3-1-2006

Justification for Class III Permit Modification March 2006 AOC 1114 Operable Unit 1295 Building 9978 Drywell (Coyote Test Field)

Sandia National Laboratories/NM

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

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

Sandia National Laboratories

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	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

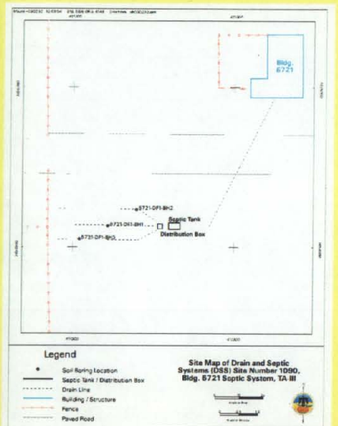
[a]Value exceeds NMED guidance for residential land-use scenario; therefore, incremental values are shown.

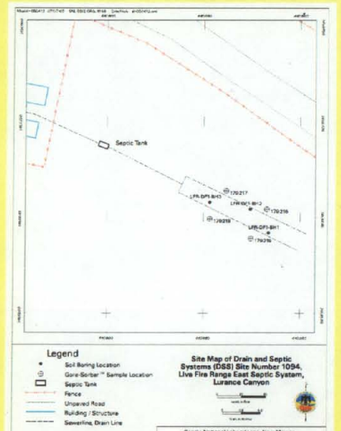
Drain and Septic Systems (DSS) Areas of Concern (AOCs)
1090, 1094, 1095, 1114, 1115, 1116, 1117,
(Poster 2 of 2)

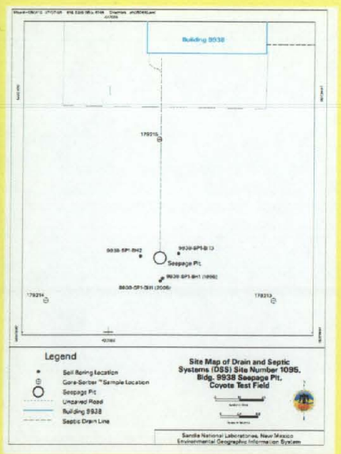
This work supported by the United States Department of Energy under contract DE-AC04-94185000.

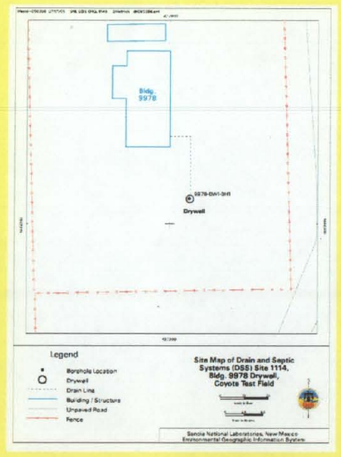
Sandia National Laboratories

Environmental Restoration Project





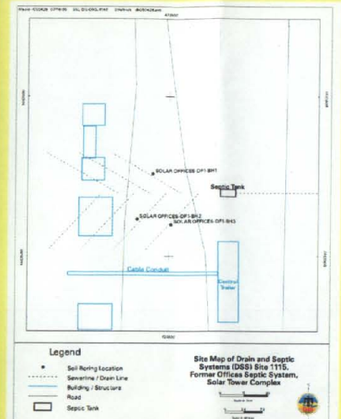


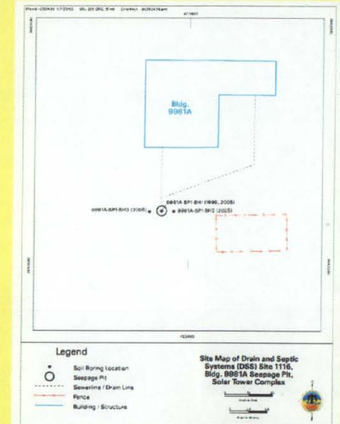


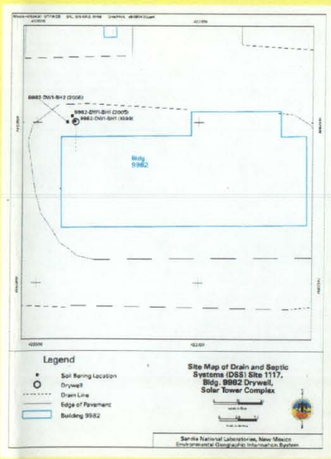
Auger drilling through the gravel aggregate to collect additional soil samples for VOC analysis at the AOC 1117 Drywell.

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 fore-ground. 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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Environmental Restoration Project
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Sandia National Laboratories

Justification for Class III Permit Modification

March 2006

AOC 1114
Operable Unit 1295
Building 9978 Drywell (Coyote Test Field)

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.

