap:

VOCARB 3000: Carbopack B/ Carboxen 1000 &1001

Instrument Configuration:

The samples reported in this SDG were analyzed on one or more of the following instrument systems (instrument systems are identified by the instrument ID designations listed below which can be found on the raw data or individual form headers):

Instrument ID	System Configuration	Chromatographic Column	P & T Trap
VOA1	HP5890/HP5970	J&W2	VOCARB 3000
VOA2	HP5890/HP5973	J&W3	VOCARB 3000
VOA4	HP5890/HP5972	Rtx VOA	VOCARB 3000
VOA5	HP5890/HP5972	J&W3	VOCARB 3000
VOA7	HP5890/HP5972	Rtx VOA	VOCARB 3000
VOA8	HP6890/HP5973	J&W3	VOCARB 3000
VOA9	HP6890/HP5973	J&W3	Tenax/Silicagel/ Charcoal

Instrument Calibration:

The instrument was properly calibrated.

For a complete list of data files for the initial calibration, see the Calibration History Report.

Holding Time:

All samples were analyzed within the required holding time.

Surrogates:

Surrogate recoveries in all samples were within the required acceptance limits.

Internal Standards:

Internal Standard areas in all samples were within the required acceptance limits.

Blanks:

There were no target analytes detected in the method blank above the required reporting limit.

Spike Analyses:

The analysis of a matrix spike (MS) and matrix spike duplicate (MSD) was not required for the samples in this SDG.

Laboratory Control Samples:

All analytes in the laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) were within the required acceptance limits for percent recovery.

All analytes in the LCS/LCSD set were within the required acceptance limits for relative percent difference.

Dilutions:

Samples in this SDG did not require dilutions.

Non Conformance Reports:

There were no Nonconformance Reports associated with this SDG.

General Comments:

Data files associated with both the initial calibration and continuing calibration check may have been manually integrated to correct misidentification of peaks by the integration software. Manual integrations are performed because of poor peak shapes exhibited by selective compounds at low concentrations, or as a result of overlapping retention time windows of similar isomeric compounds contained on the extended reporting list. If applicable, peak profiles for the affected compounds are contained in the raw data section.

The preceding narrative has been reviewed by: Charles Wilson Date: 10-04-95

QC Summary Report

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
Volatile Organics													
QC646985	BLANK	158044											
1,1-Dichloroethylene					U	ND	ug/kg				MAP	09/09/99	0900
Benzene					U	ND	ug/kg						
Chlorobenzene					U	ND	ug/kg						
Toluene					U	ND	ug/kg						
Trichloroethylene					U	ND	ug/kg						
*Bromofluorobenzene			50.0			53	ug/kg		107	(73.0 - 129.)			
*Dibromofluoromethane			50.0			49	ug/kg		97.4	(66.0 - 117.)			
*Toluene-d8			50.0			50	ug/kg		100	(73.0 - 122.)			
1,1,1-Trichloroethane					U	ND	ug/kg						
1,1,2,2-Tetrachloroethane					U	ND	ug/kg						
1,1,2-Trichloroethane					U	ND	ug/kg						
1,1-Dichloroethane					U	ND	ug/kg						
1,2-Dichloroethane					U	ND	ug/kg						
1,2-Dichloropropane					U	ND	ug/kg						
1,2-cis-Dichloroethylene					U	ND	ug/kg						
1,2-trans-Dichloroethylene					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						
Bromoform					U	ND	ug/kg						
Carbon Disulfide					U	ND	ug/kg						
Carbon Tetrachloride					U	ND	ug/kg						
Chlorodibromomethane					U	ND	ug/kg						
Chloroethane					U	ND	ug/kg						
Chloroform					U	ND	ug/kg						
Dichlorobromomethane					U	ND	ug/kg						
Ethylbenzene					U	ND	ug/kg						
Methyl Bromide					U	ND	ug/kg						
Methyl Chloride					U	ND	ug/kg						
Methylene Chloride					U	ND	ug/kg						
Styrene					U	ND	ug/kg						
Tetrachloroethylene					U	ND	ug/kg						
Vinyl Acetate					U	ND	ug/kg						
Vinyl chloride					U	ND	ug/kg						
Xylenes (TOTAL)					U	ND	ug/kg						
cis-1,3-Dichloropropylene					U	ND	ug/kg						
trans-1,3-Dichloropropylene					U	ND	ug/kg						

QC Summary Report

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
QC647128	BLANK	158072											
1,1-Dichloroethylene					U	ND	ug/l				MAP	09/10/99	0900
Benzene					U	ND	ug/l						
Chlorobenzene					U	ND	ug/l						
Toluene					U	ND	ug/l						
Trichloroethylene					U	ND	ug/l						
*Bromofluorobenzene			50.0			59	ug/l		118	(73.0 - 129.)			
*Dibromofluoromethane			50.0			46	ug/l		91.3	(66.0 - 117.)			
*Toluene-d8			50.0			51	ug/l		103	(73.0 - 122.)			
1,1,1-Trichloroethane					U	ND	ug/l						
1,1,2,2-Tetrachloroethane					U	ND	ug/l						
1,1,2-Trichloroethane					U	ND	ug/l						
1,1-Dichloroethane					U	ND	ug/l						
1,2-Dichloroethane					U	ND	ug/l						
1,2-Dichloropropane					U	ND	ug/l						
1,2-cis-Dichloroethylene					U	ND	ug/l						
1,2-trans-Dichloroethylene					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						
Bromoform					U	ND	ug/l						
Carbon Disulfide					U	ND	ug/l						
Carbon Tetrachloride					U	ND	ug/l						
Chlorodibromomethane					U	ND	ug/l						
Chloroethane					U	ND	ug/l						
Chloroform					U	ND	ug/l						
Dichlorobromomethane					U	ND	ug/l						
Ethylbenzene					U	ND	ug/l						
Methyl Bromide					U	ND	ug/l						
Methyl Chloride					U	ND	ug/l						
Methylene Chloride					U	ND	ug/l						
Styrene					U	ND	ug/l						
Tetrachloroethylene					U	ND	ug/l						
Vinyl Acetate					U	ND	ug/l						
Vinyl chloride					U	ND	ug/l						
Xylenes (TOTAL)					U	ND	ug/l						
cis-1,3-Dichloropropylene					U	ND	ug/l						
trans-1,3-Dichloropropylene					U	ND	ug/l						
QC647131	BLANK	158072											

QC Summary Report

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
1,1-Dichloroethylene					U	ND	ug/l				MAP	09/10/99	1041
Benzene					U	ND	ug/l				MAP	09/10/99	1041
Chlorobenzene					U	ND	ug/l						
Toluene					U	ND	ug/l						
Trichloroethylene					U	ND	ug/l						
*Bromofluorobenzene			500			590	ug/l		117	(73.0 - 129.)			
*Dibromofluoromethane			500			450	ug/l		90.6	(66.0 - 117.)			
*Toluene-d8			500			510	ug/l		103	(73.0 - 122.)			
1,1,1-Trichloroethane					U	ND	ug/l						
1,1,2,2-Tetrachloroethane					U	ND	ug/l						
1,1,2-Trichloroethane					U	ND	ug/l						
1,1-Dichloroethane					U	ND	ug/l						
1,2-Dichloroethane					U	ND	ug/l						
1,2-Dichloropropane					U	ND	ug/l						
1,2-cis-Dichloroethylene					U	ND	ug/l						
1,2-trans-Dichloroethylene					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						
Bromoform					U	ND	ug/l						
Carbon Disulfide					U	ND	ug/l						
Carbon Tetrachloride					U	ND	ug/l						
Chlorodibromomethane					U	ND	ug/l						
Chloroethane					U	ND	ug/l						
Chloroform					U	ND	ug/l						
Dichlorobromomethane					U	ND	ug/l						
Ethylbenzene					U	ND	ug/l						
Methyl Bromide					U	ND	ug/l						
Methyl Chloride					U	ND	ug/l						
Methylene Chloride					U	ND	ug/l						
Styrene					U	ND	ug/l						
Tetrachloroethylene					U	ND	ug/l						
Vinyl Acetate					U	ND	ug/l						
Vinyl chloride					U	ND	ug/l						
Xylenes (TOTAL)					U	ND	ug/l						
cis-1,3-Dichloropropylene					U	ND	ug/l						
trans-1,3-Dichloropropylene					U	ND	ug/l						
QC647288	BLANK	158044											
1,1-Dichloroethylene					U	ND	ug/kg				MAP	09/10/99	0900

QC Summary Report

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
Benzene					U	ND	ug/kg				MAP	09/10/99	0900
Chlorobenzene					U	ND	ug/kg						
Toluene					U	ND	ug/kg						
Trichloroethylene					U	ND	ug/kg						
*Bromofluorobenzene			50.0			59	ug/kg		118	(73.0 - 129.)			
*Dibromofluoromethane			50.0			46	ug/kg		91.3	(66.0 - 117.)			
*Toluene-d8			50.0			51	ug/kg		103	(73.0 - 122.)			
1,1,1-Trichloroethane					U	ND	ug/kg						
1,1,2,2-Tetrachloroethane					U	ND	ug/kg						
1,1,2-Trichloroethane					U	ND	ug/kg						
1,1-Dichloroethane					U	ND	ug/kg						
1,2-Dichloroethane					U	ND	ug/kg						
1,2-Dichloropropane					U	ND	ug/kg						
1,2-cis-Dichloroethylene					U	ND	ug/kg						
1,2-trans-Dichloroethylene					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						
Bromoform					U	ND	ug/kg						
Carbon Disulfide					U	ND	ug/kg						
Carbon Tetrachloride					U	ND	ug/kg						
Chlorodibromomethane					U	ND	ug/kg						
Chloroethane					U	ND	ug/kg						
Chloroform					U	ND	ug/kg						
Dichlorobromomethane					U	ND	ug/kg						
Ethylbenzene					U	ND	ug/kg						
Methyl Bromide					U	ND	ug/kg						
Methyl Chloride					U	ND	ug/kg						
Methylene Chloride					U	ND	ug/kg						
Styrene					U	ND	ug/kg						
Tetrachloroethylene					U	ND	ug/kg						
Vinyl Acetate					U	ND	ug/kg						
Vinyl chloride					U	ND	ug/kg						
Xylenes (TOTAL)					U	ND	ug/kg						
cis-1,3-Dichloropropylene					U	ND	ug/kg						
trans-1,3-Dichloropropylene					U	ND	ug/kg						
QC647660	BLANK	158044											
1,1-Dichloroethylene					U	ND	ug/kg				MAP	09/10/99	2228
Benzene					U	ND	ug/kg						

QC Summary Report

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
Chlorobenzene					U	ND	ug/kg				MAP	09/10/99	2228
Toluene					U	ND	ug/kg						
Trichloroethylene					U	ND	ug/kg						
*Bromofluorobenzene			50.0			58	ug/kg		116	(73.0 - 129.)			
*Dibromofluoromethane			50.0			47	ug/kg		93.5	(66.0 - 117.)			
*Toluene-d8			50.0			52	ug/kg		105	(73.0 - 122.)			
1,1,1-Trichloroethane					U	ND	ug/kg						
1,1,2,2-Tetrachloroethane					U	ND	ug/kg						
1,1,2-Trichloroethane					U	ND	ug/kg						
1,1-Dichloroethane					U	ND	ug/kg						
1,2-Dichloroethane					U	ND	ug/kg						
1,2-Dichloropropane					U	ND	ug/kg						
1,2-cis-Dichloroethylene					U	ND	ug/kg						
1,2-trans-Dichloroethylene					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						
Bromoform					U	ND	ug/kg						
Carbon Disulfide					U	ND	ug/kg						
Carbon Tetrachloride					U	ND	ug/kg						
Chlorodibromomethane					U	ND	ug/kg						
Chloroethane					U	ND	ug/kg						
Chloroform					U	ND	ug/kg						
Dichlorobromomethane					U	ND	ug/kg						
Ethylbenzene					U	ND	ug/kg						
Methyl Bromide					U	ND	ug/kg						
Methyl Chloride					U	ND	ug/kg						
Methylene Chloride					U	ND	ug/kg						
Styrene					U	ND	ug/kg						
Tetrachloroethylene					U	ND	ug/kg						
Vinyl Acetate					U	ND	ug/kg						
Vinyl chloride					U	ND	ug/kg						
Xylenes (TOTAL)					U	ND	ug/kg						
cis-1,3-Dichloropropylene					U	ND	ug/kg						
trans-1,3-Dichloropropylene					U	ND	ug/kg						
QC647662	BLANK	158072											
1,1-Dichloroethylene					U	ND	ug/l						
Benzene					U	ND	ug/l						
Chlorobenzene					U	ND	ug/l						

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
Toluene					U	ND	ug/l				MAP	09/10/99	2228
Trichloroethylene					U	ND	ug/l						
*Bromofluorobenzene			50.0			58	ug/l		116	(73.0 - 129.)			
*Dibromofluoromethane			50.0			47	ug/l		93.5	(66.0 - 117.)			
*Toluene-d8			50.0			52	ug/l		105	(73.0 - 122.)			
1,1,1-Trichloroethane					U	ND	ug/l						
1,1,2,2-Tetrachloroethane					U	ND	ug/l						
1,1,2-Trichloroethane					U	ND	ug/l						
1,1-Dichloroethane					U	ND	ug/l						
1,2-Dichloroethane					U	ND	ug/l						
1,2-Dichloropropane					U	ND	ug/l						
1,2-cis-Dichloroethylene					U	ND	ug/l						
1,2-trans-Dichloroethylene					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						
Bromoform					U	ND	ug/l						
Carbon Disulfide					U	ND	ug/l						
Carbon Tetrachloride					U	ND	ug/l						
Chlorodibromomethane					U	ND	ug/l						
Chloroethane					U	ND	ug/l						
Chloroform					U	ND	ug/l						
Dichlorobromomethane					U	ND	ug/l						
Ethylbenzene					U	ND	ug/l						
Methyl Bromide					U	ND	ug/l						
Methyl Chloride					U	ND	ug/l						
Methylene Chloride					U	ND	ug/l						
Styrene					U	ND	ug/l						
Tetrachloroethylene					U	ND	ug/l						
Vinyl Acetate					U	ND	ug/l						
Vinyl chloride					U	ND	ug/l						
Xylenes (TOTAL)					U	ND	ug/l						
cis-1,3-Dichloropropylene					U	ND	ug/l						
trans-1,3-Dichloropropylene					U	ND	ug/l						
QC646986	LCS	158044											
1,1-Dichloroethylene			50.0			52	ug/kg		104	(70.0 - 144.)	MAP	09/09/99	0748
Benzene			50.0			48	ug/kg		95.9	(74.0 - 133.)			
Chlorobenzene			50.0			46	ug/kg		92.8	(78.0 - 118.)			
Toluene			50.0			46	ug/kg		91.0	(79.0 - 129.)			

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
Trichloroethylene			50.0			49	ug/kg		98.3	(69.0 - 127.)	MAP	09/09/99	0748
*Bromofluorobenzene			50.0			58	ug/kg		117	(73.0 - 129.)			
*Dibromofluoromethane			50.0			49	ug/kg		97.3	(66.0 - 117.)			
*Toluene-d8			50.0			50	ug/kg		100	(73.0 - 122.)			
QC647129	LCS	158072											
1,1-Dichloroethylene			50.0			54	ug/l		108	(70.0 - 144.)	MAP	09/10/99	0715
Benzene			50.0			51	ug/l		102	(74.0 - 133.)			
Chlorobenzene			50.0			48	ug/l		95.9	(78.0 - 118.)			
Toluene			50.0			49	ug/l		97.6	(79.0 - 129.)			
Trichloroethylene			50.0			48	ug/l		96.4	(69.0 - 127.)			
*Bromofluorobenzene			50.0			59	ug/l		119	(73.0 - 129.)			
*Dibromofluoromethane			50.0			45	ug/l		90.1	(66.0 - 117.)			
*Toluene-d8			50.0			50	ug/l		101	(73.0 - 122.)			
QC647289	LCS	158044											
1,1-Dichloroethylene			50.0			54	ug/kg		108	(70.0 - 144.)			
Benzene			50.0			51	ug/kg		102	(74.0 - 133.)			
Chlorobenzene			50.0			48	ug/kg		95.9	(78.0 - 118.)			
Toluene			50.0			49	ug/kg		97.6	(79.0 - 129.)			
Trichloroethylene			50.0			48	ug/kg		96.4	(69.0 - 127.)			
*Bromofluorobenzene			50.0			59	ug/kg		119	(73.0 - 129.)			
*Dibromofluoromethane			50.0			45	ug/kg		90.1	(66.0 - 117.)			
*Toluene-d8			50.0			50	ug/kg		101	(73.0 - 122.)			
QC647661	LCS	158044											
1,1-Dichloroethylene			50.0			57	ug/kg		114	(70.0 - 144.)	MAP	09/10/99	2010
Benzene			50.0			51	ug/kg		101	(74.0 - 133.)			
Chlorobenzene			50.0			49	ug/kg		98.4	(78.0 - 118.)			
Toluene			50.0			51	ug/kg		101	(79.0 - 129.)			
Trichloroethylene			50.0			51	ug/kg		103	(69.0 - 127.)			
*Bromofluorobenzene			50.0			59	ug/kg		118	(73.0 - 129.)			
*Dibromofluoromethane			50.0			48	ug/kg		95.6	(66.0 - 117.)			
*Toluene-d8			50.0			53	ug/kg		106	(73.0 - 122.)			
QC647663	LCS	158072											
1,1-Dichloroethylene			50.0			57	ug/l		114	(70.0 - 144.)			
Benzene			50.0			51	ug/l		101	(74.0 - 133.)			
Chlorobenzene			50.0			49	ug/l		98.4	(78.0 - 118.)			
Toluene			50.0			51	ug/l		101	(79.0 - 129.)			
Trichloroethylene			50.0			51	ug/l		103	(69.0 - 127.)			
*Bromofluorobenzene			50.0			59	ug/l		118	(73.0 - 129.)			
*Dibromofluoromethane			50.0			48	ug/l		95.6	(66.0 - 117.)			
*Toluene-d8			50.0			53	ug/l		106	(73.0 - 122.)			

QC Summary Report

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
QC646989	LCS DUP	158044											
1,1-Dichloroethylene			50.0	54.0		55	ug/kg	3.07	111	(0.00 - 25.0)	MAP	09/10/99	0746
Benzene			50.0	51.0		52	ug/kg	2.05	104	(0.00 - 21.0)			
Chlorobenzene			50.0	48.0		49	ug/kg	2.50	98.4	(0.00 - 15.0)			
Toluene			50.0	49.0		50	ug/kg	3.33	101	(0.00 - 15.0)			
Trichloroethylene			50.0	48.0		50	ug/kg	3.80	100	(0.00 - 18.0)			
*Bromofluorobenzene			50.0			60	ug/kg		120	(73.0 - 129.)			
*Dibromofluoromethane			50.0			45	ug/kg		90.3	(66.0 - 117.)			
*Toluene-d8			50.0			52	ug/kg		104	(73.0 - 122.)			
QC647130	LCS DUP	158072											
1,1-Dichloroethylene			50.0	54.0		58	ug/l	8.15	117	(0.00 - 33.0)	MAP	09/10/99	2040
Benzene			50.0	51.0		52	ug/l	1.89	103	(0.00 - 29.0)			
Chlorobenzene			50.0	48.0		51	ug/l	6.06	102	(0.00 - 15.0)			
Toluene			50.0	49.0		52	ug/l	6.62	104	(0.00 - 21.0)			
Trichloroethylene			50.0	48.0		52	ug/l	7.40	104	(0.00 - 26.0)			
*Bromofluorobenzene			50.0			57	ug/l		114	(73.0 - 129.)			
*Dibromofluoromethane			50.0			47	ug/l		94.2	(66.0 - 117.)			
*Toluene-d8			50.0			53	ug/l		107	(73.0 - 122.)			
QC646987	9909228-44MS	158044											
1,1-Dichloroethylene			50.0	U ND		55	ug/kg		110	(82.0 - 136.)	MAP	09/11/99	0337
Benzene			50.0	U ND		50	ug/kg		99.1	(85.0 - 126.)			
Chlorobenzene			50.0	U ND		46	ug/kg		92.7	(70.0 - 115.)			
Toluene			50.0	4.10		49	ug/kg		89.7	(73.0 - 117.)			
Trichloroethylene			50.0	U ND		50	ug/kg		100	(70.0 - 130.)			
*Bromofluorobenzene			50.0			59	ug/kg		118	(73.0 - 129.)			
*Dibromofluoromethane			50.0			50	ug/kg		99.2	(66.0 - 117.)			
*Toluene-d8			50.0			52	ug/kg		105	(73.0 - 122.)			
QC646988	9909228-44MSD	158044											
1,1-Dichloroethylene			50.0	U ND		56	ug/kg	1.60	112	(0.00 - 30.0)	MAP	09/11/99	0408
Benzene			50.0	U ND		50	ug/kg	1.18	100	(0.00 - 30.0)			
Chlorobenzene			50.0	U ND		47	ug/kg	1.88	94.5	(0.00 - 30.0)			
Toluene			50.0	4.10		50	ug/kg	2.96	92.4	(0.00 - 30.0)			
Trichloroethylene			50.0	U ND		51	ug/kg	1.76	102	(0.00 - 30.0)			
*Bromofluorobenzene			50.0			58	ug/kg		117	(73.0 - 129.)			
*Dibromofluoromethane			50.0			49	ug/kg		99.0	(66.0 - 117.)			
*Toluene-d8			50.0			52	ug/kg		105	(73.0 - 122.)			

* represent a surrogate.

GC/MS SEMIVOLATILE ANALYSIS

CASE NARRATIVE
SNLS
SDG 99228S
Analysis by GC/MS

Sample Analysis:

The following samples were analyzed for semivolatile organic compounds using the analytical protocol from EPA SW-846 Third Edition, Method 8270C, Revision 3, December, 1996:

Laboratory Number	Sample Description
9909228-02	050109-003 B9938-SP1-BH1-9.5-S
9909228-06	050049-003 SOLARDETOX-DF1-BH3-
9909228-09	050050-003 SOLARDETOX-DF1-BH3-
9909228-12	050052-003 SOLARDETOX-DF1-BH2-
9909228-15	050053-003 SOLARDETOX-DF1-BH2-
9909228-18	050055-003 SOLARDETOX-DF1-BH1-
9909228-21	050056-003 SOLARDETOX-DF1-BH1-
9909228-24	050057-003 SOLAR 9981A-SP1-BHI
9909228-27	050058-003 SOLAR 9981A-SP1-BH1
9909228-30	050059-003 SOLAR 9982-DW1-BH1-
9909228-33	050060-003 SOLAR 9982-DW1-BH1
9909228-36	050061-003 SOLAR 9982-DW1-BH1
9909228-39	050062-003 LFR-DF1-BH1-7-S
9909228-42	050063-003 LFR-DF1-BH1-12-S
9909228-45	050064-003 LFR-DF1-BH1-7-MS/MD
9909228-48	050065-003 LFR-DF1-BH2-7-S
9909228-51	050066-003 LFR-DF1-BH2-12-S
9909228-54	050067-003 LFR-DF1-BH3-7-S
9909228-57	050068-003 LFR-DF1-BH3-12-S
QC646867	SBLK01 (Blank)
QC646868	SBLK01LCS (Laboratory Control Sample)
QC646869	SBLK01LCSD (Lab Control Sample Duplicate)
QC646870	050064-003 LFR-DF1-BH1-7-MS/MDMS (Matrix Spike)
QC646871	050064-003 LFR-DF1-BH1-7-MS/MDMSD (Matrix Spike Duplicate)

System Configuration:

The laboratory utilizes a HP 6890 Series gas chromatograph and a HP 5973 Mass Selective Detector. The configuration is equipped with electronic pressure control. All MS interfaces are capillary direct.

Chromatographic Column:

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 mm ID and 0.25 um film except J&WDB-5MS2 which is 20 meters x 0.18 mm ID and 0.18 um film):

J&W:	DB - 5.625 (5%-Phenyl)-methylpolysiloxane (identified by a DB-5.625 designation on quantitation reports and reconstructed ion chromotograms)
J&WDB-5MS	Similar to the J&W DB - 5.625 with low bleed characteristics.
Alltech:	EC-5 (SE-54) 5% Phenyl, 95% Methylpolysiloxane (identified by a EC-5 designation)
HP:	HP-5MS 5% Phenylmethylsiloxane (identified by a HP-5MS designation)
Phenomenex:	ZB-5 5% Phenyl Polysiloxane
J&WDB-5MS2	Similar to the J&W DB - 5.625 with low bleed characteristics.

Instrument Configuration:

The samples reported in this SDG were analyzed on one or more of the following instrument systems (instrument systems are identified by the instrument ID designations listed below which can be found on the raw data or individual form headers):

Instrument ID	System Configuration	Chromatographic Column
MSD2	HP6890/HP5973	ZB-5
MSD4	HP6890/HP5973	ZB-5
MSD5	HP6890/HP5973	ZB-5
MSD7	HP6890/HP5973	ZB-5
MSD8	HP6890/HP5973	J&WDB-5MS2

Sample Preparation:

All samples were prepared in accordance with accepted procedures.

Instrument Calibration:

The instrument was properly calibrated.

Due to the limited capacity of software to list all the current initial calibration files, a calibration history is 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, both independent of each other and together, at GEL show that they not only coelute, but also have similar mass spectra.

Holding Time:

All samples were analyzed within the required holding time.

Surrogates:

Surrogate recoveries in all samples were within the required acceptance limits.

Internal Standards:

Internal Standards in all samples were within the required acceptance limits.

Blanks:

There were no target analytes detected in the method blank above the required acceptance limit.

Spike Analyses:

The matrix spikes were analyzed on the following sample number:

9909228-45 (050064-003 LFR-DF1-BH1-7-MS/MD)

All of the analyte recoveries in the matrix spike and matrix spike duplicate were within the required acceptance limits.

The matrix spike duplicate was not within the required acceptance limit for relative percent difference for the following analyte:

4-nitrophenol.

Laboratory Control Samples:

All analytes in the laboratory control sample and laboratory control sample duplicate were within the required acceptance limits.

All analytes in the laboratory control sample duplicate were within the required acceptance limits for relative percent difference.

Dilutions:

None of the samples were diluted.

Nonconformance Reports:

There were no Nonconformance Reports associated with this SDG.

Manual Integrations:

No manual integrations were performed on the standards in the initial calibration or continuing calibration associated with this SDG.
No manual integrations were performed on samples, blanks or quality control samples associated with this SDG.

The preceding narrative has been reviewed by: [signature] Date: [illegible]

CASE NARRATIVE
SNLS
SDG 99228W
Analysis by GC/MS

Sample Analysis:

The following samples were analyzed for semivolatile organic compounds using the analytical protocol from EPA SW-846 Third Edition, Method 8270C, Revision 3, December, 1996:

Laboratory Number	Sample Description
9909228-62	050069-008 LFR-DF1-BH3-SVOC
QC647134	SBLK01 (Blank)
QC647135	SBLK01LCS (Laboratory Control Sample)
QC647136	SBLK01LCSD (Lab Control Sample Duplicate)

System Configuration:

The laboratory utilizes a HP 6890 Series gas chromatograph and a HP 5973 Mass Selective Detector. The configuration is equipped with electronic pressure control. All MS interfaces are capillary direct.

Chromatographic Column:

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 mm ID and 0.25 um film except J&WDB-5MS2 which is 20 meters x 0.18 mm ID and 0.18 um film):

J&W:	DB - 5.625 (5%-Phenyl)-methylpolysiloxane (identified by a DB-5.625 designation on quantitation reports and reconstructed ion chromotograms)
J&WDB-5MS	Similar to the J&W DB - 5.625 with low bleed characteristics.
Alltech:	EC-5 (SE-54) 5% Phenyl, 95% Methylpolysiloxane (identified by a EC-5 designation)
HP:	HP-5MS 5% Phenylmethylsiloxane (identified by a HP-5MS designation)
Phenomenex:	ZB-5 5% Phenyl Polysiloxane
J&WDB-5MS2	Similar to the J&W DB - 5.625 with low bleed characteristics.

Instrument Configuration:

The samples reported in this SDG were analyzed on one or more of the following instrument systems (instrument systems are identified by the instrument ID designations listed below which can be found on the raw data or individual form headers):

Instrument ID	System Configuration	Chromatographic Column
MSD2	HP6890/HP5973	ZB-5
MSD4	HP6890/HP5973	ZB-5
MSD5	HP6890/HP5973	ZB-5
MSD7	HP6890/HP5973	ZB-5
MSD8	HP6890/HP5973	J&WDB-5MS2

Sample Preparation:

All samples were prepared in accordance with accepted procedures.

Instrument Calibration:

The instrument was properly calibrated.

Due to the limited capacity of software to list all the current initial calibration files, a calibration history is 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, both independent of each other and together, at GEL show that they not only coelute, but also have similar mass spectra.

Holding Time:

All samples were analyzed within the required holding time..

Surrogates:

Surrogate recoveries were within the required acceptance limits.

Internal Standards:

Internal Standards in all samples were within the required acceptance limits.

Blanks:

There were no target analytes detected in the method blank above the required acceptance limit.

Spike Analyses:

The matrix spikes were analyzed on a sample of similar matrix not in this SDG.

The matrix spike was not within the required acceptance limits for the following analytes:

> 2-chlorophenol; 1,4-dichlorobenzene; N-nitroso-di-n-propylamine; 1,2,4-trichlorobenzene; 4-chloro-3-methylphenol; acenaphthene and pentachlorophenol.

The matrix spike duplicate was not within the required acceptance limits for the following analytes:

> 2-chlorophenol; 1,4-dichlorobenzene and pentachlorophenol.

All analytes in the matrix spike duplicate were within the required acceptance limits for relative percent difference.

Laboratory Control Samples:

All analytes in the laboratory control sample and laboratory control sample duplicate were within the required acceptance limits.

All analytes in the laboratory control sample duplicate were within the required acceptance limits for relative percent difference.

Dilutions:

None of the samples were diluted.

Nonconformance Reports:

There were no nonconformance reports associated with this SDG.

Manual Integrations:

No manual integrations were performed on the standards in the initial calibration or continuing calibration associated with this SDG.

No manual integrations were performed on samples, blanks or quality control samples associated with this SDG.

QC Summary Report

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
Extractable Organics													
QC646867	BLANK	158016											
1,2,4-Trichlorobenzene					U	ND	ug/kg				GWL	09/28/99	1554
1,4-Dichlorobenzene					U	ND	ug/kg						
2,4-Dinitrotoluene					U	ND	ug/kg						
2-Chlorophenol					U	ND	ug/kg						
4-Nitrophenol					U	ND	ug/kg						
4-chloro-3-methyl phenol					U	ND	ug/kg						
Acenaphthene					U	ND	ug/kg						
N-Nitrosodipropylamine					U	ND	ug/kg						
Pentachlorophenol					U	ND	ug/kg						
Phenol					U	ND	ug/kg						
Pyrene					U	ND	ug/kg						
*2,4,6-Tribromophenol			3330			1900	ug/kg		56.1	(44.5 - 126.)			
*2-Fluorobiphenyl			1670			1100	ug/kg		65.3	(44.7 - 110.)			
*2-Fluorophenol			3330			2400	ug/kg		71.6	(37.0 - 102.)			
*Nitrobenzene-d5			1670			1000	ug/kg		61.7	(42.4 - 107.)			
*Phenol-d6			3330			2300	ug/kg		68.2	(41.5 - 102.)			
*p-Terphenyl-d14			1670			1500	ug/kg		87.0	(45.5 - 104.)			
1,2-Dichlorobenzene					U	ND	ug/kg						
1,2-Diphenylhydrazine					U	ND	ug/kg						
1,3-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						
2,6-Dinitrotoluene					U	ND	ug/kg						
2-Chloronaphthalene					U	ND	ug/kg						
2-Methylnaphthalene					U	ND	ug/kg						
2-Nitrophenol					U	ND	ug/kg						
2-methyl-4,6-dinitrophenol					U	ND	ug/kg						
3,3'-Dichlorobenzidine					U	ND	ug/kg						
4-Bromophenyl phenyl ether					U	ND	ug/kg						
4-Chloroaniline					U	ND	ug/kg						
4-Chlorophenyl phenyl ether					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						

QC Summary Report

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
Benzo(b)fluoranthene					U	ND	ug/kg				GWL	09/28/99	1554
Benzo(ghi)perylene					U	ND	ug/kg						
Benzo(k)fluoranthene					U	ND	ug/kg						
Butyl benzyl phthalate					U	ND	ug/kg						
Carbazole					U	ND	ug/kg						
Chrysene					U	ND	ug/kg						
Di-n-butyl phthalate					U	ND	ug/kg						
Di-n-octyl phthalate					U	ND	ug/kg						
Dibenzo(a,h)anthracene					U	ND	ug/kg						
Dibenzofuran					U	ND	ug/kg						
Diethyl phthalate					U	ND	ug/kg						
Dimethyl phthalate					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-c,d)pyrene					U	ND	ug/kg						
Isophorone					U	ND	ug/kg						
N-Nitrosodiphenylamine					U	ND	ug/kg						
Naphthalene					U	ND	ug/kg						
Nitrobenzene					U	ND	ug/kg						
Phenanthrene					U	ND	ug/kg						
bis(2-Chloroethoxy)methane					U	ND	ug/kg						
bis(2-Chloroethyl) ether					U	ND	ug/kg						
bis(2-Chloroisopropyl)ether					U	ND	ug/kg						
bis(2-Ethylhexyl)phthalate					U	ND	ug/kg						
m,p-Cresol					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						
QC647134	BLANK	158075											
1,2,4-Trichlorobenzene					U	ND	ug/l				EH1	09/17/99	1740
1,4-Dichlorobenzene					U	ND	ug/l						
2,4-Dinitrotoluene					U	ND	ug/l						
2-Chlorophenol					U	ND	ug/l						
4-Nitrophenol					U	ND	ug/l						
4-chloro-3-methyl phenol					U	ND	ug/l						

QC Summary Report

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
Acenaphthene					U	ND	ug/l				EHI	09/17/99	1740
N-Nitrosodipropylamine					U	ND	ug/l						
Pentachlorophenol					U	ND	ug/l						
Phenol					U	ND	ug/l						
Pyrene					U	ND	ug/l						
*2,4,6-Tribromophenol			100			54	ug/l		53.8	(41.0 - 122.)			
*2-Fluorobiphenyl			50.0			35	ug/l		70.2	(41.2 - 107.)			
*2-Fluorophenol			100			42	ug/l		42.0	(23.6 - 75.9)			
*Nitrobenzene-d5			50.0			35	ug/l		70.8	(35.3 - 108.)			
*Phenol-d6			100			25	ug/l		25.1	(10.9 - 54.6)			
*p-Terphenyl-d14			50.0			47	ug/l		93.8	(36.6 - 110.)			
1,2-Dichlorobenzene					U	ND	ug/l						
1,2-Diphenylhydrazine					U	ND	ug/l						
1,3-Dichlorobenzene					U	ND	ug/l						
2,4,5-Trichlorophenol					U	ND	ug/l						
2,4,6-Trichlorophenol					U	ND	ug/l						
2,4-Dichlorophenol					U	ND	ug/l						
2,4-Dimethylphenol					U	ND	ug/l						
2,4-Dinitrophenol					U	ND	ug/l						
2,6-Dinitrotoluene					U	ND	ug/l						
2-Chloronaphthalene					U	ND	ug/l						
2-Methylnaphthalene					U	ND	ug/l						
2-Nitrophenol					U	ND	ug/l						
2-methyl-4,6-dinitrophenol					U	ND	ug/l						
3,3'-Dichlorobenzidine					U	ND	ug/l						
4-Bromophenyl phenyl ether					U	ND	ug/l						
4-Chloroaniline					U	ND	ug/l						
4-Chlorophenyl phenyl ether					U	ND	ug/l						
Acenaphthylene					U	ND	ug/l						
Anthracene					U	ND	ug/l						
Benzo(a)anthracene					U	ND	ug/l						
Benzo(a)pyrene					U	ND	ug/l						
Benzo(b)fluoranthene					U	ND	ug/l						
Benzo(ghi)perylene					U	ND	ug/l						
Benzo(k)fluoranthene					U	ND	ug/l						
Butyl benzyl phthalate					U	ND	ug/l						
Carbazole					U	ND	ug/l						
Chrysene					U	ND	ug/l						
Di-n-butyl phthalate					U	ND	ug/l						
Di-n-octyl phthalate					U	ND	ug/l						

QC Summary Report

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
Dibenzo(a,h)anthracene					U	ND	ug/l				EH1	09/17/99	1740
Dibenzofuran					U	ND	ug/l						
Diethyl phthalate					U	ND	ug/l						
Dimethyl phthalate					U	ND	ug/l						
Fluoranthene					U	ND	ug/l						
Fluorene					U	ND	ug/l						
Hexachlorobenzene					U	ND	ug/l						
Hexachlorobutadiene					U	ND	ug/l						
Hexachlorocyclopentadiene					U	ND	ug/l						
Hexachloroethane					U	ND	ug/l						
Indeno(1,2,3-c,d)pyrene					U	ND	ug/l						
Isophorone					U	ND	ug/l						
N-Nitrosodiphenylamine					U	ND	ug/l						
Naphthalene					U	ND	ug/l						
Nitrobenzene					U	ND	ug/l						
Phenanthrene					U	ND	ug/l						
bis(2-Chloroethoxy)methane					U	ND	ug/l						
bis(2-Chloroethyl) ether					U	ND	ug/l						
bis(2-Chloroisopropyl)ether					U	ND	ug/l						
bis(2-Ethylhexyl)phthalate					U	ND	ug/l						
m,p-Cresol					U	ND	ug/l						
m-Nitroaniline					U	ND	ug/l						
o-Cresol					U	ND	ug/l						
o-Nitroaniline					U	ND	ug/l						
p-Nitroaniline					U	ND	ug/l						
QC650713	BLANK	158075											
1,2,4-Trichlorobenzene					U	ND	ug/l				JPA	09/23/99	1403
1,4-Dichlorobenzene					U	ND	ug/l						
2,4-Dinitrotoluene					U	ND	ug/l						
2-Chlorophenol					U	ND	ug/l						
4-Nitrophenol					U	ND	ug/l						
4-chloro-3-methyl phenol					U	ND	ug/l						
Acenaphthene					U	ND	ug/l						
N-Nitrosodipropylamine					U	ND	ug/l						
Pentachlorophenol					U	ND	ug/l						
Phenol					U	ND	ug/l						
Pyrene					U	ND	ug/l						
*2,4,6-Tribromophenol			100			54	ug/l		54.3	(41.0 - 122.)			
*2-Fluorobiphenyl			50.0			29	ug/l		58.3	(41.2 - 107.)			
*2-Fluorophenol			100			35	ug/l		35.4	(23.6 - 75.9)			

QC Summary Report

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cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
*Nitrobenzene-d5			50.0			27	ug/l		54.5	(35.3 - 108.)	JPA	09/23/99	1403
*Phenol-d6			100			21	ug/l		21.4	(10.9 - 54.6)			
*p-Terphenyl-d14			50.0			40	ug/l		80.0	(36.6 - 110.)			
1,2-Dichlorobenzene					U	ND	ug/l						
1,2-Diphenylhydrazine					U	ND	ug/l						
1,3-Dichlorobenzene					U	ND	ug/l						
2,4,5-Trichlorophenol					U	ND	ug/l						
2,4,6-Trichlorophenol					U	ND	ug/l						
2,4-Dichlorophenol					U	ND	ug/l						
2,4-Dimethylphenol					U	ND	ug/l						
2,4-Dinitrophenol					U	ND	ug/l						
2,6-Dinitrotoluene					U	ND	ug/l						
2-Chloronaphthalene					U	ND	ug/l						
2-Methylnaphthalene					U	ND	ug/l						
2-Nitrophenol					U	ND	ug/l						
2-methyl-4,6-dinitrophenol					U	ND	ug/l						
3,3'-Dichlorobenzidine					U	ND	ug/l						
4-Bromophenyl phenyl ether					U	ND	ug/l						
4-Chloroaniline					U	ND	ug/l						
4-Chlorophenyl phenyl ether					U	ND	ug/l						
Acenaphthylene					U	ND	ug/l						
Anthracene					U	ND	ug/l						
Benzo(a)anthracene					U	ND	ug/l						
Benzo(a)pyrene					U	ND	ug/l						
Benzo(b)fluoranthene					U	ND	ug/l						
Benzo(ghi)perylene					U	ND	ug/l						
Benzo(k)fluoranthene					U	ND	ug/l						
Butyl benzyl phthalate					U	ND	ug/l						
Carbazole					U	ND	ug/l						
Chrysene					U	ND	ug/l						
Di-n-butyl phthalate					U	ND	ug/l						
Di-n-octyl phthalate					U	ND	ug/l						
Dibenzo(a,h)anthracene					U	ND	ug/l						
Dibenzofuran					U	ND	ug/l						
Diethyl phthalate					U	ND	ug/l						
Dimethyl phthalate					U	ND	ug/l						
Fluoranthene					U	ND	ug/l						
Fluorene					U	ND	ug/l						
Hexachlorobenzene					U	ND	ug/l						
Hexachlorobutadiene					U	ND	ug/l						

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cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
Hexachlorocyclopentadiene					U	ND	ug/l				JPA	09/23/99	1403
Hexachloroethane					U	ND	ug/l						
Indeno(1,2,3-c,d)pyrene					U	ND	ug/l						
Isophorone					U	ND	ug/l						
N-Nitrosodiphenylamine					U	ND	ug/l						
Naphthalene					U	ND	ug/l						
Nitrobenzene					U	ND	ug/l						
Phenanthrene					U	ND	ug/l						
bis(2-Chloroethoxy)methane					U	ND	ug/l						
bis(2-Chloroethyl) ether					U	ND	ug/l						
bis(2-Chloroisopropyl)ether					U	ND	ug/l						
bis(2-Ethylhexyl)phthalate					U	ND	ug/l						
m,p-Cresol					U	ND	ug/l						
m-Nitroaniline					U	ND	ug/l						
o-Cresol					U	ND	ug/l						
o-Nitroaniline					U	ND	ug/l						
p-Nitroaniline					U	ND	ug/l						
QC646868	LCS	158016											
1,2,4-Trichlorobenzene			1670			1100	ug/kg		66.4	(38.2 - 110.)	GWL	09/28/99	1627
1,4-Dichlorobenzene			1670			1100	ug/kg		63.6	(41.8 - 103.)			
2,4-Dinitrotoluene			1670			1300	ug/kg		78.1	(56.5 - 119.)			
2-Chlorophenol			3330			2100	ug/kg		62.6	(45.5 - 95.2)			
4-Nitrophenol			3330			2500	ug/kg		75.7	(30.4 - 136.)			
4-chloro-3-methyl phenol			3330			2300	ug/kg		68.0	(57.5 - 101.)			
Acenaphthene			1670			1100	ug/kg		67.5	(48.2 - 108.)			
N-Nitrosodipropylamine			1670			1100	ug/kg		65.0	(14.9 - 116.)			
Pentachlorophenol			3330			2400	ug/kg		70.9	(45.4 - 103.)			
Phenol			3330			1800	ug/kg		54.6	(36.2 - 99.7)			
Pyrene			1670			1400	ug/kg		86.4	(50.7 - 110.)			
*2,4,6-Tribromophenol			3330			2400	ug/kg		71.1	(44.5 - 126.)			
*2-Fluorobiphenyl			1670			1100	ug/kg		66.4	(44.7 - 110.)			
*2-Fluorophenol			3330			2300	ug/kg		69.3	(37.0 - 102.)			
*Nitrobenzene-d5			1670			1100	ug/kg		65.2	(42.4 - 107.)			
*Phenol-d6			3330			2300	ug/kg		67.9	(41.5 - 102.)			
*p-Terphenyl-d14			1670			1400	ug/kg		85.8	(45.5 - 104.)			
QC647135	LCS	158075											
1,2,4-Trichlorobenzene			50.0			34	ug/l		67.6	(45.7 - 97.7)	EH1	09/17/99	1812
1,4-Dichlorobenzene			50.0			33	ug/l		66.0	(34.6 - 96.9)			
2,4-Dinitrotoluene			50.0			44	ug/l		89.0	(58.5 - 111.)			
2-Chlorophenol			100			59	ug/l		59.0	(36.9 - 94.1)			

QC Summary Report

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Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
4-Nitrophenol			100			33	ug/l		33.4	(10.0 - 55.6)	EH1	09/17/99	1812
4-chloro-3-methyl phenol			100			68	ug/l		68.4	(17.3 - 126.)			
Acenaphthene			50.0			40	ug/l		80.6	(53.0 - 100.)			
N-Nitrosodipropylamine			50.0			33	ug/l		65.5	(52.1 - 104.)			
Pentachlorophenol			100			56	ug/l		56.4	(49.8 - 120.)			
Phenol			100			23	ug/l		23.4	(10.0 - 70.1)			
Pyrene			50.0			51	ug/l		102	(45.4 - 109.)			
*2,4,6-Tribromophenol			100			72	ug/l		72.1	(41.0 - 122.)			
*2-Fluorobiphenyl			50.0			34	ug/l		68.3	(41.2 - 107.)			
*2-Fluorophenol			100			38	ug/l		37.7	(23.6 - 75.9)			
*Nitrobenzene-d5			50.0			34	ug/l		67.3	(35.3 - 108.)			
*Phenol-d6			100			24	ug/l		23.6	(10.9 - 54.6)			
*p-Terphenyl-d14			50.0			42	ug/l		84.7	(36.6 - 110.)			
QC650714	LCS	158075											
1,2,4-Trichlorobenzene			50.0			31	ug/l		62.3	(45.7 - 97.7)	JPA	09/23/99	1430
1,4-Dichlorobenzene			50.0			29	ug/l		58.5	(34.6 - 96.9)			
2,4-Dinitrotoluene			50.0			34	ug/l		68.0	(58.5 - 111.)			
2-Chlorophenol			100			56	ug/l		56.3	(36.9 - 94.1)			
4-Nitrophenol			100			31	ug/l		30.8	(10.0 - 55.6)			
4-chloro-3-methyl phenol			100			63	ug/l		62.6	(17.3 - 126.)			
Acenaphthene			50.0			32	ug/l		64.5	(53.0 - 100.)			
N-Nitrosodipropylamine			50.0			32	ug/l		64.1	(52.1 - 104.)			
Pentachlorophenol			100			58	ug/l		58.4	(49.8 - 120.)			
Phenol			100			23	ug/l		23.2	(10.0 - 70.1)			
Pyrene			50.0			39	ug/l		78.9	(45.4 - 109.)			
*2,4,6-Tribromophenol			100			79	ug/l		78.6	(41.0 - 122.)			
*2-Fluorobiphenyl			50.0			33	ug/l		65.3	(41.2 - 107.)			
*2-Fluorophenol			100			39	ug/l		39.1	(23.6 - 75.9)			
*Nitrobenzene-d5			50.0			31	ug/l		62.2	(35.3 - 108.)			
*Phenol-d6			100			24	ug/l		24.4	(10.9 - 54.6)			
*p-Terphenyl-d14			50.0			39	ug/l		77.3	(36.6 - 110.)			
QC646869	LCS DUP	158016											
1,2,4-Trichlorobenzene			1670	1100		1000	ug/kg	6.43	62.2	(0.00 - 30.0)	GWL	09/28/99	1659
1,4-Dichlorobenzene			1570	1100		990	ug/kg	7.49	59.0	(0.00 - 30.0)			
2,4-Dinitrotoluene			1670	1300		1200	ug/kg	4.60	74.6	(0.00 - 30.0)			
2-Chlorophenol			3330	2100		1900	ug/kg	7.44	58.2	(0.00 - 30.0)			
4-Nitrophenol			3330	2500		2300	ug/kg	11.1	67.7	(0.00 - 30.0)			
4-chloro-3-methyl phenol			3330	2300		2200	ug/kg	5.01	64.7	(0.00 - 30.0)			
Acenaphthene			1670	1100		1100	ug/kg	3.87	65.0	(0.00 - 30.0)			
N-Nitrosodipropylamine			1670	1100		1000	ug/kg	5.02	61.8	(0.00 - 30.0)			

QC Summary Report

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cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
Pentachlorophenol			3330		2400		2400	ug/kg	0.181	71.1	(0.00 - 30.0)	GWL	09/28/99	1659
Phenol			3330		1800		1800	ug/kg	0.231	54.7	(0.00 - 30.0)			
Pyrene			1670		1400		1400	ug/kg	2.33	84.4	(0.00 - 30.0)			
*2,4,6-Tribromophenol			3330				2300	ug/kg		68.7	(44.5 - 126.)			
*2-Fluorobiphenyl			1670				1100	ug/kg		63.6	(44.7 - 110.)			
*2-Fluorophenol			3330				2100	ug/kg		64.5	(37.0 - 102.)			
*Nitrobenzene-d5			1670				1000	ug/kg		61.2	(42.4 - 107.)			
*Phenol-d6			3330				2100	ug/kg		63.0	(41.5 - 102.)			
*p-Terphenyl-d14			1670				1400	ug/kg		83.7	(45.5 - 104.)			
QC647136	LCS DUP	158075												
1,2,4-Trichlorobenzene			50.0		34.0		32	ug/l	4.20	64.8	(0.00 - 30.0)	EH1	09/17/99	1844
1,4-Dichlorobenzene			50.0		33.0		32	ug/l	4.59	63.0	(0.00 - 30.0)			
2,4-Dinitrotoluene			50.0		44.0		47	ug/l	4.97	93.5	(0.00 - 30.0)			
2-Chlorophenol			100		59.0		57	ug/l	3.31	57.1	(0.00 - 30.0)			
4-Nitrophenol			100		33.0		36	ug/l	7.65	36.1	(0.00 - 30.0)			
4-chloro-3-methyl phenol			100		68.0		68	ug/l	0.480	68.1	(0.00 - 30.0)			
Acenaphthene			50.0		40.0		39	ug/l	3.69	77.7	(0.00 - 30.0)			
N-Nitrosodipropylamine			50.0		33.0		31	ug/l	4.28	62.7	(0.00 - 30.0)			
Pentachlorophenol			100		56.0		59	ug/l	4.06	58.7	(0.00 - 30.0)			
Phenol			100		23.0		24	ug/l	0.979	23.7	(0.00 - 30.0)			
Pyrene			50.0		51.0		49	ug/l	3.96	98.0	(0.00 - 30.0)			
*2,4,6-Tribromophenol			100				75	ug/l		74.5	(41.0 - 122.)			
*2-Fluorobiphenyl			50.0				32	ug/l		64.6	(41.2 - 107.)			
*2-Fluorophenol			100				37	ug/l		37.1	(23.6 - 75.9)			
*Nitrobenzene-d5			50.0				31	ug/l		61.9	(35.3 - 108.)			
*Phenol-d6			100				23	ug/l		23.1	(10.9 - 54.6)			
*p-Terphenyl-d14			50.0				40	ug/l		80.7	(36.6 - 110.)			
QC646870	9909228-45MS	158016												
1,2,4-Trichlorobenzene			1670	U	ND		1100	ug/kg		64.1	(46.3 - 102.)	GWL	09/28/99	1731
1,4-Dichlorobenzene			1670	U	ND		1000	ug/kg		59.7	(39.0 - 101.)			
2,4-Dinitrotoluene			1670	U	ND		1100	ug/kg		64.0	(41.0 - 111.)			
2-Chlorophenol			3330	U	ND		2100	ug/kg		62.2	(50.1 - 99.8)			
4-Nitrophenol			3330	U	ND		2300	ug/kg		69.0	(42.6 - 119.)			
4-chloro-3-methyl phenol			3330	U	ND		2100	ug/kg		63.1	(50.5 - 110.)			
Acenaphthene			1670	U	ND		1000	ug/kg		62.7	(54.9 - 105.)			
N-Nitrosodipropylamine			1670	U	ND		1100	ug/kg		67.2	(46.7 - 117.)			
Pentachlorophenol			3330	U	ND		2500	ug/kg		74.5	(49.1 - 123.)			
Phenol			3330	U	ND		1900	ug/kg		57.4	(55.3 - 92.4)			
Pyrene			1670	U	ND		1300	ug/kg		79.6	(57.2 - 123.)			
*2,4,6-Tribromophenol			3330				2300	ug/kg		69.2	(44.5 - 126.)			

QC Summary Report

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cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD %	REC%	Range	Analyst	Date	Time
*2-Fluorobiphenyl			1670			1100	ug/kg		67.2	(44.7 - 110.)	GWL	09/28/99	1731
*2-Fluorophenol			3330			2400	ug/kg		71.0	(37.0 - 102.)			
*Nitrobenzene-d5			1670			1100	ug/kg		63.9	(42.4 - 107.)			
*Phenol-d6			3330			2300	ug/kg		68.3	(41.5 - 102.)			
*p-Terphenyl-d14			1670			1400	ug/kg		85.1	(45.5 - 104.)			
QC646871	9909228-45MSD	158016											
1,2,4-Trichlorobenzene			1670	U ND		1000	ug/kg	2.79	62.3	(0.00 - 18.9)	GWL	09/28/99	1803
1,4-Dichlorobenzene			1670	U ND		950	ug/kg	5.05	56.7	(0.00 - 19.5)			
2,4-Dinitrotoluene			1670	U ND		1100	ug/kg	0.0380	64.0	(0.00 - 21.6)			
2-Chlorophenol			3330	U ND		2000	ug/kg	4.40	59.5	(0.00 - 19.7)			
4-Nitrophenol			3330	U ND		3300	ug/kg	35.4**	98.7	(0.00 - 23.3)			
4-chloro-3-methyl phenol			3330	U ND		2100	ug/kg	0.666	63.6	(0.00 - 21.7)			
Acenaphthene			1670	U ND		1100	ug/kg	0.786	63.2	(0.00 - 18.9)			
N-Nitrosodipropylamine			1670	U ND		1100	ug/kg	3.26	65.0	(0.00 - 20.4)			
Pentachlorophenol			3330	U ND		2500	ug/kg	2.45	76.4	(0.00 - 24.1)			
Phenol			3330	U ND		1800	ug/kg	5.13	54.5	(0.00 - 19.4)			
Pyrene			1670	U ND		1300	ug/kg	0.189	79.8	(0.00 - 21.4)			
*2,4,6-Tribromophenol			3330			2300	ug/kg		68.5	(44.5 - 126.)			
*2-Fluorobiphenyl			1670			1100	ug/kg		66.3	(44.7 - 110.)			
*2-Fluorophenol			3330			2200	ug/kg		67.3	(37.0 - 102.)			
*Nitrobenzene-d5			1670			1000	ug/kg		60.6	(42.4 - 107.)			
*Phenol-d6			3330			2200	ug/kg		65.5	(41.5 - 102.)			
*p-Terphenyl-d14			1670			1400	ug/kg		85.6	(45.5 - 104.)			
QC646831	BLANK	158012											
2,4,6-Trinitrotoluene					U	ND	ug/kg				JLW	09/21/99	1420
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						
sym-Trinitrobenzene					U	ND	ug/kg						
*1,2-Dinitrobenzene			400			390	ug/kg		96.8	(71.6 - 108.)			
QC646836	BLANK	158013											

HPLC
ANALYSIS

CASE NARRATIVE FOR
SNLS
SDG 99228S
Analysis by HPLC

Sample Analysis:

The following samples were analyzed for nitroaromatic and nitramine organic compounds using the analytical protocol from EPA SW-846 Third Edition, Method 8330, Revision 0, September 1994.

Laboratory Number	Sample Description
9909228-02	050109-003 B9938-SP1-BH1-9.5-S
9909228-06	050049-003 SOLARDETOX-DF1-BH3-
9909228-09	050050-003 SOLARDETOX-DF1-BH3-
9909228-12	050052-003 SOLARDETOX-DF1-BH2-
9909228-15	050053-003 SOLARDETOX-DF1-BH2-
9909228-18	050055-003 SOLARDETOX-DF1-BH1-
9909228-21	050056-003 SOLARDETOX-DF1-BH1-
9909228-24	050057-003 SOLAR 9981A-SP1-BHI
9909228-27	050058-003 SOLAR 9981A-SP1-BH1
9909228-30	050059-003 SOLAR 9982-DW1-BH1-
9909228-33	050060-003 SOLAR 9982-DW1-BH1
9909228-36	050061-003 SOLAR 9982-DW1-BH1
9909228-39	050062-003 LFR-DF1-BH1-7-S
9909228-42	050063-003 LFR-DF1-BH1-12-S
9909228-45	050064-003 LFR-DF1-BH1-7-MS/MD
9909228-48	050065-003 LFR-DF1-BH2-7-S
9909228-51	050066-003 LFR-DF1-BH2-12-S
9909228-54	050067-003 LFR-DF1-BH3-7-S
9909228-57	050068-003 LFR-DF1-BH3-12-S
QC646831	XBLK01 (Blank)
QC646832	XBLK01LCS (Laboratory Control Sample)
QC646833	XBLK01LCSD (Lab Control Sample Duplicate)
QC646834	050064-003 LFR-DF1-BH1-7-MS/MDMS (Matrix Spike)
QC646835	050064-003 LFR-DF1-BH1-7-MS/MDMSD (Matrix Spike Duplicate)

System Configuration:

The laboratory utilizes a high performance liquid chromatography (HPLC) instrument configuration for explosives analyses. The chromatographic hardware system consists of an HP Model 1050 HPLC 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 is coupled to an HP Model G1306A Diode Array UV detector which monitors absorbence 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.

Chromatographic Column:

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

RP: Hypersil BDS-C18, 250 mm x 4mm 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.

Sample Preparation:

All samples were prepared in accordance with accepted procedures.

Instrument Calibration:

The instrument was properly calibrated.

Due to the limited capacity of software to list all the current initial calibration files, a calibration history is inserted in the package prior to the appropriate Form 6.

Holding Time:

All samples were analyzed within the required holding time.

Surrogates:

Surrogate recoveries in all samples were within the required acceptance limits.

Blanks:

No target analytes were detected in the method blank above the required acceptance limit.

Spike Analyses:

The matrix spikes were analyzed on the following sample number:

9909228-45 (050064-003 LFR-DF1-BH1-7-MS/MD)

All of the analyte recoveries in the matrix spike were within the required acceptance limits.

All analytes in the matrix spike duplicate were within the required acceptance limits for relative percent difference.

Laboratory Control Samples:

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

All analytes in the laboratory control sample duplicate were within the required acceptance limits for relative percent difference.

Dilutions:

None of the samples were diluted.

Nonconformance Reports:

There were no nonconformance reports associated with this SDG.

Manual Integrations:

No manual integrations were performed on the standards in the initial calibration or continuing calibration associated with this SDG.

No manual integrations were performed on samples, blanks or quality control samples associated with this SDG.

General Comments:

The FORM 8 uses the retention time of the surrogate as a measure of how close the retention times of the samples and QC are to a standard component. The Instrument Blank does not contain the surrogate.

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

The preceding narrative has been reviewed by: [illegible] Date: [illegible]

CASE NARRATIVE FOR
SNLS
SDG 99228W
Analysis by HPLC

Sample Analysis:

The following samples were analyzed for nitroaromatic and nitramine organic compounds using the analytical protocol from EPA SW-846 Third Edition, Method 8330, Revision 0, September 1994.

Laboratory Number	Sample Description
9909228-63	050069-009 LFR-DF1-BH3-HE
QC646836	XBLK01 (Blank)
QC646837	XBLK01LCS (Laboratory Control Sample)
QC646838	XBLK01LCSD (Lab Control Sample Duplicate)
QC646839	050069-009 LFR-DF1-BH3-HEMS (Matrix Spike)
QC646840	050069-009 LFR-DF1-BH3-HEMSD (Matrix Spike Duplicate)

System Configuration:

The laboratory utilizes a high performance liquid chromatography (HPLC) instrument configuration for explosives analyses. The chromatographic hardware system consists of an HP Model 1050 HPLC 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 is coupled to an HP Model G1306A Diode Array UV detector which monitors absorbence 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.

Chromatographic Column:

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

HP: Hypersil BDS-C18, 250 mm x 4mm 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.

Sample Preparation:

All samples were prepared in accordance with accepted procedures.

Instrument Calibration:

The instrument was properly calibrated.

Due to the limited capacity of software to list all the current initial calibration files, a calibration history is inserted in the package prior to the appropriate Form 6.

Holding Time:

All samples were analyzed within the required holding time.

Surrogates:

Surrogate recoveries in all samples were within the required acceptance limits.

Blanks:

No target analytes were detected in the method blank above the required acceptance limit.

Spike Analyses:

The matrix spikes were analyzed on the following sample number:

9909228-63 (050069-009 LFR-DF1-BH3-HE)

All of the analyte recoveries in the matrix spike and matrix spike duplicate were within the required acceptance limits.

All analytes in the matrix spike duplicate were within the required acceptance limits for relative percent difference.

Laboratory Control Samples:

All analytes in the laboratory control sample and laboratory control sample duplicate were within the required acceptance limits.

All analytes in the laboratory control sample duplicate were within the required acceptance limits for relative percent difference.

Dilutions:

None of the samples were diluted.

Nonconformance Reports:

There were no nonconformance reports associated with this SDG.

Manual Integrations:

No manual integrations were performed on the standards in the initial calibration or continuing calibration associated with this SDG.

No manual integrations were performed on samples, blanks or quality control samples associated with this SDG.

General Comments:

The FORM 8 uses the retention time of the surrogate as a measure of how close the retention times of the samples and QC are to a standard component. The Instrument Blank does not contain the surrogate.

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

The preceding narrative has been reviewed by: [signature] Date: 10/11/99

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample		Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
*2-Fluorobiphenyl			1670				1100	ug/kg		67.2	(44.7 - 110.)	GWL	09/28/99	1731
*2-Fluorophenol			3330				2400	ug/kg		71.0	(37.0 - 102.)			
*Nitrobenzene-d5			1670				1100	ug/kg		63.9	(42.4 - 107.)			
*Phenol-d6			3330				2300	ug/kg		68.3	(41.5 - 102.)			
*p-Terphenyl-d14			1670				1400	ug/kg		85.1	(45.5 - 104.)			
QC646871	9909228-45MSD	158016												
1,2,4-Trichlorobenzene			1670	U	ND		1000	ug/kg	2.79	62.3	(0.00 - 18.9)	GWL	09/28/99	1803
1,4-Dichlorobenzene			1670	U	ND		950	ug/kg	5.05	56.7	(0.00 - 19.5)			
2,4-Dinitrotoluene			1670	U	ND		1100	ug/kg	0.0380	64.0	(0.00 - 21.6)			
2-Chlorophenol			3330	U	ND		2000	ug/kg	4.40	59.5	(0.00 - 19.7)			
4-Nitrophenol			3330	U	ND		3300	ug/kg	35.4**	98.7	(0.00 - 23.3)			
4-chloro-3-methyl phenol			3330	U	ND		2100	ug/kg	0.666	63.6	(0.00 - 21.7)			
Acenaphthene			1670	U	ND		1100	ug/kg	0.786	63.2	(0.00 - 18.9)			
N-Nitrosodipropylamine			1670	U	ND		1100	ug/kg	3.26	65.0	(0.00 - 20.4)			
Pentachlorophenol			3330	U	ND		2500	ug/kg	2.45	76.4	(0.00 - 24.1)			
Phenol			3330	U	ND		1800	ug/kg	5.13	54.5	(0.00 - 19.4)			
Pyrene			1670	U	ND		1300	ug/kg	0.189	79.8	(0.00 - 21.4)			
*2,4,6-Tribromophenol			3330				2300	ug/kg		68.5	(44.5 - 126.)			
*2-Fluorobiphenyl			1670				1100	ug/kg		66.3	(44.7 - 110.)			
*2-Fluorophenol			3330				2200	ug/kg		67.3	(37.0 - 102.)			
*Nitrobenzene-d5			1670				1000	ug/kg		60.6	(42.4 - 107.)			
*Phenol-d6			3330				2200	ug/kg		65.5	(41.5 - 102.)			
*p-Terphenyl-d14			1670				1400	ug/kg		85.6	(45.5 - 104.)			
QC646831	BLANK	158012												
2,4,6-Trinitrotoluene						U	ND	ug/kg				JLW	09/21/99	1420
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						
sym-Trinitrobenzene						U	ND	ug/kg						
*1,2-Dinitrobenzene			400				390	ug/kg		96.8	(71.6 - 108.)			
QC646836	BLANK	158013												

QC Summary Report

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
2,4,6-Trinitrotoluene					U	ND	ug/l				JSP	09/10/99	1331
2,4-Dinitrotoluene					U	ND	ug/l				JSP	09/10/99	1331
2,6-Dinitrotoluene					U	ND	ug/l						
2-Amino-4,6-dinitrotoluene					U	ND	ug/l						
4-Amino-2,6-dinitrotoluene					U	ND	ug/l						
HMX					U	ND	ug/l						
Nitrobenzene					U	ND	ug/l						
RDX					U	ND	ug/l						
TETRYL					U	ND	ug/l						
m-Dinitrobenzene					U	ND	ug/l						
m-Nitrotoluene					U	ND	ug/l						
o-Nitrotoluene					U	ND	ug/l						
p-Nitrotoluene					U	ND	ug/l						
sym-Trinitrobenzene					U	ND	ug/l						
*1,2-Dinitrobenzene			0.519			0.47	ug/l		91.0	(75.6 - 121.)			
QC646832	LCS	158012											
2,4,6-Trinitrotoluene			800			780	ug/kg		97.1	(60.2 - 135.)	JLW	09/21/99	1502
2,4-Dinitrotoluene			800			750	ug/kg		94.1	(59.7 - 135.)			
2,6-Dinitrotoluene			800			720	ug/kg		90.5	(59.9 - 124.)			
2-Amino-4,6-dinitrotoluene			800			790	ug/kg		98.4	(70.0 - 130.)			
4-Amino-2,6-dinitrotoluene			800			800	ug/kg		99.4	(70.0 - 130.)			
HMX			800			780	ug/kg		97.2	(54.3 - 152.)			
Nitrobenzene			800			730	ug/kg		91.4	(61.6 - 124.)			
RDX			800			780	ug/kg		98.1	(56.7 - 139.)			
TETRYL			800			810	ug/kg		102	(63.3 - 134.)			
m-Dinitrobenzene			800			750	ug/kg		93.6	(59.6 - 131.)			
m-Nitrotoluene			800			730	ug/kg		91.7	(62.6 - 120.)			
o-Nitrotoluene			800			730	ug/kg		91.0	(62.6 - 121.)			
p-Nitrotoluene			800			740	ug/kg		92.5	(61.9 - 119.)			
sym-Trinitrobenzene			800			800	ug/kg		100	(67.1 - 109.)			
*1,2-Dinitrobenzene			400			380	ug/kg		95.9	(71.6 - 108.)			
QC646837	LCS	158013											
2,4,6-Trinitrotoluene			1.04			0.86	ug/l		82.8	(61.3 - 130.)	JSP	09/10/99	1413
2,4-Dinitrotoluene			1.04			0.81	ug/l		78.3	(60.1 - 132.)			
2,6-Dinitrotoluene			1.04			0.79	ug/l		76.2	(64.4 - 128.)			
2-Amino-4,6-dinitrotoluene			1.04			0.80	ug/l		77.3	(58.6 - 133.)			
4-Amino-2,6-dinitrotoluene			1.04			0.76	ug/l		73.3	(58.9 - 137.)			
HMX			1.04			0.81	ug/l		78.1	(65.8 147.)			
Nitrobenzene			1.04			0.70	ug/l		67.3	(56.6 - 114.)			
RDX			1.04			0.74	ug/l		71.2	(69.7 - 130.)			

QC Summary Report

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
TETRYL			1.04			0.82	ug/l		78.8	(66.0 - 134.)	JSP	09/10/99	1413
m-Dinitrobenzene			1.04			0.79	ug/l		76.0	(66.2 - 127.)			
m-Nitrotoluene			1.04			0.77	ug/l		74.3	(56.9 - 116.)			
o-Nitrotoluene			1.04			0.76	ug/l		73.3	(56.7 - 115.)			
p-Nitrotoluene			1.04			0.77	ug/l		74.5	(54.6 - 114.)			
sym-Trinitrobenzene			1.04			0.85	ug/l		81.4	(66.0 - 113.)			
*1,2-Dinitrobenzene			0.519			0.46	ug/l		88.0	(75.6 - 121.)			
QC646833	LCS DUP	158012											
2,4,6-Trinitrotoluene			800	780		770	ug/kg	0.911	96.2	(0.00 - 30.0)	JLW	09/21/99	1543
2,4-Dinitrotoluene			800	750		730	ug/kg	3.24	91.1	(0.00 - 30.0)			
2,6-Dinitrotoluene			800	720		700	ug/kg	2.77	88.1	(0.00 - 30.0)			
2-Amino-4,6-dinitrotoluene			800	790		800	ug/kg	1.05	99.4	(0.00 - 30.0)			
4-Amino-2,6-dinitrotoluene			800	800		790	ug/kg	0.464	98.9	(0.00 - 30.0)			
HMX			800	780		800	ug/kg	2.73	99.9	(0.00 - 30.0)			
Nitrobenzene			800	730		700	ug/kg	4.69	87.2	(0.00 - 30.0)			
RDX			800	780		780	ug/kg	0.0679	98.1	(0.00 - 30.0)			
TETRYL			800	810		800	ug/kg	1.54	100	(0.00 - 30.0)			
m-Dinitrobenzene			800	750		720	ug/kg	3.94	90.0	(0.00 - 30.0)			
m-Nitrotoluene			800	730		710	ug/kg	3.41	88.6	(0.00 - 30.0)			
o-Nitrotoluene			800	730		700	ug/kg	4.04	87.4	(0.00 - 30.0)			
p-Nitrotoluene			800	740		710	ug/kg	3.96	89.0	(0.00 - 30.0)			
sym-Trinitrobenzene			800	800		790	ug/kg	1.10	99.0	(0.00 - 30.0)			
*1,2-Dinitrobenzene			400			370	ug/kg		91.3	(71.6 - 108.)			
QC646838	LCS DUP	158013											
2,4,6-Trinitrotoluene			1.04	0.860		0.90	ug/l	4.05	86.2	(0.00 - 30.0)	JSP	09/10/99	1455
2,4-Dinitrotoluene			1.04	0.810		0.85	ug/l	3.79	81.4	(0.00 - 30.0)			
2,6-Dinitrotoluene			1.04	0.790		0.81	ug/l	1.72	77.5	(0.00 - 30.0)			
2-Amino-4,6-dinitrotoluene			1.04	0.800		0.85	ug/l	5.60	81.7	(0.00 - 30.0)			
4-Amino-2,6-dinitrotoluene			1.04	0.760		0.81	ug/l	5.42	77.4	(0.00 - 30.0)			
HMX			1.04	0.810		0.83	ug/l	2.67	80.2	(0.00 - 30.0)			
Nitrobenzene			1.04	0.700		0.75	ug/l	6.40	71.7	(0.00 - 30.0)			
RDX			1.04	0.740		0.79	ug/l	6.19	75.7	(0.00 - 30.0)			
TETRYL			1.04	0.820		0.76	ug/l	7.21	73.3	(0.00 - 30.0)			
m-Dinitrobenzene			1.04	0.790		0.83	ug/l	4.43	79.4	(0.00 - 30.0)			
m-Nitrotoluene			1.04	0.770		0.81	ug/l	4.16	77.5	(0.00 - 30.0)			
o-Nitrotoluene			1.04	0.760		0.80	ug/l	4.55	76.8	(0.00 - 30.0)			
p-Nitrotoluene			1.04	0.770		0.83	ug/l	7.09	80.0	(0.00 - 30.0)			
sym-Trinitrobenzene			1.04	0.850		0.87	ug/l	2.74	83.7	(0.00 - 30.0)			
*1,2-Dinitrobenzene			0.519			0.46	ug/l		89.1	(75.6 - 121.)			
QC646834	9909228-45MS	158012											

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample		Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
2,4,6-Trinitrotoluene			800	U	ND		820	ug/kg		103	(64.9 - 165.)	JLW	09/21/99	1625
2,4-Dinitrotoluene			800	U	ND		770	ug/kg		96.5	(65.8 - 161.)	JLW	09/21/99	1625
2,6-Dinitrotoluene			800	U	ND		730	ug/kg		91.4	(59.7 - 153.)			
2-Amino-4,6-dinitrotoluene			800	U	ND		830	ug/kg		103	(70.0 - 130.)			
4-Amino-2,6-dinitrotoluene			800	U	ND		840	ug/kg		105	(70.0 - 130.)			
HMX			800	U	ND		800	ug/kg		100	(54.9 - 157.)			
Nitrobenzene			800	U	ND		740	ug/kg		92.6	(66.4 - 157.)			
RDX			800	U	ND		750	ug/kg		93.8	(61.3 - 155.)			
TETRYL			800	U	ND		700	ug/kg		87.5	(55.9 - 147.)			
m-Dinitrobenzene			800	U	ND		770	ug/kg		95.8	(65.5 - 162.)			
m-Nitrotoluene			800	U	ND		780	ug/kg		97.1	(63.8 - 155.)			
o-Nitrotoluene			800	U	ND		790	ug/kg		98.6	(63.5 - 155.)			
p-Nitrotoluene			800	U	ND		790	ug/kg		98.9	(64.1 - 153.)			
sym-Trinitrobenzene			800	U	ND		800	ug/kg		100	(57.5 - 149.)			
*1,2-Dinitrobenzene			400				380	ug/kg		94.3	(71.6 - 108.)			
QC646839	9909228-63MS	158013												
2,4,6-Trinitrotoluene			1.04	U	ND		0.87	ug/l		84.1	(66.2 - 127.)	JSP	09/10/99	1537
2,4-Dinitrotoluene			1.04	U	ND		0.84	ug/l		80.6	(70.1 - 127.)			
2,6-Dinitrotoluene			1.04	U	ND		0.83	ug/l		80.0	(62.8 - 134.)			
2-Amino-4,6-dinitrotoluene			1.04	U	ND		0.83	ug/l		79.5	(58.7 - 134.)			
4-Amino-2,6-dinitrotoluene			1.04	U	ND		0.82	ug/l		79.2	(56.3 - 145.)			
HMX			1.04	U	ND		0.80	ug/l		76.8	(63.8 - 145.)			
Nitrobenzene			1.04	U	ND		0.74	ug/l		71.6	(57.6 - 119.)			
RDX			1.04	U	ND		0.82	ug/l		78.6	(64.9 - 133.)			
TETRYL			1.04	U	ND		0.84	ug/l		80.5	(68.0 - 133.)			
m-Dinitrobenzene			1.04	U	ND		0.81	ug/l		78.2	(70.8 - 125.)			
m-Nitrotoluene			1.04	U	ND		0.79	ug/l		76.4	(56.5 - 121.)			
o-Nitrotoluene			1.04	U	ND		0.83	ug/l		79.4	(55.4 - 121.)			
p-Nitrotoluene			1.04	U	ND		0.81	ug/l		77.5	(63.8 - 113.)			
sym-Trinitrobenzene			1.04	U	ND		0.88	ug/l		84.4	(67.7 - 113.)			
*1,2-Dinitrobenzene			0.519				0.48	ug/l		92.0	(75.6 - 121.)			
QC646835	9909228-45MSD	158012												
2,4,6-Trinitrotoluene			800	U	ND		750	ug/kg	9.75	93.5	(0.00 - 30.0)	JLW	09/21/99	1707
2,4-Dinitrotoluene			800	U	ND		700	ug/kg	9.68	87.6	(0.00 - 30.0)			
2,6-Dinitrotoluene			800	U	ND		670	ug/kg	8.44	84.0	(0.00 - 30.0)			
2-Amino-4,6-dinitrotoluene			800	U	ND		770	ug/kg	7.39	96.0	(0.00 - 30.0)			
4-Amino-2,6-dinitrotoluene			800	U	ND		760	ug/kg	9.53	95.1	(0.00 - 30.0)			
HMX			800	U	ND		780	ug/kg	2.77	97.4	(0.00 - 30.0)			
Nitrobenzene			800	U	ND		690	ug/kg	6.86	86.5	(0.00 - 30.0)			
RDX			800	U	ND		720	ug/kg	3.91	90.2	(0.00 - 30.0)			

QC Summary Report

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
TETRYL			800	U ND		700	ug/kg	0.563	87.0	(0.00 - 30.0)	JLW	09/21/99	1707
m-Dinitrobenzene			800	U ND		700	ug/kg	9.58	87.1	(0.00 - 30.0)			
m-Nitrotoluene			800	U ND		690	ug/kg	11.7	86.4	(0.00 - 30.0)			
o-Nitrotoluene			800	U ND		700	ug/kg	12.5	87.0	(0.00 - 30.0)			
p-Nitrotoluene			800	U ND		710	ug/kg	11.5	88.2	(0.00 - 30.0)			
sym-Trinitrobenzene			800	U ND		750	ug/kg	6.65	93.8	(0.00 - 30.0)			
*1,2-Dinitrobenzene			400			350	ug/kg		87.6	(71.6 - 108.)			
QC646840	9909228-63MSD	158013											
2,4,6-Trinitrotoluene			1.04	U ND		0.89	ug/l	1.72	85.5	(0.00 - 16.0)	JSP	09/10/99	1619
2,4-Dinitrotoluene			1.04	U ND		0.86	ug/l	2.03	82.2	(0.00 - 13.3)			
2,6-Dinitrotoluene			1.04	U ND		0.83	ug/l	0.00150	80.0	(0.00 - 19.3)			
2-Amino-4,6-dinitrotoluene			1.04	U ND		0.84	ug/l	2.00	81.1	(0.00 - 15.8)			
4-Amino-2,6-dinitrotoluene			1.04	U ND		0.81	ug/l	1.19	78.3	(0.00 - 12.7)			
HMX			1.04	U ND		0.87	ug/l	8.09	83.3	(0.00 - 14.4)			
Nitrobenzene			1.04	U ND		0.76	ug/l	1.58	72.7	(0.00 - 20.4)			
RDX			1.04	U ND		0.84	ug/l	2.52	80.6	(0.00 - 15.9)			
TETRYL			1.04	U ND		0.90	ug/l	7.67	87.0	(0.00 - 13.4)			
m-Dinitrobenzene			1.04	U ND		0.83	ug/l	2.32	80.0	(0.00 - 15.0)			
m-Nitrotoluene			1.04	U ND		0.80	ug/l	0.689	77.0	(0.00 - 22.8)			
o-Nitrotoluene			1.04	U ND		0.84	ug/l	1.65	80.7	(0.00 - 23.1)			
p-Nitrotoluene			1.04	U ND		0.82	ug/l	1.68	78.8	(0.00 - 23.1)			
sym-Trinitrobenzene			1.04	U ND		0.90	ug/l	2.32	86.4	(0.00 - 13.2)			
*1,2-Dinitrobenzene			0.519			0.49	ug/l		94.0	(75.6 - 121.)			
QC647092	BLANK	158065											
PCB-1260					U	ND	ug/kg				JC	09/23/99	0214
*4CMX			6.67			2.5	ug/kg		37.8	(25.3 - 110.)			
*Decachlorobiphenyl			6.67			4.0	ug/kg		60.4	(46.8 - 131.)			
PCB-1016					U	ND	ug/kg						
PCB-1221					U	ND	ug/kg						
PCB-1232					U	ND	ug/kg						
PCB-1242					U	ND	ug/kg						
PCB-1248					U	ND	ug/kg						
PCB-1254					U	ND	ug/kg						
QC649104	BLANK	158568											
PCB-1260					U	ND	ug/l				JC	09/21/99	2207
*4CMX			0.200			0.14	ug/l		70.3	(31.0 - 126.)			
*Decachlorobiphenyl			0.200			0.12	ug/l		60.1	(39.0 - 133.)			
PCB-1016					U	ND	ug/l						
PCB-1221					U	ND	ug/l						
PCB-1232					U	ND	ug/l						

QC Summary Report

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
PCB-1242					U	ND	ug/l				JC	09/21/99	2207
PCB-1248					U	ND	ug/l						
PCB-1254					U	ND	ug/l						
QC647093	LCS	158065											
PCB-1260			33.3			25	ug/kg		76.3	(53.6 - 137.)	JC	09/23/99	0232
*4CMX			6.67			3.0	ug/kg		44.6	(25.3 - 110.)			
*Decachlorobiphenyl			6.67			4.0	ug/kg		59.9	(46.8 - 131.)			
QC649105	LCS	158568											
PCB-1260			1.00			0.84	ug/l		84.0	(54.5 - 126.)	JC	09/21/99	2226
*4CMX			0.200			0.15	ug/l		72.9	(31.0 - 126.)			
*Decachlorobiphenyl			0.200			0.12	ug/l		61.0	(39.0 - 133.)			
QC647094	LCS DUP	158065											
PCB-1260			33.3	25.0		26	ug/kg	0.393	76.6	(0.00 - 36.0)	JC	09/23/99	0251
*4CMX			6.67			2.8	ug/kg		42.7	(25.3 - 110.)			
*Decachlorobiphenyl			6.67			4.0	ug/kg		59.3	(46.8 - 131.)			
QC649106	LCS DUP	158568											
PCB-1260			1.00	0.840		0.83	ug/l	1.20	83.0	(0.00 - 39.6)	JC	09/21/99	2244
*4CMX			0.200			0.12	ug/l		61.5	(31.0 - 126.)			
*Decachlorobiphenyl			0.200			0.12	ug/l		62.3	(39.0 - 133.)			
QC647095	9909228-45MS	158065											
PCB-1260			33.3	U ND		25	ug/kg		76.0	(31.5 - 159.)	JC	09/23/99	0309
*4CMX			6.67			3.4	ug/kg		51.1	(25.3 - 110.)			
*Decachlorobiphenyl			6.67			4.0	ug/kg		59.5	(46.8 - 131.)			
QC647096	9909228-45MSD	158065											
PCB-1260			33.3	U ND		25	ug/kg	0.794	75.4	(0.00 - 26.2)	JC	09/23/99	0328
*4CMX			6.67			3.3	ug/kg		49.3	(25.3 - 110.)			
*Decachlorobiphenyl			6.67			3.9	ug/kg		58.9	(46.8 - 131.)			

* represent a surrogate.

QC Summary Report

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
Metals Analysis													
QC647057	BLANK	158059											
Mercury					J	0.00845	mg/kg				RMJ	09/17/99	1503
QC647168	BLANK	158086											
Mercury					U	ND	mg/l				RMJ	09/10/99	1259
QC647061	9909228-45DUP	158059											
Mercury					J	0.0110	mg/kg	141**		(0.00 - 17.0)	RMJ	09/17/99	1540
QC647058	LCS	158059											
Mercury			5.29			5.18	mg/kg		97.9	(57.9 - 134.)	RMJ	09/17/99	1505
QC647169	LCS	158086											
Mercury			0.00200			0.00195	mg/l		97.5	(81.5 - 124.)	RMJ	09/10/99	1503
QC647059	LCS DUP	158059											
Mercury			5.29	5.18		5.27	mg/kg	1.83	99.7	(0.00 - 15.6)	RMJ	09/17/99	1507
QC647170	LCS DUP	158086											
Mercury			0.00200	0.00195		0.00197	mg/l	1.25	98.7	(0.00 - 16.3)	RMJ	09/10/99	1302
QC647060	9909228-45MS	158059											
Mercury			0.328	J 0.00189		0.352	mg/kg		107	(64.6 - 136.)	RMJ	09/17/99	1539
QC646852	BLANK	158015											
Arsenic					U	ND	mg/l				MBL	09/13/99	0813
Barium					U	ND	mg/l						
Cadmium					U	ND	mg/l						
Chromium					U	ND	mg/l						
Lead					U	ND	mg/l						
Selenium					U	ND	mg/l						
Silver					U	ND	mg/l						
QC646904	BLANK	158023											
Arsenic					U	ND	mg/kg				MBL	09/21/99	1622
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					J	0.282	mg/kg						
QC646853	LCS	158015											
Arsenic			1.00			1.04	mg/l		104	(89.5 - 112.)	MBL	09/13/99	0818
Barium			1.00			1.05	mg/l		105	(90.7 - 111.)			
Cadmium			1.00			1.03	mg/l		103	(90.7 - 115.)			
Chromium			1.00			1.05	mg/l		105	(90.0 - 112.)			
Lead			1.00			1.03	mg/l		103	(89.3 - 114.)			
Selenium			1.00			1.02	mg/l		102	(87.2 - 109.)			

QC Summary Report

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999 Page 24 of 33

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
Silver			1.00			1.10	mg/l		110	(90.9 - 116.)	MBL	09/13/99	0818
QC646905	LCS	158023											
Arsenic			55.8			62.8	mg/kg		112	(84.6 - 133.)	MBL	09/21/99	1628
Barium			70.1			81.5	mg/kg		116	(89.7 - 154.)			
Cadmium			176			216	mg/kg		123**	(77.5 - 116.)			
Chromium			48.3			53.9	mg/kg		112	(73.0 - 150.)			
Lead			53.9			64.8	mg/kg		120**	(80.4 - 117.)			
Selenium			58.5			64.3	mg/kg		110	(86.6 - 122.)			
Silver			142			129	mg/kg		91.1**	(93.2 - 130.)			
QC646854	LCS DUP	158015											
Arsenic			1.00	1.04		1.08	mg/l	3.76	108	(0.00 - 20.0)	MBL	09/13/99	0824
Barium			1.00	1.05		1.09	mg/l	3.66	109	(0.00 - 20.0)			
Cadmium			1.00	1.03		1.07	mg/l	4.28	107	(0.00 - 20.0)			
Chromium			1.00	1.05		1.09	mg/l	4.01	109	(0.00 - 20.0)			
Lead			1.00	1.03		1.08	mg/l	4.38	108	(0.00 - 20.0)			
Selenium			1.00	1.02		1.06	mg/l	4.08	106	(0.00 - 20.0)			
Silver			1.00	1.10		1.14	mg/l	3.46	114	(0.00 - 20.0)			
QC646906	LCS DUP	158023											
Arsenic			58.6	62.8		62.3	mg/kg	5.66	106	(0.00 - 22.3)	MBL	09/21/99	1634
Barium			73.6	81.5		80.4	mg/kg	6.29	109	(0.00 - 21.4)			
Cadmium			185	216		210	mg/kg	7.62	114	(0.00 - 14.3)			
Chromium			50.7	53.9		53.1	mg/kg	6.45	105	(0.00 - 21.1)			
Lead			56.6	64.8		63.0	mg/kg	7.82	111	(0.00 - 20.1)			
Selenium			61.4	64.3		64.8	mg/kg	4.09	106	(0.00 - 22.4)			
Silver			149	129		140	mg/kg	3.14	94.0	(0.00 - 18.5)			
QC646908	9909228-45MS	158023											
Arsenic			48.5	2.78		44.2	mg/kg		85.4	(71.5 - 114.)	MBL	09/21/99	1915
Barium			48.5	59.1		174	mg/kg		236**	(65.7 - 127.)			
Cadmium			48.5	ND	U	41.3	mg/kg		85.2	(76.0 - 118.)			
Chromium			48.5	11.0		52.9	mg/kg		86.2	(74.0 - 122.)			
Lead			48.5	7.75		49.2	mg/kg		85.5	(70.6 - 123.)			
Selenium			48.5	ND	U	39.6	mg/kg		81.7	(67.4 - 113.)			
Silver			48.5	0.503		47.5	mg/kg		97.0	(75.9 - 124.)			
QC646909	9909228-45MSD	158023											
Arsenic			48.5	2.78		44.6	mg/kg	0.856	86.2	(0.00 - 16.3)	MBL	09/21/99	1921
Barium			48.5	59.1		103	mg/kg	89.4**	90.1	(0.00 - 23.2)			
Cadmium			48.5	ND	U	40.3	mg/kg	2.47	83.1	(0.00 - 10.3)			
Chromium			48.5	11.0		51.7	mg/kg	2.85	83.8	(0.00 - 19.3)			
Lead			48.5	7.75		49.7	mg/kg	1.09	86.5	(0.00 - 20.3)			
Selenium			48.5	ND	U	38.6	mg/kg	2.61	79.6	(0.00 - 17.0)			

QC Summary Report

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
Silver			48.5	0.503		47.3	mg/kg	0.489	96.5	(0.00 - 14.7)	MBL	09/21/99	1921
QC646907	9909228-45SERIAL	158023											
Arsenic						3.74	mg/kg	29.6		(-)	MBL	09/21/99	1909
Barium						60.6	mg/kg	2.45		(-)			
Cadmium					U	ND	mg/kg	0.00		(-)			
Chromium						11.7	mg/kg	5.44		(-)			
Lead						8.13	mg/kg	4.75		(-)			
Selenium					U	ND	mg/kg	0.00		(-)			
Silver						2.52	mg/kg	133		(-)			

CASE NARRATIVE
SNLS
SDG#99228S

The following samples were analyzed for PCB using the analytical protocol from EPA SW-846 Third Edition, Method 8082, Revision 0, September, 1994:

Laboratory Number	Sample Description
9909228-02	050109-003 B9938-SP1-BH1-9.5-S
9909228-06	050049-003 SOLARDETOX-DF1-BH3-
9909228-09	050050-003 SOLARDETOX-DF1-BH3-
9909228-12	050052-003 SOLARDETOX-DF1-BH2-
9909228-15	050053-003 SOLARDETOX-DF1-BH2-
9909228-18	050055-003 SOLARDETOX-DF1-BH1-
9909228-21	050056-003 SOLARDETOX-DF1-BH1-
9909228-24	050057-003 SOLAR 9981A-SP1-BHI
9909228-27	050058-003 SOLAR 9981A-SP1-BH1
9909228-30	050059-003 SOLAR 9982-DW1-BH1-
9909228-33	050060-003 SOLAR 9982-DW1-BH1
9909228-36	050061-003 SOLAR 9982-DW1-BH1
9909228-39	050062-003 LFR-DF1-BH1-7-S
9909228-42	050063-003 LFR-DF1-BH1-12-S
9909228-45	050064-003 LFR-DF1-BH1-7-MS/MD
9909228-48	050065-003 LFR-DF1-BH2-7-S
9909228-51	050066-003 LFR-DF1-BH2-12-S
9909228-54	050067-003 LFR-DF1-BH3-7-S
9909228-57	050068-003 LFR-DF1-BH3-12-S
QC647092	PBLK01 (Method Blank)
QC647093	PBLK01LCS (Laboratory Control Sample)
QC647094	PBLK01LCSD (Laboratory Control Sample Duplicate)
QC647095	050064-003 LFR-DF1-BH1-7-MS (Matrix Spike)
QC647096	050064-003 LFR-DF1-BH1-7-MSD (Matrix Spike Duplicate)

System Configuration:

The laboratory utilizes the following instruments for extractable semivolatile gas chromatograph analyses: six Hewlett Packard gas chromatographs consisting of HP 5890 Series II Plus and the 6890 Series models. All gas chromatographs are configured with dual ECD detectors and splitless injections. The HP systems are equipped with electronic pressure control (EPC).

Chromatographic Column:

Chromatographic separation of analytes of interest are accomplished through analysis on one of the following columns:

J&W1: DB-5 (5%-Phenyl)-methylsiloxane 30 m x 0.25 mm x 0.25 um
DB-17MS (50%-Phenyl)-methylsiloxane 30 m x 0.25 mm x 0.25 um
J&W2: DB-5 (5%-Phenyl)-methylsiloxane 30 m x 0.32 mm x 1.0 um
DB-1701 Durabond stationary phase* 30 m x 0.32 mm x 0.5 um
J&W3: DB-5 (5%-Phenyl)-methylsiloxane 30 m x 0.53 mm x 1.5 um
DB-1701 (14% Cyanopropylphenyl)-methylsiloxane 30 m x 0.53 mm x 0.5 um
J&W4: DB-608 Durabond stationary phase* 30 m x 0.53 mm x 0.5 um
DB-XLB * 30 m x 0.53 mm x 1.5 um
J&W5: DB-XLB * 30 m x 0.25 mm x 0.25 um
DB-17MS (50%-Phenyl)-methylsiloxane 30 m x 0.25 mm x 0.25 um
* Durabond and DB-XLB are trademarks of J & W.

Instrument Configuration:

The samples reported in this Sample Delivery Group (SDG) were analyzed on one or more of the following instrument systems (instrument systems are identified by the instrument ID designations listed below which can be found on the raw data or individual form headers):

Instrument ID	System Configuration	Chromatographic Column
ECD1	HP 6890 Series GC ECD/ECD	J&W3
ECD2	HP 6890 Series GC ECD/ECD	J&W1
ECD3	HP 6890 Series GC ECD/ECD	J&W5
ECD4	HP 5890 Series II Plus GC ECD/ECD	J&W5
ECD5	HP6890 Series GC ECD/ECD	J&W5
ECD7	HP6890 Series GC ECD/ECD	J&W5

Sample Preparation:

All samples were prepared in accordance with accepted procedures.

Instrument Calibration:

The following continuing calibration check standard injections (Form 7) exceeded the %D acceptance criteria of 15% (30% for surrogates) for the indicated compounds:

File #	Date	Time	Compound	%D	Bias
008B0801	09/22/99	1205	Aroclor-1221	23.8	(+)Bias
053B5301	09/23/99	0156	Decachlorobiphenyl	32.0	(+)Bias
064B6401	09/23/99	0518	Decachlorobiphenyl	39.0	(+)Bias
075B7501	09/23/99	0842	Decachlorobiphenyl	43.0	(+)Bias
086B8601	09/23/99	1205	Decachlorobiphenyl	33.5	(+)Bias

Positive bias of analytical data is a result of instrument response for the indicated compounds increasing as the analytical sequence proceeds. The degree to which an increase in sensitivity has occurred is measured relative to the extent of which the indicated %D value exceeds the upper limit of 15% or 30%. None of the above target analytes were detected in any of the sample. Thus, the non-compliant %D values has no adverse effects on the data.

Holding Time:

All samples were analyzed within the required holding time.

Surrogates:

All surrogate recoveries were not within the required acceptance limits. Decachlorobiphenyl recovery was below acceptance limits on one analytical column (DB-XLB) in sample 9909228-02.

Blanks:

There were no target analytes detected in the method blank above the required acceptance limit.

Spike Analyses:

The matrix spikes (MS) and matrix spike duplicate (MSD) were analyzed on the following sample number:

9909228-45(050064-003 LFR-DF1-BH1-7-MS/MD)

All of the analyte recoveries in the MS and MSD were within the required acceptance limits.

All relative percent differences (RPDs) between the MS and MSD recoveries were within the required acceptance limits.

Laboratory Control Samples:

All analytes in the laboratory control sample (LCS) were within the required acceptance limits.

All analytes in the laboratory control sample duplicate (LCSD) were within the required acceptance limits for relative percent difference.

Manual Integrations:

Samples and QC analyses required manual integrations to correctly position
the baseline as set in the calibration standard injections.

Certain standards required manual integrations to correctly assign analyte peaks and/or proper peak integration as set in the initial calibration.

Copies of manual integration peak profiles are included in the application raw data section of this package.

Dilutions:

None of the samples were diluted.

Non Conformance Reports:

There were no Nonconformance Reports associated with this SDG.