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

APR 7 2005

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

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

Dear Mr. Bearzi,

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

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

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

Sincerely,

Patty Wagner
Manager

Enclosure

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

cc w/o enclosure:
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F. Nimick, SNL, MS 1089
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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 #
1113	Bldg. 6597 DW	Volume 5	605783	6597/1113-DW1-BH1-5-S	060050-002	26-SEP-02	SOIL	GROSS-A/B	GEL	206591
1113	Bldg. 6597 DW	Volume 5	605783	6597/1113-DW1-BH1-10-S	060051-002	26-SEP-02	SOIL	TOTAL-CN	GEL	206731
1113	Bldg. 6597 DW	Volume 5	605783	6597/1113-DW1-BH1-5-S	060050-002	26-SEP-02	SOIL	TOTAL-CN	GEL	206731
1113	Bldg. 6597 DW	Volume 5	605783	6597/1113-DW1-BH1-10-S	060051-001	26-SEP-02	SOIL	VOA-8260	GEL	207083
1113	Bldg. 6597 DW	Volume 5	605783	6597/1113-DW1-BH1-5-S	060050-001	26-SEP-02	SOIL	VOA-8260	GEL	207083
1113	Bldg. 6597 DW	Volume 5	605783	6597/1113-DW1-BH1-10-S	060051-002	26-SEP-02	SOIL	Cr+6	GEL	207514
1113	Bldg. 6597 DW	Volume 5	605783	6597/1113-DW1-BH1-5-S	060050-002	26-SEP-02	SOIL	Cr+6	GEL	207514
1113	Bldg. 6597 DW	Volume 5	605783	6597/1113-DW1-BH1-10-S	060051-002	26-SEP-02	SOIL	RCRA METALS	GEL	206907, 207430
1113	Bldg. 6597 DW	Volume 5	605783	6597/1113-DW1-BH1-5-S	060050-002	26-SEP-02	SOIL	RCRA METALS	GEL	206907, 207430
1114	Bldg. 9978 DW	Volume 7	605731	9978/1114-DW1-BH1-11-S	059924-003	23-SEP-02	SOIL	GAMMA SPEC	RPSD	201342
1114	Bldg. 9978 DW	Volume 7	605731	9978/1114-DW1-BH1-6-S	059923-003	23-SEP-02	SOIL	GAMMA SPEC	RPSD	201342
1114	Bldg. 9978 DW	Volume 5	605730	9978/1114-DW1-BH1-11-S	059924-002	23-SEP-02	SOIL	PCB-8082	GEL	203728
1114	Bldg. 9978 DW	Volume 5	605730	9978/1114-DW1-BH1-6-S	059923-002	23-SEP-02	SOIL	PCB-8082	GEL	203728
1114	Bldg. 9978 DW	Volume 5	605730	9978/1114-DW1-BH1-11-S	059924-002	23-SEP-02	SOIL	BNA-8270	GEL	203764
1114	Bldg. 9978 DW	Volume 5	605730	9978/1114-DW1-BH1-6-S	059923-002	23-SEP-02	SOIL	BNA-8270	GEL	203764
1114	Bldg. 9978 DW	Volume 5	605730	9978/1114-DW1-BH1-11-S	059924-001	23-SEP-02	SOIL	VOA-8260	GEL	203934
1114	Bldg. 9978 DW	Volume 5	605730	9978/1114-DW1-BH1-6-S	059923-001	23-SEP-02	SOIL	VOA-8260	GEL	203934
1114	Bldg. 9978 DW	Volume 5	605730	9978/1114-DW1-BH1-11-S	059924-002	23-SEP-02	SOIL	HE-8330	GEL	204142
1114	Bldg. 9978 DW	Volume 5	605730	9978/1114-DW1-BH1-6-S	059923-002	23-SEP-02	SOIL	HE-8330	GEL	204142
1114	Bldg. 9978 DW	Volume 5	605730	9978/1114-DW1-TB	059925-001	23-SEP-02	AQUEOUS	VOA-8260	GEL	204910
1114	Bldg. 9978 DW	Volume 5	605730	9978/1114-DW1-BH1-11-S	059924-002	23-SEP-02	SOIL	GROSS-A/B	GEL	205009
1114	Bldg. 9978 DW	Volume 5	605730	9978/1114-DW1-BH1-6-S	059923-002	23-SEP-02	SOIL	GROSS-A/B	GEL	205009
1114	Bldg. 9978 DW	Volume 5	605730	9978/1114-DW1-BH1-11-S	059924-002	23-SEP-02	SOIL	TOTAL-CN	GEL	205123
1114	Bldg. 9978 DW	Volume 5	605730	9978/1114-DW1-BH1-6-S	059923-002	23-SEP-02	SOIL	TOTAL-CN	GEL	205123
1114	Bldg. 9978 DW	Volume 5	605730	9978/1114-DW1-BH1-11-S	059924-002	23-SEP-02	SOIL	Cr+6	GEL	205618
1114	Bldg. 9978 DW	Volume 5	605730	9978/1114-DW1-BH1-6-S	059923-002	23-SEP-02	SOIL	Cr+6	GEL	205618
1114	Bldg. 9978 DW	Volume 5	605730	9978/1114-DW1-BH1-11-S	059924-002	23-SEP-02	SOIL	RCRA METALS	GEL	203818, 204433
1114	Bldg. 9978 DW	Volume 5	605730	9978/1114-DW1-BH1-6-S	059923-002	23-SEP-02	SOIL	RCRA METALS	GEL	203818, 204433
1115	F. Solar Offices SS	Volume 3	602817	SOLARDETOX-DF1-BH1-10-S	050056-003	27-AUG-99	SOIL	HE-8330	GEL	158012
1115	F. Solar Offices SS	Volume 3	602817	SOLARDETOX-DF1-BH1-5-S	050055-003	27-AUG-99	SOIL	HE-8330	GEL	158012
1115	F. Solar Offices SS	Volume 3	602817	SOLARDETOX-DF1-BH2-10-S	050053-003	27-AUG-99	SOIL	HE-8330	GEL	158012
1115	F. Solar Offices SS	Volume 3	602817	SOLARDETOX-DF1-BH2-5-S	050052-003	27-AUG-99	SOIL	HE-8330	GEL	158012
1115	F. Solar Offices SS	Volume 3	602817	SOLARDETOX-DF1-BH3-10-S	050050-003	27-AUG-99	SOIL	HE-8330	GEL	158012
1115	F. Solar Offices SS	Volume 3	602817	SOLARDETOX-DF1-BH3-5-S	050049-003	27-AUG-99	SOIL	HE-8330	GEL	158012
1115	F. Solar Offices SS	Volume 3	602817	SOLARDETOX-DF1-BH1-10-S	050056-003	27-AUG-99	SOIL	BNA-8270	GEL	158016
1115	F. Solar Offices SS	Volume 3	602817	SOLARDETOX-DF1-BH1-5-S	050055-003	27-AUG-99	SOIL	BNA-8270	GEL	158016
1115	F. Solar Offices SS	Volume 3	602817	SOLARDETOX-DF1-BH2-10-S	050053-003	27-AUG-99	SOIL	BNA-8270	GEL	158016
1115	F. Solar Offices SS	Volume 3	602817	SOLARDETOX-DF1-BH2-5-S	050052-003	27-AUG-99	SOIL	BNA-8270	GEL	158016
1115	F. Solar Offices SS	Volume 3	602817	SOLARDETOX-DF1-BH3-10-S	050050-003	27-AUG-99	SOIL	BNA-8270	GEL	158016
1115	F. Solar Offices SS	Volume 3	602817	SOLARDETOX-DF1-BH3-5-S	050049-003	27-AUG-99	SOIL	BNA-8270	GEL	158016
1115	F. Solar Offices SS	Volume 3	602817	SOLARDETOX-DF1-BH1-10-S	050056-001	27-AUG-99	SOIL	VOA-8260	GEL	158044
1115	F. Solar Offices SS	Volume 3	602817	SOLARDETOX-DF1-BH1-5-S	050055-001	27-AUG-99	SOIL	VOA-8260	GEL	158044

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 5 of 7

General Engineering Laboratories, Inc. (GEL) QC Data

Environmental
Restoration
Project

United States Department of Energy
Sandia Site Office

[redacted] COC# 605730 [redacted]

GEL QC CROSS REFERENCE

COC 605730

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

GEL QC CROSS REFERENCE

COC 605730

Site #	Site Name	SAMPLE#	F#	DISP_ER_SAMP_LOC	SAMPLE DATE	MATRIX	LAB TEST	BATCH #
1114	Bldg. 9978 DW	059924	002	9978/1114-DW1-BH1-11-S	23-SEP-02	SOIL	Cr+6	205618
1114	Bldg. 9978 DW	059924	002	9978/1114-DW1-BH1-11-S	23-SEP-02	SOIL	GROSS-A/B	205009
1114	Bldg. 9978 DW	059924	002	9978/1114-DW1-BH1-11-S	23-SEP-02	SOIL	HE-8330	204142
1114	Bldg. 9978 DW	059924	002	9978/1114-DW1-BH1-11-S	23-SEP-02	SOIL	PCB-8082	203728
1114	Bldg. 9978 DW	059924	002	9978/1114-DW1-BH1-11-S	23-SEP-02	SOIL	RCRA METALS	203818, 204433
1114	Bldg. 9978 DW	059924	002	9978/1114-DW1-BH1-11-S	23-SEP-02	SOIL	TOTAL-CN	205123
1114	Bldg. 9978 DW	059925	001	9978/1114-DW1-TB	23-SEP-02	AQUEOUS	VOA-8260	204910

REVIS

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

October 21, 2002

Laboratory Identification:

General Engineering Laboratories, Inc.

Mailing Address:

P.O. Box 30712
Charleston, South Carolina 29417

Express Mail Delivery and Shipping Address:

2040 Savage Road
Charleston, South Carolina 29407

Telephone Number:

(843) 556-8171

Summary:

Sample receipt

Sandia collected twenty-four soil samples and eleven aqueous samples on September 18, 19, 20, and 23, 2002. The samples arrived at General Engineering Laboratories, Inc., (GEL) Charleston, South Carolina on September 24, 2002, for environmental analyses. Cooler clearance (screening, temperature check, etc.) was done upon login. The coolers arrived without any visible signs of tampering and with custody seals intact. The samples were delivered with chain of custody documentation and signatures. The temperature of the samples was 2.0 and 3.0°C, as measured from the temperature control bottles.