The preceding narrative has been reviewed by: L. Mitchell Owens Date: 10/4/99

CASE NARRATIVE
SNLS
SDG#99228W

The following samples were analyzed for PCB using the analytical protocol from EPA SW-846 Third Edition, Method 8082, Revision 0, September, 1994:

Laboratory Number	Sample Description
9909228-66	050069-012 LFR-DF1-BH3-PCB
9909228-66RE	050069-012 LFR-DF1-BH3-PCBRE (Re-Extract)
QC647334	PBLK01 (Method Blank)
QC647335	PBLK01LCS (Laboratory Control Sample)
QC647336	PBLK01LCSD (Laboratory Control Sample Duplicate)
QC649104	PBLK02 (Method Blank)
QC649105	PBLK02LCS (Laboratory Control Sample)
QC649106	PBLK02LCSD (Laboratory Control Sample Duplicate)

System Configuration:

The laboratory utilizes the following instruments for extractable semivolatile gas chromatograph analyses: six Hewlett Packard gas chromatographs consisting of HP 5890 Series II Plus and the 6890 Series models. All gas chromatographs are configured with dual ECD detectors and splitless injections. The HP systems are equipped with electronic pressure control (EPC).

Chromatographic Column:

Chromatographic separation of analytes of interest are accomplished through analysis on one of the following columns:

J&W1: DB-5 (5%-Phenyl)-methylsiloxane 30 m x 0.25 mm x 0.25 um
DB-17MS (50%-Phenyl)-methylsiloxane 30 m x 0.25 mm x 0.25 um
J&W2: DB-5 (5%-Phenyl)-methylsiloxane 30 m x 0.32 mm x 1.0 um
DB-1701 Durabond stationary phase* 30 m x 0.32 mm x 0.5 um
J&W3: DB-5 (5%-Phenyl)-methylsiloxane 30 m x 0.53 mm x 1.5 um
DB-1701 (14% Cyanopropylphenyl)-methylsiloxane 30 m x 0.53 mm x 0.5 um
J&W4: DB-608 Durabond stationary phase* 30 m x 0.53 mm x 0.5 um
DB-XLB * 30 m x 0.53 mm x 1.5 um
J&W5: DB-XLB * 30 m x 0.25 mm x 0.25 um
DB-17MS (50%-Phenyl)-methylsiloxane 30 m x 0.25 mm x 0.25 um
* Durabond and DB-XLB are trademarks of J & W.

Instrument Configuration:

The samples reported in this Sample Delivery Group (SDG) were analyzed on one or more of the following instrument systems (instrument systems are identified by the instrument ID designations listed below which can be found on the raw data or individual form headers):

Instrument ID	System Configuration	Chromatographic Column
ECD1	HP 6890 Series GC ECD/ECD	J&W3
ECD2	HP 6890 Series GC ECD/ECD	J&W1
ECD3	HP 6890 Series GC ECD/ECD	J&W5
ECD4	HP 5890 Series II Plus GC ECD/ECD	J&W5
ECD5	HP6890 Series GC ECD/ECD	J&W5
ECD7	HP6890 Series GC ECD/ECD	J&W5

Sample Preparation:

All samples were not prepared in accordance with accepted procedures. Sample 9909228-66 was re-extracted out of holding to investigate low surrogate recoveries. Both extractions have been provided in this data package.

Instrument Calibration:

The following continuing calibration check standard injections (Form 7) exceeded the %D acceptance criteria of 15% (30% for surrogates) for the indicated compounds:

File #	Date	Time	Compound	%D	Bias
003F0301	09/13/99	1732	Aroclor-1016	15.4	(+)Bias
			Aroclor-1260	20.2	(+)Bias
004F0401	09/13/99	1751	Aroclor-1254	29.0	(+)Bias
005F0501	09/13/99	1809	Aroclor-1248	15.8	(-)Bias
007F0701	09/13/99	1846	Aroclor-1232	34.0	(+)Bias
007B0701	09/13/99	1846	Aroclor-1232	42.8	(+)Bias
008F0801	09/13/99	1905	Aroclor-1221	148.0	(+)Bias
008B0801	09/13/99	1905	Aroclor-1221	85.8	(+)Bias
019F1901	09/13/99	2228	Aroclor-1260	18.2	(+)Bias
019B1901	09/13/99	2228	Aroclor-1016	16.2	(+)Bias
026F2601	09/14/99	0037	Aroclor-1016	15.4	(+)Bias
			Aroclor-1260	23.0	(+)Bias
026B2601	09/14/99	0037	Aroclor-1016	17.2	(+)Bias
008F0801	09/21/99	1236	Aroclor-1221	26.6	(+)Bias
008B0801	09/21/99	1236	Aroclor-1221	21.8	(+)Bias

Positive bias of analytical data is a result of instrument response for the indicated compounds increasing as the analytical sequence proceeds. The degree to which an increase in sensitivity has occurred is measured relative to the extent of which the indicated %D value exceeds the upper limit of 15% or 30% . None of the above target analytes were detected in any of the sample. Thus, the non-compliant %D values has no adverse effects on the data.

Negative bias of analytical data is a result of instrument response for the indicated compounds decreasing as the analytical sequence proceeds. The degree to which a decrease in sensitivity has occurred is measured relative to the extent of which the indicated %D value exceeds the lower limit of 15% or 30%. The above targets exhibiting a decrease in sensitivity were not needed for confirmation. Thus, the non-compliant %D values has no adverse effects on the data.

Holding Time:

All samples were analyzed within the required holding time.

Surrogates:

All surrogate recoveries were not within the required acceptance limits. Decachlorobiphenyl surrogate recoveries were below acceptance limits in sample 9909228-66.

Blanks:

There were no target analytes detected in the method blank above the required acceptance limit.

Spike Analyses:

The matrix spikes were analyzed on a sample in a different SDG.

Laboratory Control Samples:

All analytes in the laboratory control sample (LCS) were within the required acceptance limits.

All analytes in the laboratory control sample duplicate (LCSD) were within the required acceptance limits for relative percent difference.

Manual Integrations:

Samples and QC analyses required manual integrations to correctly position the baseline as set in the calibration standard injections.

Certain standards required manual integrations to correctly assign analyte peaks and/or proper peak integration as set in the initial calibration.

Copies of manual integration peak profiles are included in the application raw data section of this package.

Dilutions:

None of the samples were diluted.

Non Conformance Reports:

There were no Nonconformance Reports associated with this SDG.

The preceding narrative has been reviewed by: [signature] Date: 10/4/99

GC/MS SEMIVOLATILE ANALYSIS

Case Narrative for SNLS

SDG 99228W

Metals Analysis by ICP
Mercury Analysis by CVAA

Sample Preparation and Analysis
The following samples were digested using EPA SW846 methods 3005A for ICP and 7074A for mercury and analyzed using methods 6010B (ICP) and 7470A (CVAA):

Laboratory Identification	Sample Description
9909228-61	050069-007 LFR-DF1-BH3-RCRA
QC646852-ICP	Preparation Blank (PBW)
QC646853-ICP	Laboratory Control Sample (LCSW)
QC646854-ICP	Laboratory Control Sample Duplicate (LCSWD)
QC647168-CVAA	Preparation Blank (PBW)
QC647169-CVAA	Laboratory Control Sample (LCSW)
QC647170-CVAA	Laboratory Control Sample Duplicate (LCSWD)

System Configurations
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 were set at a power level of 950 watts, 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 nebulizer pressure setting of 26 PSI.

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 appropriate EPA SW846 procedures.

Instrument Calibration
The instruments were calibrated following method and manufacturers' specifications. The percent recovery for mercury in the CRDL was outside of the advisory limits. The result for cadmium in the ICS-A was below the negative CRDL; therefore, the sample results may reflect a negative bias for cadmium.

Holding Time
All samples were analyzed within the required holding times.

Blanks
All the preparation blanks and continuing calibration blanks met all quality control criteria.

Spike Analyses
No sample from this sample delivery group (SDG) was designated as the quality control sample for the ICP or the CVAA batches. A sample from SNLS SDG 99257W was designated as the quality control for the CVAA batch. A sample from SNLS SDG 99158 was designated as the quality control sample for the ICP batch. These batches included a matrix spike (MS) and a sample duplicate (DUP). The percent recoveries (%R) obtained from the MS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The relative percent difference (RPD) obtained from the DUP is evaluated when the sample is greater than five times (5X) the contract required detection limit (RL). Quality control criteria were met for %R and RPD for all applicable parameters for the selected QC batches.

Serial Dilution Analysis
The designated quality control sample in the ICP batch (from SDG 99158) underwent a serial dilution analysis and met the quality control criteria of <10% for all applicable analytes. The acceptance criteria only applies to those elements greater than 50X the IDL.

Laboratory Control Samples
The laboratory control samples (LCSW) and the laboratory control sample duplicate (LCSD) met the quality control acceptance criteria for %R and RPD for all applicable parameters.

Sample Dilutions
No sample dilutions were required for this SDG.

Nonconformance Reports
No nonconformance report was issued for this SDG.

General Comments
The flagging conventions demonstrated in this package are assigned based on DL and RL values. All qualifiers assigned for this SDG have been determined after both DL and RL values have been corrected for prep and dilution factors.

Due to limitations of the forms generation software used to create the CLP-like forms for reporting data in a CLP-like data deliverable, several forms will report results to only one (e.g., Form 3a) or two (e.g., Forms 1, 5a, 9, 10) decimal places. This can result in concentrations, which are smaller than one tenth or one hundredth of the indicated reporting unit, to appear on the forms as either 0.0 or 0.00, respectively. In cases where this occurs on the forms the results have been manually corrected to reflect the additional decimal place values.

The preceding narrative has been reviewed by C. Bell for D. Grundy

Date: 10/4/99

INORGANIC ANALYSIS

Case Narrative for
Sandia National Laboratories
SDG 99228S

Metals Analysis by ICP
Mercury Analysis by CVAA

Sample Analysis

The samples were analyzed for metals using SW-846 method 6010B (ICP) and method 7471A (CVAA):

Laboratory Identification	Sample Description
9909228-02	050109-003 B9938-SP1-BH1-9.5-S
9909228-06	050049-003 SOLARDETOX-DF1-BH3-
9909228-09	050050-003 SOLARDETOX-DF1-BH3-
9909228-12	050052-003 SOLARDETOX-DF1-BH2-
9909228-15	050053-003 SOLARDETOX-DF1-BH2-
9909228-18	050055-003 SOLARDETOX-DF1-BH1-
9909228-21	050056-003 SOLARDETOX-DF1-BH1-
9909228-24	050057-003 SOLAR 9981A-SP1-BH1
9909228-27	050058-003 SOLAR 9981A-SP1-BH1
9909228-30	050059-003 SOLAR 9982-DW1-BH1-
9909228-33	050060-003 SOLAR 9982-DW1-BH1
9909228-36	050061-003 SOLAR 9982-DW1-BH1
9909228-39	050062-003 LFR-DF1-BH1-7-S
9909228-42	050063-003 LFR-DF1-BH1-12-S
9909228-45	050064-003 LFR-DF1-BH1-7-MS/MD
9909228-48	050065-003 LFR-DF1-BH2-7-S
9909228-51	050066-003 LFR-DF1-BH2-12-S
9909228-54	050067-003 LFR-DF1-BH3-7-S
9909228-57	050068-003 LFR-DF1-BH3-12-S
QC646904-ICP	Preparation Blank (PBS)
QC646905-ICP	Laboratory Control Sample (LCSS)
QC646906-ICP	Laboratory Control Sample Duplicate (LCSSD)
QC646907-ICP	050064-003 LFR-DF1-BH1-7-MS/MDL-Serial Dilution (SD)
QC646908-ICP	050064-003 LFR-DF1-BH1-7-MS/MDS-Matrix Spike (MS)
QC646909-ICP	050064-003 LFR-DF1-BH1-7-MS/MDSD-Matrix Spike Duplicate (MSD)
QC647057-CVAA	Preparation Blank (PBS)
QC647058-CVAA	Laboratory Control Sample (LCSS)
QC647059-CVAA	Laboratory Control Sample Duplicate (LCSSD)
QC647060-CVAA	050064-003 LFR-DF1-BH1-7-MS/MD S-Matrix Spike (MS)
QC647061-CVAA	050064-003 LFR-DF1-BH1-7-MS/MDD-Sample Duplicate (DUP)

System Configurations
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 were set at a power level of 950 watts, 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 nebulizer pressure setting of 26 PSI.

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 appropriate EPA SW846 procedures.

Instrument Calibration
The instruments were calibrated following method and manufacturers' specifications. The percent recoveries for arsenic and mercury in the CRDL standard were above the advisory limits. The cadmium result in the ICSA was below the negative CRDL; therefore, the sample results may reflect a negative bias for cadmium.

Holding Time
All samples were analyzed within the required holding times.

Blanks
The preparation and calibration blanks met all quality control criteria.

Spike Analyses
Sample 050064-003 LFR-DF1-BH1-7-MS/MD was designated as the quality control sample for the ICP and CVAA batches. Each batch included a matrix spike (MS), a sample duplicate (DUP-CVAA), or a matrix spike duplicate (MSD-ICP). The percent recoveries (%R) obtained from the MS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The relative percent difference (RPD) obtained from the DUP is evaluated when the sample is greater than five times (5X) the contract required detection limit (RL). The matrix spike met the recommended quality control criteria for percent recovery (75%-125%) for all applicable parameters, with the exception of barium, as indicated by the "**" qualifier. The relative percent differences (RPD%) between the sample and the MSD/DUP were within the acceptance limits of $\leq$20% for all elements, with the exception of mercury and barium, as indicated with the "**" qualifier. The mercury result for QC647061 contains "**" qualifier flags for the DUP analysis; however, the result was not considered a QC outlier because the concentration does not meet the 5X CRDL evaluation criteria listed above. The QC Summary Report is generated by LIMS, which is not programmed based on program-specific EPA Inorganics Functional Guidelines validation criteria.

Laboratory Control Samples
The laboratory control samples (LCSS) and the laboratory control sample duplicates (LCSD) met the quality control acceptance criteria for %R and RPD, with the exception of cadmium, lead, and silver, as indicated by the "**" qualifier. These elements have been identified as QC outliers based on comparison of their %R to laboratory-derived statistical process control (SPC) limits present in LIMS; however, all recoveries fall with in the certified acceptance limits supplied by the standard manufacturer.

Serial Dilution Analysis
The serial dilution sample (sample 050064-003 LFR-DF1-BH1-7-MS/MD) for the ICP batch met the quality control criteria of <10% for all analytes, with the exception of arsenic and silver. The acceptance criteria only applies to those elements greater than 50X the IDL. This is a tool used to monitor matrix enhancement or suppression caused by interferences present in the sample.

Sample Dilutions
All samples for the ICP batch were diluted at 2X. The LCSS and the LCSSD were diluted at 5X. For the CVAA batch all samples were analyzed undiluted, with the exception of the LCSS and LCSSD, which were analyzed at a 2X dilution. All samples are diluted to bring over-ranged targets within the instruments linear range and/or to eliminate potential mineral element interferences.

Nonconformance Reports
There were no nonconformance reports associated with this sample delivery group (SDG).

General Comments
The flagging conventions demonstrated in this package are assigned based on DL and RL values. All qualifiers assigned for this SDG have been determined after both DL and RL values have been corrected for prep and dilution factors.

Due to limitations of the forms generation software used to create the CLP-like forms for reporting data in a CLP-like data deliverable, several forms will report results to only one (e.g., Form 3a) or two (e.g., Forms 1, 5a, 9, 10) decimal places. This can result in concentrations, which are smaller than one tenth or one hundredth of the indicated reporting unit, to appear on the forms as either 0.0 or 0.00, respectively. In cases where this occurs on the forms the results have been manually corrected to reflect the additional decimal place values.

The preceding narrative has been reviewed by: C Beeler for D Brundey

Date: 10/4/99

GENERAL CHEMISTRY ANALYSIS

Case Narrative for
SNLS
SDG# 99228S

TOTAL CYANIDE

Analytical Batch Number: 158110

Analytical Method: EPA SW846 9012A

Laboratory Number	Sample Description
9909228-02	050109-003 B9938-SP1-BH1-9.5-S
9909228-36	050061-003 SOLAR 9982-DW1-BH1
9909228-39	050062-003 LFR-DF1-BH1-7-S
9909228-42	050063-003 LFR-DF1-BH1-12-S
9909228-45	050064-003 LFR-DF1-BH1-7-MS/MD
9909228-48	050065-003 LFR-DF1-BH2-7-S
9909228-51	050066-003 LFR-DF1-BH2-12-S
9909228-54	050067-003 LFR-DF1-BH3-7-S
9909228-57	050068-003 LFR-DF1-BH3-12-S
QC647276	Duplicate of 9909228-45
QC647277	Matrix Spike of 9909228-45
QC647278	Blank
QC647279	Laboratory Control Sample
QC647280	Laboratory Control Sample Duplicate

Sample Preparation:

All samples were prepared in accordance with accepted procedures. A Perstorp Midi-Still distillation unit was used for the distillation.

Instrument Calibration:

The instrument used was an Alpkem Flow Solution III colorimetric autoanalyzer. The instrument was properly calibrated on the day of the analysis.

Holding Time:

All samples were analyzed within the required holding time.

Blanks:

No target analytes were detected in the method blank above the required acceptance limit.

Spike Analyses:

The matrix spike was run on the following Sample Number.

9909228-45

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

Laboratory Control Samples:

All analyte recoveries in the laboratory control sample were within the required acceptance limits. All analytes in the laboratory control sample duplicate were within the required acceptance limits for relative percent difference.

Sample Duplicates:

The sample and duplicate results were less than the PQL; therefore, the RPD is not applicable.

Dilutions:

None of the samples were diluted.

Non Conformance Reports:

There were no Nonconformance Reports associated with this batch.

General Comments:

Due to Hurricane Floyd this batch was run on two different days with several days in between.

TOTAL CYANIDE

Analytical Batch Number: 158099

Analytical Method: EPA SW846 9012A

Laboratory Number	Sample Description
9909228-06	050049-003 SOLARDETOX-DF1-BH3-
9909228-09	050050-003 SOLARDETOX-DF1-BH3-
9909228-12	050052-003 SOLARDETOX-DF1-BH2-
9909228-15	050053-003 SOLARDETOX-DF1-BH2-
9909228-18	050055-003 SOLARDETOX-DF1-BH1-
9909228-21	050056-003 SOLARDETOX-DF1-BH1-
9909228-24	050057-003 SOLAR 9981A-SP1-BHI
9909228-27	050058-003 SOLAR 9981A-SP1-BH1
9909228-30	050059-003 SOLAR 9982-DW1-BH1-
9909228-33	050060-003 SOLAR 9982-DW1-BH1
QC647234	Duplicate of 9909228-33
QC647235	Matrix Spike of 9909228-33
QC647236	Blank
QC647237	Laboratory Control Sample
QC647238	Laboratory Control Sample Duplicate

Sample Preparation:

A Perstorp Midi- Still distillation unit was used for the distillation.

Instrument Calibration:

The instrument used was an Alpkem Flow Solution III colorimetric autoanalyzer. The instrument was properly calibrated on the day of the analysis.

Holding Time:

All samples were analyzed within the required holding time.

Blanks:

No target analytes were detected in the method blank above the required acceptance limit.

Spike Analyses:

The matrix spike was run on the following Sample Number.

9909228-33

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

Laboratory Control Samples:

All analyte recoveries in the laboratory control sample were within the required acceptance limits. All analytes in the laboratory control sample duplicate were within the required acceptance limits for relative percent difference.

Sample Duplicates:

The sample and duplicate results were less than the PQL; therefore, the RPD is not applicable.

Dilutions:

None of the samples were diluted.

Non Conformance Reports:

There were no Nonconformance Reports associated with this batch.

Case Narrative for
SNLS
SDG# 99228W

CYANIDE

Analytical Batch Number: 158008

Analytical Method: EPA 9012A

Laboratory Number	Sample Description
9909228-64	050069-010 LFR-DF1-BH3-CN
QC646808	Duplicate of9909156-05
QC646809	Matrix Spike of9909156-05
QC646810	Duplicate of 9909228-64
QC646811	Matrix Spike of9909228-64
QC646812	Blank
QC646813	Laboratory Control Sample
QC646814	Laboratory Control Sample Duplicate

Sample Preparation:

A Perstorp Midi- Still distillation unit was used for the distillation.

Instrument Calibration:

The instrument used was an Alpkem Flow Solution III colorimetric autoanalyzer. The instrument was properly calibrated on the day of the analysis.

Holding Time:

All samples were analyzed within the required holding time.

Blanks:

No target analytes were detected in the method blank above the required acceptance limit.

Spike Analyses:

The matrix spikes were run on the following Sample Numbers.

9909156-05 and 9909228-64

The matrix spike for 9909156-05 was outside the required acceptance limits due to matrix interference. The matrix spike for 9909228-64 was within the required acceptance limits.

Laboratory Control Samples:

All analyte recoveries in the laboratory control sample were within the required acceptance limits. All analytes in the laboratory control sample duplicate were within the required acceptance limits for relative percent difference.

Sample Duplicates:

The sample and duplicate results were less than the PQL; therefore, the RPD is not applicable.

Dilutions:

None of the samples were diluted.

Non Conformance Reports:

There were no Nonconformance Reports associated with this batch.

HEXAVALENT CHROMIUM

Analytical Batch Number: 158555

Analytical Method: EPA SW846 7196A

Laboratory Number	Sample Description
9909228-06	050049-003 SOLARDETOX-DF1-BH3-
9909228-09	050050-003 SOLARDETOX-DF1-BH3-
9909228-12	050052-003 SOLARDETOX-DF1-BH2-
9909228-15	050053-003 SOLARDETOX-DF1-BH2-
QC649065	Duplicate of 9909228-06
QC649067	Matrix Spike of 9909228-06
QC649068	Laboratory Control Sample
QC649069	Blank
QC649070	Laboratory Control Sample Duplicate

Sample Preparation:

All samples were prepared in accordance with accepted procedures.

Instrument Calibration:

The instrument used was a Sequoia-Turner Model 340 Spectrophotometer. The instrument was properly calibrated on the day of the analysis.

Holding Time:

All samples were analyzed within the required holding time.

Blanks:

No target analytes were detected in the method blank above the required acceptance limit.

Spike Analyses:

The matrix spike was run on the following Sample Number.

9909228-06

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

Laboratory Control Samples:

All analyte recoveries in the laboratory control sample were within the required acceptance limits. All analytes in the laboratory control sample duplicate were within the required acceptance limits for relative percent difference.

Sample Duplicates:

The sample and duplicate results were less than the PQL; therefore, the RPD is not applicable.

Dilutions:

None of the samples were diluted.

Non Conformance Reports:

There were no Nonconformance Reports associated with this batch.

General Comments:

An insoluble LCS was run with this batch. It showed 97% recovery.

HEXAVALENT CHROMIUM

Analytical Batch Number: 158556

Analytical Method: EPA SW846 7196A

Laboratory Number	Sample Description
9909228-02	050109-003 B9938-SP1-BH1-9.5-S
9909228-18	050055-003 SOLARDETOX-DF1-BH1-
9909228-21	050056-003 SOLARDETOX-DF1-BH1-
9909228-24	050057-003 SOLAR 9981A-SP1-BHI
9909228-27	050058-003 SOLAR 9981A-SP1-BH1
9909228-30	050059-003 SOLAR 9982-DW1-BH1-
9909228-33	050060-003 SOLAR 9982-DW1-BH1
9909228-36	050061-003 SOLAR 9982-DW1-BH1
9909228-39	050062-003 LFR-DF1-BH1-7-S
9909228-42	050063-003 LFR-DF1-BH1-12-S
9909228-45	050064-003 LFR-DF1-BH1-7-MS/MD
9909228-48	050065-003 LFR-DF1-BH2-7-S
9909228-51	050066-003 LFR-DF1-BH2-12-S
9909228-54	050067-003 LFR-DF1-BH3-7-S
9909228-57	050068-003 LFR-DF1-BH3-12-S
QC649071	Duplicate of 9909228-18
QC649072	Matrix Spike of 9909228-18
QC649074	Duplicate of 9909228-45
QC649075	Matrix Spike of 9909228-45
QC649077	Laboratory Control Sample
QC649078	Blank
QC649079	Laboratory Control Sample Duplicate

Sample Preparation:

All samples were prepared in accordance with accepted procedures.

Instrument Calibration:

The instrument used was a Sequoia-Turner Model 340 Spectrophotometer. The instrument was properly calibrated on the day of the analysis.

Holding Time:

All samples were analyzed within the required holding time.

Blanks:

No target analytes were detected in the method blank above the required acceptance limit.

Spike Analyses:

The matrix spikes were run on the following Sample Numbers.

9909228-18 and 9909228-45

All analyte recoveries in the matrix spikes were within the required acceptance limits.

Laboratory Control Samples:

All analyte recoveries in the laboratory control sample were within the required acceptance limits. All analytes in the laboratory control sample duplicate were within the required acceptance limits for relative percent difference.

Sample Duplicates:

All sample duplicate results were within the required acceptance limits.

Dilutions:

None of the samples were diluted.

Non Conformance Reports:

There were no Nonconformance Reports associated with this batch.

General Comments:

An insoluble LCS was run with this batch. It showed 95% recovery.

The preceding narratives have been reviewed by: [signature] Date: 10/04/99

HEXAVALENT CHROMIUM

Analytical Batch Number: 157999

Analytical Method: EPA 7196A

Laboratory Number	Sample Description
9909228-65	050069-011 LFR-DF1-BH3-CR6+
QC646774	Duplicate of9909228-65
QC646775	Matrix Spike of9909228-65
QC646776	Laboratory Control Sample
QC646777	Laboratory Control Sample Duplicate
QC646778	Blank

Instrument Calibration:

The instrument used was a Sequoia-Turner Model 340 Spectrophotometer. The instrument was properly calibrated on the day of the analysis.

Holding Time:

All samples were analyzed within the required holding time.

Blanks:

No target analytes were detected in the method blank above the required acceptance limit.

Spike Analyses:

The matrix spike was run on the following Sample Number.

9909228-65

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

Laboratory Control Samples:

All analyte recoveries in the laboratory control sample were within the required acceptance limits.All analytes in the laboratory control sample duplicate were within the required acceptance limits for relative percent difference.

Sample Duplicates:

All sample duplicate results were within the required acceptance limits.

Dilutions:

None of the samples were diluted.

Non Conformance Reports:

There were no Nonconformance Reports associated with this batch.

The above narratives have been reviewed by: [signature] Date: 10/04/99

QC Summary Report

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
General Chemistry													
QC646812	BLANK	158008											
Cyanide, Total					U	ND	mg/l				JLP	09/13/99	1441
QC647236	BLANK	158099											
Cyanide, Total					U	ND	mg/kg				JLP	09/10/99	1545
QC647278	BLANK	158110											
Cyanide, Total					U	ND	mg/kg				JLP	09/14/99	1126
QC646810	9909228-64DUP	158008											
Cyanide, Total					U	ND	mg/l	0.00		(0.00 - 20.0)	JLP	09/13/99	1438
QC647234	9909228-33DUP	158099											
Cyanide, Total					U	ND	mg/kg	0.00		(0.00 - 30.0)	JLP	09/10/99	1541
QC647276	9909228-45DUP	158110											
Cyanide, Total					J	0.182	mg/kg	200**		(0.00 - 30.0)	JLP	09/17/99	1719
QC646813	LCS	158008											
Cyanide, Total			0.100			0.0800	mg/l		80.0	(75.0 - 132.)	JLP	09/13/99	1442
QC647237	LCS	158099											
Cyanide, Total			5.00			3.89	mg/kg		77.7	(60.0 - 125.)	JLP	09/10/99	1546
QC647279	LCS	158110											
Cyanide, Total			5.00			3.54	mg/kg		70.7	(60.0 - 125.)	JLP	09/14/99	1128
QC646814	LCS DUP	158008											
Cyanide, Total			0.100	0.0800		0.0855	mg/l	6.66	85.5	(0.00 - 20.0)	JLP	09/13/99	1444
QC647238	LCS DUP	158099											
Cyanide, Total			5.00	3.89		3.87	mg/kg	0.515	77.3	(0.00 - 30.0)	JLP	09/10/99	1547
QC647280	LCS DUP	158110											
Cyanide, Total			5.00	3.54		4.15	mg/kg	16.0	83.0	(0.00 - 30.0)	JLP	09/14/99	1129
QC646811	9909228-64MS	158008											
Cyanide, Total			0.100	U ND		0.0752	mg/l		75.2	(75.0 - 125.)	JLP	09/13/99	1440
QC647235	9909228-33MS	158099											
Cyanide, Total			4.99	U ND		4.09	mg/kg		81.9	(70.0 - 130.)	JLP	09/10/99	1543
QC647277	9909228-45MS	158110											
Cyanide, Total			4.98	U ND		3.64	mg/kg		73.1	(70.0 - 130.)	JLP	09/14/99	1117
QC646778	BLANK	157999											
Chromium, Hexavalent					U	ND	mg/l				LAA	09/08/99	1900
QC649069	BLANK	158555											
Chromium, Hexavalent					U	ND	mg/kg				JBK	09/22/99	1430
QC649078	BLANK	158556											
Chromium, Hexavalent					U	ND	mg/kg						
QC646774	9909228-65DUP	157999											
Chromium, Hexavalent					U	ND	mg/l	0.00		(0.00 - 13.0)	LAA	09/08/99	1900
QC649065	9909228-06DUP	158555											

QC Summary Report

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
Chromium, Hexavalent					J	0.112	mg/kg	32.3**		(0.00 - 30.0)	JBK	09/22/99	1430
QC649071	9909228-18DUP	158556											
Chromium, Hexavalent					J	0.0794	mg/kg	23.6		(0.00 - 30.0)	JBK	09/22/99	1430
QC649074	9909228-45DUP	158556											
Chromium, Hexavalent					J	0.155	mg/kg	16.3		(0.00 - 30.0)			
QC646776	LCS	157999											
Chromium, Hexavalent			0.100			0.100	mg/l		100	(83.8 - 116.)	LAA	09/08/99	1900
QC649068	LCS	158555											
Chromium, Hexavalent			1.00			1.02	mg/kg		102	(76.0 - 122.)	JBK	09/22/99	1430
QC649077	LCS	158556											
Chromium, Hexavalent			1.00			0.980	mg/kg		98.0	(76.0 - 122.)			
QC646777	LCS DUP	157999											
Chromium, Hexavalent			0.100	0.100		0.101	mg/l	0.995	101	(0.00 - 20.0)	LAA	09/08/99	1900
QC649070	LCS DUP	158555											
Chromium, Hexavalent			1.00	1.02		0.910	mg/kg	11.4	91.0	(0.00 - 30.0)	JBK	09/22/99	1430
QC649079	LCS DUP	158556											
Chromium, Hexavalent			1.00	0.980		0.930	mg/kg	5.24	93.0	(0.00 - 30.0)			
QC646775	9909228-65MS	157999											
Chromium, Hexavalent			0.100	U ND		0.105	mg/l		105	(85.0 - 115.)	LAA	09/08/99	1900
QC649067	9909228-06MS	158555											
Chromium, Hexavalent			1.00	J 0.0807		1.07	mg/kg		99.0	(70.0 - 130.)	JBK	09/22/99	1430
QC649072	9909228-18MS	158556											
Chromium, Hexavalent			1.00	J 0.101		1.05	mg/kg		94.8	(70.0 - 130.)			
QC649075	9909228-45MS	158556											
Chromium, Hexavalent			1.00	J 0.182		1.12	mg/kg		93.7	(70.0 - 130.)			
QC647643	BLANK	158199											
Moisture					U	ND	wt%				GJ	09/13/99	1550
QC647646	BLANK	158200											
Moisture					U	ND	wt%				GJ	09/13/99	1510
QC648040	BLANK	158297											
Moisture					U	ND	wt%				GJ	09/13/99	1700
QC647641	9909228-15DUP	158199											
Moisture						4.00	wt%	28.6		(-)	GJ	09/13/99	1550
QC647642	9909228-17DUP	158199											
Moisture						2.00	wt%	0.00		(-)			
QC647644	9909228-43DUP	158200											
Moisture						6.00	wt%	18.2		(-)	GJ	09/13/99	1510
QC647645	9909228-47DUP	158200											
Moisture						3.00	wt%	40.0		(-)			
QC648039	9909228-57DUP	158297											

QC Summary Report

Project Description: RFP #AJ2480A

cc: SNLS00396   Lab. Sample ID: 9909228%   Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
Moisture						6.00	wt%	18.2		(-)	GJ	09/13/99	1700

RADIOLOGICAL ANALYSIS

Case Narrative for
SANDIA – 99228S

GROSS ALPHA/BETA

Analytical Batch Number: 158646

Analytical Method: EPA 900.0

Laboratory Number	Sample Description
9909228-03	050109-004 B9938-SP1-BH1-9.5-S
QC649391	Blank
QC649392	Duplicate of 050109-004 B9938-SP1-BH1-9.5-S
QC649393	Matrix Spike of 050109-004 B9938-SP1-BH1-9.5-S
QC649394	Matrix Spike Duplicate of 050109-004 B9938-SP1-BH1-9.5-S
QC649395	Laboratory Control Sample

Instrument Calibration:

The instrument was properly calibrated. The instrument was calibrated as follows: drawers A1-G4 on 5/31/99, drawers I1-J4 on 2/3/99.

Holding Time:

All samples were analyzed within the required holding time.

Blanks:

No target analytes were detected in the method blank above the required acceptance limit.

Spike Analyses:

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

Laboratory Control Samples:

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

Sample Duplicates:

All sample duplicate results were within the required acceptance limits.

Dilutions:

None of the samples were diluted.

Non Conformance Reports:

There were no Nonconformance Reports associated with this batch.

General Comment:

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.

GROSS ALPHA/BETA

Analytical Batch Number: 158647

Analytical Method: EPA 900.0

Laboratory Number	Sample Description
9909228-07	050049-004 SOLARDETOX-DF1-BH3-
9909228-10	050050-004 SOLADEXTOX-DF1-BH3-
9909228-13	050052-004 SOLARDETOX-DF1-BH2-
9909228-16	050053-004 SOLARDETOX-DF1-BH2-
9909228-19	050055-004 SOLARDETOX-DF1-BH1-
9909228-22	050056-004 SOLARDETOX-DF1-BH1-
9909228-25	050057-004 SOLAR 9981A-SP1-BH1
9909228-28	050058-004 SOLAR 9981A-SP1-BH1
9909228-31	050059-004 SOLAR 9982-DW1-BH1-
9909228-34	050060-004 SOLAR 9982-DW1-BH1
9909228-37	050061-004 SOLAR 9982-DW1-BH1
9909228-40	050062-004 LFR-DF1-BH1-7-S
9909228-43	050063-004 LFR-DF1-BH1-12-S
9909228-46	050064-004 LFR-DF1-BH1-7-MS/MD
9909228-49	050065-004 LFR-DF1-BH2-7-S
9909228-52	050066-004 LFR-DF1-BH2-12-S
9909228-55	050067-004 LFR-DF1-BH3-7-S
9909228-58	050068-004 LFR-DF1-BH3-12-S
QC649396	Blank
QC649397	Duplicate of 050064-004 LFR-DF1-BH1-7-MS/MD
QC649398	Matrix Spike of 050064-004 LFR-DF1-BH1-7-MS/MD
QC649399	Matrix Spike Duplicate of 050064-004 LFR-DF1-BH1-7-MS/MD
QC649400	Laboratory Control Sample

Instrument Calibration:

The instrument was properly calibrated. The instrument was calibrated as follows: drawers A1-G4 on 5/31/99, drawers I1-J4 on 2/3/99.

Holding Time:

All samples were analyzed within the required holding time.

Blanks:

No target analytes were detected in the method blank above the required acceptance limit.

Spike Analyses:

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

Laboratory Control Samples:

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

Sample Duplicates:

All sample duplicate results were within the required acceptance limits.

Dilutions:

None of the samples were diluted.

Non Conformance Reports:

There were no Nonconformance Reports associated with this batch.

General Comment:

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.

GAMMA SPECTROSCOPY

Analytical Batch Number: 158553

Analytical Method: HASL 300

Laboratory Number	Sample Description
9909228-03	050109-004 B9938-SP1-BH1-9.5-S
9909228-07	050049-004 SOLARDETOX-DF1-BH3-
9909228-10	050050-004 SOLADEXTOX-DF1-BH3-
9909228-13	050052-004 SOLARDETOX-DF1-BH2-
9909228-16	050053-004 SOLARDETOX-DF1-BH2-
9909228-19	050055-004 SOLARDETOX-DF1-BH1-
9909228-22	050056-004 SOLARDETOX-DF1-BH1-
9909228-25	050057-004 SOLAR 9981A-SP1-BH1
9909228-28	050058-004 SOLAR 9981A-SP1-BH1
9909228-31	050059-004 SOLAR 9982-DW1-BH1-
9909228-34	050060-004 SOLAR 9982-DW1-BH1
9909228-37	050061-004 SOLAR 9982-DW1-BH1
9909228-40	050062-004 LFR-DF1-BH1-7-S
9909228-43	050063-004 LFR-DF1-BH1-12-S
9909228-46	050064-004 LFR-DF1-BH1-7-MS/MD
9909228-49	050065-004 LFR-DF1-BH2-7-S
9909228-52	050066-004 LFR-DF1-BH2-12-S
9909228-55	050067-004 LFR-DF1-BH3-7-S
9909228-58	050068-004 LFR-DF1-BH3-12-S
QC649050	Blank
QC649051	Duplicate of 050064-004 LFR-DF1-BH1-7-MS/MD
QC649052	Laboratory Control Sample

Instrument Calibration:

The instrument was properly calibrated. All gamma detectors were calibrated during February and March of 1999.

Holding Time:

All samples were analyzed within the required holding time.

Blanks:

No target analytes were detected in the method blank above the required acceptance limit.

Laboratory Control Samples:

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

Sample Duplicates:

All sample duplicate results were within the required acceptance limits.

General Comments:

The following isotopes were not quantified due to low abundance: 9909228-07;Th-231, 9909228-13; Th-231, 9909228-19;Th-231,Fe-59, 9909228-25;Th-231, 9909228-31;Th-231, 9909228-40;Ac-228, Ra-228, 9909228-43;Ac-228,Ra-228,Th-231, 9909228-52;Th-231, 9909228-55;Th-231, QC649051; Ac-228,Th-231. The following isotopes were not quantified due to interference: 9909228-03;Ru-106.

The above case narrative was reviewed by: M. Moore Date: 7Oct1999

Case Narrative for
SANDIA – 99228W

GAMMA SPECTROSCOPY

Analytical Batch Number: 158575

Analytical Method: EPI A-013

Laboratory Number	Sample Description
9909228-59	050069-005 LFR-DF1-BH3-GS
QC649134	Blank
QC649135	Duplicate of 050069-005 LFR-DF1-BH3-GS
QC649136	Matrix Spike of 050069-005 LFR-DF1-BH3-GS
QC649137	Matrix Spike Duplicate of 050069-005 LFR-DF1-BH3-GS
QC649138	Laboratory Control Sample

Instrument Calibration:

The instrument was properly calibrated. All gamma calibrations were performed during February and March of 1999.

Holding Time:

All samples were analyzed within the required holding time.

Blanks:

No target analytes were detected in the method blank above the required acceptance limit.

Spike Analyses:

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

Laboratory Control Samples:

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

Sample Duplicates:

All sample duplicate results were within the required acceptance limits.

General Comments:

The following isotopes were not quantified due to low abundance: QC649134;Cs-137,Th-234,U-238, QC649135;Pb-212,Th-232,Th-234,U-238.

GROSS ALPHA/BETA

Analytical Batch Number: 158539

Analytical Method: EPA 900.0

Laboratory Number	Sample Description
9909228-60	050069-006 LFR-DF1-BH3-GRAB

QC649007	Blank
QC649008	Duplicate of 050069-006 LFR-DF1-BH3-GRAB
QC649009	Matrix Spike of 050069-006 LFR-DF1-BH3-GRAB
QC649010	Matrix Spike Duplicate of 050069-006 LFR-DF1-BH3-GRAB
QC649011	Laboratory Control Sample

Instrument Calibration:

The instrument was properly calibrated. The instrument was calibrated as follows: drawers A1-G4 on 5/31/99, drawers I1-J4 on 2/3/99.

Holding Time:

All samples were analyzed within the required holding time.

Blanks:

No target analytes were detected in the method blank above the required acceptance limit.

Spike Analyses:

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

Laboratory Control Samples:

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

Sample Duplicates:

All sample duplicate results were within the required acceptance limits.

Dilutions:

None of the samples were diluted.

Non Conformance Reports:

There were no Nonconformance Reports associated with this batch.

General Comment:

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.

The above case narrative was reviewed by: M. Moore Date: 1 Oct 1999

QC Summary Report

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
Radiological													
QC649007	BLANK	158539											
Gross Alpha					U	0.132	pCi/l				TMC	10/01/99	1336
Nonvolatile Beta					U	-0.137	pCi/l						
Weight of Sample, A&B						4.20	mg						
QC649391	BLANK	158646											
Gross Alpha						1.59	pCi/g				TMC	09/30/99	1800
Nonvolatile Beta						3.13	pCi/g						
Weight of Sample, A&B						0.800	mg						
QC649396	BLANK	158647											
Gross Alpha					U	0.141	pCi/g				SRB	09/29/99	1545
Nonvolatile Beta					U	0.119	pCi/g						
Weight of Sample, A&B						1.50	mg						
QC649008	9909228-60DUP	158539											
Gross Alpha					U	0.213	pCi/l	0.00		(0.00 - 20.0)	TMC	09/30/99	0213
Nonvolatile Beta					U	0.0671	pCi/l	0.00		(0.00 - 20.0)			
QC649392	9909228-03DUP	158646											
Gross Alpha						10.2	pCi/g	32.3**		(0.00 - 20.0)	TMC	09/30/99	1800
Nonvolatile Beta						31.7	pCi/g	9.74		(0.00 - 20.0)			
QC649397	9909228-46DUP	158647											
Gross Alpha						6.96	pCi/g	47.2**		(0.00 - 20.0)	SRB	09/29/99	1450
Nonvolatile Beta						11.1	pCi/g	9.24		(0.00 - 20.0)			
QC649011	LCS	158539											
Gross Alpha			90.5			108	pCi/l		119	(75.0 - 125.)	TMC	10/06/99	1311
Nonvolatile Beta			83.7			94.2	pCi/l		112	(75.0 - 125.)			
QC649395	LCS	158646											
Gross Alpha			38.5			38.2	pCi/g		99.3	(75.0 - 125.)	TMC	10/04/99	2104
Nonvolatile Beta			33.5			30.3	pCi/g		90.5	(75.0 - 125.)			
QC649400	LCS	158647											
Gross Alpha			36.2			41.7	pCi/g		115	(75.0 - 125.)	SRB	09/29/99	1545
Nonvolatile Beta			33.5			36.3	pCi/g		108	(75.0 - 125.)			
QC649009	9909228-60MS	158539											
Gross Alpha			181	U -0.000235		192	pCi/l		106	(75.0 - 125.)	TMC	09/29/99	1803
Nonvolatile Beta			168	U 0.417		161	pCi/l		96.2	(75.0 - 125.)			
QC649393	9909228-03MS	158646											
Gross Alpha			296	7.34		270	pCi/g		88.9	(75.0 - 125.)	TMC	09/30/99	1700
Nonvolatile Beta			258	28.8		287	pCi/g		100	(75.0 - 125.)			
QC649398	9909228-46MS	158647											
Gross Alpha			292	11.3		283	pCi/g		93.1	(75.0 - 125.)	SRB	09/29/99	1545
Nonvolatile Beta			270	10.1		263	pCi/g		93.6	(75.0 - 125.)			