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

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

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

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

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

The laboratory received the following samples:

Laboratory ID	Description
ARCOC-605670:	
67601001	059813-001
67601002	059814-001
67601003	059815-001
67601004	059816-001
67601013	059813-002
67601014	059814-002
67601015	059815-002
67601016	059816-002
67608001	059819-001
67608002	059856-001
67608003	059933-001
67608005	059856-002
67608006	059856-003
67608007	059856-004
67608008	059856-005
67608009	059856-006
67608010	059856-007
67608011	059856-008
ARCOC-605730:	
67601005	059917-001
67601006	059918-001
67601007	059919-001
67601008	059920-001
67601009	059921-001
67601010	059922-001
67601011	059923-001
67601012	059924-001
67601017	059917-002

REVIS

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

Case Narrative

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

Internal Chain of Custody:

Custody was maintained for the samples.

Data Package:

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

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

Edith M. Kent

Edith M. Kent

Project Manager

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

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

Method/Analysis Information

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

Sample Analysis

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

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

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

Preparation/Analytical Method Verification

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

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

Initial Calibration
All the initial calibration requirements were met.

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

Quality Control (QC) Information

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

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

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

QC Sample Designation
The following sample was designated for matrix spike analysis:
67601001 *059813-001*

MS Recovery Statement
All the required matrix spike recoveries were within the acceptance limits.

MSD Recovery Statement
All the required matrix spike duplicate recoveries were within the acceptance limits.

MS/MSD RPD Statement
The relative percent differences (RPD) between the matrix spike and matrix spike duplicate recoveries were within the acceptance limits.

Internal Standard (I STD) Acceptance
The internal standard responses, in all samples and quality control samples, met the required acceptance criteria.

Technical Information

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

Sample Preservation and Integrity
All samples met the sample preservation and integrity requirements.

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

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

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

Miscellaneous Information

Nonconformance (NCR) Documentation
A nonconformance report was not required for this sample delivery group/work order.

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

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

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

System Configuration
The laboratory utilizes the following GC/MS configurations:

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

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

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

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

Certification Statement

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

Review Validation

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

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

Reviewer: Charles Wilson Date: 10-19-02

QC Summary

Report Date: October 17, 2002

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

Workorder: 67601

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Volatile-GC/MS Federal										
Batch 203934										
QC1200306490 LCS										
1,1-Dichloroethylene	50.0			44.7	ug/kg		89	(75%-134%)	RMB	09/25/02 08:02
Benzene	50.0			49.1	ug/kg		98	(80%-120%)		
Chlorobenzene	50.0			51.5	ug/kg		103	(82%-118%)		
Toluene	50.0			51.6	ug/kg		103	(74%-115%)		
Trichloroethylene	50.0			49.0	ug/kg		98	(80%-119%)		
**Bromofluorobenzene	50.0			47.5	ug/kg		95	(69%-138%)		
**Dibromofluoromethane	50.0			49.0	ug/kg		98	(67%-137%)		
**Toluene-d8	50.0			46.0	ug/kg		92	(67%-139%)		
QC1200307640 LCS										
1,1-Dichloroethylene	50.0			47.3	ug/kg		95	(75%-134%)		09/25/02 20:45
Benzene	50.0			50.6	ug/kg		101	(80%-120%)		
Chlorobenzene	50.0			51.5	ug/kg		103	(82%-118%)		
Toluene	50.0			51.7	ug/kg		103	(74%-115%)		
Trichloroethylene	50.0			50.7	ug/kg		101	(80%-119%)		
**Bromofluorobenzene	50.0			46.9	ug/kg		94	(69%-138%)		
**Dibromofluoromethane	50.0			50.2	ug/kg		100	(67%-137%)		
**Toluene-d8	50.0			45.5	ug/kg		91	(67%-139%)		
QC1200307641 LCS										
1,1-Dichloroethylene	50.0			43.4	ug/kg		87	(75%-134%)		09/27/02 08:11
Benzene	50.0			47.5	ug/kg		95	(80%-120%)		
Chlorobenzene	50.0			46.8	ug/kg		94	(82%-118%)		
Toluene	50.0			46.3	ug/kg		93	(74%-115%)		
Trichloroethylene	50.0			47.7	ug/kg		95	(80%-119%)		
**Bromofluorobenzene	50.0			38.2	ug/kg		76	(69%-138%)		
**Dibromofluoromethane	50.0			45.8	ug/kg		92	(67%-137%)		
**Toluene-d8	50.0			40.4	ug/kg		81	(67%-139%)		
QC1200306489 MB										
1,1,1-Trichloroethane			U	ND	ug/kg					09/25/02 09:34
1,1,2,2-Tetrachloroethane			U	ND	ug/kg					
1,1,2-Trichloroethane			U	ND	ug/kg					
1,1-Dichloroethane			U	ND	ug/kg					
1,1-Dichloroethylene			U	ND	ug/kg					
1,2-Dichloroethane			U	ND	ug/kg					
1,2-Dichloropropane			U	ND	ug/kg					
2-Butanone			U	ND	ug/kg					
2-Hexanone			U	ND	ug/kg					
4-Methyl-2-pentanone			U	ND	ug/kg					
Acetone			U	ND	ug/kg					
Benzene			U	ND	ug/kg					
Bromodichloromethane			U	ND	ug/kg					
Bromoform			U	ND	ug/kg					
Bromomethane			U	ND	ug/kg					

QC Summary

Workorder: 67601

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Volatile-GC/MS Federal										
Batch 203934										
Carbon disulfide			U	ND	ug/kg					
Carbon tetrachloride			U	ND	ug/kg					
Chlorobenzene			U	ND	ug/kg					
Chloroethane			U	ND	ug/kg					
Chloroform			U	ND	ug/kg					
Chloromethane			U	ND	ug/kg					
Dibromochloromethane			U	ND	ug/kg					
Ethylbenzene			U	ND	ug/kg					
Methylene chloride			U	ND	ug/kg					
Styrene			U	ND	ug/kg					
Tetrachloroethylene			U	ND	ug/kg					
Toluene			U	ND	ug/kg					
Trichloroethylene			U	ND	ug/kg					
Vinyl acetate			U	ND	ug/kg					
Vinyl chloride			U	ND	ug/kg					
Xylenes (total)			U	ND	ug/kg					
cis-1,2-Dichloroethylene			U	ND	ug/kg					
cis-1,3-Dichloropropylene			U	ND	ug/kg					
trans-1,2-Dichloroethylene			U	ND	ug/kg					
trans-1,3-Dichloropropylene			U	ND	ug/kg					
**Bromofluorobenzene	50.0			63.0	ug/kg		126	(69%-138%)		
**Dibromofluoromethane	50.0			48.2	ug/kg		96	(67%-137%)		
**Toluene-d8	50.0			47.6	ug/kg		95	(67%-139%)		
QC1200307638 MB										
1,1,1-Trichloroethane			U	ND	ug/kg					09/25/02 22:30
1,1,2,2-Tetrachloroethane			U	ND	ug/kg					
1,1,2-Trichloroethane			U	ND	ug/kg					
1,1-Dichloroethane			U	ND	ug/kg					
1,1-Dichloroethylene			U	ND	ug/kg					
1,2-Dichloroethane			U	ND	ug/kg					
1,2-Dichloropropane			U	ND	ug/kg					
2-Butanone			U	ND	ug/kg					
2-Hexanone			U	ND	ug/kg					
4-Methyl-2-pentanone			U	ND	ug/kg					
Acetone			U	ND	ug/kg					
Benzene			U	ND	ug/kg					
Bromodichloromethane			U	ND	ug/kg					
Bromoform			U	ND	ug/kg					
Bromomethane			U	ND	ug/kg					
Carbon disulfide			U	ND	ug/kg					
Carbon tetrachloride			U	ND	ug/kg					
Chlorobenzene			U	ND	ug/kg					
Chloroethane			U	ND	ug/kg					
Chloroform			U	ND	ug/kg					
Chloromethane			U	ND	ug/kg					
Dibromochloromethane			U	ND	ug/kg					
Ethylbenzene			U	ND	ug/kg					
Methylene chloride			U	ND	ug/kg					

QC Summary

Workorder: 67601

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Volatile-GC/MS Federal											
Batch 203934											
Styrene			U	ND	ug/kg						
Tetrachloroethylene			U	ND	ug/kg						
Toluene			U	ND	ug/kg						
Trichloroethylene			U	ND	ug/kg						
Vinyl acetate			U	ND	ug/kg						
Vinyl chloride			U	ND	ug/kg						
Xylenes (total)			U	ND	ug/kg						
cis-1,2-Dichloroethylene			U	ND	ug/kg						
cis-1,3-Dichloropropylene			U	ND	ug/kg						
trans-1,2-Dichloroethylene			U	ND	ug/kg						
trans-1,3-Dichloropropylene			U	ND	ug/kg						
**Bromofluorobenzene	50.0			60.5	ug/kg		121	(69%-138%)			
**Dibromofluoromethane	50.0			48.9	ug/kg		98	(67%-137%)			
**Toluene-d8	50.0			46.9	ug/kg		94	(67%-139%)			
QC1200307639 MB											
1,1,1-Trichloroethane			U	ND	ug/kg					09/27/02	09:4
1,1,2,2-Tetrachloroethane			U	ND	ug/kg						
1,1,2-Trichloroethane			U	ND	ug/kg						
1,1-Dichloroethane			U	ND	ug/kg						
1,1-Dichloroethylene			U	ND	ug/kg						
1,2-Dichloroethane			U	ND	ug/kg						
1,2-Dichloropropane			U	ND	ug/kg						
2-Butanone			U	ND	ug/kg						
2-Hexanone			U	ND	ug/kg						
4-Methyl-2-pentanone			U	ND	ug/kg						
Acetone			U	ND	ug/kg						
Benzene			U	ND	ug/kg						
Bromodichloromethane			U	ND	ug/kg						
Bromoform			U	ND	ug/kg						
Bromomethane			U	ND	ug/kg						
Carbon disulfide			U	ND	ug/kg						
Carbon tetrachloride			U	ND	ug/kg						
Chlorobenzene			U	ND	ug/kg						
Chloroethane			U	ND	ug/kg						
Chloroform			U	ND	ug/kg						
Chloromethane			U	ND	ug/kg						
Dibromochloromethane			U	ND	ug/kg						
Ethylbenzene			U	ND	ug/kg						
Methylene chloride			U	ND	ug/kg						
Styrene			U	ND	ug/kg						
Tetrachloroethylene			U	ND	ug/kg						
Toluene			U	ND	ug/kg						
Trichloroethylene			U	ND	ug/kg						
Vinyl acetate			U	ND	ug/kg						
Vinyl chloride			U	ND	ug/kg						
Xylenes (total)			U	ND	ug/kg						
cis-1,2-Dichloroethylene			U	ND	ug/kg						
cis-1,3-Dichloropropylene			U	ND	ug/kg						

QC Summary

Workorder: 67601

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

Notes:
RER is calculated at the 95% confidence level (2-sigma).
The Qualifiers in this report are defined as follows:

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

QC Summary

Workorder: 67601

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

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

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

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

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

REVISED

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

Method/Analysis Information

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

Sample Analysis

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

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

Preparation/Analytical Method Verification

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

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

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Initial Calibration
All the initial calibration requirements were met.

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

Quality Control (QC) Information

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

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

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

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

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

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

Internal Standard (ISTD) Acceptance
The internal standard responses, in all samples and quality control samples, met the required acceptance criteria.

Technical Information

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

Sample Preservation and Integrity
All samples met the sample preservation and integrity requirements.

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

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

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

REVISED

Miscellaneous Information

Nonconformance (NCR) Documentation
A nonconformance report was not required for this sample delivery group/work order.

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

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

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

System Configuration

The laboratory utilizes the following GC/MS configurations:

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

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

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

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

REVISI

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

Certification Statement

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

Review Validation

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

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

Reviewer: _____ **Date:** 11-11-02

QC Summary

Report Date: October 18, 2002

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

Workorder: 67608

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

QC Summary

Workorder: 67608

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Volatile-GC/MS Federal											
Batch 204910											
Styrene			U	ND	ug/L						
Tetrachloroethylene			U	ND	ug/L						
Toluene			U	ND	ug/L						
Trichloroethylene			U	ND	ug/L						
Vinyl chloride			U	ND	ug/L						
Xylenes (total)			U	ND	ug/L						
cis-1,2-Dichloroethylene			U	ND	ug/L						
cis-1,3-Dichloropropylene			U	ND	ug/L						
trans-1,2-Dichloroethylene			U	ND	ug/L						
trans-1,3-Dichloropropylene			U	ND	ug/L						
**Bromofluorobenzene	50.0			66.5	ug/L		133	(67%-136%)			
**Dibromofluoromethane	50.0			48.2	ug/L		96	(62%-148%)			
**Toluene-d8	50.0			47.3	ug/L		95	(58%-139%)			

Notes:
RER is calculated at the 95% confidence level (2-sigma).
The Qualifiers in this report are defined as follows:

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

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

Semi-Volatile Case Narrative
Sandia National Labs (SNLS)
SDG 67601

Method/Analysis Information

Procedure:	**Semivolatile Analysis by Gas Chromatograph/Mass Spectrometer**
Analytical Method:	SW846 8270C
Prep Method:	SW846 3550B
Analytical Batch Number:	203764
Prep Batch Number:	203763

Sample Analysis

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

Sample ID	Client ID
67601013	059813-002
67601014	059814-002
67601015	059815-002
67601016	059816-002
67601017	059917-002
67601018	059918-002
67601019	059919-002
67601020	059920-002
67601021	059921-002
67601022	059922-002
67601023	059923-002
67601024	059924-002
1200305965	SBLK01 (Blank)

1200305966	SBLK01LCS (Laboratory Control Sample)
1200305967	059813-002MS (Matrix Spike)
1200305968	059813-002MSD (Matrix Spike Duplicate)

Preparation/Analytical Method Verification

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

Calibration Information

Due to the limited capacity of software we do not display all of the current initial calibration files here. If necessary, a calibration history will be inserted in the package prior to the appropriate Form 6.

Diphenylamine has now superseded N-Nitroso-diphenylamine as a CCC on Quantitation Reports, Initial Calibration Reports, Calibration Check Standard Reports, etc. Previous versions of EPA Method 8270 (prior to 8270C) listed N-Nitroso-diphenylamine as a CCC. However, as stated in EPA Method 8270C, Revision 3, December, 1996, Section 1.4.5, "N-Nitroso-diphenylamine decomposes in the gas chromatographic inlet and cannot be separated from Diphenylamine." Studies of these two compounds at GEL, both independent of each other and together, show that they not only coelute, but also have similar mass spectra. N-Nitroso-diphenylamine and Diphenylamine will be reported as Diphenylamine on all reports and forms.

When calibrations are performed for Appendix IX compounds some of the compounds may not be calibrated exactly according to the criteria in Method 8270C. If the %RSD is greater than 15% or the correlation coefficient is less that 0.99 then the analyte is quantitated using the response factor. If the analyte is detected then the sample is reanalyzed for that analyte on an instrument that is compliant with the criteria in the method.