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
QC649010	9909228-60MSD	158539											
Gross Alpha			181	U -0.000285		215	pCi/l	11.5	119	(0.00 - 20.0)	TMC	10/06/99	1130
Nonvolatile Beta			167	U 0.417		198	pCi/l	20.7**	119	(0.00 - 20.0)			
QC649394	9909228-03MSD	158646											
Gross Alpha			296	7.34		277	pCi/g	2.47	91.1	(0.00 - 20.0)	TMC	09/30/99	1700
Nonvolatile Beta			258	28.8		259	pCi/g	11.7	89.3	(0.00 - 20.0)			
QC649399	9909228-46MSD	158647											
Gross Alpha			307	11.3		337	pCi/g	13.3	106	(0.00 - 20.0)	SRB	09/29/99	1545
Nonvolatile Beta			284	10.1		276	pCi/g	0.131	93.7	(0.00 - 20.0)			
QC649050	BLANK	158553											
Americium-241					U	0.0119	pCi/g				EJB	09/20/99	1237
Cesium-137						0.0373	pCi/g						
Cobalt-60					U	-0.00164	pCi/g						
Actinium-228						0.106	pCi/g						
Cerium-144					U	0.0208	pCi/g						
Cesium-134					U	-0.00928	pCi/g						
Chromium-51					U	0.0101	pCi/g						
Iron-59					U	0.0185	pCi/g						
Lead-212						0.0409	pCi/g						
Lead-214					U	0.0312	pCi/g						
Potassium-40					U	0.218	pCi/g						
Radium-226					U	0.0170	pCi/g						
Radium-228						0.106	pCi/g						
Ruthenium-103					U	0.0105	pCi/g						
Ruthenium-106					U	-0.0962	pCi/g						
Thorium-231					U	0.0115	pCi/g						
Thorium-232						0.0405	pCi/g						
Thorium-234					U	0.245	pCi/g						
Uranium-235						0.116	pCi/g						
Uranium-238					U	0.245	pCi/g						
Yttrium-88					U	-0.0291	pCi/g						
Zirconium-95					U	-0.0251	pCi/g						
QC649134	BLANK	158575											
Americium-241					U	3.05	pCi/L				EJB	09/20/99	1925
Cesium-137					U	0.00	pCi/L						
Cobalt-60						1.96	pCi/L						
Actinium-228					U	7.11	pCi/L						
Cerium-144					U	6.06	pCi/L						
Cesium-134					U	-4.37	pCi/L						
Chromium-51					U	4.94	pCi/L						

QC Summary Report

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
Iron-59					U	-2.41	pCi/L				EJB	09/20/99	1925
Lead-212						4.96	pCi/L						
Lead-214						8.63	pCi/L						
Potassium-40					U	5.56	pCi/L						
Radium-226						5.22	pCi/L						
Radium-228					U	7.11	pCi/L						
Ruthenium-103					U	-0.647	pCi/L						
Ruthenium-106					U	18.1	pCi/L						
Thorium-231					U	2.45	pCi/L						
Thorium-232						4.97	pCi/L						
Thorium-234					U	0.00	pCi/L						
Uranium-235					U	9.99	pCi/L						
Uranium-238					U	0.00	pCi/L						
Yttrium-88					U	0.213	pCi/L						
Zirconium-95					U	1.63	pCi/L						
QC649051	9909228-46DUP	158553											
Americium-241					U	-0.0742	pCi/g	0.00		(0.00 - 20.0)	EJB	09/20/99	1238
Cesium-137					U	-0.00338	pCi/g	0.00		(0.00 - 20.0)			
Cobalt-60					U	-0.00299	pCi/g	0.00		(0.00 - 20.0)			
Actinium-228					U	0.00	pCi/g	0.00		(0.00 - 20.0)			
Cerium-144					U	0.0492	pCi/g	0.00		(0.00 - 20.0)			
Cesium-134					U	0.00174	pCi/g	0.00		(0.00 - 20.0)			
Chromium-51					U	0.114	pCi/g	0.00		(0.00 - 20.0)			
Iron-59					U	0.0321	pCi/g	0.00		(0.00 - 20.0)			
Lead-212						0.297	pCi/g	8.72		(0.00 - 20.0)			
Lead-214						0.807	pCi/g	11.5		(0.00 - 20.0)			
Potassium-40						4.62	pCi/g	6.68		(0.00 - 20.0)			
Radium-226						0.709	pCi/g	2.09		(0.00 - 20.0)			
Radium-228						0.227	pCi/g	200		(0.00 - 20.0)			
Ruthenium-103					U	-0.00178	pCi/g	0.00		(0.00 - 20.0)			
Ruthenium-106					U	-0.0113	pCi/g	0.00		(0.00 - 20.0)			
Thorium-231					U	0.00	pCi/g	0.00		(0.00 - 20.0)			
Thorium-232						0.292	pCi/g	8.69		(0.00 - 20.0)			
Thorium-234					U	0.0837	pCi/g	200		(0.00 - 20.0)			
Uranium-235					U	-0.0381	pCi/g	0.00		(0.00 - 20.0)			
Uranium-238					U	0.0837	pCi/g	200		(0.00 - 20.0)			
Yttrium-88					U	0.0102	pCi/g	0.00		(0.00 - 20.0)			
Zirconium-95						0.0552	pCi/g	0.00		(0.00 - 20.0)			
QC649135	9909228-59DUP	158575											
Americium-241						2.62	pCi/L	0.00		(0.00 - 20.0)	EJB	09/21/99	1812

QC Summary Report

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
Cesium-137					U	3.28	pCi/L	0.00		(0.00 - 20.0)	EJB	09/21/99	1812
Cobalt-60					U	-1.46	pCi/L	0.00		(0.00 - 20.0)			
Actinium-228					U	5.83	pCi/L	0.00		(0.00 - 20.0)			
Cerium-144					U	1.03	pCi/L	0.00		(0.00 - 20.0)			
Cesium-134					U	0.931	pCi/L	0.00		(0.00 - 20.0)			
Chromium-51					U	-14.0	pCi/L	0.00		(0.00 - 20.0)			
Iron-59					U	3.41	pCi/L	0.00		(0.00 - 20.0)			
Lead-212					U	0.00	pCi/L	0.00		(0.00 - 20.0)			
Lead-214						8.96	pCi/L	0.00		(0.00 - 20.0)			
Potassium-40						36.1	pCi/L	0.00		(0.00 - 20.0)			
Radium-226						8.45	pCi/L	0.00		(0.00 - 20.0)			
Radium-228					U	5.83	pCi/L	0.00		(0.00 - 20.0)			
Ruthenium-103						4.38	pCi/L	0.00		(0.00 - 20.0)			
Ruthenium-106					U	-7.07	pCi/L	0.00		(0.00 - 20.0)			
Thorium-231					U	9.27	pCi/L	0.00		(0.00 - 20.0)			
Thorium-232					U	0.00	pCi/L	0.00		(0.00 - 20.0)			
Thorium-234					U	0.00	pCi/L	0.00		(0.00 - 20.0)			
Uranium-235					U	8.44	pCi/L	0.00		(0.00 - 20.0)			
Uranium-238					U	0.00	pCi/L	0.00		(0.00 - 20.0)			
Yttrium-88					U	0.756	pCi/L	0.00		(0.00 - 20.0)			
Zirconium-95						10.3	pCi/L	0.00		(0.00 - 20.0)			
QC649052	LCS	158553											
Americium-241			1140			1080	pCi/g		94.2	(75.0 - 125.)	EJB	09/20/99	1738
Cesium-137			441			464	pCi/g		105	(75.0 - 125.)			
Cobalt-60			702			709	pCi/g		101	(75.0 - 125.)			
QC649138	LCS	158575											
Americium-241			852			1040	pCi/L		122	(75.0 - 125.)	EJB	09/20/99	1959
Cesium-137			329			329	pCi/L		100	(75.0 - 125.)			
Cobalt-60			484			465	pCi/L		96.2	(75.0 - 125.)			
QC649136	9909228-59MS	158575											
Americium-241			8520	1.59	U	9540	pCi/L		112	(75.0 - 125.)	EJB	09/20/99	1956
Cesium-137			3290	0.372	U	3510	pCi/L		107	(75.0 - 125.)			
Cobalt-60			4860	5.86		5000	pCi/L		103	(75.0 - 125.)			
QC649137	9909228-59MSD	158575											
Americium-241			8520	1.59	U	8720	pCi/L	9.02	102	(0.00 - 20.0)	EJB	09/21/99	1842
Cesium-137			3290	0.372	U	3500	pCi/L	0.228	106	(0.00 - 20.0)			
Cobalt-60			4860	5.86		5260	pCi/L	5.22	108	(0.00 - 20.0)			

QC Summary Report

Project Description: RFP #AJ2480A

cc: SNLS00396 Lab. Sample ID: 9909228% Report Date: October 07, 1999

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time

Notes:
The qualifiers in this report are defined as follows:
J indicates presence of analyte between DL (Detect Limit) and RL (Report Limit)
U indicates presence of analyte < DL (Detect Limit)

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

CAC

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

SEP 2 1 2005

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

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

Dear Mr. Bearzi:

On behalf of the Department of Energy (DOE) and Sandia Corporation, DOE is submitting the enclosed Solid Waste Management Unit (SWMU) Assessment Reports and Proposals for Corrective Action Complete (CAC) for Drain and Septic Systems (DSS) Area of Concern (AOC) Sites 1094, 1095, 1114, 1115, 1116, and 1117. DOE is also submitting responses to Requests for Supplemental Information (RSIs) for SWMUs 140, 147, and 150 at Sandia National Laboratories, New Mexico, EPA ID No. NM5890110518. These documents are compiled as DSS Round 10 and CAC (formerly No further Action [NFA]) Batch 28.

This submittal includes descriptions of the site characterization work and risk assessments for DSS AOCs and SWMUs 1094, 1095, 1114, 1115, 1116, 1117, 140, 147, and 150. The risk assessments conclude that, for these nine sites: (1) there is no significant risk to human health under both the industrial and residential land-use scenarios; and (2) that there are no ecological risks associated with these sites.

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

If you have any questions, please contact me at (505) 845-6036, or John Gould at (505) 845-6089.

Sincerely,

Patty Wagner
Manager

Enclosure

cc w/enclosure:
L. King, USEPA, Region 6 (Via Certified Mail)
W. Moats, NMED-HWB (Via Certified Mail)
J. Volkerding, DOE-NMED-OB (2 copies)

cc w/o enclosure.:
T. Longo, NNSA/NA-56
F. Nimick, SNL, MS 1089
P. Freshour, 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
R. E. Fate, SNL, MS 1089
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 1094, LIVE FIRE RANGE EAST SEPTIC SYSTEM (LURANCE CANYON)

September 2005

United States Department of Energy
Sandia Site Office

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ACRONYMS AND ABBREVIATIONS

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

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1.0 PROJECT BACKGROUND

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

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

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

A number of additional drain systems were identified from the engineering drawings and field inspection work. It was also determined that some of the sites on the 1996 list actually contained more than one individual drain or septic system that had been combined under one four-digit site number. In order to reduce confusion, a decision was made to assign each individual system its own unique four-digit number. A new site list containing a total of 121 individual DSS sites was generated in 2000. Of these 121 sites, the NMED required environmental assessment work at a total of 61. No characterization was required at the remaining 60 sites because the sites either were found not to exist, were the responsibility of other non-SNL/NM organizations, were already designated as individual SWMUs, or were considered by the NMED to pose no threat to human health or the environment. Subsequent backhoe excavation at DSS Site 1091 confirmed that the system did not exist, which decreased the number of DSS sites requiring characterization to 60.

Concurrent with the field inspection and site identification work, NMED/HWB and SNL/NM ER Project technical personnel worked together to reach consensus on a staged approach and specific procedures that would be used to characterize the DSS sites, as well as the remaining OU 1295 Septic Tanks and Drainfield SWMUs that had not been approved for NFA. These procedures are described in detail in the "Sampling and Analysis Plan [SAP] for Characterizing and Assessing Potential Releases to the Environment From Septic and Other Miscellaneous Drain Systems at Sandia National Laboratories/New Mexico" (SNL/NM October 1999), which was approved by the NMED/HWB on January 28, 2000 (Bearzi January 2000). A follow-on document, "Field Implementation Plan [FIP], Characterization of Non-Environmental Restoration Drain and Septic Systems" (SNL/NM November 2001a), 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 1094: LIVE FIRE RANGE EAST SEPTIC SYSTEM

2.1 Summary

The SNL/NM ER Project conducted an assessment of DSS Site 1094, the Live Fire Range East 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 Live Fire Range East Septic System, and that it does not pose a threat to human health or the environment under either the recreational or residential land-use scenarios. Current operations at the site are conducted in accordance with applicable laws and regulations that are protective of the environment.

Review and analysis of all relevant data for DSS Site 1094 indicate that concentrations of constituents of concern (COCs) at this site are below applicable risk assessment action levels. Thus, a determination of Corrective Action Complete (CAC) without controls (NMED April 2004) is recommended for DSS Site 1094 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 1094 is located in Lurance Canyon within the boundaries of the U.S. Forest Service Withdrawn Area on federally owned land controlled by Kirtland Air Force Base (KAFB) and permitted to the U.S. Department of Energy. The site is located on Coyote Springs Road approximately 3.6 miles east of the Coyote Springs Road intersection with Lovelace Road (Figure 2.2.1-1). The active septic system septic tank is located approximately 50 feet southeast of the perimeter fence around a maintenance building and trailer complex that support the Live Fire Range activities. The system consists of a 1,000-gallon septic tank that empties to a drainfield with two 110-foot-long, parallel drain lines (Figure 2.2.1-2). Construction details are based upon engineering drawings (SNL/NM May 1983), site inspections, and backhoe excavations of the system. The system is still active and receives discharges from the Live Fire Range support building and trailer complex, approximately 50 feet to the northwest.

DSS Site 1094 is located near the active channel of Arroyo del Coyote in the Lurance Canyon portion of the drainage basin. The site geology consists of discontinuous channel deposits of alluvial materials derived from, and overlying, local bedrock. Bedrock in the area is comprised of Precambrian-age biotite-granites, metavolcanics, metasediments, and Paleozoic sedimentary rocks. The alluvial materials are extremely heterogeneous mixtures of poorly weathered soils, silts, poorly sorted sands and gravels, boulders, and blocks derived from the Precambrian and Paleozoic rocks. Figure 2.2.1-3 shows an outcrop of these alluvial deposits exposed in the stream bank near DSS Site 1094. Individual beds are also extremely variable in

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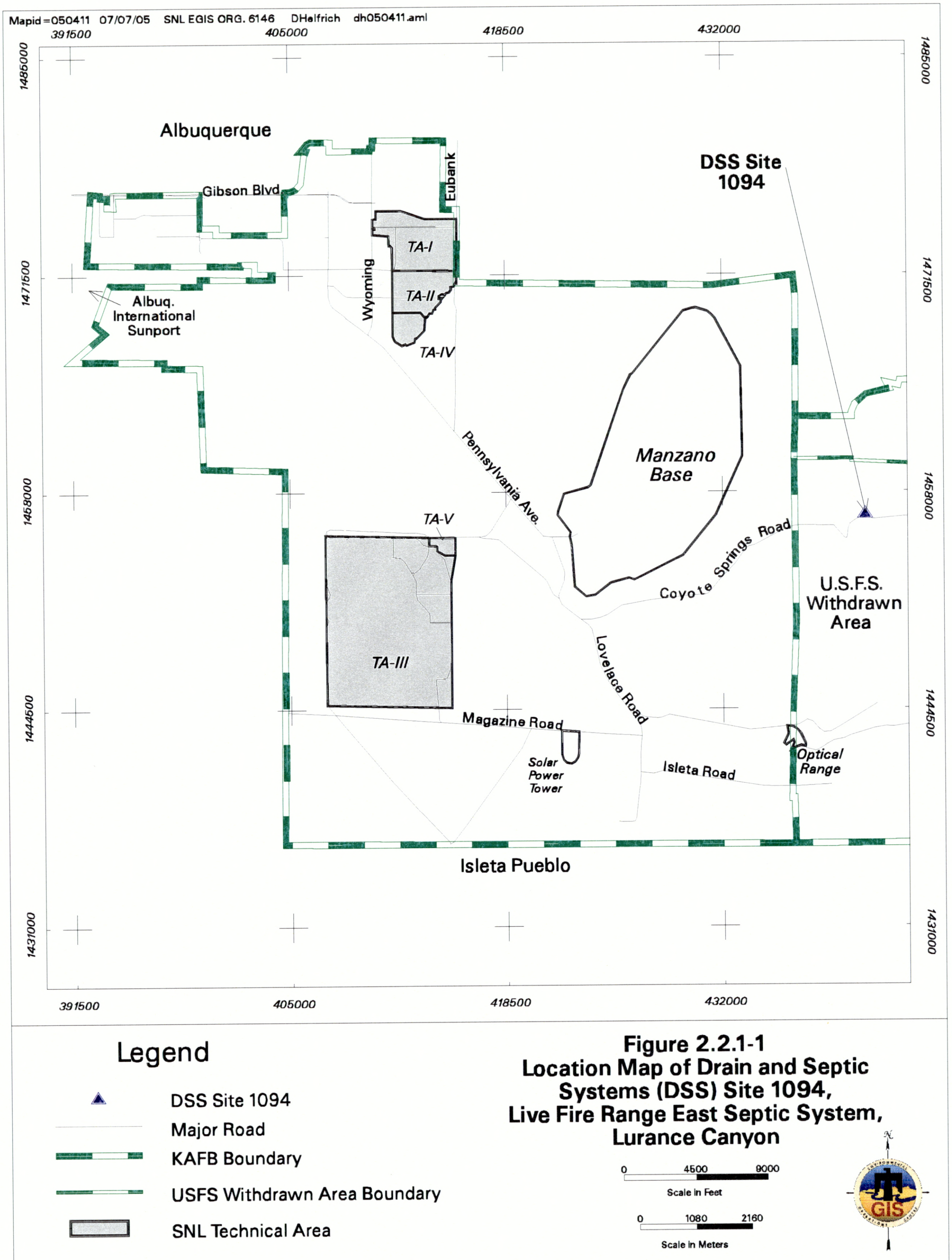
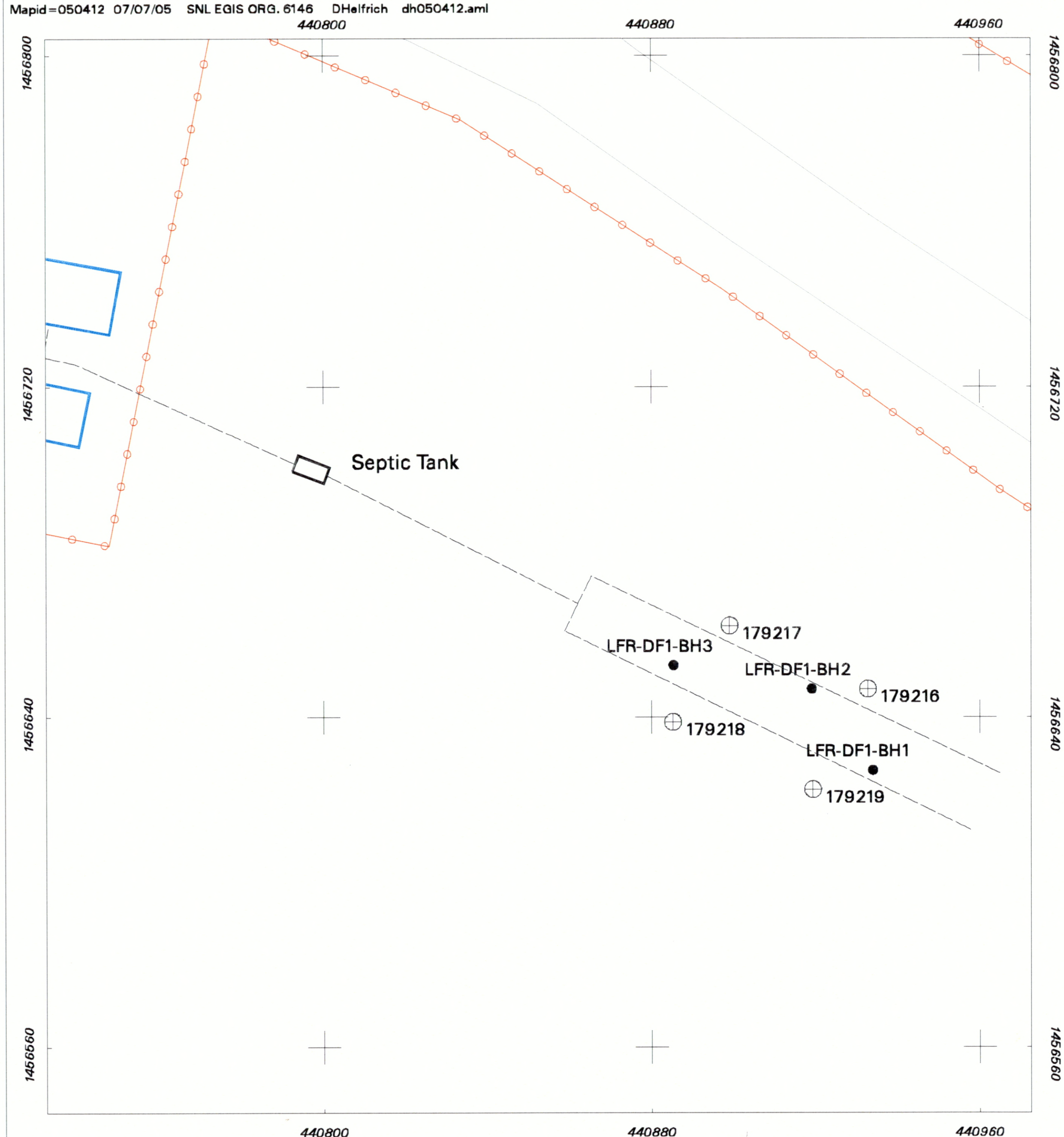


Figure 2.2.1-1
Location Map of Drain and Septic Systems (DSS) Site 1094, Live Fire Range East Septic System, Lurance Canyon

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

840857.03010000 A257

Mapid=050412 07/07/05 SNL EGIS ORG. 6146 DHelfrich dh050412.aml



Legend

- ● Soil Boring Location
- ⊕ Gore-Sorber™ Sample Location
- Septic Tank
- Fence
- Unpaved Road
- Building / Structure
- Sewerline, Drain Line

Figure 2.2.1-2
Site Map of Drain and Septic Systems (DSS) Site Number 1094, Live Fire Range East Septic System, Lurance Canyon

0 20 40
Scale in Feet

0 4.8 9.6
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

840857.03010000 A258

Figure 2.2.1-3
Alluvial deposits exposed along the stream bank of Lurance Canyon near DSS Site 1094 with hard hat for scale. View to the northwest. April 26, 2005

thickness and probably have a preferred orientation in the direction of the stream flow. Thickness of the alluvial fill at this site is unknown. Site vegetation primarily consists of desert grasses, shrubs, cacti, and sparse juniper and piñon trees.

The ground surface in the vicinity of the site is hummocky, with a slight slope to the west. The closest major drainage is the active channel of Arroyo del Coyote, located approximately 150 feet south 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 5,995 feet above mean sea level (SNL/NM April 2003). The groundwater beneath the site probably occurs in unconfined conditions in the fractured Precambrian bedrock. As measured in the nearest groundwater monitoring well, CYN-MW5, approximately 1,900 feet to the southwest, depth to groundwater is approximately 107 feet below ground surface (bgs). Groundwater flow is thought to be generally to the west in the Lurance Canyon area (SNL/NM November 2001b). The nearest production well to DSS Site 1094 is KAFB-11, approximately 4.9 miles to the northwest.

2.2.2 Operational History

Although no precise construction information is available, records indicate that the Live Fire Range support building complex was in operation and discharging to the septic system about 1983. 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. The system is still active and receives discharges from the support buildings associated with Live Fire Range operations.

2.3 Land Use

2.3.1 Current Land Use

The current land use for DSS Site 1094 is industrial.

2.3.2 Future/Proposed Land Use

The projected future land use for DSS Site 1094 is recreational (DOE et al. October 1995).

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3.0 INVESTIGATORY ACTIVITIES

3.1 Summary

Three assessment investigations have been conducted at this site. In August 1999, a backhoe was used to physically locate the buried drainfield drain lines at the site (Investigation 1). In September 1999 and April 2005, subsurface soil samples were collected from three borings in the drainfield (Investigation 2). In May 2002, a passive soil-vapor survey was conducted to determine whether areas of significant volatile organic compound (VOC) contamination were present in the soil around the drainfield (Investigation 3). Investigations 1, 2, and 3 were required by the NMED/HWB to adequately characterize the site and were conducted in accordance with procedures presented in the SAP (SNL/NM October 1999) and FIP (SNL/NM November 2001a) described in Chapter 1.0. These investigations are discussed in the following sections.

3.2 Investigation 1—Backhoe Excavation

On August 27, 1999, a backhoe was used to determine the location, dimensions, and average depth of the DSS Site 1094 drainfield system. The drainfield was found to have two laterals, constructed of 4-inch-diameter, polyvinyl chloride pipe, arranged as shown on Figure 2.2.1-2, with an average drain line trench depth of 7 feet bgs. Although damp soil was observed beneath the east ends of the two drain lines, no visible evidence of stained or discolored soil or odors indicating residual contamination was observed during the excavation. No samples were collected during the backhoe excavation at the site, and care was taken not to damage the drain lines of this still-active system.

3.3 Investigation 2—Soil Sampling

Once the system drain lines were located, soil sampling was conducted in accordance with the rationale and procedures outlined in the SAP (SNL/NM October 1999) and FIP (SNL/NM November 2001a) approved by the NMED. On September 1 and September 2, 1999, soil samples were collected from three drainfield boreholes. Soil boring locations are shown in Figure 2.2.1-2. Figure 3.3-1 shows the additional soil samples being collected at DSS Site 1094 in April 2005. A summary of the boreholes, sample depths, sample analyses, analytical methods, laboratories, and sample dates is presented in Table 3.3-1.

DSS Site 1094 was one of five shallow groundwater DSS sites that had 2-butanone concentrations above the 10 parts-per-billion (micrograms [μg]/kilogram [kg]) VOC trigger level specified in the SAP (SNL/NM October 1999), and therefore required additional sampling. The samples collected at these five sites were all analyzed at the same time, and the laboratory reported detections of the same three VOCs (2-butanone, methylene chloride, and toluene) in generally similar concentrations for all five sites. Because these compounds are recognized by the U.S. Environmental Protection Agency (EPA) as typical laboratory contaminants, it was suspected that the VOC detections might be the result of a laboratory artifact or other analytical problem, rather than soil contamination. After meeting with the NMED, it was decided to

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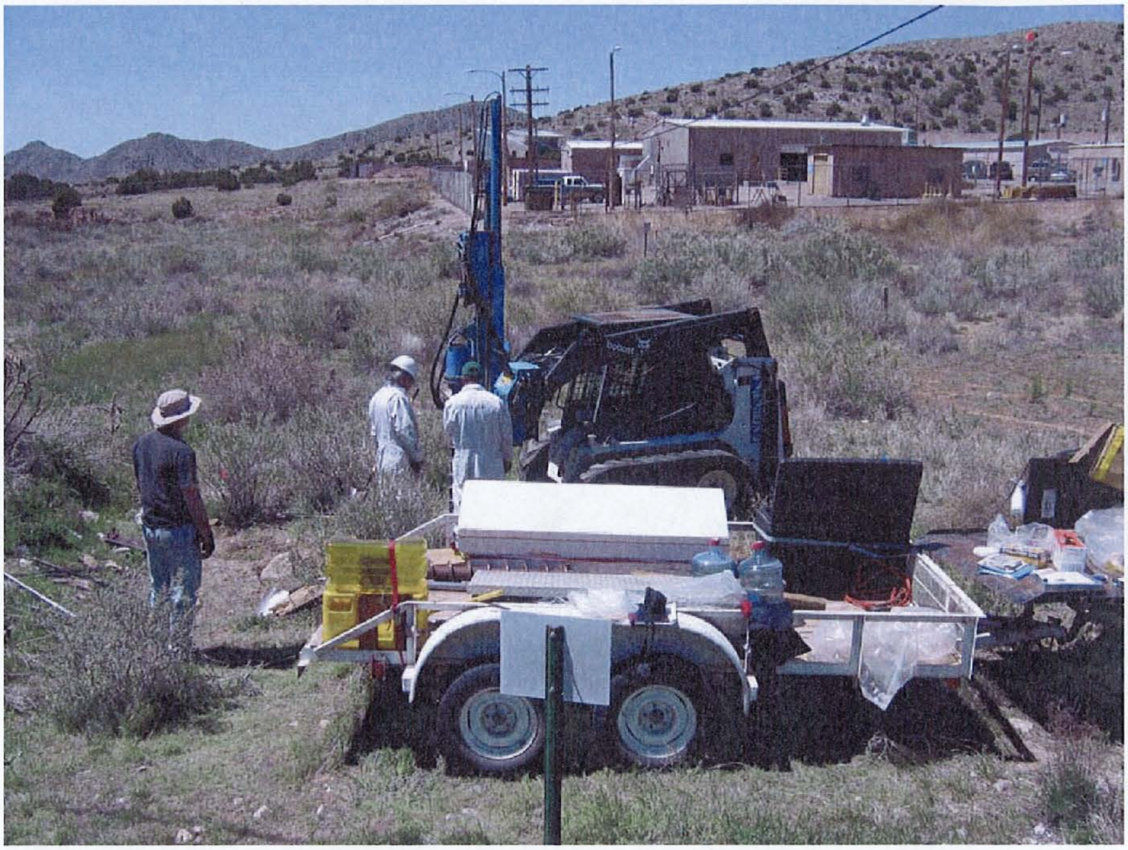

Figure 3.3-1
Collecting soil samples with the Geoprobe™ at DSS Site 1094,
Live Fire Range East Septic System. View to the northwest. April 26, 2005

Table 3.3-1
Summary of Area Sampled, Analytical Methods, and Laboratories Used for
DSS Site 1094, Live Fire Range East Septic System (Lurance Canyon) Soil Samples

Sampling Area	Number of Borehole Locations	Top of Sampling Intervals in Each Borehole (ft bgs)	Total Number of Soil Samples	Analytical Parameters and EPA Methods[a]	Analytical Laboratory	Date Samples Collected
Drainfield	3	BH1 = 7, 12 BH2 = 7, 12, 17, 22 BH3 = 7, 11, 17, 22	10+1 Duplicate	VOCs EPA Method 8260	GEL	04-25-05 04-26-05 04-27-05
	3	7, 12	6	SVOCs EPA Method 8270	GEL	09-01-99 09-02-99
	3	7, 12	6	PCBs EPA Method 8082	GEL	09-01-99 09-02-99
	3	7, 12	6	HE Compounds EPA Method 8330	GEL	09-01-99 09-02-99
	3	7, 12	6	RCRA Metals EPA Methods 6000/7000	GEL	09-01-99 09-02-99
	3	7, 12	6	Hexavalent Chromium EPA Method 7196A	GEL	09-01-99 09-02-99
	3	7, 12	6	Total Cyanide EPA Method 9012A	GEL	09-01-99 09-02-99
	3	7, 12	6	Gamma Spectroscopy EPA Method 901.1	GEL	09-01-99 09-02-99
	3	7, 12	6	Gross Alpha/Beta Activity EPA Method 900.0	GEL	09-01-99 09-02-99

[a]EPA November 1986.
bgs = Below ground surface.
BH = Borehole.
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.
SVOC = Semivolatile organic compound.
VOC = Volatile organic compound.

resample DSS Site 1094 and the other four sites for VOCs only, at the original 1999 locations and depths, and to collect additional samples at 5 and 10 feet below the original sample depths at DSS Site 1094 and some of the other sites, as specified by the NMED (Cooper March 2005). The VOC resampling at DSS Site 1094 was conducted from April 25 to April 27, 2005. However, subsurface refusal prevented the collection of the deeper, 17- and 22-foot-bgs, samples at the DF1-BH-1 location (Figure 2.2.1-2). Only toluene was detected in the April 2005 samples at a maximum concentration of 6.63 µg/kg. It was concluded that the 1999 VOC samples were probably affected by laboratory contamination. Therefore, the 1999 VOC data were replaced with the 2005 VOC analytical results in the data tables and in the risk assessment.

3.3.1 Soil Sampling Methodology

An auger drill rig was used to sample all boreholes at the required depth intervals. In drainfields, the top of the shallow interval started at the bottom of the drain line trenches, as determined by the backhoe excavation, and the lower (deep) interval started at 7 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 sampling 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 an off-site laboratory for analysis.

3.3.2 Soil Sampling Results and Conclusions

Analytical results for the soil samples collected at DSS Site 1094 are presented and discussed in this section.

<u>VOCs</u>

Because of the laboratory contamination concerns regarding the 1999 VOC data, and because the site was resampled, the original 1999 VOC data were replaced with the 2005 VOC analytical results in the data tables and in the risk assessment.

VOC analytical results for the ten soil samples and one duplicate collected in April 2005 from the three drainfield boreholes are summarized in Table 3.3.2-1. Method detection limits (MDLs) for the VOC soil analyses are presented in Table 3.3.2-2. Only two VOCs were detected in the soil samples collected at this site. Low concentrations of toluene were detected in every sample collected, while a trace of xylene was detected only in the 17-foot-bgs sample from borehole BH2. While these compounds were not detected in the associated trip blank (TB) or equipment blank (EB) samples, they are common laboratory contaminants and may not indicate soil contamination at this site.

SVOCs

Semivolatile organic compound (SVOC) analytical results for the six soil samples collected in September 1999 from the three drainfield boreholes are summarized in Table 3.3.2-3. MDLs for the SVOC soil analyses are presented in Table 3.3.2-4. No SVOCs were detected in any soil sample collected at this site.

PCBs

Polychlorinated biphenyl (PCB) analytical results for the six soil samples collected in September 1999 from the three drainfield boreholes are summarized in Table 3.3.2-5. MDLs for the PCB soil analyses are presented in Table 3.3.2-6. No PCBs were detected in any soil sample collected at this site.

HE Compounds

High explosive (HE) compound analytical results for the six soil samples collected in September 1999 from the three drainfield boreholes are summarized in Table 3.3.2-7. MDLs for the HE soil analyses are presented in Table 3.3.2-8. No HE compounds were detected in any soil sample collected at this site.

RCRA Metals and Hexavalent Chromium

Resource Conservation and Recovery Act (RCRA) metals and hexavalent chromium analytical results for the six soil samples collected from the three drainfield boreholes in September 1999 are summarized in Table 3.3.2-9. MDLs for the metals in soil analyses are presented in Table 3.3.2-10. Silver was detected above the NMED-approved background in all three boreholes. Similar concentrations were measured in the 12-foot-bgs sample from borehole BH1, the 7- and 12-foot-bgs samples from borehole BH2, and the 7-foot-bgs sample from borehole BH3.

Total Cyanide

Total cyanide analytical results for the six soil samples collected in September 1999 from the three drainfield boreholes are summarized in Table 3.3.2-11. MDLs for the cyanide soil analyses are presented in Table 3.3.2-12. Cyanide was not detected in any sample collected at this site.

Table 3.3.2-1
Summary of DSS Site 1094, Live Fire Range East Septic System (Lurance Canyon)
Confirmatory Soil Sampling, VOC Analytical Results
April 2005
(Off-Site Laboratory)

Sample Attributes			VOCs (EPA Method 8260[a]) (µg/kg)							
Record Number[b]	ER Sample ID	Sample Depth (ft)	Acetone	Bromodichloro-methane	Bromoform	Carbon disulfide	Chloroform	Dibromo-chloromethane	Toluene	Xylene
608533	LFR-DF1-BH1-7-S	7	ND (2.58)	ND (0.2)	ND (0.3)	ND (1.25)	ND (0.2)	ND (0.3)	**2.39**	ND (0.4)
608533	LFR-DF1-BH1-12-S	12	ND (2.58)	ND (0.2)	ND (0.3)	ND (1.25)	ND (0.2)	ND (0.3)	**1.79**	ND (0.4)
608533	LFR-DF1-BH2-7-S	7	ND (2.58)	ND (0.2)	ND (0.3)	ND (1.25)	ND (0.2)	ND (0.3)	**1.87**	ND (0.4)
608533	LFR-DF1-BH2-12-S	12	ND (2.58)	ND (0.2)	ND (0.3)	ND (1.25)	ND (0.2)	ND (0.3)	**3.06**	ND (0.4)
608533	LFR-DF1-BH2-12-DU	12	ND (2.58)	ND (0.2)	ND (0.3)	ND (1.25)	ND (0.2)	ND (0.3)	**3.92**	ND (0.4)
608533	LFR-DF1-BH2-17-S	17	ND (9.00 J)	ND (0.2)	ND (0.3)	ND (1.25)	ND (0.2)	ND (0.3)	**6.63**	**1.29**
608533	LFR-DF1-BH2-22-S	22	ND (2.58)	ND (0.2)	ND (0.3)	ND (1.25)	ND (0.2)	ND (0.3)	**1.38**	ND (0.4)
608533	LFR-DF1-BH3-7-S	7	ND (2.58)	ND (0.2)	ND (0.3)	ND (1.25)	ND (0.2)	ND (0.3)	**1.02**	ND (0.4)
608533	LFR-DF1-BH3-11-S	11	ND (2.58)	ND (0.2)	ND (0.3)	ND (1.25)	ND (0.2)	ND (0.3)	**0.917 J (1)**	ND (0.4)
608533	LFR-DF1-BH3-17-S	17	ND (6.56 J)	ND (0.2)	ND (0.3)	ND (1.25)	ND (0.2)	ND (0.3)	**1.69**	ND (0.4)
608533	LFR-DF1-BH3-22-S	22	ND (2.58)	ND (0.2)	ND (0.3)	ND (1.25)	ND (0.2)	ND (0.3)	**0.723 J (1)**	ND (0.4)
Quality Assurance/Quality Control Samples (µg/L)										
608533	LFR-DF1-EB-2	NA	**4.84 J**	**0.612 J (1)**	**1.02**	**5.65**	**0.282 J (1)**	**1.2**	ND (0.25)	ND (0.34)
608533	1094-DSS-TB-2	NA	ND (1.25)	ND (0.25)	ND (0.25)	**5.71**	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.34)

Note: Values in **bold** represent detected analytes.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.

BH = Borehole.
DF = Drainfield.
DSS = Drain and Septic Systems.
DU = Duplicate sample.
EB = Equipment blank.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
J = Value 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.
LFR = Live Fire Range.
MDL = Method detection limit.
µg/kg = Microgram(s) per kilogram.
µg/L = Microgram(s) per liter.
NA = Not applicable.
ND = Not detected above the MDL, shown in parentheses.
S = Soil sample.
TB = Trip blank.
VOC = Volatile organic compound.

Table 3.3.2-2
Summary of DSS Site 1094, Live Fire Range East Septic System (Lurance Canyon)
Confirmatory Soil Sampling, VOC Analytical MDLs
April 2005
(Off-Site Laboratory)

Analyte	EPA Method 8260[a] Detection Limit (µg/kg)
Acetone	2.58
Benzene	0.33
Bromodichloromethane	0.2
Bromoform	0.3
Bromomethane	0.5
2-Butanone	1.7
Carbon disulfide	1.25
Carbon tetrachloride	0.2
Chlorobenzene	0.2
Chloroethane	0.5
Chloroform	0.2
Chloromethane	0.5
Dibromochloromethane	0.3
1,1-Dichloroethane	0.3
1,2-Dichloroethane	0.25
1,1-Dichloroethene	0.3
cis-1,2-Dichloroethene	0.3
trans-1,2-Dichloroethene	0.3
1,2-Dichloropropane	0.3
cis-1,3-Dichloropropene	0.2
trans-1,3-Dichloropropene	0.3
Ethylbenzene	0.2
2-Hexanone	1.52
Methylene chloride	2
4-Methyl-2-pentanone	1.09
Styrene	0.2
1,1,2,2-Tetrachloroethane	0.25
Tetrachloroethene	0.2
Toluene	0.29
1,1,1-Trichloroethane	0.3
1,1,2-Trichloroethane	0.3
Trichloroethene	0.25
Vinyl acetate	1.25
Vinyl chloride	0.5
Xylene	0.4

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

Table 3.3.2-3
Summary of DSS Site 1094, Live Fire Range East Septic System (Lurance Canyon)
Confirmatory Soil Sampling, SVOC Analytical Results
September 1999
(Off-Site Laboratory)

Sample Attributes			SVOCs (EPA Method 8270[a]) (µg/kg)
Record Number[b]	ER Sample ID	Sample Depth (ft)	
602817	LFR-DF1-BH1-7-S	7	ND
602817	LFR-DF1-BH1-12-S	12	ND
602817	LFR-DF1-BH2-7-S	7	ND
602817	LFR-DF1-BH2-12-S	12	ND
602817	LFR-DF1-BH3-7-S	7	ND
602817	LFR-DF1-BH3-12-S	12	ND
Quality Assurance/Quality Control Sample (µg/L)			
602817	LFR-DF1-EB	NA	ND

[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
BH = Borehole.
DF = Drainfield.
DSS = Drain and Septic Systems.
EB = Equipment blank.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
LFR = Live Fire Range.
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.
S = Soil sample.
SVOC = Semivolatile organic compound.

Table 3.3.2-4
Summary of DSS Site 1094, Live Fire Range East Septic System (Lurance Canyon)
Confirmatory Soil Sampling, SVOC Analytical MDLs
September 1999
(Off-Site Laboratory)

Analyte	EPA Method 8270[a] Detection Limit (µg/kg)
Acenaphthene	160
Acenaphthylene	147
Anthracene	86.7
Benzo(a)anthracene	66.7
Benzo(a)pyrene	73.3
Benzo(b)fluoranthene	143
Benzo(g,h,i)perylene	80
Benzo(k)fluoranthene	133
4-Bromophenyl phenyl ether	117
Butylbenzyl phthalate	90
Carbazole	153
4-Chlorobenzenamine	153
bis(2-Chloroethoxy)methane	170
bis(2-Chloroethyl)ether	53.3
bis-Chloroisopropyl ether	103
4-Chloro-3-methylphenol	127
2-Chloronaphthalene	173
2-Chlorophenol	157
4-Chlorophenyl phenyl ether	147
Chrysene	53.3
m,p-Cresol	153
o-Cresol	63.3
Dibenz[a,h]anthracene	83.3
Dibenzofuran	133
1,2-Dichlorobenzene	170
1,3-Dichlorobenzene	130
1,4-Dichlorobenzene	61
3,3'-Dichlorobenzidine	277
2,4-Dichlorophenol	177
Diethylphthalate	76.7
2,4-Dimethylphenol	110
Dimethylphthalate	110
Di-n-butyl phthalate	73.3
Dinitro-o-cresol	100
2,4-Dinitrophenol	367
2,4-Dinitrotoluene	117
2,6-Dinitrotoluene	140
Di-n-octyl phthalate	173
1,2-Diphenylhydrazine	56.7
bis(2-Ethylhexyl) phthalate	300
Fluoranthene	66.7
Fluorene	113

Refer to footnotes at end of table.

Table 3.3.2-4 (Concluded)
Summary of DSS Site 1094, Live Fire Range East Septic System (Lurance Canyon)
Confirmatory Soil Sampling, SVOC Analytical MDLs
September 1999
(Off-Site Laboratory)

Analyte	EPA Method 8270[a] Detection Limit (µg/kg)
Hexachlorobenzene	70
Hexachlorobutadiene	153
Hexachlorocyclopentadiene	193
Hexachloroethane	133
Indeno(1,2,3-cd)pyrene	80
Isophorone	147
2-Methylnaphthalene	203
Naphthalene	157
2-Nitroaniline	66.7
3-Nitroaniline	83.3
4-Nitroaniline	103
Nitrobenzene	133
2-Nitrophenol	180
4-Nitrophenol	110
n-Nitrosodiphenylamine	20.7
n-Nitrosodipropylamine	130
Pentachlorophenol	56.7
Phenanthrene	60
Phenol	56.7
Pyrene	73.3
1,2,4-Trichlorobenzene	187
2,4,5-Trichlorophenol	153
2,4,6-Trichlorophenol	76.7

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

Table 3.3.2-5
Summary of DSS Site 1094, Live Fire Range East Septic System (Lurance Canyon)
Confirmatory Soil Sampling, PCB Analytical Results
September 1999
(Off-Site Laboratory)

Sample Attributes			PCBs
Record Number[b]	ER Sample ID	Sample Depth (ft)	(EPA Method 8082[a]) (µg/kg)
602817	LFR-DF1-BH1-7-S	7	ND
602817	LFR-DF1-BH1-12-S	12	ND
602817	LFR-DF1-BH2-7-S	7	ND
602817	LFR-DF1-BH2-12-S	12	ND
602817	LFR-DF1-BH3-7-S	7	ND
602817	LFR-DF1-BH3-12-S	12	ND
Quality Assurance/Quality Control Sample (µg/L)			
602817	LFR-DF1-EB	NA	ND H

[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
BH = Borehole.
DF = Drainfield.
DSS = Drain and Septic Systems.
EB = Equipment blank.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
H = The holding time was exceeded for the associated sample analysis.
ID = Identification.
LFR = Live Fire Range.
µg/kg = Microgram(s) per kilogram.
µg/L = Microgram(s) per liter.
NA = Not applicable.
ND = Not detected.
PCB = Polychlorinated biphenyl.
S = Soil sample.

Table 3.3.2-6
Summary of DSS Site 1094, Live Fire Range East Septic System (Lurance Canyon)
Confirmatory Soil Sampling, PCB Analytical MDLs
September 1999
(Off-Site Laboratory)

Analyte	EPA Method 8082[a] Detection Limit (µg/kg)
Aroclor-1016	1.22
Aroclor-1221	2.82
Aroclor-1232	1.63
Aroclor-1242	1.67
Aroclor-1248	0.907
Aroclor-1254	1.16
Aroclor-1260	0.943

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

Table 3.3.2-7
Summary of the DSS Site 1094, Live Fire Range East Septic System (Lurance Canyon) Confirmatory Soil Sampling, HE Compound Analytical Results
August–September 1999
(Off-Site Laboratory)

Sample Attributes			HE
Record Number[b]	ER Sample ID	Sample Depth (ft)	(EPA Method 8330[a]) (µg/kg)
602817	LFR-DF1-BH1-7-S	7	ND
602817	LFR-DF1-BH1-12-S	12	ND
602817	LFR-DF1-BH2-7-S	7	ND
602817	LFR-DF1-BH2-12-S	12	ND
602817	LFR-DF1-BH3-7-S	7	ND
602817	LFR-DF1-BH3-12-S	12	ND
Quality Assurance/Quality Control Sample (µg/L)			
602817	LFR-DF1-EB	NA	ND

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

Table 3.3.2-8
Summary of DSS Site 1094, Live Fire Range East Septic System (Lurance Canyon)
Confirmatory Soil Sampling, HE Compound Analytical MDLs
September 1999
(Off-Site Laboratory)

Analyte	EPA Method 8330[a] Detection Limit (µg/kg)
2-Amino-4,6-dinitrotoluene	6.6
4-Amino-2,6-dinitrotoluene	5.5
1,3-Dinitrobenzene	4.1
2,4-Dinitrotoluene	6.2
2,6-Dinitrotoluene	6.5
HMX	5.3
Nitrobenzene	5.2
2-Nitrotoluene	7.8
3-Nitrotoluene	11
4-Nitrotoluene	11
RDX	9.7
Tetryl	7.5
1,3,5-Trinitrobenzene	6.6
2,4,6-Trinitrotoluene	5.7

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

Table 3.3.2-9
Summary of DSS Site 1094, Live Fire Range East Septic System (Lurance Canyon)
Confirmatory Soil Sampling, Metals Analytical Results
September 1999
(Off-Site Laboratory)

Sample Attributes			Metals (EPA Methods 6000/7000/7196A[a]) (mg/kg)								
Record Number[b]	ER Sample ID	Sample Depth (ft)	Arsenic	Barium	Cadmium	Chromium	Chromium (VI)	Lead	Mercury	Selenium	Silver
602817	LFR-DF1-BH1-7-S	7	2.96	58.1 J	ND (0.0358)	10	0.132 J (0.189)	8.54	0.00621 J (0.0268)	ND (0.255)	0.456 J (0.472)
602817	LFR-DF1-BH1-12-S	12	2.53	45.8 J	ND (0.0352)	8.81	0.0962 J (0.192)	5.09	0.0025 J (0.0296)	ND (0.25)	**0.558 J**
602817	LFR-DF1-BH2-7-S	7	2.88	69.6 J	ND (0.0376)	9.37	0.107 J (0.194)	5.75	0.00868 J (0.0286)	ND (0.267)	**0.602 J**
602817	LFR-DF1-BH2-12-S	12	3.19	117 J	ND (0.0373)	14.7	0.14 J (0.2)	5.34	0.00397 J (0.0323)	ND (0.265)	**0.573 J**
602817	LFR-DF1-BH3-7-S	7	2.46	65.8 J	ND (0.0365)	9.51	0.159 J (0.199)	13.3	0.0141 J (0.0325)	ND (0.26)	**0.528 J**
602817	LFR-DF1-BH3-12-S	12	2.48	48.2 J	0.0366 J (0.463)	6.51	0.079 J (0.197)	4.83	0.00399 J (0.0312)	ND (0.25)	0.485 J
Background Concentration—Canyons Study Group[c]			9.8	246	0.64	18.8	NC	18.9	0.055	2.7	<0.5
Quality Assurance/Quality Control Sample (mg/L)											
602817	LFR-DF1-EB	NA	ND (0.00451)	ND (0.00051)	ND (0.00044)	ND (0.00056)	ND (0.006)	ND (0.00159)	ND (0.00004 J)	ND (0.00271)	ND (0.00073)

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

BH = Borehole.
DF = Drainfield.
DSS = Drain and Septic Systems.
EB = Equipment blank.
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.
LFR = Live Fire Range.
MDL = Method detection limit.
mg/kg = Milligram(s) per kilogram.
mg/L = Milligrams per liter.
NA = Not applicable.
NC = Not calculated.
ND ( ) = Not detected above the MDL, shown in parentheses.
S = Soil sample.

Table 3.3.2-10
Summary of DSS Site 1094, Live Fire Range East Septic System (Lurance Canyon)
Confirmatory Soil Sampling, Metals Analytical MDLs
September 1999
(Off-Site Laboratory)

Analyte	EPA Method 6000/7000/7196A[a] Detection Limit (mg/kg)
Arsenic	0.414–0.455
Barium	0.0491–0.054
Cadmium	0.0345–0.038
Chromium	0.0691–0.076
Chromium (VI)	0.032–0.0347
Lead	0.143–0.157
Mercury	0.00167–0.0022
Selenium	0.245–0.27
Silver	0.0545–0.06

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

Table 3.3.2-11
Summary of DSS Site 1094, Live Fire Range East Septic System (Lurance Canyon)
Confirmatory Soil Sampling, Total Cyanide Analytical Results
September 1999
(Off-Site Laboratory)

Sample Attributes			Total Cyanide (EPA Method 9012A[a]) (mg/kg)
Record Number[b]	ER Sample ID	Sample Depth (ft)	
602817	LFR-DF1-BH1-7-S	7	ND
602817	LFR-DF1-BH1-12-S	12	ND
602817	LFR-DF1-BH2-7-S	7	ND
602817	LFR-DF1-BH2-12-S	12	ND
602817	LFR-DF1-BH3-7-S	7	ND
602817	LFR-DF1-BH3-12-S	12	ND
Quality Assurance/Quality Control Sample (mg/L)			
602817	LFR-DF1-EB	NA	ND

[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
BH = Borehole.
DF = Drainfield.
DSS = Drain and Septic Systems.
EB = Equipment blank.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
LFR = Live Fire Range.
mg/kg = Milligram(s) per kilogram.
mg/L = Milligram(s) per liter.
NA = Not applicable.
ND = Not detected.
S = Soil sample.