Initial Calibration
All initial calibration requirements have been met for this SDG.

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

Quality Control (QC) Information

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

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

LCS Recovery Statement
The laboratory control sample (LCS) spike recoveries for this SDG were within the established acceptance limits.

QC Sample Designation
The following sample analyzed with this SDG was chosen for matrix spike analysis:
67601013 059813-002

MS Recovery Statement
The matrix spike recoveries for this SDG were within the established acceptance limits.

MSD Recovery Statement
The matrix spike duplicate (MSD) recoveries for this SDG were within the established acceptance limits.

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

Internal Standard (ISTD) Acceptance
The internal standard responses were within the required acceptance criteria for all samples and QC.

Technical Information:

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

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

Sample Dilutions
The following sample was diluted due to the thick nature of the sample in the syringe. It was very difficult to pull up into the syringe.
67601022 059922-002

Miscellaneous Information:

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

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

System Configuration

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

Chromatographic Columns

Chromatographic separation of semivolatile components is accomplished through analysis on one or more of the following columns (all with dimensions of 30 meters x 0.25 millimeters ID and 0.25 micron film except J&W DB-5MS2 which is 25 meters x 0.20 mm ID and 0.33 micron film):

Column ID	Column Description
J&W	DB-5.625(5% Phenyl)-methylpolysiloxane (identified by a DB-5.625 designation on quantitation reports and reconstructed ion chromatograms)
J&W DB-5MS	Similar to the J&W DB-5.625 with low bleed characteristics (identified by a DB-5MS designation)

Alltech	EC-5 (SE-54) 5% Phenyl, 95% Methylpolysiloxane (identified by a HP-5MS designation)
HP	HP-5MS 5% Phenylmethylsiloxane (identified by a HP-5MS designation)
Phenomenex	ZB-5 5% Phenyl Polysiloxane (identified by a ZB-5 designation)
J&W DB-5MS2	Similar to the J&W DB-5.625 with low bleed characteristics (identified by a DB-5MS2 designation)

Instrument Configuration

The samples reported in this SDG were analyzed on one or more of the following instrument systems. Instrument systems are referenced in the raw data and individual form headers by the Instrument ID designations listed below:

Instrument ID	System Configuration	Chromatographic Column
MSD2	HP6890/HP5973	DB-5MS2
MSD4	HP6890/HP5973	DB-5MS2
MSD5	HP6890/HP5973	DB-5MS2
MSD7	HP6890/HP5973	DB-5MS2
MSD8	HP6890/HP5973	DB-5MS2

Certification Statement

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

Review Validation:

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

Reviewer: Erin Hawkins **Date:** 12/21/02

QC Summary

Report Date: October 21, 2002

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

Workorder: 67601

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-GC/MS Federal										
Batch 203764										
QC1200305966 LCS										
1,2,4-Trichlorobenzene	1670			932	ug/kg		56	(27%-91%)	EH1	09/30/02 22:36
1,4-Dichlorobenzene	1670			849	ug/kg		51	(25%-85%)		
2,4,5-Trichlorophenol	3330			2270	ug/kg		68	(42%-96%)		
2,4,6-Trichlorophenol	3330			1940	ug/kg		58	(32%-91%)		
2,4-Dinitrotoluene	1670			1350	ug/kg		81	(50%-109%)		
2-Chlorophenol	3330			1770	ug/kg		53	(31%-85%)		
4-Chloro-3-methylphenol	3330			2400	ug/kg		72	(34%-97%)		
4-Nitrophenol	3330			2760	ug/kg		83	(22%-128%)		
Acenaphthene	1670			1110	ug/kg		66	(39%-98%)		
Hexachlorobenzene	1670			1160	ug/kg		70	(41%-105%)		
Hexachlorobutadiene	1670			903	ug/kg		54	(21%-94%)		
Hexachloroethane	1670			845	ug/kg		51	(25%-86%)		
N-Nitrosodipropylamine	1670			1010	ug/kg		61	(34%-90%)		
Nitrobenzene	1670			915	ug/kg		55	(30%-84%)		
Pentachlorophenol	3330			2320	ug/kg		70	(27%-109%)		
Phenol	3330			1790	ug/kg		54	(31%-83%)		
Pyrene	1670			1410	ug/kg		84	(37%-110%)		
m,p-Cresols	3330			2070	ug/kg		62	(40%-83%)		
o-Cresol	3330			1910	ug/kg		57	(34%-86%)		
*2,4,6-Tribromophenol	3330			2180	ug/kg		65	(23%-111%)		
*2-Fluorobiphenyl	1670			887	ug/kg		53	(21%-104%)		
*2-Fluorophenol	3330			1650	ug/kg		50	(22%-93%)		
*Nitrobenzene-d5	1670			900	ug/kg		54	(24%-97%)		
*Phenol-d5	3330			1810	ug/kg		54	(22%-99%)		
*p-Terphenyl-d14	1670			1200	ug/kg		72	(30%-133%)		
QC1200305965 MB										
1,2,4-Trichlorobenzene			U	ND	ug/kg					09/30/02 22:16
1,2-Dichlorobenzene			U	ND	ug/kg					
1,3-Dichlorobenzene			U	ND	ug/kg					
1,4-Dichlorobenzene			U	ND	ug/kg					
2,4,5-Trichlorophenol			U	ND	ug/kg					
2,4,6-Trichlorophenol			U	ND	ug/kg					
2,4-Dichlorophenol			U	ND	ug/kg					
2,4-Dimethylphenol			U	ND	ug/kg					
2,4-Dinitrophenol			U	ND	ug/kg					
2,4-Dinitrotoluene			U	ND	ug/kg					
2,6-Dinitrotoluene			U	ND	ug/kg					
2-Chloronaphthalene			U	ND	ug/kg					
2-Chlorophenol			U	ND	ug/kg					
2-Methyl-4,6-dinitrophenol			U	ND	ug/kg					
2-Methylnaphthalene			U	ND	ug/kg					
2-Nitrophenol			U	ND	ug/kg					

QC Summary

Workorder: 67601

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-GC/MS Federal											
Batch 203764											
3,3'-Dichlorobenzidine			U	ND	ug/kg						
4-Bromophenylphenylether			U	ND	ug/kg						
4-Chloro-3-methylphenol			U	ND	ug/kg						
4-Chloroaniline			U	ND	ug/kg						
4-Chlorophenylphenylether			U	ND	ug/kg						
4-Nitrophenol			U	ND	ug/kg						
Acenaphthene			U	ND	ug/kg						
Acenaphthylene			U	ND	ug/kg						
Anthracene			U	ND	ug/kg						
Benzo(a)anthracene			U	ND	ug/kg						
Benzo(a)pyrene			U	ND	ug/kg						
Benzo(b)fluoranthene			U	ND	ug/kg						
Benzo(ghi)perylene			U	ND	ug/kg						
Benzo(k)fluoranthene			U	ND	ug/kg						
Butylbenzylphthalate			U	ND	ug/kg						
Carbazole			U	ND	ug/kg						
Chrysene			U	ND	ug/kg						
Di-n-butylphthalate			U	ND	ug/kg						
Di-n-octylphthalate			U	ND	ug/kg						
Dibenzo(a,h)anthracene			U	ND	ug/kg						
Dibenzofuran			U	ND	ug/kg						
Diethylphthalate			U	ND	ug/kg						
Dimethylphthalate			U	ND	ug/kg						
Diphenylamine			U	ND	ug/kg						
Fluoranthene			U	ND	ug/kg						
Fluorene			U	ND	ug/kg						
Hexachlorobenzene			U	ND	ug/kg						
Hexachlorobutadiene			U	ND	ug/kg						
Hexachlorocyclopentadiene			U	ND	ug/kg						
Hexachloroethane			U	ND	ug/kg						
Indeno(1,2,3-cd)pyrene			U	ND	ug/kg						
Isophorone			U	ND	ug/kg						
N-Nitrosodipropylamine			U	ND	ug/kg						
Naphthalene			U	ND	ug/kg						
Nitrobenzene			U	ND	ug/kg						
Pentachlorophenol			U	ND	ug/kg						
Phenanthrene			U	ND	ug/kg						
Phenol			U	ND	ug/kg						
Pyrene			U	ND	ug/kg						
bis(2-Chloroethoxy)methane			U	ND	ug/kg						
bis(2-Chloroethyl) ether			U	ND	ug/kg						
bis(2-Chloroisopropyl)ether			U	ND	ug/kg						
bis(2-Ethylhexyl)phthalate			U	ND	ug/kg						
m,p-Cresols			U	ND	ug/kg						
m-Nitroaniline			U	ND	ug/kg						
o-Cresol			U	ND	ug/kg						
o-Nitroaniline			U	ND	ug/kg						
p-Nitroaniline			U	ND	ug/kg						