Table 3.3.2-12
Summary of DSS Site 1094, Live Fire Range East Septic System (Lurance Canyon)
Confirmatory Soil Sampling, Total Cyanide Analytical MDLs
September 1999
(Off-Site Laboratory)

Analyte	EPA Method 9012A[a] Detection Limit (mg/kg)
Total Cyanide	0.138–0.139

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

Radionuclides

Analytical results for the gamma spectroscopy analysis of the six soil samples collected in September 1999 from the three drainfield boreholes are summarized in Table 3.3.2-13. No activities above NMED-approved background levels were detected in any sample analyzed. However, although not detected, the minimum detectable activities (MDAs) for uranium-235 exceeded the background activity because the standard gamma spectroscopy count time for soil samples (6,000 seconds) was not sufficient to reach the NMED-approved background activity established for SNL/NM soils. Even though the 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.

Gross Alpha/Beta Activity

Gross alpha/beta activity analytical results for the six soil samples collected in September 1999 from the three drainfield boreholes are summarized in Table 3.3.2-14. No gross alpha or beta activity was detected above the background levels (Miller September 2003) in any of the samples. These results indicate no significant levels of radioactive material are present in the soil at the site.

3.3.3 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. Only carbon disulfide was detected in the TB for DSS Site 1094 (Table 3.3.2-1).

A set of aqueous EB samples were collected for PCBs, HE compounds, metals, cyanide, gamma spectroscopy, and gross alpha/beta during the September 1999 sampling and for VOCs during the April 2005 resampling at the Live Fire Range East Septic System. Six VOCs were detected in the EB associated with the 2005 resampling for VOCs. No SVOCs, HE compounds, metals, hexavalent chromium, cyanide, or radionuclide activities were detected in the EB associated with the September 1999 sampling. No PCBs were detected in the 1999 EB; however, it was analyzed outside the method holding time.

Table 3.3.2-13
Summary of DSS Site 1094, Live Fire Range East Septic System (Lurance Canyon)
Confirmatory Soil Sampling, Gamma Spectroscopy Analytical Results
September 1999
(Off-Site Laboratory)

Sample Attributes			Activity (EPA Method 901.1[a]) (pCi/g)							
Record Number[b]	ER Sample ID	Sample Depth (ft)	Cesium-137		Thorium-232		Uranium-235		Uranium-238	
			Result	Error[c]	Result	Error[c]	Result	Error[c]	Result	Error[c]
602817	LFR-DF1-BH1-7-S	7	ND (0.0217)	--	0.2	0.0417	ND (0.141)	--	ND (0.973)	--
602817	LFR-DF1-BH1-12-S	12	ND (0.0253)	--	0.218	0.0486	0.133	0.126	0.889	0.985
602817	LFR-DF1-BH2-7-S	7	ND (0.0309)	--	0.4	0.0649	**ND (0.179)**	--	1.6	1.29
602817	LFR-DF1-BH2-12-S	12	ND (0.0296)	--	0.36	0.0601	**ND (0.164)**	--	1.38	0.891
602817	LFR-DF1-BH3-7-S	7	ND (0.0312)	--	0.398	0.0651	**ND (0.17)**	--	1.05	1.14
602817	LFR-DF1-BH3-12-S	12	0.0253	0.0297	0.255	0.0547	0.0883	0.11	1.34	1.59
Background Activity—Canyons Study Group[d]			1.55	NA	1.03	NA	0.16	NA	2.31	NA
Quality Assurance/Quality Control Sample (pCi/L)										
602817	LFR-DF1-EB	NA	ND (5.5)	--	ND (6.13)	--	12.7	19.9	ND (60.5)	--

Note: Values in **bold** exceed background soil activities.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
[c]Two standard deviations about the mean detected activity.
[d]Dinwiddie September 1997.

BH = Borehole.
DF = Drainfield.
DSS = Drain and Septic Systems.
EB = Equipment blank.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
LFR = Live Fire Range.
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.
pCi/L = Picocurie(s) per liter.
S = Soil sample.
-- = Error not calculated for nondetect results.

Table 3.3.2-14
Summary of DSS Site 1094, Live Fire Range East Septic System (Lurance Canyon)
Confirmatory Soil Sampling, Gross Alpha/Beta Activity Analytical Results
September 1999
(Off-Site Laboratory)

Sample Attributes			Activity (EPA Method 900.0[a]) (pCi/g)			
Record		Sample	Gross Alpha		Gross Beta	
Number[b]	ER Sample ID	Depth (ft)	Result	Error[c]	Result	Error[c]
602817	LFR-DF1-BH1-7-S	7	9.69	4.16	8.7	3.54
602817	LFR-DF1-BH1-12-S	12	5.97	3.48	4.96	2.8
602817	LFR-DF1-BH2-7-S	7	10.6	3.86	11.9	2.68
602817	LFR-DF1-BH2-12-S	12	6.96	3.39	10.8	2.88
602817	LFR-DF1-BH3-7-S	7	10.8	3.93	14.5	3.11
602817	LFR-DF1-BH3-12-S	12	6.5	3.31	8.18	2.81
Background Activity[d]			17.4	NA	35.4	NA
Quality Assurance/Quality Control Sample (pCi/L)						
602817	LFR-DF1-EB	NA	ND (0.26)	--	ND (0.509)	--

[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
[c]Two standard deviations about the mean detected activity.
[d]Miller September 2003.
BH = Borehole.
DF = Drainfield.
DSS = Drain and Septic Systems.
EB = Equipment blank.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
LFR = Live Fire Range.
MDA = Minimum detectable activity.
NA = Not applicable.
ND ( ) = Not detected above the MDA, shown in parentheses.
pCi/g = Picocurie(s) per gram.
pCi/L = Picocurie(s) per liter.
S = Soil sample.
-- = Error not calculated for nondetect results.

As shown in Table 3.3.2-1, to assess the precision and repeatability of sampling and analytical procedures, a duplicate soil sample (designated 'DU') was collected and analyzed at the off-site laboratory for VOCs during the April 2005 resampling. Toluene concentrations in the primary and duplicate samples from the 12-foot-bgs interval in borehole BH2 were comparable. No other VOCs were detected in either the primary or duplicate sample.

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), SNL/NM ER Project "Data Validation Procedure for Chemical and Radiochemical Data," Administrative Operating Procedure (AOP) 00-03 (SNL/NM December 1999), or "Data Validation Procedure for Chemical and Radiochemical Data," AOP 00-03, Rev. 01 (SNL/NM December 2003). Annex A contains the data validation reports for the samples collected at this site. In addition, SNL/NM Department 7713 (Radiation Protection

Sample Diagnostics [RPSD] Laboratory) reviewed all gamma spectroscopy results according to "Laboratory Data Review Guidelines," Procedure No. RPSD-02-11, Issue No. 2 (SNL/NM July 1996). The data are acceptable for use in this request for a determination of CAC without controls.

3.4 Investigation 3—Passive Soil-Vapor Sampling

In May 2002, a passive soil-vapor survey was conducted in the Live Fire Range East 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.

3.4.1 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 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.

3.4.2 Soil-Vapor Survey Results and Conclusions

A total of four GS passive soil-vapor samplers were placed in the drainfield area of the site (Figure 2.2.1-2). Samplers were installed at the site on May 1, 2002, and were retrieved on May 16, 2002. Sample locations are designated by the same six-digit sample number both on Figure 2.2.1-2 and in the analytical results tables presented in Annex 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 18 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.

3.5 Site Sampling Data Gaps

Analytical data from the site assessment were sufficient for characterizing the nature and extent of possible COC releases. There are no further data gaps regarding characterization of DSS Site 1094.

4.0 CONCEPTUAL SITE MODEL

The conceptual site model for DSS Site 1094, the Live Fire Range East Septic System, is based upon the COCs identified in the soil samples collected from beneath the drainfield at this site. This section summarizes the nature and extent of contamination and the environmental fate of the COCs.

4.1 Nature and Extent of Contamination

Potential COCs at DSS Site 1094 are VOCs, SVOCs, PCBs, HE compounds, cyanide, RCRA metals, hexavalent chromium, and radionuclides. No SVOCs, PCBs, HE compounds, or cyanide were detected in any of the soil samples collected at this site. Two VOCs, toluene and xylene, were detected in these samples. Of the eight RCRA metals, only silver was detected at concentrations above the approved maximum background concentrations for SNL/NM Canyons Study Area soils (Dinwiddie September 1997). Hexavalent chromium was detected in these samples, but because it does not have a calculated background value, it is unknown whether this COC exceeds background. When a metal concentration exceeded its maximum background screening value, it was considered further in the risk assessment process. None of the four representative gamma spectroscopy radionuclides were detected at activities exceeding the corresponding background levels. However, the MDAs for some of the uranium-235 analyses exceeded the corresponding background activity. Finally, no gross alpha/beta activity was detected above the New Mexico-established background levels.

4.2 Environmental Fate

Potential COCs may have been released into the vadose zone via aqueous effluent discharged from the drainfield. Possible secondary release mechanisms include the uptake of COCs that may have been released into the soil beneath the drainfield (Figure 4.2-1). The depth to groundwater at the site (approximately 107 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 recreational or residential land-use scenarios. Annex C provides additional discussion on the fate and transport of COCs at DSS Site 1094.

Table 4.2-1 summarizes the potential COCs for DSS Site 1094. All potential COCs were retained in the conceptual site model and were evaluated in both the human health and ecological risk assessments. The current and future land use for DSS Site 1094 is recreational (DOE et al. October 1995).

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

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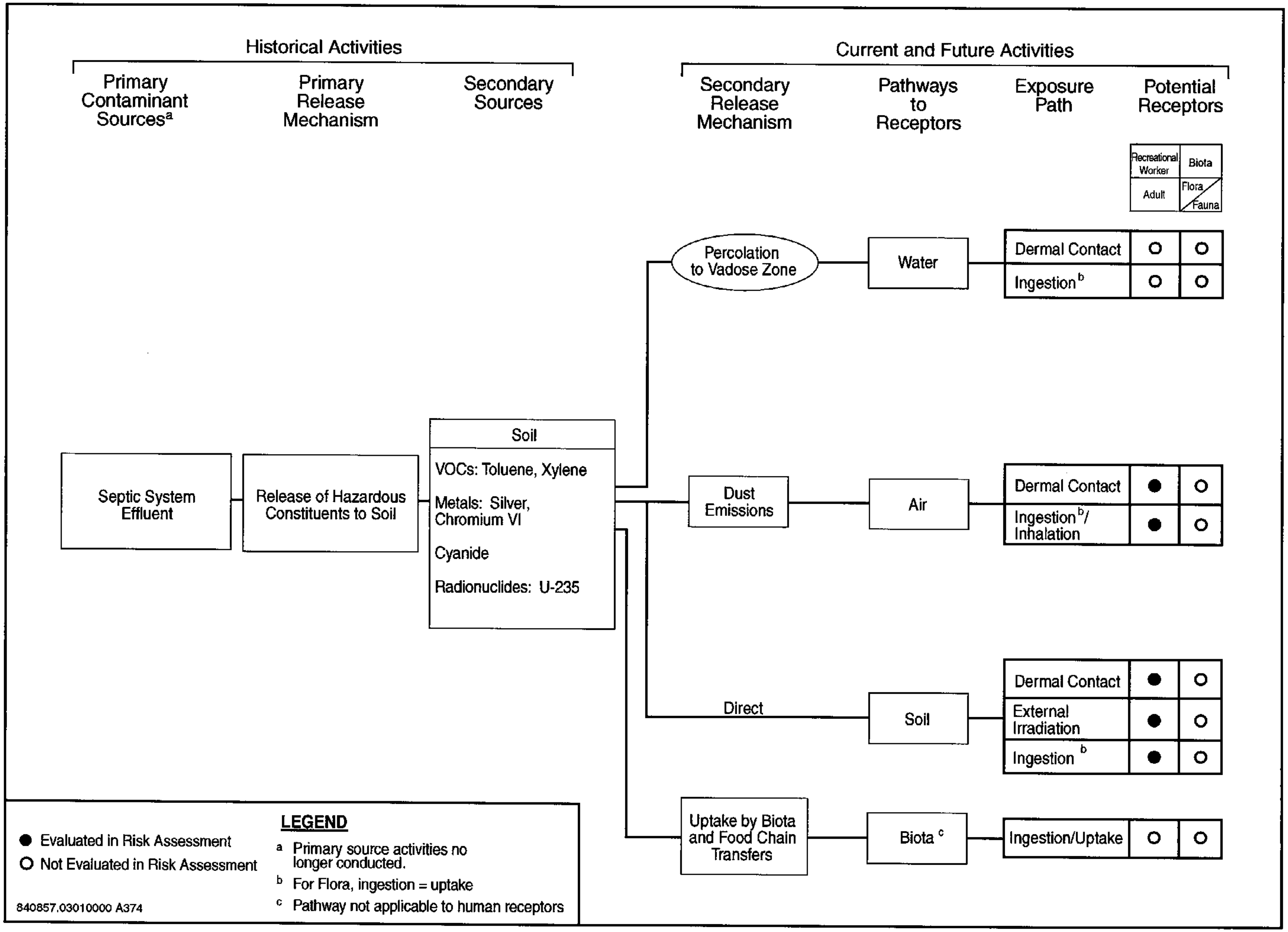

Figure 4.2-1
Conceptual Site Model Flow Diagram for DSS Site 1094, Live Fire Range East Septic System (Lurance Canyon)

Table 4.2-1
Summary of Potential COCs for DSS Site 1094, Live Fire Range East Septic System (Lurance Canyon)

COC Type		Number of Samples[a]	COCs Detected or with Concentrations Greater than Background or Nonquantified Background	Maximum Background Limit/Canyons Study Group[b] (mg/kg)	Maximum Concentration[c] (All Samples) (mg/kg)	Average Concentration[d] (mg/kg)	Number of Samples Where COCs Detected or with Concentrations Greater than Background or Nonquantified Background[e]
VOCs		11	Toluene	NA	0.0066	0.0023	11
		11	Xylene	NA	0.0013	0.0003	1
SVOCs		6	None	NA	NA	NA	None
PCBs		6	None	NA	NA	NA	None
HE Compounds		6	None	NA	NA	NA	None
RCRA Metals		6	Silver	<0.5	0.602 J	0.534	4
Chromium VI		6	Chromium VI	NC	0.159 J	0.119	6
Cyanide		6	None	NC	NA	NA	None
Radionuclides (pCi/g)	Gamma Spectroscopy	6	Uranium-235	0.16	ND (0.179)	NC[f]	3
	Gross Alpha	6	None	NA	NA	NA	None
	Gross Beta	6	None	NA	NA	NA	None

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

COC = Constituent of concern.
DSS = Drain and Septic Systems.
HE = High explosive(s).
J = Analytical result was qualified as an estimated value.
MDA = Minimum detectable activity.
MDL = Method detection limit.
mg/kg = Milligram(s) per kilogram.
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.

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 recreational or residential land-use scenarios. Annex C provides additional discussion of the exposure routes and receptors at DSS Site 1094.

4.3 Site Assessment

Site assessment at DSS Site 1094 included risk assessments for both human health and ecological risk. This section briefly summarizes the site assessment results, and Annex C discusses the risk assessment performed for DSS Site 1094 in more detail.

4.3.1 Summary

The site assessment concluded that DSS Site 1094 poses no significant threat to human health under either recreational or residential land-use scenarios. Ecological risks were found to be insignificant because no pathways exist.

4.3.2 Risk Assessments

Risk assessments were performed for both human health and ecological risk at DSS Site 1094. This section summarizes the results.

4.3.2.1 Human Health

DSS Site 1094 has been recommended for a recreational land-use scenario (DOE et al. October 1995). Because toluene, xylene, silver, and uranium-235 were detected, are present above background, or have MDAs above background levels, it was necessary to perform a human health risk assessment analysis for the site, which included these COCs. In addition, because hexavalent chromium, which was detected, and cyanide, which was not detected, have nonquantified background values, these COCs are also evaluated in the risk assessment analysis. Annex C provides a complete discussion of the risk assessment process, results, and uncertainties. The risk assessment process provides a quantitative evaluation of the potential adverse human health effects from constituents in the site's soil by calculating the hazard index (HI) and excess cancer risk for both recreational and residential land-use scenarios.

The HI calculated for the COCs at DSS Site 1094 is 0.00 for the recreational land-use scenario, which is less than the numerical standard of 1.0 suggested by risk assessment guidance (EPA 1989). The incremental HI risk, determined by subtracting risk associated with background from potential nonradiological COC risk (without rounding), is 0.00. The excess cancer risk is 3E-11 for DSS Site 1094 COCs for a recreational 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 2.72E-11. Both the incremental HI and excess cancer risk are below NMED guidelines.

The HI calculated for the COCs at DSS Site 1094 is 0.00 for the residential land-use scenario, which is less than the numerical standard of 1.0 suggested by risk assessment guidance (EPA 1989). The incremental HI risk, determined by subtracting risk associated with background from potential nonradiological COC risk (without rounding), is 0.00. The excess cancer risk for DSS Site 1094 COCs is 7E-10 for a residential land-use scenario. NMED guidance states that cumulative excess lifetime cancer risk must be less than 1E-5 (Bearzi January 2001); thus the excess cancer risk for this site is below the suggested acceptable risk value. The estimated incremental excess cancer risk is 7.31E-10. Both the incremental HI and estimated incremental excess cancer risk are below NMED guidelines.

For the radiological COCs, one of the constituents (uranium-235) had MDA values greater than the corresponding background 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 1.9E-3 millirem (mrem)/year (yr) for the recreational 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 1.6E-8 for the recreational land-use scenario. Furthermore, the incremental TEDE for the residential land-use scenario that results from a complete loss of institutional controls is 4.8E-3 mrem/yr with an associated estimated incremental excess cancer risk of 4.6E-8. The guideline for this scenario is 75 mrem/yr (SNL/NM February 1998). Therefore, DSS Site 1094 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 1094, Live Fire Range East Septic System (Lurance Canyon) Carcinogens

Scenario	Nonradiological Risk	Radiological Risk	Total Risk
Recreational	2.72E-11	1.6E-8	1.6E-8
Residential	7.31E-10	4.6E-8	4.6E-8

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 recreational and residential land-use scenarios.

4.3.2.2 Ecological

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

All COCs at DSS Site 1094 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 1094 poses insignificant risk to human health under both the recreational 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 1094, a baseline ecological risk assessment is not required for the site.

5.0 RECOMMENDATION FOR CORRECTIVE ACTION COMPLETE WITHOUT CONTROLS DETERMINATION

5.1 Rationale

Based upon field investigation data and the human health and ecological risk assessment analyses, a determination of CAC without controls (NMED April 2004) is recommended for DSS Site 1094 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 a recreational 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 1094. This is consistent with the NMED's NFA Criterion 5, which states, "the SWMU/AOC [Area of Concern] has been characterized or remediated in accordance with current applicable state or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use" (NMED March 1998).

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ANNEX A
DSS Site 1094
Soil Sample Data Validation Results

Records Center Code: ER/1295/DAT

SMO ANALYTICAL DATA ROUTING FORM

Project Name: Non-ER Septic Systems
Case No./Service Order: CF0686

SNL Task Leader: Tony Roybal
Org/Mail Stop: 6135/1147

SMO Project Coordinator: Salmi
Sample Ship Date:

ARCOC	Lab	Lab ID	Preliminary Received	Final Received	EDD Req'd YES	EDD Req'd NO	EDD Rec'd YES	EDD Rec'd NO
602817	GEL	9909228B		10/11/99	X		X	
602820	GEL	9909228A		10/11/99	X		X	

	Date		
Correction Requested from Lab:		Correction Request #:	
Corrections Received:		Requester:	
Review Complete:	10-25-99	Signature:	W. Palencia
Priority Data Faxed:		Faxed To:	
Preliminary Notification:		Person Notified:	
Final Transmittal:	10-26-99	Transmitted To:	Sanders
		Transmitted By:	Palencia
Filed in Records Center: ER	10-26-99	Filed By:	Palencia

Comments: Part 1 of 3

RECEIVED NOV 02 1999

Received (Records Center) By:

Internal Lab

ANALYSIS REQUEST AND CHAIN OF CUSTODY

Page 1 of 4

AR/COC **602817**

Batch No.　　SAR/WR No.　　SMO Use 9/7/99

Dept. No./Mail Stop:	6135/1147	[redacted]		Contract No.:	AJ-2480A
Project/Task Manager:	NON-ER Septic Sys/M Sanders			Case No.:	7223.930
Project Name:	Non-ER Septic Systems	Lab Contact:	E Kent 803 556 8171	SMO Authorization:	
Record Center Code:	ER/1295/DAT	Lab Destination:	GEL	Bill To: Sandia National Laboratories	
Logbook Ref. No.:		SMO Contact/Phone:	D Salmi 844-3110	Supplier Services Dept.:	
Service Order No.	CF 0686	Send Report to SMO:	S Jensen 844-3184	P.O. Box 5800 MS 0154	
Location	Tech Area				
Building	Room				

*TBs from GEL lab have bubbles

* Please combine COC 602817 + COC 602820 in one lab batch

Reference LOV (available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Beginning Depth/ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID (Lab Use)
050049-001	Sdsordelor-DF1-BH3-5-S	5 ft	NA	082799 1350	S	AC	125ml	4C	GR	SA	VOC	[redacted]
050049-003	" -5-S	5 ft		082799 1350		AG	500ml			SA	CN, PCB, Cr6+, SVOC, HE, RCRA Metals	[redacted]
050049-004	" -5-S	5 ft		082799 1350		AG	500ml			SA	Gamma Spec, Gr A/B	[redacted]
050050-001	" -10-S	10 ft		082799 1405		AC	125 ml			SA	VOC	[redacted]
050050-003	" -10-S	10 ft		082799 1405		AG	500ml			SA	CN, PCB, Cr6+, SVOC, HE, RCRA Metals	[redacted]
050050-004	" -10-S	10 ft		082799 1405		AG	500ml			SA	Gamma Spec, Gr A/B	[redacted]
~~050051-003~~	~~" -10-MSDS~~	~~10 ft~~		~~082799 1405~~		~~AG~~	~~500ml~~			~~MSDS~~	~~CN, PCB, Cr6+, SVOC, HE, RCRA Metals~~	[redacted]
050-052-001	Sdsordelor-DF1-BH2-5-S	5 ft		082799 1430		AC	125ml			SA	VOC	[redacted]
050052-003	" -5-S	5 ft		082799 1430		AG	500ml			SA	CN, PCB, Cr6+, SVOC, HE, RCRA Metals	[redacted]
050052-004	" -5-S	5 ft		082799 1430		AG	500ml			SA	Gamma Spec, Gr A/B	[redacted]

RMMA ☐ Yes ☒ No　Ref. No.

Sample Disposal ☐ Return to Client ☒ Disposal by lab

Turnaround Time ☒ Normal ☐ Rush

Required Report Date　VG 9/8/99

[redacted]

Special Instructions/QC Requirements

EDD ☒ Yes ☐ No

Raw Data Package ☒ Yes ☐ No

Send info to Mike Sanders * All TB came w/bubble

VOC 8260　HE 8330　PCB 8082

CN 9010A　RCRA Metals 6010/7471

Cr6+ 7196A　Gamma Spec HASL 300

SVOC 8270　Gross A/B 900

Sample Team Members: Name	Signature	Init	Company/Organization/Phone
Margaret Sanchez	Margaret Sanchez	MS	Weston/6118/845-3267
~~Gilbert Quintana~~			~~IT/6118/238-0417~~

		Org.	Date	Time
1. Relinquished by	Margaret Sanchez	6118	9-7-99	0930
1. Received by		7577	9-7-99	0930
2. Relinquished by		7577	9/7/99	1130
2. Received by				
3. Relinquished by				
3. Received by				
4. Relinquished by				
4. Received by				
5. Relinquished by				
5. Received by				
6. Relinquished by				
6. Received by				

602817 ↓ 602818 } 2　　050049 050073 } 25

Analysis Request And Chain Of Custody (Continuation)

AR/COC-602817

Project Name: Non-ER Sypetic System	Project/Task Manger: M Sanders				Case No.:7223.230							
Location	Tech Area				Reference LOV (available at SMO)							Lab use
Building	Room											
Sample No-Fraction	ER Sample ID or Sample Location detail	Depth In Ft	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Methods	Sample Type	Parameter & Method Requested	Lab Sample ID
050053-001	Solardetox-DF1-BH2-10-S	10 Ft	NA	082799 1455	S	AC	125ml	4C	GR	SA	VOC	
050053-003	" -10-S	10 Ft		082799 1455		AG	500ml			SA	CN PCB Cr6+ SVOC HG RCRA Met	
050053-004	-10-S	10 Ft		082799 1455		AG	500ml			SA	Gamma Spec, Gr A/B	
~~050054-003~~	~~-10-DU~~	~~10 Ft~~		~~082799 1455~~		~~AG~~	~~500ml~~			~~DU~~	~~CN PCB Cr6+ SVOC HG RCRA Met~~	
050055-001	Solardetox-DF1-BH1-5-S	5 Ft		082799 1515		AC	125ml			SA	VOC	
050055-003	" -5-S	5 Ft		082799 1515		AG	500ml			SA	CN PCB Cr6+ SVOC RCRA Met HG	
050055-004	" -5-S	5 Ft		082799 1515		AG	500ml			SA	Gamma Spec, Gr A/B	
050056-001	" -10-S	10 Ft		082799 1533		AC	125ml			SA	VOC	
050056-003	" -10-S	10 Ft		082799 1533		AG	500ml			SA	CN PCB Cr6+ SVOC HG RCRA Met	
050056-004	" -10-S	10 Ft		082799 1533		AG	500ml			SA	Gamma Spec, Gr A/B	
050057-001	Solar 9981A-SP1-BH1-8-S	8 Ft		083099 1215		AC	125ml			SA	VOC	
050057-003	" -8-S	8 Ft		083099 1215		AG	500ml			SA	CN PCB Cr6+ SVOC HG RCRA Met	
050057-004	" -8-S	8 Ft		083099 1215		AG	250ml			SA	Gamma Spec, G A/B	
050058-001	" -13-S	13 Ft		083099 1245		AC	125ml			SA	VOC	
050058-003	" -13-S	13 Ft		083099 1245		AG	500ml			SA	CN PCB Cr6+ SVOC HG RCRA Met	
050058-004	" -13-S	13 Ft		083099 1245		AG	250ml			SA	Gamma Spec Gr A/B	
050059-001	Solar 9982-DW1-BH1-11-S	11 Ft		083099 1635		AC	125ml			SA	VOC	
050059-003	Solar 9982-DW1-BH1-11-S	11 Ft		083099 1635		AG	500ml			SA	CN PCB Cr6+ SVOC HG RCRA Met	
050059-004	" -11-S	11 Ft		083099 1635		AG	250ml			SA	Gamma Spec, Gr. A/B	
050060-001	" -11-DU	11 Ft	↓	083099 1635	↓	AC	125ml	↓	↓	DU	VOC	

Analysis Request And Chain Of Custody (Continuation)

4 / ND

Page 3 of 3

AR/COC-600817

Project Name:	Non-ER Sypetic System	Project/Task Manger: M Sanders			Case No.: 7223 230							Lab use
Location	Tech Area				Reference LOV (available at SMO)							
Building	Room											
Sample No-Fraction	ER Sample ID or Sample Location detail	Depth in Ft	ER Site No	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Methods	Sample Type	Parameter & Method Requested	Lab Sample ID
050060-008	Solar 9982-DIVI-BH1-11-DU	11 Ft	N/A	083099 1635	S	AG	500ml	4C	GR	DU	CN PCB Cr6+ SVOC HE RCRA Met	
050060-004	" -11-DU	11 Ft		083099 1635		AG	250ml			DU	Gamma Spec, Gr A/B	
050061-001	" -16-S	16 Ft		083199 0851		AC	125ml			SA	VOC	
050061-003	" -16-S	16 Ft		083199 0851		AG	500ml			SA	CN PCB Cr6+ SVOC HE RCRA Met	
050061-004	" -16-S	16 Ft		083199 0851		AG	250ml			SA	Gamma Spec Gr A/B	
050062-001	LFR-DFI-BH1-7-S	7 Ft		090199 1115		AC	125ml			SA	VOC	
050062-003	" -7-S	7 Ft		090199 1145		AG	500ml			SA	CN PCB Cr6+ SVOC HE RCRA Met	
050062-004	" -7-S	7 Ft		090199 1145		AG	250ml			SA	Gamma Spec, Gr A/B	
050063-001	" -12-S	12 Ft		090199 1507		AC	125ml			SA	VOC	
050063-003	" -12-S	12 Ft		090199 1507		AG	500 250ml			SA	PCB Cr6+ SVOC HE RCRA Met	
050063-004	" -12-S	12 Ft		090199 1507		AG	250 500ml			GR	Gamma Spec, Gr A/B	
050064-001	LFR-DFI-BH1-7-MS/MSD	7 Ft		090199 1115		AC	2x 125ml			MS/MSD	VOC	
050064-003	" "	7 Ft		090199 1145		AG	2x 500ml			MS/MSD	CN PCB Cr6+ SVOC HE RCRA Met	
050064-004	" "	7 Ft		090199 1145		AG	2x 250ml			MS/MSD	Gamma Spec, Gr A/B	
050065-001	LFR-DFI-BH2-7-S	7 Ft		090299 0930		AC	125ml			SA	VOC	
050065-003	"	7 Ft		090299 0940		AG	500ml			SA	CN PCB Cr6+ SVOC HE RCRA Met	
050065-004	"	7 Ft		090299 0940		AG	250ml			SA	Gamma Spec, Gr A/B	
050066-001	LFR-DFI-BH2-12-S	12 Ft		090299 1052		AC	125ml			SA	VOC	
050066-003	"	12 Ft		090299 1052		AG	500ml			SA	CN PCB Cr6+ SVOC HE RCRA Met	
050066-004	LFR-DFI-BH2-12-S	12 Ft		090299 1052		AG	250ml			SA	Gamma Spec, Gr A/B	

LAB USE

Analysis Request And Chain Of Custody (Continuation)

AR/COC- 602 817

Project Name: Non-ER Sypetic System   Project/Task Manger M Sanders   Case No 7223 230

Location: Tech Area

Building: Room

Reference LOV (available at SMO)

Sample No-Fraction	ER Sample ID or Sample Location detail	Depth in Ft	ER Site No	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Methods	Sample Type	Parameter & Method Requested	Lab use: Lab Sample ID
050067-001	LFR-DF1-BH3 -7-5	7Ft	N/A	010299 1351	S	AC	125 ml	4C	GR	SA	VOC	
067 ~~050068~~-003	LFR-DFI-BH3 -7-5	7Ft	N/A	010299 1351	S	AG	500 ml	4C	GR	SA	UN PCB SVOC HE RCRA Met	
050067-004	LFR-DFI-BH3 -7-5	7Ft	N/A	010299 1351	S	AG	250 ml	4C	GR	SA	Gamma Spec, Gr A/B	
050068-001	" -12-5	12Ft	N/A	010299 1424	S	AC	125 ml	4C	GR	SA	VOC	
050068-003	" -12-5	12Ft	N/A	010299 1424	S	AG	500 ml	4C	GR	SA	UN PCB SVOC HE RCRA Met	
050068-004	" -12-5	12Ft	N/A	010299 1424	S	AG	250 ml	4C	GR	SA	Gamma Spec, Gr A/A	
050069-005-1	LFR-DFI-BH3-GS	N/A	N/A	010799 0130	DIW	P	1L	HNO_3	GR	EB	Gamma Spec	
050069-006-2	LFR-DFI-BH3-GrAB	N/A	N/A	010799 0130	DIW	P	1L	HNO_3	GR	EB	Gross A/B	
050069-007-3	LFR-DFI-BH3-RCRA	N/A	N/A	010799 0130	DIW	P	500 ml	HNO_3	GR	EB	RCRA Met	
050069-008-4	" -SVOC	N/A	N/A	010799 0130	DIW	AG	2x 1L	4C	GR	EB	SVOC	
050069-009-5	" -HE	N/A	N/A	010799 0130	DIW	AG	4x 1L	4C	GR	EB	HE	
050069-010-6	" -CN	N/A	N/A	010799 0130	DIW	P	1L	NaOH ~~4C~~	GR	EB	total CN	
050069-011-7	" -Cr6+	N/A	N/A	010799 0130	DIW	P	500 ml	4C	GR	EB	Cr6+	
050069-012-8	" -PCB	N/A	N/A	010799 0130	DIW	AG	2x 1L	4C	GR	EB	PCB	
050069-013-9	" -EB	N/A	N/A	010799 0130	DIW	G	3x 40 ml	HCL	GR	EB	VOC	
050069-014-10	" -TB	N/A	N/A	010799 0130	DIW	G	3x 40 ml	HCL	GR	~~EB~~ TB	VOC	

Internal Lab

ANALYSIS REQUEST AND CHAIN OF CUSTODY

Page 1 of 1

Batch No. SAR/WR No. SMO Use

AR/COC **602820**

*Please combine COC 602820 and COC 602817 in one lab batch
* TB from lab have bubbles

Dept. No./Mail Stop:	6135/1147	T. Roybal [redacted]		Contract No.:	AJ-2480A
Project/Task Manager:	NON-ER Septic Sys ~~M Sanders~~	[redacted]		Case No.:	7223.230
Project Name:	Non-ER Septic Systems	Lab Contact:	E Kent 803 556 8171	SMO Authorization:	
Record Center Code:	ER/1295/DAT	Lab Destination:	GEL	Bill To: Sandia National Laboratories	
Logbook Ref. No.:		SMO Contact/Phone:	D Salmi 844-3110	Supplier Services Dept.:	
Service Order No.	CF 0686	Send Report to SMO:	S Jensen 844-3184	P.O. Box 5800 MS 0154	
Location	Tech Area				
Building	Room	Reference LOV(available at SMO)			

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Beginning Depth/ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Use: Lab Sample ID
050109-001	39938-SM-BH1-9.5-S	9.5 ft	103	083199 1642	S	AC	1.5ml	4C	GR	SA	VOC	[redacted]
050109-003	" " -9.5 S	9.5 ft	103	083199 1642	S	AG	250ml	4C	GR	SA	CN Cr6+ HE PCB SVOC RCRA Met	[redacted]
050109-004	" -9.5-S	9.5 ft	103	083199 1642	S	AG	500ml	4C	GR	SA	+Gross Alpha+ Gamma Spec both	[redacted]
050110-005	" 9.5-TB	9.5 ft	103	083199 1642	S	G	3+ 40ml	HCL	GR	TB	VOC	[redacted]

*COC 602821 Releases

RMMA	☒ Yes ☐ No	Ref. No.	[redacted]
Sample Disposal	☐ Return to Client	☒ Disposal by lab	[redacted]
Turnaround Time	☒ Normal	☐ Rush	[redacted]
	Required Report Date	VQ 9/3/99	[redacted]

Sample Team Members	Name	Signature	Init	Company/Organization/Phone
	Margaret Sanchez	Margaret Sanchez	MS	Weston/6118/845-3267
	~~Gilbert Quintana~~			~~IT/6118/238-9417~~ NA

Special Instructions/QC Requirements
EDD ☒ Yes ☐ No
Raw Data Package ☒ Yes ☐ No
Send info to Mike Sanders all
VOC 8260 HE 8330, PCB 8082
CN 9010A RCRA Met 6010/7471
Cr6+ 7196A Gamma Spec HASL 300
SVOC 8270 Gross A/B 900
Please list as separate report.

[redacted]

	Org.	Date	Time		Org.	Date	Time
1.Relinquished by [signature]	6118	9-1-99	1115	4 Relinquished by			
1. Received by [signature] SMO	7577	9-1-99	1115	4. Received by			
2.Relinquished by [signature] SMO	7577	9-2-99	1200	5.Relinquished by			
2. Received by				5. Received by			
3.Relinquished by				6 Relinquished by			
3. Received by				6. Received by			

050109
050118 > 10

*Released by COC 602821

Internal Lab

ANALYSIS REQUEST AND CHAIN OF CUSTODY

Batch No. SAR/WR No. SMO Use

AR/COC 602820

*Please combine COC 602820 and COC 602817 in one lab batch

*TB from lab have bubbles

Dept. No./Mail Stop:	6135/1147	Date Samples Shipped:		Contract No.:	AJ-2480A
Project/Task Manager:	NON-ER Septic Sys/M Sanders	Carrier/Waybill No.:		Case No.:	7223.230
Project Name:	Non-ER Septic Systems	Lab Contact:	E Kent 803 556 8171	SMO Authorization:	[signature]
Record Center Code:	ER/1295/DAT	Lab Destination:	GEL	Bill To: Sandia National Laboratories	
Logbook Ref. No.:		SMO Contact/Phone:	D Salmi 844-3110	Supplier Services Dept.:	
Service Order No.	CF 0686	Send Report to SMO:	S Jensen 844-3184	P.O. Box 5800 MS 0154	
Location	Tech Area				
Building	Room				

Reference LOV(available at SMO)

9909228%A Lab Use

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Beginning Depth/ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
050109-001	39938-SP1-BH1-9.5-S	9.5 Ft	103	083199 1642	S	AC	125ml	4C	GR	SA	VOC	
050109-003	" " -9.5 S	9.5 ft	103	083199 1642	S	AG	250ml	4C	GR	SA	CN Cr6+ HE PCB SVOC RCRA Met	
050109-004	" -9.5-S	9.5 Ft	103	083199 1642	S	AG	500ml	4C	GR	SA	+Gross Alpha + Gamma Spec Both	
050110-005	" 9.5-TB	9.5 Ft	103	083199 1642	SW DIW	G	3 x 40ml	HCL	GR	TB	VOC	

*COC 602821 Releases

RMMA	☒ Yes ☐ No	Ref. No.	
Sample Disposal	☐ Return to Client	☒ Disposal by lab	
Turnaround Time	☒ Normal	☐ Rush	
	Required Report Date		

Special Instructions/QC Requirements

EDD ☒ Yes ☐ No

Raw Data Package ☒ Yes ☐ No

Send info to Mike Sanders *all

VOC 8260 HE 8330, PCB 8082

CN 9010A RCRA Met 6010/7471

Cr6+ 7196A Gamma Spec HASL 300

SVOC 8270 Gross A/B 900

Please list as separate report.

Sample Team Members	Name	Signature	Init	Company/Organization/Phone
	Margaret Sanchez	[signature]	MY	Weston/6118/845-3267
	~~Gilbert Quintana~~			~~IT/6118/238-9417~~

		Org.	Date	Time
1. Relinquished by	[signature]	6118	9-1-99	1115
1. Received by	[signature]	7577	9-1-99	1115
2. Relinquished by	[signature]	7577	9-2-99	1200
2. Received by	[signature]	GEL	9/3/99	1100
3. Relinquished by				
3. Received by				
4. Relinquished by				
4. Received by				
5. Relinquished by				
5. Received by				
6. Relinquished by				
6. Received by				

050109
050118 > 10

*Released by COC 602821

Internal Lab

ANALYSIS REQUEST AND CHAIN OF CUSTODY

Batch No. SAR/WR No. SMO Use 99092287

Page 1 of 4 ~~3~~

AR/COC **602817**

Dept. No./Mail Stop:	6135/1147	[redacted]		Contract No.:	AJ-2490A
Project/Task Manager:	NON-ER Septic Sys/M Sanders			Case No.:	7223-830
Project Name:	Non-ER Septic Systems	Lab Contact:	E Kent 803 556 8171	SMO Authorization:	[signature]
Record Center Code:	ER/1295/DAT	Lab Destination:	GEL	Bill To: Sandia National Laboratories	
Logbook Ref. No.:		SMO Contact/Phone:	D Salmi 844-3110	Supplier Services Dept.:	
Service Order No.	CF 0686	Send Report to SMO:	S Jensen 844-3184	P.O. Box 5800 MS 0154	
Location	Tech Area				
Building	Room				

*TBs from GEL lab have bubbles

* Please combine COC 602817 + COC 602 820 in one lab batch 99092288

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Beginning Depth/ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID (Lab Use)
050049-001	Solardetox-DF1-BH3-5-S	5 ft	NA	082799 1350	S	AC	125 ml	4C	GR	SA	VOC	[redacted]
050049-003	" -5-S	5 ft		082799 1350		AG	500 ml			SA	CN, PCB, Cr6+, SVOC, HE, RCRA Met	[redacted]
050049-004	" -5-S	5 ft		082799 1350		AG	500 ml			SA	Gamma Spec, Gr A/B	[redacted]
050050-001	" -10-S	10 ft		082799 1405		AC	125 ml			SA	VOC	[redacted]
050050-003	" -10-S	10 ft		082799 1405		AG	500 ml			SA	CN, PCB, Cr6+, SVOC, HE, RCRA Met	[redacted]
050050-004	" -10-S	10 ft		082799 1405		AG	500 ml			SA	Gamma Spec, Gr A/B	[redacted]
~~050051-003~~	~~" -10-MSDS~~	~~10 ft~~		~~082799 1405~~		~~AG~~	~~500 ml~~			MSDS	CN, PCB, Cr6+, SVOC, HE, RCRA Met	[redacted]
050-052-001	Solardetox-DF1-BH2-5-S	5 ft		082799 1430		AC	125 ml			SA	VOC	[redacted]
050052-003	" -5-S	5 ft		082799 1430		AG	500 ml			SA	CN, PCB, Cr6+, SVOC, HE, RCRA Met	[redacted]
050052-004	" -5-S	5 ft		082799 1430		AG	500 ml			SA	Gamma Spec, Gr A/B	[redacted]

RMMA ☐ Yes ☒ No Ref. No.

Sample Disposal ☐ Return to Client ☒ Disposal by lab

Turnaround Time ☒ Normal ☐ Rush

Required Report Date

Special Instructions/QC Requirements

EDD ☒ Yes ☐ No

Raw Data Package ☒ Yes ☐ No

Send Info to Mike Sanders *All TB came w/bubble

VOC 8260 HE 8330 PCB 8082

CN 9010A RCRA Metals 6010/7471

Cr6+ 7196A Gamma Spec HASL 300

SVOC 8270 Gross A/B 900

Sample Team Members	Name	Signature	Init	Company/Organization/Phone
	Margaret Sanchez	[signature]	MS	Weston/6118/845-3267
	~~Gilbert Quintana~~			~~IT/6118/238-0417~~

		Org.	Date	Time		Org.	Date	Time
1.Relinquished by [signature]		6118	9-7-99	0930	4.Relinquished by			
1. Received by [signature]		7577	9-7-99	0930	4. Received by			
2.Relinquished by [signature]		7577	9/7/99	1130	5.Relinquished by			
2. Received by [signature]		GEL	9/8/99	1100	5. Received by			
3.Relinquished by					6.Relinquished by			
3. Received by					6. Received by			

602817 → 602818 } 2

050049 050073 } 25

Analysis Request And Chain Of Custody (Continuation)

AR/COC-~~6~~ 602817

Project Name:	Non-ER Sypetic System	Project/Task Manger: M Sanders			Case No.:7223.230							
Location	Tech Area				Reference LOV (available at SMO)							Lab use
Building	Room											
Sample No-Fraction	ER Sample ID or Sample Location detail	Depth in Ft	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Methods	Sample Type	Parameter & Method Requested	Lab Sample ID
050053-001	Solardetox-DF1-BH2-10-S	10 Ft	NA	082799 1455	S	AC	125ml	4C	GR	SA	VOC	
050053-003	" -10-S	10 Ft	↓	082799 1455	↓	AG	500ml	↓	↓	SA	CN PCB Cr6+ SVOC HE RCRA Met	
050053-004	-10-S	10 Ft		082799 1455		AG	500ml			SA	Gamma Spec, Gr A/B	
~~050054-003~~	~~-10-DU~~	~~10 Ft~~		~~082799 1455~~		~~AG~~	~~500ml~~			~~DU~~	~~CN PCB Cr6+ SVOC HE RCRA Met~~	
050055-001	Solardetox-DF1-BH1-5-S	5 Ft		082799 1515		AC	125ml			SA	VOC	
050055-003	" -5-S	5 Ft		082799 1515		AG	500ml			SA	CN PCB Cr6+ SVOC RCRA Met HE	
050055-004	" -5-S	5 Ft		082799 1515		AG	500ml			SA	Gamma Spec, Gr A/B	
050056-001	" -10-S	10 Ft		082799 1533		AC	125ml			SA	VOC	
050056-003	" -10-S	10 Ft		082799 1533		AG	500ml			SA	CN PCB Cr6+ SVOC HE RCRA Met	
050056-004	" -10-S	10 Ft		082799 1533		AG	500ml			SA	Gamma Spec, Gr A/B	
050057-001	Solar-9981A-SP1-BH1-8-S	8 Ft		083099 1215		AC	125ml			SA	VOC	
050057-003	" -8-S	8 Ft		083099 1215		AG	500ml			SA	CN PCB Cr6+ SVOC HE RCRA Met	
050057-004	" -8-S	8 Ft		083099 1215		AG	250ml			SA	Gamma Spec, G A/B	
050058-001	" -13-S	13 Ft		083099 1245		AC	125ml			SA	VOC	
050058-003	" -13-S	13 Ft		083099 1245		AG	500ml			SA	CN PCB Cr6+ SVOC HE RCRA Met	
050058-004	" -13-S	13 Ft		083099 1245		AG	250ml			SA	Gamma Spec Gr A/B	
050059-001	Solar 9982-DW1-BH1-11-S	11 Ft		083099 1635		AC	125ml			SA	VOC	
050059-003	Solar-9982-DW1-BH1-11-S	11 Ft		083099 1635		AG	500ml			SA	CN PCB Cr6+ SVOC HE RCRA Met	
050059-004	" -11-S	11 Ft		083099 1635		AG	250ml			SA	Gamma Spec, Gr A/B	
050060-001	" -11-DU	11 Ft	↓	083099 1635	↓	AC	125ml	↓	↓	DU	VOC	

Analysis Request And Chain Of Custody (Continuation)

AR/COC- 602817

Project Name: Non-ER Sypetic System		Project/Task Manger: M Sanders				Case No.:7223.230						Lab use
Location	Tech Area				Reference LOV (available at SMO)							
Building	Room											
Sample No-Fraction	ER Sample ID or Sample Location detail	Depth in Ft	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Methods	Sample Type	Parameter & Method Requested	Lab Sample ID
050060-003	Solar 9982-DW1-BH1-11-DU	11 Ft	N/A	083099 1635	S	AG	500ml	4C	GR	DU	CN PCB Cr6+ SVOC HE RCRA Met	[redacted]
050060-004	" -11-DU	11 Ft		083099 1635		AG	250ml			DU	Gamma Spec, Gr A/B	[redacted]
050061-001	" -16-S	16 Ft		083199 0951		AC	125ml			SA	VOC	[redacted]
050061-003	" -16-S	16 Ft		083199 0951		AG	500ml			SA	CN PCB Cr6+ SVOC HE RCRA Met	[redacted]
050061-004	" -16-S	16 Ft		083199 0951		AG	250ml			SA	Gamma Spec Gr A/B	[redacted]
050062-001	LFR-DFI-BH1-7-S	7 Ft		090199 1015		AC	125ml			SA	VOC	[redacted]
050062-003	" -7-S	7 Ft		090199 1145		AG	500ml			SA	CN PCB Cr6+ SVOC HE RCRA Met	[redacted]
050062-004	" -7-S	7 Ft		090199 1145		AG	250ml			SA	Gamma Spec, Gr A/B	[redacted]
050063-001	" -12-S	12 Ft		090199 1507		AC	125ml			SA	VOC	[redacted]
050063-003	" -12-S	12 Ft		090199 1507		AG	+500 250ml			SA	CN PCB Cr6+ SVOC HE RCRA Met	[redacted]
050063-004	" -12-S	12 Ft		090199 1507		AG	+250 500ml			GR	Gamma Spec, Gr A/B	[redacted]
050064-001	LFR-DFI-BH1-7-MS/MSD	7 Ft		090199 1015		AC	2X 125ml			MS/MSD	VOC	[redacted]
050064-003	" "	7 Ft		090199 1145		AG	2X 500ml			MS/MSD	CN PCB Cr6+ SVOC HE RCRA Met	[redacted]
050064-004	" "	7 Ft		090199 1145		AG	2X 250ml			MS/MSD	Gamma Spec, Gr A/B	[redacted]
050065-001	LFR-DFI-BH2-7-S	7 Ft		090299 0940		AC	125ml			SA	VOC	[redacted]
050065-003	"	7 Ft		090299 0940		AG	500ml			SA	CN PCB Cr6+ SVOC HE RCRA Met	[redacted]
050065-004	"	7 Ft		090299 0940		AG	250ml			SA	Gamma Spec, Gr A/B	[redacted]
050066-001	LFR-DFI-BH2-12-S	12 Ft		090299 1052		AC	125ml			SA	VOC	[redacted]
050066-003	"	12 Ft		090299 1052		AG	500ml			SA	CN PCB Cr6+ SVOC HE RCRA Met	[redacted]
050066-004	LFR-DFI-BH2-12-S	12 Ft		090299 1052		AG	250ml			SA	Gamma Spec, Gr A/B	[redacted]

[redacted]

Analysis Request And Chain Of Custody (Continuation)

Page 3 of 3 4 4

AR/COC- 602817

Project Name:	Non-ER Sypetic System	Project/Task Manger: M Sanders			Case No.:7223.230							Lab use
Location	Tech Area				Reference LOV (available at SMO)							
Building	Room											
Sample No-Fraction	ER Sample ID or Sample Location detail	Depth in Ft	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Methods	Sample Type	Parameter & Method Requested	Lab Sample ID
050067-001	LFR-DF1-BH3-7-S	7Ft	N/A	090299 1351	S	AC	250ml	4C	GR	SA	VOC	[redacted]
0067 ~~050068~~-003	LFR-DF1-BH3-7-S	7Ft	N/A	090299 1351	S	AG	500ml	4C	GR	SA	CN PCB Cr6+ SVOC HE RCRA Met	
050067-004	LFR-DF1-BH3-7-S	7Ft	N/A	090299 1351	S	AG	250ml	4C	GR	SA	Gamma Spec, Gr A/B	
050068-001	" -12-S	12Ft	N/A	090299 1424	S	AC	125ml	4C	GR	SA	VOC	
050068-003	" -12-S	12Ft	N/A	090299 1424	S	AG	500ml	4C	GR	SA	CN PCB Cr6+ SVOC HE RCRA Met	
050068-004	" -12-S	12Ft	N/A	090299 1424	S	AG	250ml	4C	GR	SA	Gamma Spec, Gr A/B	
050069-005-1	LFR-DF1-BH3-GS	N/A	N/A	090799 0730	DIW	P	1L	HNO_3	GR	EB	Gamma Spec	
050069-006-2	LFR-DF1-BH3-GrAB	N/A	N/A	090799 0730	DIW	P	1L	HNO_3	GR	EB	Gross A/B	
050069-007-3	LFR-DF1-BH3-RCRA	N/A	N/A	090799 0730	DIW	P	500ml	HNO_3	GR	EB	RCRA Met	
050069-008-4	" -SVOC	N/A	N/A	090799 0730	DIW	AG	2x 1L	4C	GR	EB	SVOC	
050069-009-5	" -HE	N/A	N/A	090799 0730	DIW	AG	4x 1L	4C	GR	EB	HE	
050069-010-6	" -CN	N/A	N/A	090799 0730	DIW	P	1L	NaOH ~~4C~~	GR	EB	total CN	
050069-011-7	" -Cr6+	N/A	N/A	090799 0730	DIW	P	500ml	4C	GR	EB	Cr6+	
050069-012-8	" -PCB	N/A	N/A	090799 0730	DIW	AG	2x 1L	4C	GR	EB	PCB	
050069-013-9	" -EB	N/A	N/A	090799 0730	DIW	G	3x 40ml	HCL	GR	EB	VOC	
050069-014-10	" -TB	N/A	N/A	090799 0730	DIW	G	3x 40ml	HCL	GR	~~EB~~ TB	VOC	

[redacted]

Sample Findings Summary

Site: Non-ER Septic Systems AR/COC: 602817 / 602820 Data Classification: Organics (EPA 8260A, 8270C, 8330, 8082)

ER Sample ID	Analysis	DV Qualifiers	Comments
050069-008 LFR-DF1-BH3-SVOC	99-09-2 (3-nitroaniline)	UJ	COC # 602817
050069-012 LFR-DF1-BH3-PCB	EPA 8082 (PCBs)	UJ2	
Note: See attached spreadsheet for VOC data qualifications.			
Data are acceptable.			
QC Measures appear to be adequate.			