Workorder: 67601

QC Summary

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-GC/MS Federal										
Batch 203764										
*2,4,6-Tribromophenol	3330			1920	ug/kg		58	(23%-111%)		
*2-Fluorobiphenyl	1670			883	ug/kg		53	(21%-104%)		
*2-Fluorophenol	3330			1940	ug/kg		58	(22%-93%)		
*Nitrobenzene-d5	1670			963	ug/kg		58	(24%-97%)		
*Phenol-d5	3330			2040	ug/kg		61	(22%-99%)		
*p-Terphenyl-d14	1670			1320	ug/kg		79	(30%-133%)		
QC1200305967 67601013 MS										
1,2,4-Trichlorobenzene	1670 U	ND		1110	ug/kg		66	(15%-112%)		09/30/02 23:58
1,4-Dichlorobenzene	1670 U	ND		964	ug/kg		58	(19%-89%)		
2,4,5-Trichlorophenol	3330 U	ND		2510	ug/kg		75			
2,4,6-Trichlorophenol	3330 U	ND		2160	ug/kg		65			
2,4-Dinitrotoluene	1670 U	ND		1360	ug/kg		82	(32%-117%)		
2-Chlorophenol	3330 U	ND		2130	ug/kg		64	(13%-101%)		
4-Chloro-3-methylphenol	3330 U	ND		2660	ug/kg		80	(23%-114%)		
4-Nitrophenol	3330 U	ND		2730	ug/kg		82	(20%-126%)		
Acenaphthene	1670 U	ND		1120	ug/kg		67	(15%-114%)		
Hexachlorobenzene	1670 U	ND		1180	ug/kg		71			
Hexachlorobutadiene	1670 U	ND		1080	ug/kg		65			
Hexachloroethane	1670 U	ND		978	ug/kg		59			
N-Nitrosodipropylamine	1670 U	ND		1210	ug/kg		73	(18%-106%)		
Nitrobenzene	1670 U	ND		1120	ug/kg		67			
Pentachlorophenol	3330 U	ND		2320	ug/kg		70	(34%-110%)		
Phenol	3330 U	ND		2120	ug/kg		64	(17%-104%)		
Pyrene	1670 U	ND		1320	ug/kg		79	(26%-130%)		
m,p-Cresols	3330 U	ND		2380	ug/kg		71			
o-Cresol	3330 U	ND		2280	ug/kg		69			
*2,4,6-Tribromophenol	3330	1880		2260	ug/kg		68	(23%-111%)		
*2-Fluorobiphenyl	1670	770		1000	ug/kg		60	(21%-104%)		
*2-Fluorophenol	3330	1550		1970	ug/kg		59	(22%-93%)		
*Nitrobenzene-d5	1670	818		1060	ug/kg		64	(24%-97%)		
*Phenol-d5	3330	1650		2080	ug/kg		63	(22%-99%)		
*p-Terphenyl-d14	1670	1120		1130	ug/kg		68	(30%-133%)		
QC1200305968 67601013 MSD										
1,2,4-Trichlorobenzene	1670 U	ND		1110	ug/kg	0	66	(0%-31%)		10/01/02 00:18
1,4-Dichlorobenzene	1670 U	ND		1010	ug/kg	5	61	(0%-36%)		
2,4,5-Trichlorophenol	3330 U	ND		2410	ug/kg	4	72			
2,4,6-Trichlorophenol	3330 U	ND		2160	ug/kg	0	65			
2,4-Dinitrotoluene	1670 U	ND		1390	ug/kg	2	84	(0%-37%)		
2-Chlorophenol	3330 U	ND		2180	ug/kg	2	66	(0%-34%)		
4-Chloro-3-methylphenol	3330 U	ND		2650	ug/kg	0	80	(0%-34%)		
4-Nitrophenol	3330 U	ND		2630	ug/kg	4	79	(0%-35%)		
Acenaphthene	1670 U	ND		1060	ug/kg	5	64	(0%-33%)		
Hexachlorobenzene	1670 U	ND		1180	ug/kg	0	71			
Hexachlorobutadiene	1670 U	ND		1100	ug/kg	2	66			
Hexachloroethane	1670 U	ND		1010	ug/kg	3	61			
N-Nitrosodipropylamine	1670 U	ND		1230	ug/kg	1	74	(0%-29%)		
Nitrobenzene	1670 U	ND		1100	ug/kg	2	66			
Pentachlorophenol	3330 U	ND		2090	ug/kg	11	63	(0%-40%)		

QC Summary

Workorder: 67601

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-GC/MS Federal												
Batch 203764												
Phenol	3330	U	ND		2160	ug/kg	2	65	(0%-37%)			
Pyrene	1670	U	ND		1220	ug/kg	8	73	(0%-39%)			
m,p-Cresols	3330	U	ND		2390	ug/kg	1	72				
o-Cresol	3330	U	ND		2300	ug/kg	1	69				
*2,4,6-Tribromophenol	3330		1880		2380	ug/kg		72	(23%-111%)			
*2-Fluorobiphenyl	1670		770		988	ug/kg		59	(21%-104%)			
*2-Fluorophenol	3330		1550		2040	ug/kg		61	(22%-93%)			
*Nitrobenzene-d5	1670		818		1070	ug/kg		64	(24%-97%)			
*Phenol-d5	3330		1650		2130	ug/kg		64	(22%-99%)			
*p-Terphenyl-d14	1670		1120		1080	ug/kg		65	(30%-133%)			

Notes:
RER is calculated at the 95% confidence level (2-sigma).
The Qualifiers in this report are defined as follows:

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

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

Semi-Volatile Case Narrative
Sandia National Labs (SNLS)
SDG 67601-1

Method/Analysis Information

Procedure:	**Semivolatile Analysis by Gas Chromatograph/Mass Spectrometer**
Analytical Method:	SW846 8270C
Prep Method:	SW846 3510C
Analytical Batch Number:	204261
Prep Batch Number:	204260

Sample Analysis

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

Sample ID	Client ID
67608005	059856-002
1200307304	SBLK01 (Blank)
1200307305	SBLK01LCS (Laboratory Control Sample)
1200307306	059856-002MS (Matrix Spike)
1200307307	059856-002MSD (Matrix Spike Duplicate)

Preparation/Analytical Method Verification

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

Calibration Information

Due to the limited capacity of software we do not display all of the current initial calibration files here. If necessary, a calibration history will be inserted in the package prior to the appropriate Form 6.

Diphenylamine has now superseded N-Nitroso-diphenylamine as a CCC on Quantitation Reports, Initial Calibration Reports, Calibration Check Standard Reports, etc. Previous versions of EPA Method 8270 (prior to 8270C) listed N-Nitroso-diphenylamine as a CCC. However, as stated in EPA Method 8270C, Revision 3, December, 1996, Section 1.4.5, "N-Nitroso-diphenylamine decomposes in the gas chromatographic inlet and cannot be separated from

Diphenylamine." Studies of these two compounds at GEL, both independent of each other and together, show that they not only coelute, but also have similar mass spectra. N-Nitroso-diphenylamine and Diphenylamine will be reported as Diphenylamine on all reports and forms.

When calibrations are performed for Appendix IX compounds some of the compounds may not be calibrated exactly according to the criteria in Method 8270C. If the %RSD is greater than 15% or the correlation coefficient is less that 0.99 then the analyte is quantitated using the response factor. If the analyte is detected then the sample is reanalyzed for that analyte on an instrument that is compliant with the criteria in the method.

Initial Calibration
All initial calibration requirements have been met for this SDG.

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

Quality Control (QC) Information

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

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

LCS Recovery Statement
The laboratory control sample (LCS) spike recoveries for this SDG were within the established acceptance limits.

QC Sample Designation
The following sample analyzed with this SDG was chosen for matrix spike analysis:
67608005 059856-002

MS Recovery Statement
The matrix spike recoveries for this SDG were within the established acceptance limits.

MSD Recovery Statement
The matrix spike duplicate (MSD) recoveries for this SDG were within the established acceptance limits.

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

Internal Standard (ISTD) Acceptance
The internal standard responses were within the required acceptance criteria for all samples and QC.

Technical Information:

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

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

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

Miscellaneous Information:

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

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

System Configuration

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

Chromatographic Columns

Chromatographic separation of semivolatile components is accomplished through analysis on one or more of the following columns (all with dimensions of 30 meters x 0.25 millimeters ID and 0.25 micron film except J&W DB-5MS2 which is 25 meters x 0.20 mm ID and 0.33 micron film):

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

Instrument Configuration

The samples reported in this SDG were analyzed on one or more of the following instrument systems. Instrument systems are referenced in the raw data and individual form headers by the Instrument ID designations listed below:

Instrument ID	System Configuration	Chromatographic Column
MSD2	HP6890/HP5973	DB-5MS2

MSD4	HP6890/HP5973	DB-5MS2
MSD5	HP6890/HP5973	DB-5MS2
MSD7	HP6890/HP5973	DB-5MS2
MSD8	HP6890/HP5973	DB-5MS2

Certification Statement

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

Review Validation:

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

Reviewer: Erin Haubert **Date:** 10/21/02

QC Summary

Report Date: October 21, 2002

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

Workorder: 67608

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-GC/MS Federal										
Batch 204261										
QC1200307305 LCS										
1,2,4-Trichlorobenzene	50.0			41.1	ug/L		82	(53%-104%)	EHI	09/30/02 17:04
1,4-Dichlorobenzene	50.0			41.3	ug/L		83	(47%-102%)		
2,4,5-Trichlorophenol	100			84.6	ug/L		85	(67%-106%)		
2,4,6-Trichlorophenol	100			82.9	ug/L		83	(45%-111%)		
2,4-Dinitrotoluene	50.0			50.9	ug/L		102	(55%-121%)		
2-Chlorophenol	100			75.7	ug/L		76	(47%-87%)		
4-Chloro-3-methylphenol	100			91.2	ug/L		91	(51%-100%)		
4-Nitrophenol	100			38.2	ug/L		38	(10%-55%)		
Acenaphthene	50.0			45.9	ug/L		92	(53%-111%)		
Hexachlorobenzene	50.0			45.8	ug/L		92	(67%-114%)		
Hexachlorobutadiene	50.0			41.0	ug/L		82	(44%-106%)		
Hexachloroethane	50.0			41.4	ug/L		83	(47%-97%)		
N-Nitrosodipropylamine	50.0			48.0	ug/L		96	(52%-118%)		
Nitrobenzene	50.0			44.4	ug/L		89	(49%-110%)		
Pentachlorophenol	100			85.1	ug/L		85	(31%-110%)		
Phenol	100			33.1	ug/L		33	(16%-44%)		
Pyrene	50.0			50.2	ug/L		100	(68%-117%)		
m,p-Cresols	100			70.2	ug/L		70	(43%-100%)		
o-Cresol	100			72.8	ug/L		73	(47%-87%)		
**2,4,6-Tribromophenol	100			85.7	ug/L		86	(27%-126%)		
**2-Fluorobiphenyl	50.0			39.6	ug/L		79	(32%-109%)		
**2-Fluorophenol	100			47.2	ug/L		47	(13%-73%)		
**Nitrobenzene-d5	50.0			39.6	ug/L		79	(33%-107%)		
**Phenol-d5	100			31.6	ug/L		32	(14%-66%)		
**p-Terphenyl-d14	50.0			42.4	ug/L		85	(36%-130%)		
QC1200307304 MB										
1,2,4-Trichlorobenzene			U	ND	ug/L					09/30/02 16:43
1,2-Dichlorobenzene			U	ND	ug/L					
1,3-Dichlorobenzene			U	ND	ug/L					
1,4-Dichlorobenzene			U	ND	ug/L					
2,4,5-Trichlorophenol			U	ND	ug/L					
2,4,6-Trichlorophenol			U	ND	ug/L					
2,4-Dichlorophenol			U	ND	ug/L					
2,4-Dimethylphenol			U	ND	ug/L					
2,4-Dinitrophenol			U	ND	ug/L					
2,4-Dinitrotoluene			U	ND	ug/L					
2,6-Dinitrotoluene			U	ND	ug/L					
2-Chloronaphthalene			U	ND	ug/L					
2-Chlorophenol			U	ND	ug/L					
2-Methyl-4,6-dinitrophenol			U	ND	ug/L					
2-Methylnaphthalene			U	ND	ug/L					
2-Nitrophenol			U	ND	ug/L					

QC Summary

Workorder: 67608

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-GC/MS Federal										
Batch 204261										
3,3'-Dichlorobenzidine			U	ND	ug/L					
4-Bromophenylphenylether			U	ND	ug/L					
4-Chloro-3-methylphenol			U	ND	ug/L					
4-Chloroaniline			U	ND	ug/L					
4-Chlorophenylphenylether			U	ND	ug/L					
4-Nitrophenol			U	ND	ug/L					
Acenaphthene			U	ND	ug/L					
Acenaphthylene			U	ND	ug/L					
Anthracene			U	ND	ug/L					
Benzo(a)anthracene			U	ND	ug/L					
Benzo(a)pyrene			U	ND	ug/L					
Benzo(b)fluoranthene			U	ND	ug/L					
Benzo(ghi)perylene			U	ND	ug/L					
Benzo(k)fluoranthene			U	ND	ug/L					
Butylbenzylphthalate			U	ND	ug/L					
Carbazole			U	ND	ug/L					
Chrysene			U	ND	ug/L					
Di-n-butylphthalate			U	ND	ug/L					
Di-n-octylphthalate			U	ND	ug/L					
Dibenzo(a,h)anthracene			U	ND	ug/L					
Dibenzofuran			U	ND	ug/L					
Diethylphthalate			U	ND	ug/L					
Dimethylphthalate			U	ND	ug/L					
Diphenylamine			U	ND	ug/L					
Fluoranthene			U	ND	ug/L					
Fluorene			U	ND	ug/L					
Hexachlorobenzene			U	ND	ug/L					
Hexachlorobutadiene			U	ND	ug/L					
Hexachlorocyclopentadiene			U	ND	ug/L					
Hexachloroethane			U	ND	ug/L					
Indeno(1,2,3-cd)pyrene			U	ND	ug/L					
Isophorone			U	ND	ug/L					
N-Nitrosodipropylamine			U	ND	ug/L					
Naphthalene			U	ND	ug/L					
Nitrobenzene			U	ND	ug/L					
Pentachlorophenol			U	ND	ug/L					
Phenanthrene			U	ND	ug/L					
Phenol			U	ND	ug/L					
Pyrene			U	ND	ug/L					
bis(2-Chloroethoxy)methane			U	ND	ug/L					
bis(2-Chloroethyl) ether			U	ND	ug/L					
bis(2-Chloroisopropyl)ether			U	ND	ug/L					
bis(2-Ethylhexyl)phthalate			U	ND	ug/L					
m,p-Cresols			U	ND	ug/L					
m-Nitroaniline			U	ND	ug/L					
o-Cresol			U	ND	ug/L					
o-Nitroaniline			U	ND	ug/L					
p-Nitroaniline			U	ND	ug/L					