ER Sample ID - This value is located on the AR/Chain of Custody.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method, use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate, needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions_CE, EPA6010, EPA6020, EPA7470/1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH_ALK, HACH_ NO2, HACH_NO3, MEKC_HE, PCBRISC

Reviewed by: [signature] Date: 12/16/99

Data Validation Qualifiers and Descriptive Flags*

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

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

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

* This is not a definitive list. Other qualifiers are potentially available. Notify Tina Sanchez to revise list.

Updated: September 14, 1999

ARCOC #602817/602820 Organic Analyses (VOCs) ER Sample ID	75-35-4 (1,1-dichloroethene)	79-01-6 (trichloroethene)
ARCOC #602820		
050109-001 B9938-SP1-BH1-9.5-S	UJ	UJ
050110-005 B9938-SP1-BH1-9.5-TB	UJ	UJ
ARCOC #602817		
050049-001 SOLARDETOX-DF1-BH3-5-S	UJ	UJ
050050-001 SOLARDETOX-DF1-BH3-10-S	UJ	UJ
050-052-001 SOLARDETOX-DF1-BH2-5-S	UJ	UJ
050053-001 SOLARDETOX-DF1-BH2-10-S	UJ	UJ
050055-001 SOLARDETOX-DF1-BH1-5-S	UJ	UJ
050056-001 SOLARDETOX-DF1-BH1-10-S	UJ	UJ
050057-001 SOLAR9981A-SP1-BH1-8-S	UJ	UJ
050058-001 SOLAR9981A-SP1-BH1-13-S	UJ	UJ
050059-001 SOLAR9982-DW1-BH1-11-S	UJ	UJ
050060-001 SOLAR9982-DW1-BH1-11-DU	UJ	UJ
050061-001 SOLAR9982-DW1-BH1-16-S	UJ	UJ
050062-001 LFR-DF1-BH1-7-S	UJ	UJ
050063-001 LFR-DF1-BH1-12-S	UJ	UJ
050064-001 LFR-DF1-BH1-7-MSMSD	UJ	UJ
050065-001 LFR-DF1-BH2-7-S	UJ	UJ
050066-001 LFR-DF1-BH2-12-S	UJ	UJ
050067-001 LFR-DF1-BH3-7-S	UJ	UJ
050068-001 LFR-DF1-BH3-12-S	UJ	UJ
050069-013 LFR-DF1-BH3-EB	UJ	UJ
050069-014 LFR-DF1-BH3-TB	UJ	UJ

[signature] 12/16/95

Sample Findings Summary

Site: Non-ER Septic Systems AR/COC: 602817/602820 Data Classification: Inorganics (EPA 6010B, 7470/1A, 9012A, 7196A)

ER Sample ID	Analysis	DV Qualifiers	Comments
Note: See attached spread sheet for data qualifications.			
	Data are acceptable.		
QC	Measures appear to be adequate.		

ER Sample ID - This value is located on the AR/Chain of Custody.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method, use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate, needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions_CE, EPA6010, EPA6020, EPA7470/1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH_ALK, HACH_ NO2, HACH_NO3, MEKC_HE, PCBRISC

Reviewed by: [signature] Date: 12/16/99

Data Validation Qualifiers and Descriptive Flags*

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

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

Descriptive Flags

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

* This is not a definitive list. Other qualifiers are potentially available. Notify Tina Sanchez to revise list.

Updated: September 14, 1999

ARCOC #602817/602820 Inorganic Analyses (RCRA metals, CN, Cr6+) ER Sample ID	7440-39-3 (Ba)	7440-43-9 (Cd)	7440-22-4 (Ag)	7440-38-2 (As)		7439-97-6 (Hg)
ARCOC #602820						
050109-003 B9938-SP1-BH1-9.5-S	J,A2,P1		J,B,B3			J,B
ARCOC #602817						
050049-003 SOLARDETOX-DF1-BH3-5-S	J,A2,P1		J,B,B3			J,B
050050-003 SOLARDETOX-DF1-BH3-10-S	J,A2,P1		J,B,B3			J,B
050-052-003 SOLARDETOX-DF1-BH2-5-S	J,A2,P1		J,B,B3			J,B
050053-003 SOLARDETOX-DF1-BH2-10-S	J,A2,P1		J,B,B3			J,B
050055-003 SOLARDETOX-DF1-BH1-5-S	J,A2,P1		J,B,B3			J,B
050056-003 SOLARDETOX-DF1-BH1-10-S	J,A2,P1		J,B,B3			J,B
050057-003 SOLAR9981A-SP1-BH1-8-S	J,A2,P1		J,B,B3	J,B3		
050058-003 SOLAR9981A-SP1-BH1-13-S	J,A2,P1		J,B,B3			J,B
050059-003 SOLAR9982-DW1-BH1-11-S	J,A2,P1		J,B,B3			J,B
050060-003 SOLAR9982-DW1-BH1-11-DU	J,A2,P1		J,B,B3			J,B
050061-003 SOLAR9982-DW1-BH1-16-S	J,A2,P1		J,B,B3			
050062-003 LFR-DF1-BH1-7-S	J,A2,P1		J,B,B3			J,B
050063-003 LFR-DF1-BH1-12-S	J,A2,P1		J,B,B3			J,B
050064-003 LFR-DF1-BH1-7-MSMSD	J,A2,P1		J,B,B3			J,B
050065-003 LFR-DF1-BH2-7-S	J,A2,P1		J,B,B3			J,B
050066-003 LFR-DF1-BH2-12-S	J,A2,P1		J,B,B3			J,B
050067-003 LFR-DF1-BH3-7-S	J,A2,P1		J,B,B3			J,B
050068-003 LFR-DF1-BH3-12-S	J,A2,P1	J,B3	J,B,B3			J,B
050069-007 LFR-DF1-BH3-RCRA						UJ,B3

[illegible] 12/16/95

MEMORANDUM

DATE: December 16, 1999

TO: File

FROM: Kenneth Salaz KAS

SUBJECT: Organic Data Review and Validation
Non-ER Septic Systems, ARCOC #602817/602820,
Project/Task No. 7223.02.02.01

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

Summary

All samples were prepared and analyzed with accepted procedures and specified methods: EPA8260A (VOCs), EPA8270C (SVOCs), EPA8330 (HEs), and EPA8082 (PCBs). Problems were identified with the data package that result in the qualification of data.

1. PCB Analysis: The extraction holding time was exceeded for the re-extraction of sample 9909228-66 due to low initial surrogate recoveries. All results were non-detect (ND) and will be qualified "UJ2."

2. VOC Analysis: The initial calibration response factors (RFs) of 1,1-dichloroethene and trichloroethene were less than (<) the required minimums. The associated results of samples 9909228-01, -04, -05, -08, -11, -14, -17, -20, -23, -26, -29, -32, -35, -38, -41, -44, -47, -50, -53, -56, -67, and -68 were ND and will be qualified "UJ."

   SVOC Analysis: The continuing calibration verification (CCV) percent difference (%D) of 3-nitroaniline was greater than (>) 40%. The associated result of sample 9909228-62 was ND and will be qualified "UJ."

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

Holding Times

VOC/SVOC/HE Analyses: All samples were analyzed within the prescribed holding times.

PCB Analysis: All samples were analyzed and extracted within the prescribed holding times except as noted above in the summary section.

Calibration

VOC Analysis: The initial and continuing calibrations met QC acceptance criteria except as noted above in the summary section and the following. The CCV %Ds of chloromethane, acetone, 2-hexanone, and vinyl acetate were >20%. However, all associated sample results were ND. Thus, no data were qualified.

SVOC Analysis: The initial and continuing calibrations met QC acceptance criteria except as noted above in the summary section and the following. The CCV %Ds of 2,4-dinitrophenol, 4-nitrophenol, carbazole, pyrene, 3,3'-dichlorobenzidine, indeno(1,2,3-cd)pyrene, and benzo(g,h,i)perylene were outside QC limits. However, all associated sample results were ND. Thus, no data were qualified.

HE/PCB Analyses: The initial and continuing calibrations met QC acceptance criteria.

Blanks

All Analyses: No target analytes were detected in the method blanks.

Surrogates

VOC/SVOC/HE Analyses: The surrogate percent recoveries (%RECs) met QC acceptance criteria.

PCB Analysis: The surrogate %RECs met QC acceptance criteria except for the following. The %REC of sample 9909228-02 was slightly < QC limits (46.5<46.8). However, all other QC criteria were met. Thus, no data were qualified.

Internal Standards (ISs)

VOC/SVOC Analyses: The IS areas and retention times (RTs) met QC acceptance criteria.

HE/PCB Analyses: No internal standards were required for these methods.

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

VOC/HE/PCB Analyses: The MS/MSD met QC acceptance criteria.

SVOC Analysis: The MS/MSD met QC acceptance criteria except for the following. The MSD relative percent difference (RPD) of 4-nitrophenol was > QC limits. However, the MS/MSD %RECs met QC acceptance criteria. Thus, no data were qualified.

Laboratory Control Samples (LCS/LCSD)

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

Other QC

VOC Analysis: A field duplicate was submitted on the ARCOC. When possible, RPDs were calculated and are listed on the data validation worksheet. No target analytes were detected in the equipment blank (EB) or trip blank (TB).

SVOC/HE/PCB Analyses: Field duplicates were submitted on the ARCOC. However, all sample results were ND. Thus, RPDs could not be calculated. No target analytes were detected in the EBs. No field blanks (FBs) were submitted on the ARCOC.

No other specific issues were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

MEMORANDUM

DATE: December 16, 1999

TO: File

FROM: Kenneth Salaz KAS

SUBJECT: Inorganic Data Review and Validation
Non-ER Septic Systems, ARCOC #602817/602820,
Project/Task No. 7223.02.02.01

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

Summary

All samples were prepared and analyzed with accepted procedures and specified methods: EPA6010B (ICP metals), EPA7470/1A (Hg), EPA9012A (CN), and EPA7196A (Cr6+). Problems were identified with the data package that result in the qualification of data.

1. ICP Analysis: In the initial calibration blank (ICB) and/or continuing calibration blank (CCB), cadmium (Cd) and arsenic (As) were detected. The Cd result of sample 9909228-57 and the As result of -24 were positive, less than (<) 5X the blank concentrations, and will be qualified "J,B3." Silver (Ag) was detected in the CCB and method blank. The results of samples -02, -06, -09, -12, -15, -18, -21, -24, -27, -30, -33, -36, -39, -42, -45, -48, -51, -54, and -57 were positive, <5X the blank concentrations, and will be qualified "J,B,B3."

   Hg Analysis: In the ICB for the equipment blank (EB), mercury (Hg) was detected at a negative concentration. The absolute value was greater than (>) the detection limit (DL) but < the reporting limit (RL). The associated result of sample 9909228-61 was non-detect (ND) and will be qualified "UJ,B3." Hg was also detected in the method blank for the field samples. The associated results of samples -02, -06, -09, -12, -15, -18, -21, -27, -30, -33, -39, -42, -45, -48, -51, -54, and -57 were positive, <5X the blank concentration, and will be qualified "J,B."

2. ICP Analysis: The MS percent recovery (%REC) and the MSD relative percent difference (RPD) of barium (Ba) were > QC limits. The associated results of samples 9909228-02, -06, -09, -12, -15, -18, -21, -24, -27, -30, -33, -36, -39, -42, -45, -48, -51, -54, and -57 were positive and will be qualified "J,A2,P1."

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

Holding Times

All Analyses: All samples were analyzed within the prescribed holding times.

Calibration

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

Blanks

ICP/Hg Analyses: No target analytes were detected in the blanks except as noted above in the summary section and the following. Ba was detected in the ICB and CCB for the EB. However, the blank concentrations were < the associated DLs. Thus, no data were qualified.

CN/Cr6+ Analyses: No target analytes were detected in the blanks.

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

ICP Analysis: The MS/MSD met QC acceptance criteria except as noted above in the summary section.

Hg/CN/Cr6+ Analyses: The MSs met QC acceptance criteria. No MSDs were performed. However, replicate analyses were performed as measures of laboratory precision.

Laboratory Control Samples (LCS/LCSD)

ICP Analysis: The LCS/LCSD met QC acceptance criteria except for the following. The LCS %RECs of Cd, Ag, and lead (Pb) were outside QC limits. However, the LCSDs met QC acceptance criteria. Thus, no data were qualified.

Hg/CN/Cr6+ Analyses: The LCS/LCSD met QC acceptance criteria.

Replicates

ICP Analysis: No replicate analysis was performed. The MS/MSD were used as a measure of precision.

Hg/CN/Cr6+ Analyses: The replicate analyses met QC acceptance criteria.

ICP Interference Check Sample (ICS)

ICP Analysis: The ICS met QC acceptance criteria.

Hg/CN/Cr6+ Analyses: No ICS was required for these methods.

ICP Serial Dilution

ICP Analysis: The ICP serial dilution met QC acceptance criteria.

Hg/CN/Cr6+ Analyses: No serial dilution was required for these methods.

Other QC

All Analyses: Field duplicates were submitted on the ARCOC. When possible, RPDs were calculated and are listed on the data validation worksheets. No target analytes were detected in the EBs. No field blanks (FBs) were submitted on the ARCOC.

No other specific issues were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

Sample Findings Summary

Site: Non-ER Septic Systems AR/COC: 602817 / 602820 Data Classification: Radiological (EPA 900.0 ↓ HASL 300)

ER Sample ID	Analysis	DV Qualifiers	Comments
⇒ Note: See attached spreadsheet for data qualifications.			
Data	are acceptable (except as noted on spreadsheet).		
QC	Measures appear to be adequate.		

ER Sample ID - This value is located on the AR/Chain of Custody.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method, use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate, needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions_CE, EPA6010, EPA6020, EPA7470/1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH_ALK, HACH_ NO2, HACH_NO3, MEKC_HE, PCBRISC

Reviewed by: ____________ Date: 12/16/99

Data Validation Qualifiers and Descriptive Flags*

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

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

Descriptive Flags

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

* This is not a definitive list. Other qualifiers are potentially available. Notify Tina Sanchez to revise list.

Updated: September 14, 1999

ARCOC #602817/602820 Radiological Analyses (Gross Alpha/Beta, Gamma Spec) ER Sample ID	86954-36-1 (Am-241)	13967-70-9 (Cs-134)	10045-97-3 (Cs-137)	15092-94-1 (Pb-212)	7440-29-1 (Th-232)	15117-96-1 (U-235)	13967-71-0 (Zr-95)
ARCOC #602820							
050109-004 B9938-SP1-BH1-9.5-S	J		J,B			J,B	
ARCOC #602817							
050049-004 SOLARDETOX-DF1-BH3-5-S	J		J,B			J,B	
050050-004 SOLARDETOX-DF1-BH3-10-S	J		J,B			J,B	
050-052-004 SOLARDETOX-DF1-BH2-5-S	J		J,B				
050053-004 SOLARDETOX-DF1-BH2-10-S	J		J,B			J,B	
050055-004 SOLARDETOX-DF1-BH1-5-S	J		J,B				
050056-004 SOLARDETOX-DF1-BH1-10-S	J		J,B				
050057-004 SOLAR9981A-SP1-BH1-8-S	J	R	J,B				
050058-004 SOLAR9981A-SP1-BH1-13-S	J		J,B				
050059-004 SOLAR9982-DW1-BH1-11-S	J	R	J,B				
050060-004 SOLAR9982-DW1-BH1-11-DU	J		J,B				
050061-004 SOLAR9982-DW1-BH1-16-S	J		J,B			J,B	
050062-004 LFR-DF1-BH1-7-S	J		J,B			J,B	
050063-004 LFR-DF1-BH1-12-S	J		J,B				
050064-004 LFR-DF1-BH1-7-MSMSD	J	R	J,B				
050065-004 LFR-DF1-BH2-7-S	J	R	J,B			J,B	
050066-004 LFR-DF1-BH2-12-S	J		J,B			J,B	
050067-004 LFR-DF1-BH3-7-S	J		J,B			J,B	
050068-004 LFR-DF1-BH3-12-S	J		J,B			J,B	
050069-005 LFR-DF1-BH3-GS				J,B	J,B		J

Finney Bailey 12/16/95

MEMORANDUM

DATE: December 16, 1999

TO: File

FROM: Kenneth Salaz KMS

SUBJECT: Radiological Data Review and Validation
Non-ER Septic Systems, ARCOC #602817/602820,
Project/Task No. 7223.02.02.01

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

Summary

All samples were prepared and analyzed with accepted procedures and specified methods: EPA900.0 (Gross Alpha/Beta) and HASL300 (Gamma Spec). Problems were identified with the data package that result in the qualification of data.

1. Gamma Spec Analysis: In the method blank for the equipment blank (EB), lead (Pb)-212 and thorium (Th)-232 were detected. The associated results of sample 9909228-59 were less than (<) 5X the blank concentrations and will be qualified "J,B." In the method blank for the field samples, cesium (Cs)-137 and uranium (U)-235 were detected. The Cs-137 results of samples -03, -07, -10, -13, -16, -19, -22, -25, -28, -31, -34, -37, -40, -43, -46, -49, -52, -55, and -58, as well as the U-235 results of samples -03, -07, -10, -16, -37, -40, -49, -52, -55, and -58, were <5X the blank concentrations and will be qualified "J,B."

2. Gamma Spec Analysis: The replicate error ratios (RERs) of zirconium (Zr)-95 for the EB and americium (Am)-241 for the field samples were greater than (>) 1 but <3. The Zr-95 result of sample 9909228-59 and the Am-241 results of samples -03, -07, -10, -13, -16, -19, -22, -25, -28, -31, -34, -37, -40, -43, -46, -49, -52, -55, and -58 will be qualified "J."

3. Gamma Spec Analysis: The negative bias criteria were not met for the Cs-134 results of samples 9909228-25, -31, -46, and -49. The results were negative and < the associated negative MDAs. Thus, these results will be qualified "R" (unusable).

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

Holding Times

All Analyses: All samples were analyzed within the prescribed holding times.

Calibration

All Analyses: No calibration data were provided. However, the case narrative stated that the instruments were properly calibrated.

Blanks

Gross Alpha/Beta Analysis: In the method blank, gross alpha/beta were detected. However, the blank concentrations were < the associated 2-sigma uncertainties. Thus, no data were qualified.

Gamma Spec Analysis: No target analytes were detected in the method blank except as noted above in the summary section and the following. Actinium (Ac)-228, Pb-212, radium (Ra)-228, and U-235 were detected. However, the blank concentrations were < the associated 2-sigma uncertainties. Thus, no data were qualified.

Matrix Spike (MS) Analysis

All Analyses: The MSs met QC acceptance criteria.

Laboratory Control Sample (LCS)

All Analyses: The LCSs met QC acceptance criteria.

Replicates

Gross Alpha/Beta Analysis: The replicate analysis met QC acceptance criteria.

Gamma Spec Analysis: The replicate analysis met QC acceptance criteria except as noted above in the summary section.

Tracer Recoveries

All Analyses: No tracers were required for these methods.

Negative Bias

All Analyses: All results met negative bias QC acceptance criteria except as noted above in the summary section.

Other QC

Gross Alpha/Beta Analysis: A field duplicate was submitted on the ARCOC. All RERs were <1. No target analytes were detected in the EB. No field blank (FB) was submitted on the ARCOC.

Gamma Spec Analysis: A field duplicate was submitted on the ARCOC. All RERs were <1. No target analytes were detected in the EB except Ra-226. However, the blank concentration was < the associated 2-sigma uncertainties. Thus, no data were qualified. No FB was submitted on the ARCOC.

No other specific issues were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

Data Validation Summary

Site/Project: Non-ER Septic Systems Project/Task #: 7223.02.02.01 # of Samples: 68 Matrix: 57 soil / 11 aqueous

AR/COC #: 602820/602817 Laboratory Sample IDs: 9909228-01 thru -68

Laboratory: GEL

Laboratory Report #: 9909228A/B

QC Element	Analysis									
	Organics				Inorganics				RAD	Other (Cr6+)
	VOC	SVOC	Pesticide/ PCB	HPLC (HE)	ICP/AES	GFAA/ AA	CVAA (Hg)	CN		
1. Holding Times/Preservation	✓	✓	~~✓~~ UJ	✓	✓	NA	✓	✓	✓	✓
2. Calibrations	UJ	UJ	✓	✓	✓		✓	✓	✓	✓
3. Method Blanks	✓	✓	✓	✓	UJ, B3 J, B, B3		J, B	✓	J, B	✓
4. MS/MSD	✓	✓	✓	✓	J, A2, P1		✓	✓	✓	✓
5. Laboratory Control Samples	✓	✓	✓	✓	✓		✓	✓	✓	✓
6. Replicates					NA		✓	✓	J	✓
7. Surrogates	✓	✓	✓	✓						NA
8. Internal Standards	✓	✓								
9. TCL Compound Identification	✓	✓								
10. ICP Interference Check Sample					✓					
11. ICP Serial Dilution					✓					
12. Carrier/Chemical Tracer Recoveries									NA	
13. Other QC	✓	✓	✓	✓	✓		✓	✓	R	✓

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

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

Reviewed By: [signature] Date: 12/16/99

Holding Time and Preservation

Site/Project: Non-ER Septic Systems AR/COC #: 602820/602817 Laboratory Sample IDs: 9909228-01 thru -68

Laboratory: GEL Laboratory Report #: 9909228A/B

# of Samples: 68 Matrix: 57 soil / 11 aqueous

Sample ID	Analytical Method	Holding Time Criteria	Days Holding Time was Exceeded	Preservation Criteria	Preservation Deficiency	Comments
9909228-66	EPA 8082 (PCBs)	7 days	6	NA	NA	Sample re-extracted out of holding due to low surrogate recoveries.

NA = Not Applicable

Reviewed By: [signature] Date: 12/16/99

Volatile Organics (SW 846 Method 8260)

Site/Project: Non-ER Septic Systems AR/COC #: 602820/602817 # of Samples: 19 Matrix: Soil

Laboratory: GEL Laboratory Report #: 9909228A/B Laboratory Sample IDs: 9909228-01, -05, -08, -11, -14, -17, -20, -23, -26, -29, -32, -35, -38, -41, -44, -47, -50, -53, -56

Methods: EPA 8260A Batch #s: 158044

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF >.05	Calib. RSD/ R^2 <20% / 0.99	(1) CCV %D 20%	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks	CCV %D 20%	
1	74-87-3	Chloromethane	✓	0.10	✓	✓	✓	34.8	✓							NA	✓	✓	✓	
1	74-83-9	Bromomethane		0.10	✓			✓												
1	75-01-4	vinyl chloride		0.10	NA															
1	75-00-3	Chloroethane		0.01																
1	75-09-2	methylene chloride (10xblk)		0.01	✓											6.45				
1	67-64-1	acetone(10xblk)		0.01	✓			30.8								NA				
1	75-15-0	carbon disulfide		0.10	NA			✓												
1	75-35-4	1,1-dichloroethene		0.20		0.17				✓	✓	✓	✓	✓	✓					
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												30.6				
2	71-55-6	1,1,1-trichloroethane		0.10												NA				
2	56-23-5	carbon tetrachloride		0.10																
2	75-27-4	Bromodichloromethane		0.20																
2	78-87-5	1,2-dichloropropane		0.01																
2	10061-01-5	cis-1,3-dichloropropene		0.20																
2	79-01-6	Trichloroethene		0.30		0.24				✓	✓	✓	✓	✓	✓					
2	124-48-1	Dibromochloromethane		0.10		✓														
2	79-00-5	1,1,2-trichloroethane		0.10																
2	71-43-2	Benzene		0.50						✓	✓	✓	✓	✓	✓					
2	10061-02-6	trans-1,3-dichloropropene		0.10																
2	75-25-2	Bromoform		0.10	✓															
3	108-10-1	4-methyl-2-pentanone		0.10	NA															
3	591-78-6	2-hexanone		0.01				29.7												
3	127-18-4	Tetrachloroethene		0.20				✓												
3	79-34-5	1,1,2,2-tetrachloroethane		0.30																
3	108-88-3	toluene(10xblk)		0.40						✓	✓	✓	✓	✓	✓	26.3				
3	108-90-7	Chlorobenzene		0.50						✓	✓	✓	✓	✓	✓	NA				
3	100-41-4	Ethylbenzene		0.10																
3	100-42-5	Styrene		0.30																
3	1330-20-7	xylenes(total)		0.30																
	540-59-0	1,2-dichloroethylene(total)		0.01																
	110-75-8	2-chloroethyl vinyl ether				NA	NA	NA	NA								NA	NA	NA	
	108-05-4	Vinyl Acetate	✓			✓	✓	29.9	✓								✓	✓	✓	

Comments:
(1) CCV %D applies to samples -01, -05, -08, and -11 only.

Notes: Shaded rows are RCRA compounds.

NA = Not Applicable

Reviewed By: [signature] Date: 12/16/99

Volatile Organics (SW 846 Method 8260)

Site/Project: Non-ER Septic Systems AR/COC #: 602820/602817 # of Samples: 3 Matrix: Aqueous

Laboratory: GEL Laboratory Report #: 9909228A18 Laboratory Sample IDs: 9909228-04, -67, -68

Methods: EPA 8260A Batch #s: 158072

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blks	LCS	LCSD	LCS RPD	① MS	MSD	MS RPD	Field Dup. RPD	② Equip. Blanks	Trip Blanks		
						>.05	<20% / 0.99	20%												
1	74-87-3	Chloromethane	✓	0.10	✓	✓	✓	✓	✓				NA	NA	NA	NA	NA	NA		
1	74-83-9	Bromomethane	✓	0.10	✓	✓	✓													
1	75-01-4	vinyl chloride		0.10	NA	✓	✓													
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	75-15-0	carbon disulfide	✓	0.10	NA	✓	✓													
1	75-35-4	1,1-dichloroethene	✓	0.20		0.17	✓			✓	✓	✓								
1	75-34-3	1,1-dichloroethane	✓	0.10		✓	✓													
1	67-66-3	Chloroform	✓	0.20		✓	✓													
1	107-06-2	1,2-dichloroethane	✓	0.10		✓	✓													
1	78-93-3	2-butanone(10xblk)	✓	0.01		✓	✓													
2	71-55-6	1,1,1-trichloroethane	✓	0.10		✓	✓													
2	56-23-5	carbon tetrachloride	✓	0.10		✓	✓													
2	75-27-4	Bromodichloromethane	✓	0.20		✓	✓													
2	78-87-5	1,2-dichloropropane	✓	0.01		✓	✓													
2	10061-01-5	cis-1,3-dichloropropene	✓	0.20		✓	✓													
2	79-01-6	Trichloroethene	✓	0.30		0.24	✓			✓	✓	✓								
2	124-48-1	Dibromochloromethane	✓	0.10		✓	✓													
2	79-00-5	1,1,2-trichloroethane	✓	0.10		✓	✓													
2	71-43-2	Benzene	✓	0.50		✓	✓			✓	✓	✓								
2	10061-02-6	trans-1,3-dichloropropene	✓	0.10		✓	✓													
2	75-25-2	Bromoform	✓	0.10	✓	✓	✓													
3	108-10-1	4-methyl-2-pentanone	✓	0.10	NA	✓	✓													
3	591-78-6	2-hexanone	✓	0.01		✓	✓													
3	127-18-4	Tetrachloroethene	✓	0.20		✓	✓													
3	79-34-5	1,1,2,2-tetrachloroethane	✓	0.30		✓	✓													
3	108-88-3	toluene(10xblk)	✓	0.40		✓	✓			✓	✓	✓								
3	108-90-7	Chlorobenzene	✓	0.50		✓	✓			✓	✓	✓								
3	100-41-4	Ethylbenzene	✓	0.10		✓	✓													
3	100-42-5	Styrene	✓	0.30		✓	✓													
3	1330-20-7	xylenes(total)	✓	0.30		✓	✓													
	540-59-0	1,2-dichloroethylene(total)	✓	0.01		✓	✓													
	110-75-8	2-chloroethyl vinyl ether				NA	NA	NA	NA											
	108-05-4	Vinyl Acetate	✓			✓	✓	✓	✓											

Comments:
① MS/MSD performed on a sample from another SDG.
② Samples are EB and TBs.

Notes: Shaded rows are RCRA compounds.

NA = Not Applicable

Reviewed By: [signature] Date: 12/16/99

Volatile Organics

Site/Project: Non-ER Septic Systems AR/COC #: 602820/602817 Batch #s: 158072,

Laboratory: GEL Laboratory Report #: 9909228A1B # of Samples: 22 Matrix: 19 soil / 3 aqueous

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
All Passed									

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

IS 1: ~~Bromochloromethane~~ Fluorobenzene
IS 2: 1,4-Di~~fluoro~~chlorobenzene-d4
IS 3: Chlorobenzene-d5

DS 12/7/99

Comments: *Summary:

Calibration:

⇒ 1,1-dichloroethene and trichloroethene had initial calib. RFs < the required minimums. All assoc. sample results were ND and will be qualified "UJ."

⇒ chloromethane, acetone, 2-hexanone, and vinyl acetate had CCV %Ds > 20%. All assoc. sample results were ND. Thus, no data were qualified.

Semivolatile Organics (SW 846 Method 8270)

Site/Project: Non-ER Septic Systems AR/COC #: ~~602820~~ 602820 /602817 Laboratory Sample IDs: 9909228-02, -06, -09, -12, -15, -18, -21, -24, -27,

Laboratory: GEL Laboratory Report #: 99092284/B " -30, -33, -36, -39, -42, -45, -48, -51, -54, -57

Methods: EPA8270C

# of Samples: 19 Matrix: soil Batch #s: 158016

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	(1) Field Dup. RPD	Equip. Blanks	(2) Field Blanks	(3) CCV %D	
							>.05	<20% / 0.99	20%											30%	
1	A	108-95-2	Phenol	✓	0.80	NA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	✓	NA	✓	
1	BN	111-44-4	bis(2-Chloroethyl)ether		0.70		✓	✓													
1	A	95-57-8	2-Chlorophenol		0.80		✓	✓			✓	✓	✓	✓	✓	✓					
1	BN	541-73-1	1,3-Dichlorobenzene		0.60		✓	✓													
1	BN	106-46-7	1,4-Dichlorobenzene		0.50		✓	✓			✓	✓	✓	✓	✓	✓					
1	BN	95-50-1	1,2-Dichlorobenzene		0.40		✓	✓													
1	A	95-48-7	2-Methylphenol (o-cresol)		0.70		✓	✓													
1	BN	108-60-1	bis(2-chloroisopropyl)ether	✓	0.01		✓	✓													
1	A	106-44-5	4-Methylphenol		0.60		NA	NA	NA	NA								NA			
1	BN	621-64-7	N-Nitroso-di-n-propylamine	✓	0.50		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓			
1	BN	67-72-1	Hexachloroethane		0.30		✓	✓													
2	BN	98-95-3	Nitrobenzene		0.20		✓	✓													
2	BN	78-59-1	Isophorone		0.40		✓	✓													
2	A	88-75-5	2-Nitrophenol		0.10		✓	✓													
2	A	105-67-9	2,4-Dimethylphenol		0.20		✓	✓													
2	BN	111-91-1	bis(2-Chloroethoxy)methane		0.30		✓	✓													
2	A	120-83-2	2,4-Dichlorophenol		0.20		✓	✓													
2	BN	120-82-1	1,2,4-Trichlorobenzene		0.20		✓	✓			✓	✓	✓	✓	✓	✓					
2	BN	91-20-3	Naphthalene		0.70	✓	✓	✓													
2	BN	106-47-8	4-Chloroaniline		0.01	✓	✓	✓													
2	BN	87-68-3	Hexachlorobutadiene		0.01	NA	✓	✓													
2	A	59-50-7	4-Chloro-3-methylphenol		0.20		✓	✓			✓	✓	✓	✓	✓	✓					
2	BN	91-57-6	2-Methylnaphthalene		0.40		✓	✓													
3	BN	77-47-4	Hexachlorocyclopentadiene		0.01		✓	✓													
3	A	88-06-2	2,4,6-Trichlorophenol		0.20		✓	✓													
3	A	95-95-4	2,4,5-Trichlorophenol		0.20		✓	✓													

Notes: Shaded rows are RCRA compounds.

NA = Not Applicable

Comments:
(1) Field dup. was submitted. All results ND; no RPDs calculated.
(2) No FB submitted on the COC.
(3) CCV %D applies to samples -48, -51, -54, and -57 only.

Reviewed By: [signature] Date: 12/16/99

Semivolatile Organics

Site/Project: Non-ER Septic Systems AR/COC #: ~~603830~~ 602820 / 602817 (initials, 12/8/99) Batch #s: 158016

Laboratory: GEL Laboratory Report #: 9909 ~~228~~ ~~#~~ 1B # of Samples: 19 Matrix: Soil

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R²	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	① Field Dup. RPD	Equip. Blanks	② Field Blanks	③ CCV %D	
							>.05	<20% / 0.99	20%											20%	
3	BN	91-58-7	2-Chloronaphthalene	✓	0.80	NA	✓	✓	✓	✓							NA	✓	NA	✓	
3	BN	88-74-4	2-Nitroaniline (o-)		0.01	✓	✓	✓													
3	BN	131-11-3	Dimethylphthalate		0.01	NA	✓	✓													
3	BN	208-96-8	Acenaphthylene		0.90		✓	✓													
3	BN	606-20-2	2,6-Dinitrotoluene		0.20		✓	✓													
3	BN	99-09-2	3-Nitroaniline (m-)		0.01	✓	✓	✓													
3	BN	83-32-9	Acenaphthene		0.90	NA	✓	✓			✓	✓	✓	✓	✓	✓					
3	A	51-28-5	2,4-Dinitrophenol		0.01	✓	✓	✓													
3	A	100-02-7	4-Nitrophenol		0.01	✓	✓	✓			✓	✓	✓	✓	✓	35.4				-23.8	
3	BN	132-64-9	Dibenzofuran		0.80	NA	✓	✓													
3	BN	121-14-2	2,4-Dinitrotoluene		0.20		✓	✓			✓	✓	✓	✓	✓	✓				✓	
3	BN	84-66-2	Diethylphthalate		0.01		✓	✓													
3	BN	005-72-3	4-Chlorophenyl-phenylether		0.40		✓	✓													
3	BN	86-73-7	Fluorene		0.90		✓	✓													
3	BN	100-01-6	4-Nitroaniline (p-)		0.01	✓	✓	✓													
4	A	534-52-1	4,6-Dinitro-2-methylphenol		0.01	NA	✓	✓													
4	BN	86-30-6	N-Nitrosodiphenylamine (1)		0.01		✓	✓													
4	BN	101-55-3	4-Bromophenyl-phenylether		0.10		✓	✓													
4	BN	18-74-1	Hexachlorobenzene		0.10		✓	✓													
4	A	87-86-5	Pentachlorophenol		0.05		✓	✓			✓	✓	✓	✓	✓	✓					
4	BN	85-01-8	Phenanthrene		0.70		✓	✓													
4	BN	20-12-7	Anthracene		0.70		✓	✓													
4	BN	86-74-8	Carbazole		0.01		✓	✓													
4	BN	84-74-2	Di-n-butylphthalate		0.01		✓	✓													
4	BN	06-44-0	Fluoranthene		0.60		✓	✓													
5	BN	129-00-0	Pyrene		0.60		✓	✓			✓	✓	✓	✓	✓	✓					
5	BN	85-68-7	Butylbenzylphthalate		0.01		✓	✓													
5	BN	91-94-1	3,3'-Dichlorobenzidine		0.01		✓	✓													
5	BN	56-55-3	Benzo(a)anthracene		0.80		✓	✓													

NA = Not Applicable

Comments:
① Field dup. was submitted. All results ND; no RPDs calculated.
No FB submitted on the COC.
CCV %D applies to samples -48, -51, -54, and -57 only.

Semivolatile Organics

Site/Project: Non-ER Septic Systems AR/COC #: 602820 ~~602820~~/602817 Batch #s: 158016

Laboratory: GEL Laboratory Report #: 9909228A/B # of Samples: 19 Matrix: soil

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blanks	LCS	LCS D	LCS RPD	MS	MSD	MS RPD	① Field Dup. RPD	Equip. Blanks	② Field Blanks	③ CCV %D	
							>.05	<20% / 0.99	20%											20%	
5	BN	218-01-9	Chrysene	✓	0.70	NA	✓	✓	✓	✓							NA	✓	NA	✓	
5	BN	117-81-7	bis(2-Ethylhexyl)phthalate		0.01	✓	✓	✓													
6	BN	117-84-0	Di-n-octylphthalate		0.01	NA	✓	✓													
6	BN	205-99-2	Benzo(b)fluoranthene		0.70	✓	✓	✓													
6	BN	207-08-9	Benzo(k)fluoranthene		0.70	NA	✓	✓													
6	BN	50-32-8	Benzo(a)pyrene		0.70		✓	✓													
6	BN	193-39-5	Indeno(1,2,3-cd)pyrene		0.50		✓	✓	-21.4												
6	BN	53-70-3	Dibenz(a,h)anthracene		0.40	✓	✓	✓	✓												
6	BN	191-24-2	Benzo(g,h,i)perylene		0.50	NA	✓	✓													
	BN	122-66-7	1,2-diphenylhydrazine				✓	✓													
	A	N22	m,p-cresol				✓	✓													

NA = Not Applicable

Surrogate Recovery Outliers

Sample	SMC 1	SMC 2	SMC 3	SMC 4	SMC 5	SMC 6	SMC 7	SMC 8
All Passed								

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)~~ TAS 12/8/99

Comments:
① Field dup. was submitted. All results ND; no RPDs calculated.
② No FB submitted on the COC.
③ CCV %D applies to samples -48, -51, -54, and -57 only.

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
All Passed												

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

Semivolatile Organics (SW 846 Method 8270)

Site/Project: Non-ER Septic Systems AR/COC #: 602820/602817 Laboratory Sample IDs: 9909228-62

Laboratory: GEL Laboratory Report #: 9909228 A/B

Methods: EPA 8270C

# of Samples: 1 Matrix: Aqueous Batch #s: 158075

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS ①	MSD	MS RPD	Field Dup. RPD	② Equip. Blanks	Field Blanks		
							>.05	<20% / 0.99	20%												
1	A	108-95-2	Phenol	✓	0.80	NA	✓	✓	✓	✓	✓	✓	✓	NA	NA	NA	NA	NA	NA		
1	BN	111-44-4	bis(2-Chloroethyl)ether	✓	0.70		✓	✓													
1	A	95-57-8	2-Chlorophenol	✓	0.80		✓	✓			✓	✓	✓								
1	BN	541-73-1	1,3-Dichlorobenzene	✓	0.60		✓	✓													
1	BN	106-46-7	1,4-Dichlorobenzene	✓	0.50		✓	✓			✓	✓	✓								
1	BN	95-50-1	1,2-Dichlorobenzene	✓	0.40		✓	✓													
1	A	95-48-7	2-Methylphenol (o-cresol)	✓	0.70	✓	✓	✓													
1	BN	108-60-1	bis(2-chloroisopropyl)ether	✓	0.01	NA	✓	✓													
1	A	106-44-5	4-Methylphenol		0.60		NA	NA	NA	NA											
1	BN	621-64-7	N-Nitroso-di-n-propylamine	✓	0.50		✓	✓	✓	✓	✓	✓	✓								
1	BN	67-72-1	Hexachloroethane	✓	0.30		✓	✓													
2	BN	98-95-3	Nitrobenzene	✓	0.20		✓	✓													
2	BN	78-59-1	Isophorone	✓	0.40		✓	✓													
2	A	88-75-5	2-Nitrophenol	✓	0.10		✓	✓													
2	A	105-67-9	2,4-Dimethylphenol	✓	0.20		✓	✓													
2	BN	111-91-1	bis(2-Chloroethoxy)methane	✓	0.30		✓	✓													
2	A	120-83-2	2,4-Dichlorophenol	✓	0.20		✓	✓													
2	BN	120-82-1	1,2,4-Trichlorobenzene	✓	0.20		✓	✓			✓	✓	✓								
2	BN	91-20-3	Naphthalene	✓	0.70		✓	✓													
2	BN	106-47-8	4-Chloroaniline	✓	0.01		✓	✓													
2	BN	87-68-3	Hexachlorobutadiene	✓	0.01		✓	✓													
2	A	59-50-7	4-Chloro-3-methylphenol	✓	0.20		✓	✓			✓	✓	✓								
2	BN	91-57-6	2-Methylnaphthalene	✓	0.40		✓	✓													
3	BN	77-47-4	Hexachlorocyclopentadiene	✓	0.01		✓	✓													
3	A	88-06-2	2,4,6-Trichlorophenol	✓	0.20		✓	✓													
3	A	95-95-4	2,4,5-Trichlorophenol	✓	0.20		✓	✓													

Comments:
① MS/MSD performed on a sample from another SDG.
② Sample is an EB.

Notes: Shaded rows are RCRA compounds.

NA = Not Applicable

Reviewed By: [signature] Date: 12/16/99

Semivolatile Organics

Site/Project: Non-ER Septic Systems AR/COC #: 602820/602817 Batch #s: 158075

Laboratory: GEL Laboratory Report #: 9909238A/B # of Samples: 1 Matrix: Aqueous

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	① MS	MSD	MS RPD	Field Dup. RPD	② Equip. Blanks	Field Blanks		
							>.05	<20%/ 0.99	20%												
3	BN	91-58-7	2-Chloronaphthalene	✓	0.80	NA	✓	✓	✓	✓				NA	NA	NA	NA	NA	NA		
3	BN	88-74-4	2-Nitroaniline (o-)	✓	0.01	✓	✓	✓													
3	BN	131-11-3	Dimethylphthalate	✓	0.01	NA	✓	✓													
3	BN	208-96-8	Acenaphthylene	✓	0.90		✓	✓													
3	BN	606-20-2	2,6-Dinitrotoluene	✓	0.20		✓	✓													
3	BN	99-09-2	3-Nitroaniline (m-)	✓	0.01	✓	✓	✓	41.0												
3	BN	83-32-9	Acenaphthene	✓	0.90	NA	✓	✓	✓		✓	✓	✓								
3	A	51-28-5	2,4-Dinitrophenol	✓	0.01	✓	✓	✓	-25.5												
3	A	100-02-7	4-Nitrophenol	✓	0.01	NA	✓	✓	-30.2		✓	✓	✓								
3	BN	132-64-9	Dibenzofuran	✓	0.80		✓	✓	✓												
3	BN	121-14-2	2,4-Dinitrotoluene	✓	0.20		✓	✓			✓	✓	✓								
3	BN	84-66-2	Diethylphthalate	✓	0.01		✓	✓													
3	BN	005-72-3	4-Chlorophenyl-phenylether	✓	0.40		✓	✓													
3	BN	86-73-7	Fluorene	✓	0.90		✓	✓													
3	BN	100-01-6	4-Nitroaniline (p-)	✓	0.01	✓	✓	✓													
4	A	534-52-1	4,6-Dinitro-2-methylphenol	✓	0.01	✓	✓	✓													
4	BN	86-30-6	N-Nitrosodiphenylamine (1)	✓	0.01	NA	✓	✓													
4	BN	101-55-3	4-Bromophenyl-phenylether	✓	0.10		✓	✓													
4	BN	18-74-1	Hexachlorobenzene	✓	0.10		✓	✓													
4	A	87-86-5	Pentachlorophenol	✓	0.05	✓	✓	✓			✓	✓	✓								
4	BN	85-01-8	Phenanthrene	✓	0.70	NA	✓	✓													
4	BN	20-12-7	Anthracene	✓	0.70		✓	✓													
4	BN	86-74-8	Carbazole	✓	0.01		✓	✓	22.0												
4	BN	84-74-2	Di-n-butylphthalate	✓	0.01		✓	✓	✓												
4	BN	06-44-0	Fluoranthene	✓	0.60		✓	✓	✓												
5	BN	129-00-0	Pyrene	✓	0.60		✓	✓	-24.0		✓	✓	✓								
5	BN	85-68-7	Butylbenzylphthalate	✓	0.01		✓	✓	✓												
5	BN	91-94-1	3,3'-Dichlorobenzidine	✓	0.01		✓	✓	31.4												
5	BN	56-55-3	Benzo(a)anthracene	✓	0.80		✓	✓	✓												

Comments:
① MS/MSD performed on a sample from another SDG.
② Sample is an EB.

NA = Not Applicable

Semivolatile Organics

Site/Project: Non-ER Septic Systems AR/COC #: 602820/602817 Batch #s: 158075

Laboratory: GEL Laboratory Report #: 9909228A1B # of Samples: 1 Matrix: Aqueous

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF >.05	Calib. RSD/ R^2 <20% / 0.99	CCV %D 20%	Method Blanks	LCS	LCS D	LCS RPD	① MS	MSD	MS RPD	Field Dup. RPD	② Equip. Blanks	Field Blanks		
5	BN	218-01-9	Chrysene	✓	0.70	NA	✓	✓	✓	✓				NA	NA	NA	NA	NA	NA		
5	BN	117-81-7	bis(2-Ethylhexyl)phthalate	✓	0.01		✓	✓													
6	BN	117-84-0	Di-n-octylphthalate	✓	0.01		✓	✓													
6	BN	205-99-2	Benzo(b)fluoranthene	✓	0.70	✓	✓	✓													
6	BN	207-08-9	Benzo(k)fluoranthene	✓	0.70	NA	✓	✓													
6	BN	50-32-8	Benzo(a)pyrene	✓	0.70		✓	✓													
6	BN	193-39-5	Indeno(1,2,3-cd)pyrene	✓	0.50		✓	✓	-28.8												
6	BN	53-70-3	Dibenz(a,h)anthracene	✓	0.40		✓	✓	✓												
6	BN	191-24-2	Benzo(g,h,i)perylene	✓	0.50		✓	✓	-24.4												
	BN	122-66-7	1,2-diphenylhydrazine	✓			✓	✓	✓												
	A	N22	m,p-cresol	✓			✓	✓	✓												

NA = Not Applicable

Surrogate Recovery Outliers

Sample	SMC 1	SMC 2	SMC 3	SMC 4	SMC 5	SMC 6	SMC 7	SMC 8
All								
Passed								

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)~~ EAS 12/8/99

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
All Passed												

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

Comments:
① MS/MSD performed on a sample from another SDG.
② Sample is an EB.

*Summary:

Calibration:

⟹ 3-nitroaniline had a CCV %D >40%. The assoc. result was ND and will be qualified "UJ."

⟹ 2,4-dinitrophenol, 4-nitrophenol, carbazole, pyrene, 3,3'-dichlorobenzidine, Indeno(1,2,3-cd)pyrene, and benzo(g,h,i)perylene had CCV %Ds outside QC limits. All assoc. results were ND. Thus, no data were qualified.

High Explosives (SW 846 Method 8330)

Site/Project: Non-ER Septic Systems AR/COC #: 602820/602817 Laboratory Sample IDs: 9909228-02, -06, -09, -12, -15, -18, -21, -24, -27, -30,
Laboratory: GEL Laboratory Report #: 9909228A/B " -33, -36, -39, -42, -45, -48, -51, -54, -57
Methods: EPA 8330
# of Samples: 19 Matrix: soil Batch #s: 158012

CAS #	NAME	TAL	Intercept	Curve R^2	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	① Field Dup. RPD	Equip. Blanks	② Field Blanks		
				.99	20%	U			20%			20%		U	U		
2691-41-0	HMX	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	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		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	N/A	NA			

NA = Not Applicable

Sample	SMC %REC	SMC RT	Sample	SMC %REC	SMC RT
All					
Passed					

Comments:
① Field dup. was submitted. All results ND; no RPDs calculated
② No FB submitted on the COC.

*Summary
⇒ All QC met. No data were qualified.

Confirmation

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

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

Reviewed By: [signature] Date: 12/16/99

High Explosives (SW 846 Method 8330)

Site/Project: Non-ER Septic Systems AR/COC #: 602817 Laboratory Sample IDs: 9909228-63

Laboratory: GEL Laboratory Report #: 9909228~~D-63~~ EAS 12/13/99

Methods: EPA 8330

# of Samples: 1 Matrix: Aqueous Batch #s: 158013

CAS #	NAME	TAL	Intercept	Curve R^2	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	(1) Equip. Blanks	Field Blanks		
				.99	20%	U			20%			20%		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		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA					

NA = Not Applicable

Sample	SMC %REC	SMC RT	Sample	SMC %REC	SMC RT
All Passed					

Comments:
(1) Sample is an EB.
*Summary
=> All QC met. No data were qualified.

Confirmation

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

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

Reviewed By: [signature] Date: 12/16/99

PCBs (SW 846 - Method 8082)

Site/Project: Non-ER Septic Systems AR/COC #: 602820/602817 Laboratory Sample IDs: 9909228-02, -06, -09, -12, -15, -18, -21, -24, -27, -30,
Laboratory: GEL Laboratory Report #: 9909228A/B " -33, -36, -39, -42, -45, -48, -51, -54, -57
Methods: EPA 8082
\# of Samples: 19 Matrix: Soil Batch #s: 158065

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

NA = Not Applicable

Sample	SMC % REC	SMC RT	Sample	SMC % REC	SMC RT
9909228-02	46.5 (<46.8)	✓			

Comments:
(1) Field dup. was submitted, All results ND; no RPDs calculated.

*Summary:
Surrogates:
→ Sample -02 had a Surrogate %REC slightly < QC limits. All other QC criteria were met. Thus, no data were qualified.

Confirmation

Sample	CAS #	RPD > 25%	Sample	CAS #	RPD > 25%
All Passed					

Reviewed By: [signature] Date: 12/16/99

PCBs (SW 846 - Method 8082)

Site/Project: Non-ER Septic Systems AR/COC #: 602817 Laboratory Sample IDs: 9909228-66

Laboratory: GEL Laboratory Report #: 9909228B

Methods: EPA8082

# of Samples: 1 Matrix: Aqueous Batch #s: 158568

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

NA = Not Applicable

Sample	SMC % REC	SMC RT	Sample	SMC % REC	SMC RT
All Passed					

Comments:
① MS/MSD performed on a sample from a different SDG.
② Sample is an EB.

*Summary

Holding Time.

⇒ Sample was re-extracted out of holding due to low initial surrogate recoveries. All results were ND and will be qualified "UJ2."

Confirmation

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

Reviewed By: [signature] Date: 12/16/99

Inorganic Metals

Site/Project: Non-ER Septic Systems AR/COC #: 602820/602817 Laboratory Sample IDs: 9909228-02, -06, -09, -12, -15, -18, -21, -24, -27, -30,
" -33, -36, -39, -42, -45, -48, -51, -54, -57

Laboratory: GEL Laboratory Report #: 9909228A1B

Methods: EPA 6010B(ICP), EPA 7471A(Hg)

# of Samples: 19 Matrix: soil Batch #s: 158023(ICP), 158059(Hg)

CAS #/ Analyte	QC Element																			
	TAL	ICV	CCV	(µg/L) ICB	(µg/L) CCB ①	Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep. RPD	ICS AB	② Serial Dilution	Field Dup. RPD	Equip. Blanks	③ Field Blanks	CCB	CCB
7429-90-5 Al																		NA		
7440-39-3 Ba	✓	✓	✓	✓	✓	✓	✓	✓	✓	236	✓	87.1	NA	✓	✓	27.5	✓		✓	
7440-41-7 Be																				
7440-43-9 Cd	✓	✓	✓	0.4	✓	✓	123	✓	✓	✓	✓	✓	NA	✓	NA	NA	✓		✓	
7440-70-2 Ca																				
7440-47-3 Cr	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	✓	NA	21.2	✓		✓	
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	✓	✓	✓	✓	3.5	.282	91.4	✓	✓	✓	✓	✓	NA	✓	NA	NA	✓		4.5	
7440-23-5 Na																				
7440-62-2 V																				
7440-66-6 Zn																				
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	120	✓	✓	✓	✓	✓	NA	✓	NA	35.8	✓		✓	
7782-49-2 Se	✓	✓	✓	✓	✓	✓	✓	✓	✓	↓	↓	↓	↓	↓	↓	NA	✓		✓	
7440-38-2 As	✓	✓	✓	4.6	✓	✓	✓	✓	✓							19.5	✓		4.4	
7440-36-0 Sb																				
7440-28-0 Tl																				
7439-97-6 Hg	✓	✓	✓	✓	✓	.00845	✓	✓	✓	✓	NA	NA	✓	NA	NA	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

NA = Not Applicable

Comments:
① CCB applies to samples -02, -06, -09, -12, -15, -18, and -21 only.
② Serial dilution criteria apply only to sample results > 50X the RL.
③ No FB submitted on the COC.

Reviewed By: [signature] Date: 12/16/99

* Summary → See back of this page

Blanks:

⇒ Cd and As were detected in the ICB and/or CCB. The Cd result of Sample -57 and the As result of -24 were positive, <5X the blank conc.s, and will be qualified "J,B3."

⇒ Ag was detected in the CCB and method blank. The results of all samples were pos., <5X the blank conc.s, and will be qualified "J,B,B3."

⇒ Hg was detected in the method blank. The assoc. results of Samples -02, -06, -09, -12, -15, -18, -21, -27, -30, -33, -39, -42, -45, -48, -51, -54, and -57 were pos., < 5X the blank conc., and will be qualified "J,B."

LCS:

⇒ Cd, Ag, and Pb had LCS %RECs outside QC limits. However, the LCSD %RECs and RPDs met QC criteria. Thus, no data were qualified.

MS/MSD:

⇒ Ba had an MS %REC and an MSD RPD > QC limits. All assoc. results were pos. and will be qualified "J,A1,P1."

Inorganic Metals

Site/Project: Non-ER Septic Systems AR/COC #: 602817 Laboratory Sample IDs: 9909228-61

Laboratory: GEL Laboratory Report #: 9909228B

Methods: EPA 6010B (ICP metals), EPA 7470A (Hg)

# of Samples: 1 Matrix: Aqueous Batch #s: 158015 (ICP metals), 158086 (Hg)

CAS #/ Analyte	QC Element																		
	TAL	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	(1) MS	MSD	MSD RPD	Rep. RPD	ICS AB	(2) Serial Dilution	Field Dup. RPD	(3) Equip. Blanks	Field Blanks		
7429-90-5 Al										NA	NA	NA	NA		NA	NA	NA	NA		
7440-39-3 Ba	✓	✓	✓	0.2	0.3	✓	✓	✓	✓					✓						
7440-41-7 Be																				
7440-43-9 Cd	✓	✓	✓	✓	✓	✓	✓	✓	✓					✓						
7440-70-2 Ca																				
7440-47-3 Cr	✓	✓	✓	✓	✓	✓	✓	✓	✓					✓						
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	✓	✓	✓	✓	✓	✓	✓	✓	✓					✓						
7440-23-5 Na																				
7440-62-2 V																				
7440-66-6 Zn																				
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	✓	✓	✓					✓						
7782-49-2 Se	✓	✓	✓	✓	✓	✓	✓	✓	✓					✓						
7440-38-2 As	✓	✓	✓	✓	✓	✓	✓	✓	✓					✓						
7440-36-0 Sb																				
7440-28-0 Tl																				
7439-97-6 Hg	✓	✓	✓	-0.1	✓	✓	✓	✓	✓					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

NA = Not Applicable

Comments:
(1) MS and replicate performed on a sample from another SDG.
(2) Serial dilution " " " " " " ".
(3) Sample is an EB.

Reviewed By: [signature] Date: 12/16/97

*Summary: Method Blanks: ⟹ Ba detected @ values < DL. No data qualified.
⟹ Hg " @ a negative value. Result was ND and will be qualified "UJ,B3"

B-14

General Chemistry

Site/Project: Non-ER Septic Systems AR/COC #: 602820/602817 Laboratory Sample IDs: 9909228-02, -06, -09, -12, -15, -18, -21, -24, -27, -30,
Laboratory: GEL Laboratory Report #: 9909228A/B " -33, -36, -39, -42, -45, -48, -51, -54, -57
Methods: EPA 9012A (CN), EPA 7196A (Cr6+)
# of Samples: 19 Matrix: Soil Batch #s: 158110/158099 (CN), 158555/158556 (Cr6+)

CAS #	Analyte	TAL	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep. RPD	ICS AB (1)	Serial Dilution	Field (2) Dup. RPD	Equip. Blanks	(3) Field Blanks	
		QC Element																		
5955-70-0	CN	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	NA	✓	NA	
18540-29-9	Cr^{6+}	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	↓	↓	✓	↓	↓	↓	✓	↓	

NA = Not Applicable

Comments:
(1) No ICS or serial dilution required for these methods.
(2) Field dup. submitted. All results < the RL, no RPDs calculated.
(3) No FBs submitted on the COC.

Reviewed By: [signature] Date: 12/16/99

General Chemistry

Site/Project: Non-ER Septic Systems AR/COC #: 6028~~17~~ ~~20~~ 17 12/14/99 Laboratory Sample IDs: 9909228-64, -65

Laboratory: GEL Laboratory Report #: 9909228B

Methods: EPA9012A (CN), EPA7196A (Cr^{6+})

# of Samples: 2 Matrix: Aqueous Batch #s: 158008(CN), 157999(Cr^{6+})

CAS #	Analyte	QC Element: TAL	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	① Rep. RPD	② ICS AB	Serial Dilution	Field Dup. RPD	③ Equip. Blanks	Field Blanks	
5955-70-0	CN	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA	NA	NA	NA	NA	NA	NA	
18540-29-9	Cr^{6+}	✓	↓	↓	↓	↓	✓	✓	✓	✓	✓	↓	↓	↓	↓	↓	↓	↓	↓	

NA = Not Applicable

Comments:
① Sample results ND; No RPDs calculated.
② No ICS or serial dilution required for these methods.
③ Samples are EBs.

*Summary
→ All QC criteria met. No data were qualified.

Reviewed By: [signature] Date: 12/16/99

Radiochemistry

Site/Project: Non-ER Septic Systems AR/COC #: 602820/602817 Laboratory Sample IDs: 9909228-03, -07, -10, -13, -16, -19, -22, -25, -28, -31,
" -34, -37, -40, -43, -46, -49, -52, -55, -58

Laboratory: GEL Laboratory Report #: 9909228A10

Methods: EPA 900.0 (Gross α/β), HASL 300 (Gamma Spec)

# of Samples: 19 Matrix: Soil Batch #s: 158646/158647 (Gross α/β), 158553 (HASL 300)

Analyte	Method Blanks	LCS	MS	Rep RER	(QC/C) Equip. Blanks	Field Dup. RER	① Field Blanks	② 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					
U-238													
U-234													
U-235/-236													
Th-232													
Th-228													
Th-230													
Pu-239/-240													
Gross Alpha	1.59 / ✓	✓	✓	✓	✓	✓	NA						
Nonvolatile Beta	3.13 / ✓	✓	✓	✓	✓	✓							
Ra-226													
Ra-28													
Ni-63				1.9 12/14/99									
Gamma Spec. Am-241	✓	✓	NA	~~NA~~	✓	✓	NA						
Gamma Spec. Cs-137	0.0373	✓		✓	✓								
Gamma Spec. Co-60	✓	✓			✓								
Ra-228/Ra-226	.106 / ✓	✓			✓/8.18								
Ac-228/Pb-212	.106/.0409	✓			✓								
Th-232/U-235	.0405/.116	✓			✓								

NA = Not Applicable

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:
① No FB submitted on the COC.
② No tracers required for these methods.

*Summary → See back of this page.

Reviewed By: [signature] Date: 12/16/99

Method Blank:

⇒ Cs-137 and U-235 were detected. The Cs-137 results of all samples, as well as the U-235 results of -03, -07, -10, -16, -37, -40, -49, -52, -55, -58, were <5x the blank conc.s and will be qualified "J."

⇒ Gross Alpha/Beta, Ac-228, Pb-212, Ra-228, and Th-232 were also detected. However, the blank conc.s were < the assoc. 2-sigma uncertainties. Thus, no data were qualified.

Replicate:

⇒ ~~Ra-226 was~~ KAS 11/14/97 Am-241 had an RER >1 but <3. The assoc. sample results will be qualified "J."

EB:

⇒ Ra-226 was detected. The blank conc. was < the assoc. 2-sigma uncertainties. Thus, no data were qualified.

Negative Bias:

⇒ The Cs-134 results of samples -25, -31, -46, and -49 were negative and < the assoc. negative MDAs. Thus, the results will be qualified "R."

Radiochemistry

Site/Project: Non-ER Septic Systems AR/COC #: 6028~~17~~ 20 17 EAS 12/14/99

Laboratory: GEL Laboratory Report #: 9909228B

Methods: EPA 900.0 (Gross α/β), EPI A-013 (Gamma Spec)

\# of Samples: 2 Matrix: aqueous

Laboratory Sample IDs: 9909228-59, -60

Batch #s: 158539 (Gross α/β), 158575 (Gamma Spec)

Analyte	Method Blanks	LCS	MS	Rep RER	Equip. Blanks (1)	Field Dup. RER	Field Blanks	(2) 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													
U-238								NA					
U-234													
U-235/-236													
Th-232													
Th-228													
Th-230													
Pu-239/-240													
Gross Alpha	✓	✓	✓	✓	NA	NA	NA						
Nonvolatile Beta	✓	✓	✓	✓	↓	NA	↓						
Ra-226													
Ra-28													
Ni-63													
Gamma Spec. Am-241	✓	✓	✓	✓	NA	NA	NA						
Gamma Spec. Cs-137	✓	↓	↓	↓	↓	↓	↓						
Gamma Spec. Co-60	✓	↓	↓	↓	↓	↓	↓						
↓ Pb-212	4.96	↓	↓	↓	↓	↓	↓						
Th-232	4.97	↓	↓	↓	↓	↓	↓						
Zr-95	✓	↓	↓	1.2	↓	↓	↓						

NA = Not Applicable

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:
(1) Samples are EBS.
(2) No tracers required for these methods.

*Summary:

Method Blank:
⇒ Pb-212 and Th-232 were detected in the method blank. Results <5X and will be qualified "J, B."

Replicate:
⇒ Zr-95 had an RER >1 but <3. Result will be qualified "J."

Reviewed By: [signature] Date: 12/16/99

Contract Verification Review (CVR)

Project Leader ROYBAL | Project Name NON-ER SEPTIC SYSTEMS | Case No. 7223.230

AR/COC No. 602817 & 602820 | Analytical Lab GEL | SDG No. 9909228A & B

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

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

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
1.1	All items on COC complete - data entry clerk initialed and dated	X		SNL SAMPLE #050110-005 DESIGNATED AS SOIL ON COC	X	
1.2	Container type(s) correct for analyses requested	X				
1.3	Sample volume adequate for # and types of analyses requested	X				
1.4	Preservative correct for analyses requested	X				
1.5	Custody records continuous and complete	X				
1.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X				
1.7	Date samples received	X				
1.8	Condition upon receipt information provided	X				

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X				
2.4	Matrix spike/matrix spike duplicate data provided(if requested)	X				
2.5	Detection limits provided; PQL and MDL(or IDL), MDA and L_c	X				
2.6	QC batch numbers provided	X				
2.7	Dilution factors provided and all dilution levels reported	X				
2.8	Data reported in appropriate units and using correct significant figures	X				
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	X				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met	X		PCB EQUIPMENT BLANK RE-EXTRACTED OUT OF HOLDING TIME DUE TO LOW SURROGATE RECOVERY	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	RECOVERY FOR CADMIUM, LEAD & SILVER OUTSIDE QC LIMITS
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	BARIUM OUTSIDE RECOVERY LIMITS FOR SAMPLE #9909228-45MS
3.4 Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples		X	RPD FOR MERCURY ABOVE QC ACCEPTANCE LIMITS FOR SAMPLE DUPLICATE RPD FOR Cr 6 + DUPLICATE ABOVE QC ACCEPTANCE LIMITS RPD FOR GROSS ALPHA SAMPLE REPLICATE HIGH
b) Matrix spike duplicate RPD data reported and met for all organic samples		X	RPD FOR 4-NITROPHENOL ABOVE QC ACCEPTANCE LIMITS FOR SAMPLE #9909228-45MS/MSD
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	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 pesticides/PCBs	X		

Contract Verification Review (Continued)

4.0 Calibration and Validation Documentation

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

Contract Verification Review (Concluded)

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions

Were deficiencies unresolved? ☐ Yes ☑ No

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

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

Reviewed by: W. Palencia Date: 10-25-99 Closed by: ______________ Date: __________

RECORDS CENTER CODE: ____________

SMO ANALYTICAL DATA ROUTING FORM

PROJECT NAME: DSS-NFA

PROJECT/TASK: 7223.02.02.01

SNL TASK LEADER: Langkopf

ORG/MS/CF0#: 6146/1089/CFO#023-05

SMO PROJECT LEAD: Palencia

SAMPLE SHIP DATE: 4/28/2005

ARCOC	LAB	LAB ID	PRELIM DATE	FINAL DATE	EDD	EDD ON Q	Cust CD	RC CD
608533	GEL	135431		5/25/2005	X	X		

DATA PACKAGE TAT:	RUSH	X	NORMAL
CORRECTIONS REQUESTED BY/DATE:	L. Herrera		05-26-05
PROBLEM #/DATE CORRECTION RECEIVED:	9946		06-06-05
CVR COMPLETED BY/DATE:	L. Herrera		05-26-05
FINAL TRANSMITTED TO/DATE:	M. Sanders		05-26-05
SENT TO VALIDATION BY/DATE:	R. Kavanaugh		06-06-05
REVISIONS REQUESTED/REVISIONS RECEIVED (DATE):			
VALIDATION COMPLETED BY/DATE:	KAL		06-16-05
COPY TO WM BY/DATE:			
CD REQUESTED BY/DATE			
CD RECEIVED BY/DATE			
TO ERDMS OR RECORDS CENTER BY/DATE:			

COMMENTS:

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. N/A

SMO Use

AR/COC 608533

Dept. No./Mail Stop:	6146/1089	Date Samples Shipped:	4-28-05	Project/Task No.:	7223.02.02.01
Project/Task Manager:	~~Mike Sanders~~ Lanckof, Berg	Carrier/Waybill No.	49547	SMO Authorization:	[illegible signature]
Project Name:	DSS NFA	Lab Contact:	Edie Kent(843)769-7385	Contract #:	PO 21671
Record Center Code:		Lab Destination:	GEL		500 BOTTLE ORDER
Logbook Ref. No.:		SMO Contact/Phone:	Pam Puissant(505)844-3185		
Service Order No.	CFO23-05 ✓	Send Report to SMO:	Wendy Palencia(505) 844-3132		
Location	Tech Area				
Building	Room				

☐ Waste Characterization
-Send preliminary/copy report to:

☐ Released by COC No.: ______
☑ Validation Required

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

Reference LOV(available at SMO) 135431

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
✓ 068338-001	LFR-DF1-BH2-7-S	7ft	1094	042505/1050	S	BAS	125 ml	4C	G	SA	VOCs	001
✓ 068339-001	LFR-DF1-BH2-12-S	12ft	1094	042505/1145	S	BAS	125 ml	4C	G	SA	VOCs	002
✓ 068340-001	LFR-DF1-BH2-12-DU	12ft	1094	042505/1145	S	BAS	125 ml	4C	G	DU	VOCs	003
✓ 068341-001	LFR-DF1-BH2-17-S	17ft	1094	042505/1300	S	BAS	125 ml	4C	G	SA	VOCs	004
✓ 068342-001	LFR-DF1-BH2-22-S	22ft	1094	042505/1502	S	BAS	125 ml	4C	G	SA	VOCs	005
✓ 068343-001	LFR-DF1-BH3-7-S	7ft	1094	042605/0840	S	BAS	125 ml	4C	G	SA	VOCs	006
✓ 068344-001	LFR-DF1-BH3-11-S	11ft	1094	042605/0912	S	BAS	125 ml	4C	G	SA	VOCs	007
✓ 068345-001	LFR-DF1-BH3-17-S	17ft	1094	042605/0958	S	BAS	125 ml	4C	G	SA	VOCs	008
✓ 068346-001	LFR-DF1-BH3-22-S	22ft	1094	042605/1120	S	BAS	125 ml	4C	G	SA	VOCs	009
✓ 068334-001	LFR-DF1-BH1-7-S	7ft	1094	042605/1310	S	BAS	125 ml	4C	G	SA	VOCs	010
✓ 068335-001	LFR-DF1-BH1-12-S	12ft	1094	042705/1135	S	BAS	125 ml	4C	G	SA	VOCs	011

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day ☐ Negotiated TAT

Return Samples By:

Sample Tracking Smo Use
Date Entered(mm/dd/yy) 05/02/05
Entered by: RK
QC inits. WP

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level D Package ☑ Yes ☐ No
*Send report to:
Mike Sanders/Org.6146/MS 1089/505-284-2478

*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members

Name	Signature	Init	Company/Organization/Phone/Cellular
William Gibson	[signature]	WG	Weston/6146/284-5232/239-7367
Gilbert Quintana	[signature]	GQ	Shaw/6146/284-3309/238-9417
Robert Lynch	[signature]	RL	Weston/6146/250-7090

1.Relinquished by [signature]	Org. 6146	Date 4/28/05	Time 0855	4.Relinquished by	Org.	Date	Time
1. Received by [signature]	Org. 6146	Date 4/28/05	Time 0855	4. Received by	Org.	Date	Time
2.Relinquished by [signature]	Org. 6146	Date 4/28/05	Time 1200	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- **608533**

135432

Project Name:	DSS NFA	Project/Task Manger: Mike Sanders	Project/Task No.: 7223.02.02.01
Location	Tech Area		
Building	Room	**Reference LOV (available at SMO)**	

Lab use

Sample No-Fraction	ER Sample ID or Sample Location detail	Pump Depth (ft)	ER Site No.	Date/Time (hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
068355-001	LFR-DF1-EB-2	N/A	1094	042705/1315	DIW	G	3x40ml	HCL	C	EB	VOCs	001
068356-001	1094-DSS-TB-2	N/A	1094	042505/1050	DIW	G	3x40ml	HCL	C	TB	VOCs	002

Abnormal Conditions on Receipt **LAB USE**

Recipient Initials________

Sample Findings Summary

Site: DSS-NFA **AR/COC:** 608533 **Data Type:** Organic

	VOC	All target analytes except those already qualified	67-64-1 (Acetone)
068355-001 LFR-DF1-EB-2		P2	
068356-001 1094-DSS-TB-2		P2	
068341-001 LFR-DF1-BH2-17-S			9.00 UJ,B2
068345-001 LFR-DF1-BH3-17-S			6.56 UJ,B2

Validated By: Kevin A Lambert

Date: 06/16/05

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

Memorandum

Date: June 16, 2005

To: File

From: Kevin Lambert

Subject: Organic Data Review and Validation – SNL
Site: DSS-NFA
AR/COC: 608533
SDG: 135431 and 135432
Laboratory: GEL
Project/Task: 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 SMO AOP 00-03 Rev 1.

Summary

All samples were prepared and analyzed with accepted procedures using method EPA8260A/B (VOC). All compounds were successfully analyzed. Problems were identified with the data package that result in the qualification of data.

1. VOC:
   For the equipment blank (EB) and trip blank (TB), no MS/MSD was reported. The LCS percent recovery (%R) met QC acceptance criteria. However, no measure of precision was provided for the target analytes. Therefore, the associated sample results will be flagged "P2" to indicate insufficient QC data to determine laboratory precision.

   For the field samples, the continuing calibration verification percent difference (CCV %D) for acetone (30%) was > 20% but ≤ 40%. The associated sample results that were non-detects (NDs) will not be qualified based on professional judgment and detects will be qualified "J." Also, acetone was detected (≥ DL) in the EB. The associated sample results that were detects < 10x the blank concentration but > the RL will be qualified "UJ" at the reported values (9.00 ug/L and 6.56 ug/L, respectively) with descriptive flag "B2."

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

Holding Times/Preservation

All samples were extracted and analyzed within the prescribed holding times and properly preserved.

Calibration

The initial calibration and continuing calibration data met QC acceptance criteria except as noted above in the summary section and as follows.

VOC:
The calibration response factor (RF) for trichloroethene (0.26 and 0.27) was < the specified minimum RF (0.30). The calibration relative standard deviation (RSD) and CCV %D for trichloroethene met QC acceptance criteria. The associated sample results were NDs and as a result based on professional judgment no data will be qualified. The CCV %D for eight target analytes were > 20% but ≤ 40% (see Data Validation Worksheets). The associated sample results were NDs and as a result based on professional judgment no data will be qualified.

Blanks

No target analytes were detected in the blanks except as noted above in the summary section and as follows.

VOC:
Five target analytes were detected (≥ DL) in one or more of the blanks (see Data Validation Worksheets). The associated sample results were NDs; no data will be qualified as a result.

Internal Standards (ISs)

Internal standards data met QC acceptance criteria.

Surrogates

The surrogate recoveries met QC acceptance criteria.

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

The LCS/LCSD met QC acceptance criteria except as noted above in the summary section and as follows.

VOC:
It should be noted that no LCSD was provided with the SDG. Laboratory precision was assessed using the MS/MSD. No data will be qualified as a result.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS/MSD met QC acceptance criteria except as noted above in the summary section.

Target Compound Identification/Confirmation

No target compound identification/confirmation analyses were required.

Detection Limits/Dilutions

All detection limits were properly reported. No dilutions were required.

Other QC

No EB, TB, field blank (FB), or field duplicate pair was submitted on the AR/COC(s) except as follows.

VOC:

An EB, TB, and a field duplicate pair were submitted on the AR/COC(s). There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues were identified which affect data quality.

Data Validation Summary

Site/Project: DSS-NFA Project/Task #: 7223.02.02.01 # of Samples: 13 Matrix: 2 aqueous, 11 soil

AR/COC #: 608533 Laboratory Sample IDs: 135431-001 to -011

Laboratory: GEL 135432-001, -002

SDG #: 135431, 135432

QC Element	VOC	SVOC	Pesticide/ PCB	HPLC (HE)	ICP/AES	GFAA/ AA	CVAA (Hg)	CN	RAD	Other
	Organics				**Inorganics**					
1. Holding Times/Preservation	✓									
2. Calibrations	J									
3. Method Blanks	✓									
4. MS/MSD	P2									
5. Laboratory Control Samples	✓									
6. Replicates										
7. Surrogates	✓									
8. Internal Standards	✓									
9. TCL Compound Identification	✓									
10. ICP Interference Check Sample										
11. ICP Serial Dilution										
12. Carrier/Chemical Tracer Recoveries										
13. Other QC EB, TB, F. Dup	UJ									

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

R = Unusable
Check (√) = Acceptable
Shaded Cells = Not Applicable (also "NA")

NP = Not Provided
Other: ______

Reviewed By: Karen A Lambert Date: 06/16/05 ~~06/18~~ KAL

Volatile Organics

Site/Project: ______ AR/COC #: 608533 Batch #s: 422850

Laboratory: ______ SDG #: 135431, 135432 # of Samples: 2 Matrix: aqueous

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
	Met				Met				
	Criteria				Criteria				

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

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

① The calib RF for TCE was < the specified min RF; RSD & CCV %D met QC criteria; assoc results were NDs; no data will be qualified based on professional judgment

② The CCV %D for 3 target analytes were > 20 but ≤ 40; assoc results were NDs; no data will be qualified based on professional judgment

Comments: ③ No MS/MSD was reported for these samples; LCS %R met QC criteria; however no measure of precision was ~~for~~ provided for the target analytes; thus results will be flagged "P2" to indicate insufficient QC data to determine lab precision

Volatile Organics (SW 846 Method 8260)

Site/Project: DSS-NFA AR/COC #: 608533 # of Samples: 2 Matrix: aqueous

Laboratory: SDG #: 135431, 135432 Laboratory Sample IDs: 135432-001, -002

Methods: EPA8260B(VOC) Batch #s: 422850

IS	CAS #	Name	TCL	Min. RF	Intercept	1 Calib. RF	Calib. RSD/ R^2	2 CCV %D	Method Blks	LCS	LCSD	LCS RPD	— MS	3 MSD	— MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks		
						>.05	<20% / 0.99	20%												
1	71-55-6	1,1,1-trichloroethane	✓	0.10	NA	✓	✓	✓	✓	✓										
2	79-34-5	1,1,2,2-tetrachloroethane	✓	0.30		✓	✓													
2	79-00-5	1,1,2-trichloroethane	✓	0.10		✓	✓													
1	75-34-3	1,1-dichloroethane	✓	0.10		✓	✓													
1	75-35-4	1,1-dichloroethene	✓	0.20		✓	✓													
1	107-06-2	1,2-dichloroethane	✓	0.10		✓	✓													
1	156-59-2	cis-1,2-dichloroethene	✓	0.01		✓	✓													
1	78-87-5	1,2-dichloropropane	✓	0.01		✓	✓							Not						
1	78-93-3	2-butanone (MEK) (10xblk)	✓	0.01		✓	✓													
1	156-60-5	trans-1,2-dichloroethene	✓			✓	✓													
2	591-78-6	2-hexanone (MBK)	✓	0.01		✓	✓													
2	108-10-1	4-methyl-2-pentanone (MIBK)	✓	0.10		✓	✓						Provided							
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		✓	✓	-22												
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		✓	✓	-22												
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	NA	✓	✓													
2	127-18-4	tetrachloroethene	✓	0.20		✓	✓													
2	108-88-3	toluene(10xblk)	✓	0.40		✓	✓													
2	10061-02-6	trans-1,3-dichloropropene	✓	0.10		✓	✓													
1	79-01-6	trichloroethene	✓	0.30		0.26	✓													
1	75-01-4	vinyl chloride	✓	0.10		✓	✓													
2	1330-20-7	xylenes(total)	✓	0.30		✓	✓	✓												
	108-05-4	vinyl acetate	✓		✓	✓	✓	-24	✓	✓										

Comments:

Notes: Shaded rows are RCRA compounds.

Reviewed By: Kevin A Lambert Date: 06/16/05

Volatile Organics (SW 846 Method 8260)

Site/Project: ____ AR/COC #: 608533 # of Samples: 11 Matrix: soil

Laboratory: ____ SDG #: 135431, 135432 Laboratory Sample IDs: 135431-001 to -011

Methods: EPA8260A (VOC) Batch #s: 422767/422766

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF (1)	Calib. RSD/ R^2	CCV %D (2)	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks (3)	Trip Blanks	10x [5x]	
						>.05	<20% / 0.99	20%												
1	71-55-6	1,1,1-trichloroethane	✓	0.10	NA	✓	✓	23	✓	✓			✓	✓	✓	✓	✓	✓		
2	79-34-5	1,1,2,2-tetrachloroethane	✓	0.30		✓	✓	✓												
2	79-00-5	1,1,2-trichloroethane	✓	0.10		✓	✓													
1	75-34-3	1,1-dichloroethane	✓	0.10		✓	✓													
1	75-35-4	1,1-dichloroethene	✓	0.20		✓	✓													
1	107-06-2	1,2-dichloroethane	✓	0.10		✓	✓													
1	156-59-2	cis-1,2-dichloroethene	✓	0.01		✓	✓	21												
1	78-87-5	1,2-dichloropropane	✓	0.01		✓	✓	✓												
1	78-93-3	2-butanone (MEK) (10xblk)	✓	0.01		✓	✓													
1	156-60-5	trans-1,2-dichloroethene	✓			✓	✓													
2	591-78-6	2-hexanone (MBK)	✓	0.01		✓	✓													
2	108-10-1	4-methyl-2-pentanone (MIBK)	✓	0.10		✓	✓													
1	67-64-1	acetone(10xblk)	✓	0.01		✓	✓	30									4.84 J		48.4	
1	71-43-2	benzene	✓	0.50		✓	✓	✓									✓			
1	75-27-4	bromodichloromethane	✓	0.20		✓	✓	✓									0.612J		[3.06]	
3	75-25-2	bromoform	✓	0.10	✓	✓	✓	✓									1.02	✓	[5.10]	
1	74-83-9	bromomethane	✓	0.10	✓	✓	✓	22									5.65	5.71	[28.55]	
1	75-15-0	carbon disulfide	✓	0.10	NA	✓	✓	✓									✓	✓		
1	56-23-5	carbon tetrachloride	✓	0.10		✓	✓	24												
2	108-90-7	chlorobenzene	✓	0.50		✓	✓	✓												
1	75-00-3	chloroethane	✓	0.01		✓	✓	22												
1	67-66-3	chloroform	✓	0.20		✓	✓	✓									0.282J		[1.41]	
1	74-87-3	chloromethane	✓	0.10		✓	✓										✓			
1	10061-01-5	cis-1,3-dichloropropene	✓	0.20		✓	✓										✓			
2	124-48-1	dibromochloromethane	✓	0.10		✓	✓										1.20		[6.0]	
2	100-41-4	ethylbenzene	✓	0.10		✓	✓										✓			
1	75-09-2	methylene chloride (10xblk)	✓	0.01		✓	✓													
2	100-42-5	styrene	✓	0.30		✓	✓													
2	127-18-4	tetrachloroethene	✓	0.20		✓	✓	22												
2	108-88-3	toluene(10xblk)	✓	0.40		✓	✓	✓								24				
2	10061-02-6	trans-1,3-dichloropropene	✓	0.10		✓	✓	~~KAL~~ ✓								✓				
1	79-01-6	trichloroethene	✓	0.30		0.27	✓	21 ✓												
1	75-01-4	vinyl chloride	✓	0.10		✓	✓	✓												
2	1330-20-7	xylenes(total)	✓	0.30		✓	✓													
	108-05-4	vinyl acetate	✓			✓	✓													

Comments:

Notes: Shaded rows are RCRA compounds.

Reviewed By: Kevin A Lambert Date: ~~06/14~~ KAL 06/16/05

Volatile Organics

Site/Project: ______ AR/COC #: 608533 Batch #s: 422767

Laboratory: ______ SDG #: 135431, 135432 # of Samples: 11 Matrix: soil

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
	Met				Met				
	Criteria				Criteria				

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

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

(1) The calib RF for TCE was < the specified min RF; RSD & CCV %D met QC criteria; results were NDs; no data will be qualified based on professional judgment

(2) The CCV %D for 7 target analytes were > 20 but ≤ 40; NDs will not be qualified based on professional judgment and detects will be qualified "J"

Comments: Six target analytes were detected in blks; all results were NDs except acetone; no data will be qualified; acetone was detected in EB; assoc results that were detects < 10x blk [c] and < the RL and will be qualified "U" at RL w/ descriptive flag "B2"; results that were detects < 10 blk [c] but > the RL will be qualified "U" at the reported value w/ flag "B2"

Contract Verification Review (CVR)

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

AR/COC No. 608533 | Analytical Lab: GEL | SDG No. 135431

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

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

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
1.1	All items on COC complete - data entry clerk initialed and dated	X				
1.2	Container type(s) correct for analyses requested	X				
1.3	Sample volume adequate for # and types of analyses requested	X				
1.4	Preservative correct for analyses requested	X				
1.5	Custody records continuous and complete	X				
1.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X				
1.7	Date samples received	X				
1.8	Condition upon receipt information provided	X				

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X				
2.4	Matrix spike/matrix spike duplicate data provided (if requested)	X				
2.5	Detection limits provided; PQL and MDL (or IDL), MDA and L_c	X				
2.6	QC batch numbers provided	X				
2.7	Dilution factors provided and all dilution levels reported	X				
2.8	Data reported in appropriate units and using correct significant figures	X				
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	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	X		
c) Matrix spike recovery data reported and met	X		
3.4 Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	N/A		
b) Matrix spike duplicate RPD data reported and met for all organic samples	X		
3.5 Blank data a) Method or reagent blank data reported and met for all samples	X		
b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	Acetone, Bromodichloromethane, Bromoform, Carbon Disulfide, Chloroform, Dibromochloromethane detected in EB 068355-001/135432001; Carbon Disulfide detected in TB 068356-001/135432002
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.)	X		
a) 12-hour tune check provided			
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)	N/A		
a) Initial calibration provided			
b) Continuing calibration provided	N/A		
c) Instrument run logs provided	N/A		
4.3 Inorganics (metals)	N/A		
a) Initial calibration provided			
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	N/A		
a) Instrument run logs provided			

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
068344-001	VOC	Incorrect Sample ID or Sample Location Detail / Correct Sample ID is LFR-DF1-BH3-11S

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 9946 and date correction request was submitted 05/26/05

Reviewed by: [signature] Date: 05/26/05 Closed by: ______ Date: ______

ANNEX B
DSS Site 1094
Gore-Sorber™ Passive Soil-Vapor Survey Analytical Results

GORE
Creative Technologies Worldwide

W. L. GORE & ASSOCIATES, INC.

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

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

June 6, 2002

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

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

Dear Mr. Sanders:

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

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

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

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

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

Jay W. Hodny

Jay W. Hodny, Ph.D.
Associate

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

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W. L. GORE & ASSOCIATES, INC.

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

Creative Technologies Worldwide

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

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

Jay W. Hodny

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

Jim Whetzel

Analytical Data Reviewed by:
Jim E. Whetzel, Chemist

Jim Whetzel

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GORE-SORBER® Screening Survey
Final Report

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

SITE INFORMATION

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

FIELD PROCEDURES

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

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

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

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

GORE-SORBER® Screening Survey Final Report

ANALYTICAL PROCEDURES

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

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

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

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

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

GORE-SORBER® Screening Survey
Final Report

DATA TABULATION

 # CONTOUR MAPS ENCLOSED: No contour maps were generated.

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

General Comments:

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

GORE-SORBER® Screening Survey Final Report

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

Project Specific Comments:

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

GORE-SORBER® Screening Survey
Final Report

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

UNITS	
µg	micrograms (per sorber), reported for compounds
MDL	method detection limit
bdl	below detection limit
nd	non-detect
ANALYTES	
BTEX	combined masses of benzene, toluene, ethylbenzene and total xylenes (Gasoline Range Aromatics)
BENZ	benzene
TOL	toluene
EtBENZ	ethylbenzene
mpXYL	m-, p-xylene
oXYL	o-xylene
C11,C13&C15	combined masses of undecane, tridecane, and pentadecane (C11+C13+C15) (Diesel Range Alkanes)
UNDEC	undecane
TRIDEC	tridecane
PENTADEC	pentadecane
TMBs	combined masses of 1,3,5-trimethylbenzene and 1,2,4-trimethylbenzene
135TMB	1,3,5-trimethylbenzene
124TMB	1,2,4-trimethylbenzene
ct12DCE	cis- & trans-1,2-dichloroethene
t12DCE	trans-1,2-dichloroethene
c12DCE	cis-1,2-dichloroethene
NAPH&2-MN	combined masses of naphthalene and 2-methyl naphthalene
NAPH	naphthalene
2MeNAPH	2-methyl naphthalene
MTBE	methyl t-butyl ether
11DCA	1,1-dichloroethane
$CHCl_3$	chloroform
111TCA	1;1,1-trichloroethane
12DCA	1,2-dichloroethane
CCl_4	carbon tetrachloride
TCE	trichloroethene
OCT	octane
PCE	tetrachloroethene
ClBENZ	chlorobenzene
14DCB	1,4-dichlorobenzene
BLANKS	
TBn	unexposed trip blanks, travels with the exposed modules
method blank	QA/QC module, documents analytical conditions during analysis

APPENDIX A:

1. CHAIN OF CUSTODY
2. DATA TABLE

GORE-SORBER® Screening Survey Chain of Custody

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

GORE Creative Technologies Worldwide

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

Instructions: Customer must complete ALL shaded cells

Customer Name: SANDIA NATIONAL LABS
Address: ACCOUNTS PAYABLE MS0154
P.O.BOX 5130
ALBUQUERQUE NM 87185 U.S.A.
Phone: 505-284-3303
FAX: 505-284-2616

Site Name: NON-ER DRAIN+ SEPTIC
Site Address: ~~KIVL 2ND~~ AFB, NM
KIRTLAND
Project Manager: MIKE SANDERS
Customer Project No.:
Customer P.O. #: 28518 Quote #: 211946

Serial # of Modules Shipped

# 179087 - # 179144	# 179087 - # 179134		
# 179150 - # 179233	# 179135 - # 179136		
# - #	# 179139 - #		
# - #	# 179142 - # 179144		
- #	# 179150 - # 179151		
- #	# - #		
# - #	# - #		
# - #	# - #		
# - #	# - #		
# - #	# - #		

\# of Modules for Installation 135 # of Trip Blanks 7
Total Modules Shipped: 142 Pieces
Total Modules Received: 142 Pieces
Total Modules Installed: 135 Pieces

Serial # of Trip Blanks (*Client Decides*)

		#
# 179227	#	#
#	#	#
#	#	#
#	#	#
#	#	#
#	#	#
#	#	#
#	#	#

Prepared By: [signature]
Verified By: Mary Anne Morghi

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

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

Installation Start Date and Time: 4/23/02 10815T : AM PM
Installation Complete Date and Time: 5/6/02 10940 : AM PM

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

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

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

Relinquished By	Date	Time	Received By	Date	Time
Relinquished By [signature] Affiliation: W.L. Gore & Associates, Inc	3-4-02	12:00	Received By: Mike Sanders Affiliation: Sandia/ER	3-6-02	
Relinquished By William J. [signature] Affiliation: 6135	5-14-02	12:58	Received By: Affiliation:		
Relinquished By Affiliation			Received By: Mary Anne Morghi Affiliation: W.L. Gore & Associates, Inc.	5/17/02	14:00

GORE-SORBER ® Screening Survey is a registered service mark of W.L. Gore & Associates, Inc.

FORM 8R.8
1/08/01

GORE-SORBER® Screening Survey Chain of Custody

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

GORE Creative Technologies Worldwide

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

Instructions: Customer must complete ALL shaded cells

Customer Name: SANDIA NATIONAL LABS
Address: ACCOUNTS PAYABLE MS0154
P.O.BOX 5130
ALBUQUERQUE NM 87185 U.S.A.
Phone: 505-284-3303
FAX: 505-284-2616

Site Name: NON-ER DUAIN+ SEPTIC
Site Address: ~~KIVL 2ND~~ AFB, NM
KIRTLAND
Project Manager: MIKE SANDERS
Customer Project No.:
Customer P.O. #: 28518 Quote #: 211946

Serial # of Modules Shipped

# 179087 - # 179144		#179152 - #179187
# 179150 - # 179233		#179188 - #179226
# - #		# - #
# - #		# - #
- #		# - #
- #		# - #
# - #		# - #
# - #		# - #
# - #		# - #
# - #		# - #

\# of Modules for Installation 135 # of Trip Blanks 7

Total Modules Shipped: 142 Pieces
Total Modules Received: 142 Pieces
Total Modules Installed: 135 Pieces

Serial # of Trip Blanks (*Client Decides*)		#
#179228	#	#
#179229	#	#
#	#	#
#	#	#
#	#	#
#	#	#
#	#	#
#	#	#

Prepared By: [signature]
Verified By: Mary Ann Marghi

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

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

Installation Start Date and Time: 4/23/02 1081ST : AM PM
Installation Complete Date and Time: 5/6/02 109401 : AM PM

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

Total Modules Retrieved: 79 Pieces
Total Modules Lost in Field: 4 Pieces
Total Unused Modules Returned: 3 Pieces

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

Relinquished By	Date	Time	Received By	Date	Time
[signature] Affiliation: W.L. Gore & Associates, Inc.	3-4-02	12:00	Mike Sanders Affiliation: Sandia, 6133	3-7-02	
William J. Foley Affiliation: Sandia N.L. 6135	5-21-02	0935	Received By: Affiliation:		
Relinquished By Affiliation			Mary Ann Marghi Affiliation: W.L. Gore & Associates, Inc.	5-24-02	13:30

FORM 8R.8
1/08/01

GORE-SORBER® Screening Survey Installation and Retrieval Log

SITE NAME & LOCATION

LINE #	MODULE #	INSTALLATION DATE/TIME	RETRIEVAL DATE/TIME	EVIDENCE OF LIQUID HYDROCARBONS (LPH) or HYDROCARBON ODOR (Check as appropriate): LPH	ODOR	NONE	MODULE IN WATER (check one): YES	NO	COMMENTS
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, 0930						1108/6531- -5
22.	179108	0853							-6
23.	179109	0900							-4
24.	179110	0907							-2
25.	179111	0916							-3
26.	179112	0936							-1
27.	179113	4/25/02, 0746	5-10-02, 0812						1027/6530- -5
28.	179114	0754							-2
29.	179115	0800							-3
30.	179116	0810							-4
31.	179117	0818	0917						-1
32.	179118	0915	5-10-02, 0925						1010/6536- 5
33.	179119	0922							6
34.	179120	0931							4
35.	179121	0942							2
36.	179122	0947							1
37.	179123	0956	1002						3
38.	179124	1026	5-10-02, 1013						1028/6560- 1
9.	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

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						1026/650-65-	3
44.	179130	1437	5-10-02, 1051							1
45.	179131	1442	5-10-02, 1053							1
46.	179132	1446							1025/650-	1
47.	179133	1504	5-10-02, 11:06							2
48.	179134	4/26/02, 0905	5-10-02, 1247							3
49.	179135	0914	1254						1093/6584-	1
50.	179136	0930	5-10-02, 1305							4
51.	179137	0938	Lost							2
52.	179138	0948	Lost							3
53.	179139	1018	5-10-02, 1322							5
54.	179140	1026	Lost						1031/6600-	2
55.	179141	1030	Lost							3
56.	179142	1038	5-10-02, 1343							4
57.	179143	1136	5-10-02, 11:36							1
[illegible]	179144	1142							276/829X-	2
[illegible]	179150	1150								3
60.	179151	1155	5-10-02, 11:54							4
61.	179152	4/29/02, 0814	5-14-02, 09:42							1
62.	179153	0822							1084/6505-	1
63.	179154	0829								5
64.	179155	0903								3
65.	179156	0845	5-14-02 10:21							2
66.	179157	0930	05-14-02 0919							4
67.	179158	0934							1083/6570-	4
68.	179159	0940								1
69.	179160	0948	0940							2
70.	179161	1050	05-14-02, 1025							3
71.	179162	1100							1032/6610-	1
72.	179163	1110								2
73.	179164	1114								4
74.	179165	1120								3
75.	179166	1126	05-14-02, 11:03							5
76.	179167	1222	05-14-02, 11:06							6
77.	179168	1230							1120/6643-	2
78.	179169	1237								3
79.	179170	1242	05-14-02, 11:32							4
80.	179171	1320	5-14-02 - 08:44							1
[illegible]	179172	1325	0912						1034/6710-	4
82.	179173	1332	0851							3
83.	179174	1340	0855							2
84.	179175	1423	5-14-02, 0814							1
									1035/6715-	4

FORM 29R.1
6/13/01

GORE-SORBER® Screening Survey Installation and Retrieval Log

P 3. 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	
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
101.	179192	1300							-3
102.	179193	1313							-5
103.	179194	1318	5-15-02, 1032						-4
104.	179195	1445	5-15-02, 14:05						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/LFR- 2
126.	179217	1218	5-16-02-0935						1

DSS SITE 1094

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						
128.	179219	1231	5-16-02, 0950						1094/LFR-GS-3
129.	179220	5/6/02, 0850	5-21-01 07:57						-4
130.	179221	0857							1081/6650 -1
131.	179222	0909							-3
132.	179223	0918							-2
133.	179224	0926							-4
134.	179225	0933							-6
135.	179226	0940	5-21-01, 0851						-5
136.	179227								-7
137.	179228								
138.	179229								
139.	179230								
140.	179231								
141.	179232								
142.	179233								
143.									
144.									
145.									
146.									
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168.									

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

DSS SITE 1094

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 1094

SAMPLE NAME	124TMB, ug	135TMB, ug	ct12DCE, ug	t12DCE, ug	c12DCE, ug	NAPH&2-MN, ug	NAPH, ug	2MeNAPH, ug	MTBE, ug	11DCA, ug	111TCA, ug	12DCA, ug
MDL=	0.03	0.02		0.14	0.03		0.01	0.02	0.04	0.04	0.02	0.02
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
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

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

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

SAMPLE NAME	TCE, ug	OCT, ug	PCE, ug	14DCB, ug	CHCl3, ug	CCl4, ug	ClBENZ, 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

DSS SITE 1094

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 1094
Risk Assessment

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DSS SITE 1094: RISK ASSESSMENT REPORT

I. Site Description and History

Drain and Septic Systems (DSS) Site 1094, the Live Fire Range East Septic System at Sandia National Laboratories/New Mexico (SNL/NM), is located in Lurance Canyon on federally owned land controlled by Kirtland Air Force Base (KAFB) and permitted to the U.S. Department of Energy (DOE). The active system consists of a 1,000-gallon septic tank connected to a drainfield consisting of two 110-foot-long, parallel drain lines. Available information indicates that the Live Fire Range support complex was built about 1983 (SNL/NM May 1983), and it is assumed that the septic system was also constructed at that time. The system is still active. Environmental concern about DSS Site 1094 is based upon the potential for the release of constituents of concern (COCs) in effluent discharged to the environment via the septic system at this site. Because operational records were not available, the investigation was planned to be consistent with other DSS site investigations and to sample for possible COCs that may have been released during facility operations.

The ground surface in the vicinity of the site is hummocky with a slight slope to the west. The closest major drainage is the active channel of Arroyo del Coyote, located approximately 150 feet south of the site. No springs or perennial surface-water bodies are located within 3 miles of the site. Average annual rainfall in the SNL/NM and KAFB area, as measured at Albuquerque International Sunport, is 8.1 inches (NOAA 1990). Surface-water runoff in the vicinity of the site is minor because the hummocky surface retards runoff. 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 1094 is unpaved with some native vegetation, and no storm sewers are used to direct surface water away from the site.

DSS Site 1094 lies at an average elevation of approximately 5,995 feet above mean sea level. The groundwater beneath the site probably occurs in unconfined conditions in the fractured Precambrian bedrock. As measured in the nearest groundwater monitoring well, CYN-MW5, approximately 1,900 feet to the southwest, depth to groundwater is approximately 107 feet below ground surface (bgs). Groundwater flow is thought to be generally to the west in the Lurance Canyon area (SNL/NM November 2001a). The nearest production well is KAFB-11, approximately 4.9 miles northwest of the site.

II. Data Quality Objectives

The Data Quality Objectives (DQOs) presented in the "Sampling and Analysis Plan [SAP] for Characterizing and Assessing Potential Releases to the Environment From Septic and Other Miscellaneous Drain Systems at Sandia National Laboratories/New Mexico" (SNL/NM October 1999) and "Field Implementation Plan [FIP], Characterization of Non-Environmental Restoration Drain and Septic Systems" (SNL/NM November 2001b) 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 1094 was effluent discharged to the environment from the drainfield at this site.

Table 1
Summary of Sampling Performed to Meet Data Quality Objectives

DSS Site 1094 Sampling Area	Potential COC Source	Number of Sampling Locations	Sample Density (samples/acre)	Sampling Location Rationale
Soil beneath the septic system drainfield	Effluent discharged to the environment from the drainfield	3	NA	Evaluate potential COC releases to the environment from effluent discharged from the drainfield

COC = Constituent of concern.
DSS = Drain and Septic Systems.
NA = Not Applicable.

Using a Geoprobe™, the soil samples were collected from two 3- or 4-foot-long sampling intervals at three borehole locations at DSS Site 1094. Drainfield sampling intervals started at 7 and 12 feet bgs for the 1999 sampling and at 7, 11, 12, 17, or 22 feet bgs during the 2005 resampling for volatile organic compounds (VOCs). The soil samples were collected in accordance with the procedures described in the SAP (SNL/NM October 1999) and FIP (SNL/NM November 2001b). Table 2 summarizes the types of confirmatory and QA/QC samples collected at the site and the laboratories that performed the analyses.

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

Table 2
Number of Confirmatory Soil and QA/QC Samples Collected from DSS Site 1094

Sample Type	VOCs	SVOCs	PCBs	HE	RCRA Metals	Hexavalent Chromium	Cyanide	Gamma Spectroscopy Radionuclides	Gross Alpha/Beta
Confirmatory	10	6	6	6	6	6	6	6	6
Duplicates	1	0	0	0	0	0	0	0	0
EBs and TBs[a]	2	1	1	1	1	1	1	1	1
Total Samples	13	7	7	7	7	7	7	7	7
Analytical Laboratory	GEL	GEL	GEL	GEL	GEL	GEL	GEL	GEL	GEL

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

Table 3
Summary of Data Quality Requirements for DSS Site 1094

Analytical Method[a]	Data Quality Level	GEL
VOCs EPA Method 8260	Defensible	10
SVOCs EPA Method 8270	Defensible	6
PCBs EPA Method 8082	Defensible	6
HE Compounds EPA Method 8330	Defensible	6
RCRA Metals EPA Method 6000/7000	Defensible	6
Hexavalent Chromium EPA Method 7196A	Defensible	6
Total Cyanide EPA Method 9012A	Defensible	6
Gamma Spectroscopy Radionuclides EPA Method 901.1	Defensible	6
Gross Alpha/Beta Activity EPA Method 900.0	Defensible	6

Note: The number of samples does not include QA/QC samples such as duplicates, trip blanks, and equipment blanks.
[a]EPA November 1986.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
GEL = General Engineering Laboratories, Inc.
HE = High explosive(s).
PCB = Polychlorinated biphenyl.
QA/QC = Quality assurance/quality control.
RCRA = Resource Conservation and Recovery Act.
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), one field duplicate (for VOCs only), and one set of equipment blanks. No significant QA/QC problems were identified in the QA/QC samples.

All of the soil sample results were verified/validated by SNL/NM according to "Verification and Validation of Chemical and Radiochemical Data," Technical Operating Procedure (TOP) 94-03, Rev. 0 (SNL/NM July 1994), SNL/NM ER Project "Data Validation Procedure for Chemical and Radiochemical Data," Administrative Operating Procedure (AOP) 00-03 (SNL/NM December 1999), or "Data Validation Procedure for Chemical and Radiochemical Data," AOP 00-03, Rev. 01 (SNL/NM December 2003). The data validation reports are presented in the associated DSS Site 1094 request for a determination of Corrective Action Complete (CAC) without controls. The reviews confirmed that the analytical data are defensible and therefore acceptable for use in the request for a determination of CAC without controls. Therefore, the DQOs have been fulfilled.

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

III.1 Introduction

The determination of the nature, migration rate, and extent of contamination at DSS Site 1094 is based upon an initial conceptual model validated with confirmatory sampling at the site. The initial conceptual model was developed from archival site research, site inspections, soil sampling, and passive soil-vapor sampling. The DQOs contained in the SAP (SNL/NM October 1999) and FIP (SNL/NM November 2001b) 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 1094, which is presented in Chapter 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 1094 were evaluated using laboratory analyses of the soil samples. The analytical requirements included analyses for VOCs, SVOCs, HE compounds, PCBs, RCRA metals, hexavalent chromium, cyanide, radionuclides by gamma spectroscopy, and gross alpha/beta activity. The analytes and methods listed in Tables 2 and 3 are appropriate to characterize the COCs and potential degradation products at DSS Site 1094.

III.3 Rate of Contaminant Migration

The septic system at DSS Site 1094 is still active. The migration rate of COCs that may have been introduced into the subsurface via the septic system at this site is therefore dependent upon the volume of aqueous effluent discharged to the environment from this drainfield. Analytical data generated from the soil sampling conducted at the site are adequate to characterize the rate of COC migration at DSS Site 1094 up to the date of sampling in April 2005.

III.4 Extent of Contamination

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

The soil samples were collected at sampling depths starting at 7, 11, 12, 17, and 22 feet bgs in the drainfield area. Sampling intervals started at the depths at which effluent discharged from the drainfield drain lines would have entered the subsurface environment at the site. This sampling procedure was required by New Mexico Environment Department (NMED) regulators and has been used at numerous DSS-type sites at SNL/NM. The soil samples are considered to be representative of the soil potentially contaminated with the COCs at this site and are sufficient to determine the vertical extent, if any, of COCs.

IV. Comparison of COCs to Background Levels

Site history and characterization activities are used to identify potential COCs. The DSS Site 1094 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 1094. All samples were collected from depths of 5 feet bgs or greater; therefore, evaluation of ecological risk was not performed. Both tables show the associated SNL/NM maximum background concentration values (Dinwiddie September 1997). Section VI.4 discusses the results presented in Tables 4 and 5.

V. Fate and Transport

The primary releases of COCs at DSS Site 1094 were to the subsurface soil resulting from the discharge of effluents from the Live Fire Range east septic system. Wind, water, and biota are natural mechanisms of COC transport from the primary release point; however, because the discharge was to subsurface soil, none of these mechanisms are considered to be of potential significance as transport mechanisms at this site. Infiltration of precipitation is essentially nonexistent at DSS Site 1094, as virtually all of the moisture either drains away from the site or evaporates. Because groundwater at this site is approximately 107 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 1094 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.

Table 4
Nonradiological COCs for Human Health Risk Assessment at DSS Site 1094 with Comparison to the Associated SNL/NM Background Screening Value, BCF, and Log K_{ow}

COC	Maximum Concentration (All Samples) (mg/kg)	SNL/NM Background Concentration (mg/kg)[a]	Is Maximum COC Concentration Less Than or Equal to the Applicable SNL/NM Background Screening Value?	BCF (maximum aquatic)	Log K_{ow} (for organic COCs)	Bioaccumulator?[b] (BCF>40, Log K_{ow}>4)
Inorganic						
Arsenic	3.19	9.8	Yes	44[c]	–	**Yes**
Barium	117 J	246	Yes	170[d]	–	**Yes**
Cadmium	0.0366 J	0.64	Yes	64[c]	–	**Yes**
Chromium, total	14.7	18.8	Yes	16[c]	–	No
Chromium VI	0.159 J	NC	**Unknown**	16[c]	–	No
Cyanide	0.0695[e]	NC	**Unknown**	NC	–	**Unknown**
Lead	13.3	18.9	Yes	49[c]	–	**Yes**
Mercury	0.0141 J	0.055	Yes	5,500[c]	–	**Yes**
Selenium	0.133[e]	2.7	Yes	800[f]	–	**Yes**
Silver	0.602 J	<0.5	**No**	0.5[c]	–	No
Organic						
Toluene	0.00663	NA	**NA**	10.7[c]	2.69[c]	No
Xylene	0.00129	NA	**NA**	23.4[g]	1.5[h]	No

Note: **Bold** indicates the COCs that exceed the background screening values and/or are bioaccumulators.
[a]Dinwiddie September 1997, Canyons Study Group.
[b]NMED March 1998.
[c]Yanicak March 1997.
[d]Neumann 1976.
[e]Nondetected concentration (i.e., one-half the maximum detection limit if value is greater than the maximum detected concentration or analyte was not detected at all).
[f]Callahan et al. 1979.
[g]Howard 1990.
[h]Micromedex, Inc. 1998.

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

Table 5
Radiological COCs for Human Health Risk Assessment at DSS Site 1094 with Comparison to the Associated SNL/NM Background Screening Value and BCF

COC	Maximum Activity (All Samples) (pCi/g)[a]	SNL/NM Background Activity (pCi/g)[b]	Is Maximum COC Activity Less Than or Equal to the Applicable SNL/NM Background Screening Value?	BCF (maximum aquatic)	Is COC a Bioaccumulator?[c] (BCF >40)
Cs-137	ND (0.0312)	1.55	Yes	3,000[d]	**Yes**
Th-232	0.4	1.03	Yes	3,000[d]	**Yes**
U-235	**ND (0.179)**	0.16	**No**	900[d]	**Yes**
U-238	1.38	2.31	Yes	900[d]	**Yes**

Note: **Bold** indicates COCs that exceed the background screening values and/or are bioaccumulators.
[a]Value listed is the greater of either the maximum detection or the highest MDA.
[b]Dinwiddie September 1997, Canyons Study Group.
[c]NMED March 1998.
[d]Baker and Soldat 1992.
BCF = Bioconcentration factor.
COC = Constituent of concern.
DSS = Drain and Septic Systems.
MDA = Minimum detectable activity.
ND ( ) = Not detected above the MDA, shown in parentheses.
ND ( ) = Not detected, but the MDA (shown in parentheses) exceeds background activity.
NMED = New Mexico Environment Department.
pCi/g = Picocurie(s) per gram.
SNL/NM = Sandia National Laboratories/New Mexico.

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 1094 are limited to VOCs. 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 VOCs through volatilization is expected to be minimal.

Table 6 summarizes the fate and transport processes that can occur at DSS Site 1094. 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 1094

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

DSS = Drain and Septic Systems.

VI. Human Health Risk Assessment

VI.1 Introduction

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

Step 1.	Site data are described that provide information on the potential COCs, as well as the relevant physical characteristics and properties of the site.
Step 2.	Potential pathways are identified by which a representative population might be exposed to the COCs.

Step 3.	The potential intake of these COCs by the representative population is calculated using a tiered approach. The first component of the tiered approach is a screening procedure that compares the maximum concentration of the COC to an SNL/NM maximum background screening value. COCs that are not eliminated during the first screening procedure are carried forward in the risk assessment process.
Step 4.	Toxicological parameters are identified and referenced for COCs that were not eliminated during the screening procedure.
Step 5.	Potential toxicity effects (specified as a hazard index [HI]) and estimated excess cancer risks are calculated for nonradiological COCs and background. For radiological COCs, the incremental total effective dose equivalent (TEDE) and estimated incremental cancer risk are calculated by subtracting applicable background concentrations directly from maximum on-site contaminant values. This background subtraction applies only when a radiological COC occurs as contamination and exists as a natural background radionuclide.
Step 6.	These values are compared with guidelines established by the U.S. Environmental Protection Agency (EPA), NMED, and 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 1094. 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 1094 has been designated with a future land-use scenario of recreational (DOE et al. October 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 1094 is approximately 107 feet bgs. No intake routes through plant, meat, or milk ingestion are considered appropriate for either the recreational or residential land-use scenarios. Figure 1 shows the conceptual site model flow diagram for DSS Site 1094.

Pathway Identification

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

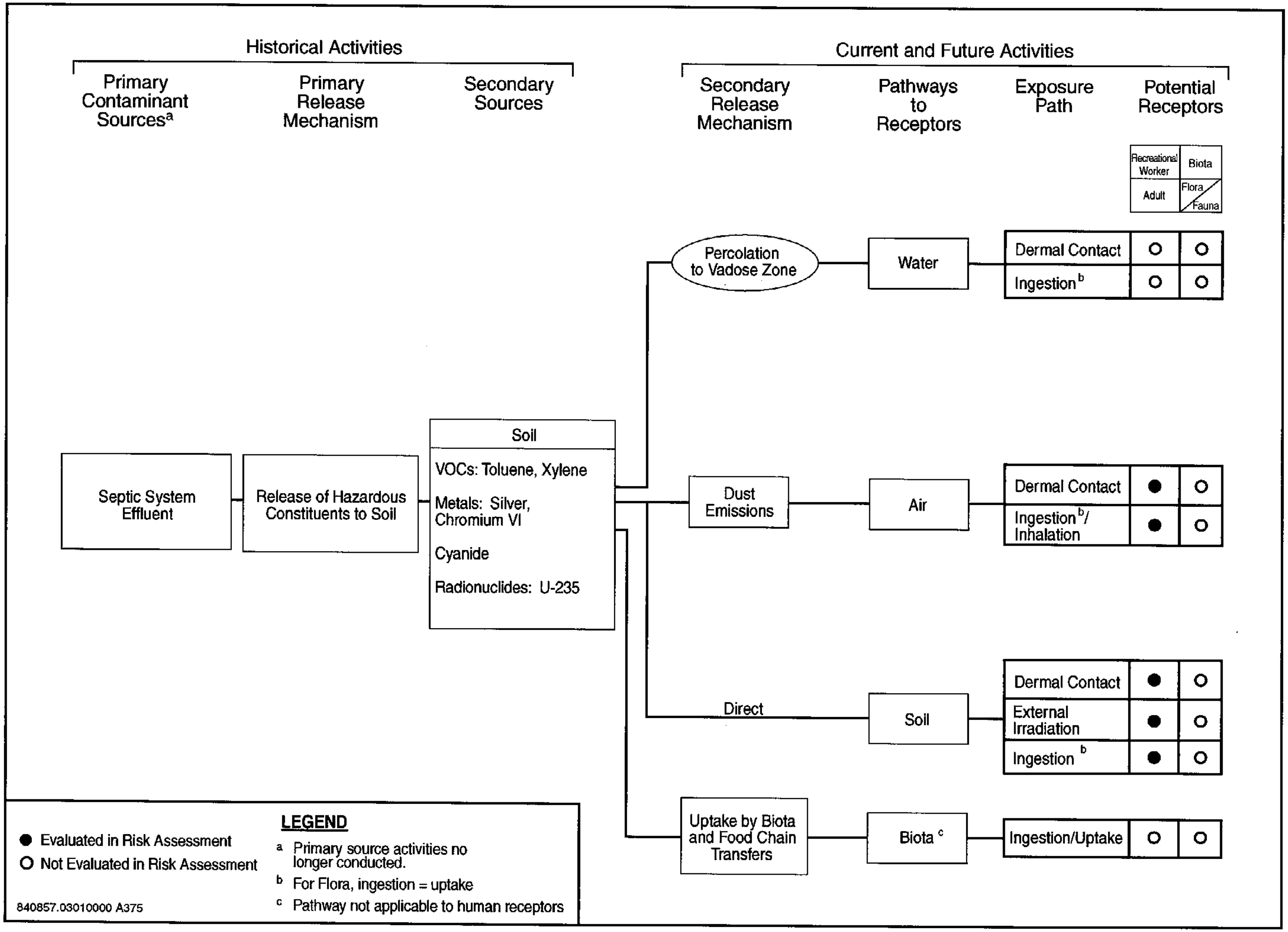

Figure 1

Conceptual Site Model Flow Diagram for DSS Site 1094, Live Fire Range East Septic System (Lurance Canyon)

VI.4 Step 3. Background Screening Procedure

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

VI.4.1 Methodology

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

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

VI.4.2 Results

Tables 4 and 5 show the DSS Site 1094 maximum COC concentrations that were compared to the SNL/NM maximum background values (Dinwiddie September 1997) for the human health risk assessment. For the nonradiological COCs, one constituent was measured at a concentration greater than the background screening value. Two constituents do not have quantified background screening concentrations; therefore it is unknown whether these COCs exceed background. Two constituents are organic compounds that do not have corresponding background screening values.

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

VI.5 Step 4. Identification of Toxicological Parameters

Tables 7 (nonradiological) and 8 (radiological) list the COCs retained in the risk assessment and the values for the available toxicological information. The toxicological values for the nonradiological COCs presented in Table 7 were obtained from the Integrated Risk Information System (IRIS) (EPA 2004a), the "Technical Background Document for Development of Soil Screening Levels, Revision 2" (NMED February 2004), and EPA Region 6 (EPA 2004b). Dose conversion factors (DCFs) used in determining the excess TEDE values for radiological COCs for the individual pathways are the default values provided in the RESRAD computer code (Yu et al. 1993a) as developed in the following documents:

Table 7
Toxicological Parameter Values for DSS Site 1094 Nonradiological COCs

COC	RfD_o (mg/kg-d)	Confidence[a]	RfD_{inh} (mg/kg-d)	Confidence[a]	SF_o $(mg/kg-d)^{-1}$	SF_{inh} $(mg/kg-d)^{-1}$	Cancer Class[b]	ABS
Inorganic								
Chromium VI	3E-3[c]	L	2.3E-6[c]	L	–	4.2E+1[c]	A	0.01[d]
Cyanide	2E-2[c]	M	–	–	–	–	D	0.1[d]
Silver	5E-3[c]	L	–	–	–	–	D	0.01[d]
Organic								
Toluene	2E-1[c]	M	1.1E-1[c]	M	–	–	D	0.1[d]
Xylene	2E+0[c]	M	2E-1[e]	–	–	–	D	0.1[d]

[a]Confidence associated with IRIS (EPA 2004a) database values. Confidence: L = low, M = medium.
[b]EPA weight-of-evidence classification system for carcinogenicity (EPA 1989) taken from IRIS (EPA 2004a):
A = Human carcinogen.
D = Not classifiable as to human carcinogenicity.
[c]Toxicological parameter values from IRIS electronic database (EPA 2004a).
[d]Toxicological parameter values from NMED (February 2004).
[e]Toxicological parameter values from EPA Region 6 (EPA 2004b).

ABS = Gastrointestinal absorption coefficient.
COC = Constituent of concern.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
IRIS = Integrated Risk Information System.
mg/kg-d = Milligram(s) per kilogram-day.
$(mg/kg-d)^{-1}$ = Per milligram per kilogram-day.
NMED = New Mexico Environment Department.
RfD_{inh} = Inhalation chronic reference dose.
RfD_o = Oral chronic reference dose.
SF_{inh} = Inhalation slope factor.
SF_o = Oral slope factor.
– = Information not available.

Table 8
Radiological Toxicological Parameter Values for DSS Site 1094 COCs Obtained from RESRAD Risk Coefficients[a]

COC	SF_o (1/pCi)	SF_{inh} (1/pCi)	SF_{ev} (g/pCi-yr)	Cancer Class[b]
U-235	4.70E-11	1.30E-08	2.70E-07	A

[a]Yu et al. 1993a.
[b]EPA weight-of-evidence classification system for carcinogenicity (EPA 1989): A = Human carcinogen for high dose and high dose rate (i.e., greater than 50 rem per year). For low-level environmental exposures, the carcinogenic effect has not been observed and documented.
1/pCi = One per picocurie.
COC = Constituent of concern.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
g/pCi-yr = Gram(s) per picocurie year.
SF_{ev} = External volume exposure slope factor.
SF_{inh} = Inhalation slope factor.
SF_o = Oral (ingestion) slope factor.

- DCFs for ingestion and inhalation were taken from "Federal Guidance Report No. 11, Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion" (EPA 1988).
- DCFs for surface contamination (contamination on the surface of the site) were taken from DOE/EH-0070, "External Dose-Rate Conversion Factors for Calculation of Dose to the Public" (DOE 1988).
- DCFs for volume contamination (exposure to contamination deeper than the immediate surface of the site) were calculated using the methods discussed in "Dose-Rate Conversion Factors for External Exposure to Photon Emitters in Soil" (Kocher 1983) and in ANL/EAIS-8, "Data Collection Handbook to Support Modeling the Impacts of Radioactive Material in Soil" (Yu et al. 1993b).

VI.6 Step 5. Exposure Assessment and Risk Characterization

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

VI.6.2 Risk Characterization

Table 9 shows an HI of 0.00 for the DSS Site 1094 nonradiological COCs and an estimated excess cancer risk of 3E-11 for the designated recreational land-use scenario. The numbers presented include exposure from soil ingestion, dermal contact, and dust and volatile inhalation for nonradiological COCs. Table 10 shows an HI of 0.00 and no quantified estimated excess cancer risk for the DSS Site 1094 associated background constituents under the designated recreational land-use scenario.

For the radiological COC, contribution from the direct gamma exposure pathway is included. For the recreational land-use scenario, a TEDE was calculated that results in an incremental TEDE of 1.9E-3 millirem (mrem)/year (yr). In accordance with EPA guidance found in Office of Solid Waste and Emergency Response (OSWER) Directive No. 9200.4-18 (EPA 1997a), an incremental TEDE of 15 mrem/yr is used for the probable land-use scenario (recreational in this case); the calculated dose value for DSS Site 1094 for the recreational land-use scenario is well below this guideline. The estimated excess cancer risk is 1.6E-8.

For nonradiological COCs under the residential land-use scenario, the HI is 0.00 with an estimated excess cancer risk of 7E-10 (Table 9). The numbers in the table include exposure from soil ingestion, dermal contact, and dust and volatile inhalation. Although the EPA (1991) generally recommends that inhalation not be included in a residential land-use scenario, this pathway is included because of the potential for soil in Albuquerque, New Mexico, to be eroded and for dust to be present in predominantly residential areas. Because of the nature of the local soil, other exposure pathways are not considered (see Appendix 1). Table 10 shows an HI of 0.00 and no quantified estimated excess cancer risk for the DSS Site 1094 associated background constituents under the residential land-use scenario.

For the radiological COC, the incremental TEDE for the residential land-use scenario is 4.8E-3 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 1094 for the residential land-use scenario is well below

Table 9
Risk Assessment Values for DSS Site 1094 Nonradiological COCs

COC	Maximum Concentration (mg/kg)	Recreational Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Chromium VI	0.159 J	0.00	3E-11	0.00	7E-10
Cyanide	0.0695[b]	0.00	–	0.00	–
Silver	0.602 J	0.00	–	0.00	–
Organic					
Toluene	0.00663	0.00	–	0.00	–
Total xylenes	0.00129	0.00	–	0.00	–
Total		0.00	3E-11	0.00	7E-10

[a]EPA 1989.
[b]Nondetected concentration (i.e., one-half the maximum detection limit is greater than the maximum detected concentration).
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 1094 Nonradiological Background Constituents

COC	Background Concentration[a] (mg/kg)	Recreational Land-Use Scenario[b]		Residential Land-Use Scenario[b]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Chromium	NC	–	–	–	–
Cyanide	NC	–	–	–	–
Silver	<1	–	–	–	–
Total		0.00	–	0.00	–

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

this guideline. Consequently, DSS Site 1094 is eligible for unrestricted radiological release as the residential land-use scenario results in an incremental TEDE of less than 75 mrem/yr to the on-site receptor. The estimated excess cancer risk is 4.6E-8. The excess cancer risk from the nonradiological and radiological COCs should be summed to provide risk estimates for persons exposed to both types of carcinogenic contaminants, as noted in OSWER Directive No. 9200.4-18 "Establishment of Cleanup Levels for CERCLA [Comprehensive Environmental Response, Compensation, and Liability Act] Sites with Radioactive Contamination" (EPA 1997a). This summation is tabulated in Section VI.9.

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 recreational (the designated land-use scenario for this site) and residential land-use scenarios.

For the nonradiological COCs under the recreational land-use scenario, the HI is 0.00 (less than the numerical guideline of 1 suggested in the RAGS [EPA 1989]). The estimated excess cancer risk is 3E-11. 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 recreational and residential land-use scenarios. Assuming the recreational land-use scenario, there is no quantifiable excess cancer risk for nonradiological COCs. The incremental risk is determined by subtracting risk associated with background from potential COC risk. These numbers are not rounded before the difference is determined and therefore may appear to be inconsistent with numbers presented in tables and within the text. For conservatism, the background constituents that do not have quantified background screening concentrations are assumed to have a hazard quotient of 0.00. The incremental HI is 0.00 and the estimated incremental excess cancer risk is 2.72E-11 for the recreational land-use scenario. These incremental risk calculations indicate insignificant risk to human health from nonradiological COCs under a recreational land-use scenario.

For the radiological COC under the recreational land-use scenario, the incremental TEDE is 1.9E-3 mrem/yr, which is significantly lower than the EPA's numerical guideline of 15 mrem/yr (EPA 1997a). The estimated incremental excess cancer risk is 1.6E-8.

The calculated HI for the nonradiological COCs under the residential land-use scenario is 0.00, which is below numerical guidance. The estimated excess cancer risk is 7E-10. NMED guidance states that cumulative excess lifetime cancer risk must be less than 1E-5 (Bearzi January 2001); thus the excess cancer risk for this site is below the suggested acceptable risk value. The incremental HI is 0.00 and the estimated incremental excess cancer risk is 7.31E-10 for the residential land-use scenario. These incremental risk calculations indicate insignificant risk to human health from nonradiological COCs under the residential land-use scenario.

The incremental TEDE for a residential land-use scenario from the radiological component is 4.8E-3 mrem/yr, which is significantly lower than the numerical guideline of 75 mrem/yr suggested in the SNL/NM "RESRAD Input Parameter Assumptions and Justification" (SNL/NM February 1998). The estimated incremental excess cancer risk is 4.6E-8.

VI.8 Step 7. Uncertainty Discussion

The determination of the nature, rate, and extent of contamination at DSS Site 1094 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 2001b). 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 1094.

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

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

Table 7 shows the uncertainties (confidence levels) in nonradiological toxicological parameter values. There is a combination of estimated values and values from the IRIS (EPA 2004a), EPA Region 6 (EPA 2004b), and the "Technical Background Document for Development of Soil Screening Levels, Revision 2" (NMED February 2004). Where values are not provided, information is not available from the Health Effects Assessment Summary Tables (HEAST) (EPA 1997b), IRIS (EPA 2004a), "Technical Background Document for Development of Soil Screening Levels, Revision 2" (NMED February 2004), Risk Assessment Information System (ORNL 2003), or EPA regions (EPA 2004b, EPA 2002a, EPA 2002b). Because of the conservative nature of the RME approach, uncertainties in toxicological values are not expected to change the conclusion from the risk assessment analysis.

Risk assessment values for nonradiological COCs are within the acceptable range for human health under the recreational 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 recreational 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 1094 contains identified COCs consisting of some inorganic, organic, and radiological compounds. Because of the location of the site, the designated recreational 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 recreational land-use scenario the HI (0.00) is significantly lower than the accepted numerical guidance from the EPA. The estimated excess cancer risk is 3E-11; thus, excess cancer risk is also below the acceptable risk value provided by the NMED for an recreational land-use scenario (Bearzi January 2001). The incremental HI is 0.00, and the estimated incremental excess cancer risk is 2.72E-11 for the recreational land-use scenario. These incremental risk calculations indicate insignificant risk to human health for the recreational land-use scenario.

Using conservative assumptions and an RME approach to risk assessment, calculations for the nonradiological COCs show that for the residential land-use scenario the HI (0.00) is below the accepted numerical guidance from the EPA. The estimated excess cancer risk is 7E-10. Thus, excess cancer risk is below the acceptable risk value provided by the NMED for a residential land-use scenario (Bearzi January 2001). The incremental HI is 0.00 and the estimated incremental excess cancer risk is 7.31E-10 for the residential land-use scenario. These incremental risk calculations indicate insignificant risk to human health for the residential land-use scenario.

The incremental TEDE and corresponding estimated cancer risk from the radiological COC are much less than EPA guidance values. The estimated TEDE is 1.9E-3 mrem/yr for the recreational land-use scenario, which is much lower than the EPA's numerical guidance of 15 mrem/yr (EPA 1997a). The corresponding estimated incremental excess cancer risk value is 1.6E-8 for the recreational land-use scenario. Furthermore, the incremental TEDE for the residential land-use scenario that results from a complete loss of institutional control is 4.8E-3 mrem/yr with an associated risk of 4.6E-8. The guideline for this scenario is 75 mrem/yr (SNL/NM February 1998). Therefore, DSS Site 1094 is eligible for unrestricted radiological release.

The excess cancer risk from the nonradiological and radiological COCs should be summed to provide risk estimates for persons exposed to both types of carcinogenic contaminants, as noted in OSWER Directive No. 9200.4-18 (EPA 1997a). The summation of the nonradiological and radiological carcinogenic risks is tabulated in Table 11.

Table 11
Summation of Incremental Nonradiological and Radiological Risks from DSS Site 1094, Live Fire Range East Septic System Carcinogens

Scenario	Nonradiological Risk	Radiological Risk	Total Risk
Recreational	2.72E-11	1.6E-8	1.6E-8
Residential	7.31E-10	4.6E-8	4.6E-8

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 recreational 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 1094. 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 the 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 1094 are located 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 is 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 radiological decay of the COCs 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 is not deemed necessary to predict the potential level of ecological risk associated with the site.

VIII. References

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APPENDIX 1
EXPOSURE PATHWAY DISCUSSION FOR CHEMICAL AND RADIONUCLIDE CONTAMINATION

Introduction

Sandia National Laboratories/New Mexico (SNL/NM) uses a default set of exposure routes and associated default parameter values developed for each future land-use designation being considered for SNL/NM Environmental Restoration (ER) Project sites. This default set of exposure scenarios and parameter values are invoked for risk assessments unless site-specific information suggests other parameter values. Because many SNL/NM solid waste management units (SWMUs) have similar types of contamination and physical settings, SNL/NM believes that the risk assessment analyses at these sites can be similar. A default set of exposure scenarios and parameter values facilitates the risk assessments and subsequent review.

The default exposure routes and parameter values used are those that SNL/NM views as resulting in a Reasonable Maximum Exposure (RME) value. Subject to comments and recommendations by the U.S. Environmental Protection Agency (EPA) Region VI and New Mexico Environment Department (NMED), SNL/NM will use these default exposure routes and parameter values in future risk assessments.

At SNL/NM, all SWMUs exist within the boundaries of the Kirtland Air Force Base. Approximately 240 potential waste and release sites have been identified where hazardous, radiological, or mixed materials may have been released to the environment. Evaluation and characterization activities have occurred at all of these sites to varying degrees. Among other documents, the SNL/NM ER draft Environmental Assessment (DOE 1996) presents a summary of the hydrogeology of the sites and the biological resources present. When evaluating potential human health risk the current or reasonably foreseeable land use negotiated and approved for the specific SWMU/AOC, aggregate, or watershed will be used. The following references generally document these land uses: *Workbook: Future Use Management Area 2 (DOE et al. September 1995); Workbook: Future Use Management Area 1 (DOE et al. October 1995); Workbook: Future Use Management Areas 3, 4, 5, and 6 (DOE and USAF January 1996); Workbook: Future Use Management Area 7 (DOE and USAF March 1996)*. At this time, all SNL/NM SWMUs have been tentatively designated for either industrial or recreational future land use. The NMED has also requested that risk calculations be performed based upon a residential land-use scenario. Therefore, all three land-use scenarios will be addressed in this document.

The SNL/NM ER Project has screened the potential exposure routes and identified default parameter values to be used for calculating potential intake and subsequent hazard index (HI), excess cancer risk and dose values. The EPA (EPA 1989) provides a summary of exposure routes that could potentially be of significance at a specific waste site. These potential exposure routes consist of:

- Ingestion of contaminated drinking water
- Ingestion of contaminated soil

- Ingestion of contaminated fish and shellfish
- Ingestion of contaminated fruits and vegetables
- Ingestion of contaminated meat, eggs, and dairy products
- Ingestion of contaminated surface water while swimming
- Dermal contact with chemicals in water
- Dermal contact with chemicals in soil
- Inhalation of airborne compounds (vapor phase or particulate)
- External exposure to penetrating radiation (immersion in contaminated air; immersion in contaminated water; and exposure from ground surfaces with photon-emitting radionuclides)

Based upon the location of the SNL/NM SWMUs and the characteristics of the surface and subsurface at the sites, we have evaluated these potential exposure routes for different land-use scenarios to determine which should be considered in risk assessment analyses (the last exposure route is pertinent to radionuclides only). At SNL/NM SWMUs, there is currently no consumption of fish, shellfish, fruits, vegetables, meat, eggs, or dairy products that originate on site. Additionally, no potential for swimming in surface water is present due to the high-desert environmental conditions. As documented in the RESRAD computer code manual (ANL 1993), risks resulting from immersion in contaminated air or water are not significant compared to risks from other radiation exposure routes.

For the industrial and recreational land-use scenarios, SNL/NM ER has, therefore, excluded the following five potential exposure routes from further risk assessment evaluations at any SNL/NM SWMU:

- Ingestion of contaminated fish and shellfish
- Ingestion of contaminated fruits and vegetables
- Ingestion of contaminated meat, eggs, and dairy products
- Ingestion of contaminated surface water while swimming
- Dermal contact with chemicals in water

That part of the exposure pathway for radionuclides related to immersion in contaminated air or water is also eliminated.

Based upon this evaluation, for future risk assessments the exposure routes that will be considered are shown in Table 1.

Table 1
Exposure Pathways Considered for Various Land-Use Scenarios

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

Equations and Default Parameter Values for Identified Exposure Routes

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

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

Generic Equation for Calculation of Risk Parameter Values

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

Risk (or Dose) = Intake x Toxicity Effect (either carcinogenic, noncarcinogenic, or radiological)

= C x (CR x EFD/BW/AT) x Toxicity Effect (1)

where;

C = contaminant concentration (site specific)
CR = contact rate for the exposure pathway
EFD= exposure frequency and duration
BW = body weight of average exposure individual
AT = time over which exposure is averaged.

For nonradiological constituents of concern (COCs), the total risk/dose (either cancer risk or HI) is the sum of the risks/doses for all of the site-specific exposure pathways and contaminants. For radionuclides, the calculated radiation exposure, expressed as TEDE is compared directly to the exposure guidelines of 15 millirem per year (mrem/year) for industrial and recreational future use and 75 mrem/year for the unlikely event that institutional control of the site is lost and the site is used for residential purposes (EPA 1997).

The evaluation of the carcinogenic health hazard produces a quantitative estimate for excess cancer risk resulting from the COCs present at the site. This estimate is evaluated for determination of further action by comparison of the quantitative estimate with the potentially acceptable risk of 1E-5 for nonradiological carcinogens. The evaluation of the noncarcinogenic health hazard produces a quantitative estimate (i.e., the HI) for the toxicity resulting from the COCs present at the site. This estimate is evaluated for determination of further action by comparison of this quantitative estimate with the EPA standard HI of unity (1). The evaluation of the health hazard from radioactive compounds produces a quantitative estimate of doses resulting from the COCs present at the site. This estimated dose is used to calculate an assumed risk. However, this calculated risk is presented for illustration purposes only, not to determine compliance with regulations.

The specific equations used for the individual exposure pathways can be found in RAGS (EPA 1989) and are outlined below. The RESRAD Manual (ANL 1993) describes similar equations for the calculation of radiological exposures.

Soil Ingestion

A receptor can ingest soil or dust directly by working in the contaminated soil. Indirect ingestion can occur from sources such as unwashed hands introducing contaminated soil to food that is then eaten. An estimate of intake from ingesting soil will be calculated as follows:

$$I_s = \frac{C_s * IR * CF * EF * ED}{BW * AT}$$

where:

I_s = Intake of contaminant from soil ingestion (milligrams [mg]/kilogram [kg]-day)
C_s = Chemical concentration in soil (mg/kg)
IR = Ingestion rate (mg soil/day)
CF = Conversion factor (1E-6 kg/mg)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
BW = Body weight (kg)
AT = Averaging time (period over which exposure is averaged) (days)

It should be noted that it is conservatively assumed that the receptor only ingests soil from the contaminated source.

Soil Inhalation

A receptor can inhale soil or dust directly by working in the contaminated soil. An estimate of intake from inhaling soil will be calculated as follows (EPA August 1997):

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

where:

I_s = Intake of contaminant from soil inhalation (mg/kg-day)
C_s = Chemical concentration in soil (mg/kg)
IR = Inhalation rate (cubic meters [m^3]/day)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
VF = soil-to-air volatilization factor (m^3/kg)
PEF = particulate emission factor (m^3/kg)
BW = Body weight (kg)
AT = Averaging time (period over which exposure is averaged) (days)

Soil Dermal Contact

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

where:

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

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

Groundwater Ingestion

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

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

where:

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

Groundwater Inhalation

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

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

where:

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

For volatile compounds, volatilization from groundwater can be an important exposure pathway from showering and other household uses of groundwater. This exposure pathway will only be evaluated for organic chemicals with a Henry's Law constant greater than 1×10^{-5} and with a molecular weight of 200 grams/mole or less (EPA 1991).

Tables 2 and 3 show the default parameter values suggested for use by SNL/NM at SWMUs, based upon the selected land-use scenarios for nonradiological and radiological COCs, respectively. References are given at the end of the table indicating the source for the chosen parameter values. SNL/NM uses default values that are consistent with both regulatory guidance and the RME approach. Therefore, the values chosen will, in general, provide a conservative estimate of the actual risk parameter. These parameter values are suggested for use for the various exposure pathways, based upon the assumption that a particular site has no unusual characteristics that contradict the default assumptions. For sites for which the assumptions are not valid, the parameter values will be modified and documented.

Summary

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

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

Parameter	Industrial	Recreational	Residential
General Exposure Parameters			
Exposure Frequency (day/yr)	250[a,b]	8.7 (4 hr/wk for 52 wk/yr)[a,b]	350[a,b]
Exposure Duration (yr)	25[a,b,c]	30[a,b,c]	30[a,b,c]
Body Weight (kg)	70[a,b,c]	70 Adult[a,b,c] 15 Child[a,b,c]	70 Adult[a,b,c] 15 Child[a,b,c]
Averaging Time (days) for Carcinogenic Compounds (= 70 yr x 365 day/yr) for Noncarcinogenic Compounds (= ED x 365 day/yr)	25,550[a,b] 9,125[a,b]	25,550[a,b] 10,950[a,b]	25,550[a,b] 10,950[a,b]
Soil Ingestion Pathway			
Ingestion Rate (mg/day)	100[a,b]	200 Child[a,b] 100 Adult[a,b]	200 Child[a,b] 100 Adult[a,b]
Inhalation Pathway			
Inhalation Rate (m^3/day)	20[a,b]	15 Child[a] 30 Adult[a]	10 Child[a] 20 Adult[a]
Volatilization Factor (m^3/kg)	Chemical Specific	Chemical Specific	Chemical Specific
Particulate Emission Factor (m^3/kg)	1.36E9[a]	1.36E9[a]	1.36E9[a]
Water Ingestion Pathway			
Ingestion Rate (liter/day)	2.4[a]	2.4[a]	2.4[a]
Dermal Pathway			
Skin Adherence Factor (mg/cm^2)	0.2[a]	0.2 Child[a] 0.07 Adult[a]	0.2 Child[a] 0.07 Adult[a]
Exposed Surface Area for Soil/Dust (cm^2/day)	3,300[a]	2,800 Child[a] 5,700 Adult[a]	2,800 Child[a] 5,700 Adult[a]
Skin Adsorption Factor	Chemical Specific	Chemical Specific	Chemical Specific

[a]Technical Background Document for Development of Soil Screening Levels (NMED December 2000).
[b]Risk Assessment Guidance for Superfund, Vol. 1, Part B (EPA 1991).
[c]Exposure Factors Handbook (EPA August 1997).

ED = Exposure duration.
EPA = U.S. Environmental Protection Agency.
hr = Hour(s).
kg = Kilogram(s).
m = Meter(s).
mg = Milligram(s).
NA = Not available.
wk = Week(s).
yr = Year(s).

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

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

[a]Risk Assessment Guidance for Superfund, Vol. 1, Part B (EPA 1991).
[b]Exposure Factors Handbook (EPA August 1997).
[c]EPA Region VI guidance (EPA 1996).
[d]For radionuclides, RESRAD (ANL 1993).
[e]SNL/NM (February 1998).
EPA = U.S. Environmental Protection Agency.
g = Gram(s)
hr = Hour(s).
kg = Kilogram(s).
m = Meter(s).
mg = Milligram(s).
NA = Not applicable.
wk = Week(s).
yr = Year(s).

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