Workorder: 67608

QC Summary

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-GC/MS Federal										
Batch 204261										
**2,4,6-Tribromophenol	100			69.1	ug/L		69	(27%-126%)		
**2-Fluorobiphenyl	50.0			37.3	ug/L		75	(32%-109%)		
**2-Fluorophenol	100			47.6	ug/L		48	(13%-73%)		
**Nitrobenzene-d5	50.0			43.1	ug/L		86	(33%-107%)		
**Phenol-d5	100			32.5	ug/L		33	(14%-66%)		
**p-Terphenyl-d14	50.0			42.4	ug/L		85	(36%-130%)		
QC1200307306 67608005 MS										
1,2,4-Trichlorobenzene	100	U	ND	80.2	ug/L		80	(44%-102%)		09/30/02 17:45
1,4-Dichlorobenzene	100	U	ND	74.0	ug/L		74	(48%-95%)		
2,4,5-Trichlorophenol	200	U	ND	152	ug/L		76			
2,4,6-Trichlorophenol	200	U	ND	153	ug/L		77			
2,4-Dinitrotoluene	100	U	ND	88.5	ug/L		89	(48%-120%)		
2-Chlorophenol	200	U	ND	139	ug/L		70	(32%-98%)		
4-Chloro-3-methylphenol	200	U	ND	171	ug/L		85	(40%-107%)		
4-Nitrophenol	200	U	ND	101	ug/L		50	(16%-78%)		
Acenaphthene	100	U	ND	84.6	ug/L		85	(32%-127%)		
Hexachlorobenzene	100	U	ND	80.0	ug/L		80			
Hexachlorobutadiene	100	U	ND	79.1	ug/L		79			
Hexachloroethane	100	U	ND	77.0	ug/L		77			
N-Nitrosodipropylamine	100	U	ND	88.9	ug/L		89	(44%-119%)		
Nitrobenzene	100	U	ND	80.5	ug/L		81			
Pentachlorophenol	200	U	ND	150	ug/L		75	(44%-104%)		
Phenol	200	U	ND	85.8	ug/L		43	(15%-70%)		
Pyrene	100	U	ND	87.0	ug/L		87	(29%-142%)		
m,p-Cresols	200	U	ND	146	ug/L		73			
o-Cresol	200	U	ND	148	ug/L		74			
**2,4,6-Tribromophenol	200		62.5	156	ug/L		78	(27%-126%)		
**2-Fluorobiphenyl	100		32.4	72.3	ug/L		72	(32%-109%)		
**2-Fluorophenol	200		34.6	103	ug/L		52	(13%-73%)		
**Nitrobenzene-d5	100		34.5	72.6	ug/L		73	(53%-107%)		
**Phenol-d5	200		23.4	82.7	ug/L		41	(14%-66%)		
**p-Terphenyl-d14	100		33.4	71.7	ug/L		72	(36%-130%)		
QC1200307307 67608005 MSD										
1,2,4-Trichlorobenzene	100	U	ND	87.0	ug/L	8	87	(0%-20%)		09/30/02 18:06
1,4-Dichlorobenzene	100	U	ND	82.2	ug/L	11	82	(0%-20%)		
2,4,5-Trichlorophenol	200	U	ND	169	ug/L	10	84			
2,4,6-Trichlorophenol	200	U	ND	159	ug/L	4	79			
2,4-Dinitrotoluene	100	U	ND	95.3	ug/L	7	95	(0%-16%)		
2-Chlorophenol	200	U	ND	152	ug/L	8	76	(0%-25%)		
4-Chloro-3-methylphenol	200	U	ND	184	ug/L	8	92	(0%-25%)		
4-Nitrophenol	200	U	ND	116	ug/L	14	58	(0%-25%)		
Acenaphthene	100	U	ND	91.7	ug/L	8	92	(0%-24%)		
Hexachlorobenzene	100	U	ND	86.0	ug/L	7	86			
Hexachlorobutadiene	100	U	ND	85.8	ug/L	8	86			
Hexachloroethane	100	U	ND	83.8	ug/L	8	84			
N-Nitrosodipropylamine	100	U	ND	92.1	ug/L	4	92	(0%-20%)		
Nitrobenzene	100	U	ND	86.4	ug/L	7	86			
Pentachlorophenol	200	U	ND	156	ug/L	4	78	(0%-17%)		

QC Summary

Workorder: 67608

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-GC/MS Federal												
Batch 204261												
Phenol	200	U	ND		91.9	ug/L	7	46	(0%-29%)			
Pyrene	100	U	ND		90.1	ug/L	3	90	(0%-30%)			
m,p-Cresols	200	U	ND		156	ug/L	7	78				
o-Cresol	200	U	ND		159	ug/L	7	80				
**2,4,6-Tribromophenol	200		62.5		171	ug/L		86	(27%-126%)			
**2-Fluorobiphenyl	100		32.4		77.6	ug/L		78	(32%-109%)			
**2-Fluorophenol	200		34.6		110	ug/L		55	(13%-73%)			
**Nitrobenzene-d5	100		34.5		77.3	ug/L		77	(33%-107%)			
**Phenol-d5	200		23.4		88.9	ug/L		45	(14%-66%)			
**p-Terphenyl-d14	100		33.4		76.3	ug/L		76	(36%-130%)			

Notes:
RER is calculated at the 95% confidence level (2-sigma).
The Qualifiers in this report are defined as follows:

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

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

HPLC Narrative
Sandia National Labs (SNLS)
SDG 67601

Method/Analysis Information

Procedure:	**Nitroaromatics and Nitramines by High Performance Liquid Chromatography (HPLC)**
Analytical Method:	SW846 8330
Prep Method:	SW846 8330 PREP
Analytical Batch Number:	204142
Prep Batch Number:	204140

Sample Analysis

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

Sample ID	Client ID
67601013	059813-002
67601014	059814-002
67601015	059815-002
67601016	059816-002
67601017	059917-002
67601018	059918-002
67601019	059919-002
67601020	059920-002
67601021	059921-002
67601022	059922-002

67601023	059923-002
67601024	059924-002
1200306979	XBLK01 (Blank)
1200306980	XBLK01 LCS (Laboratory Control Sample)

System Configuration

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

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

Chromatographic Columns

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

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

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

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

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

Preparation/Analytical Method Verification

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

Calibration Information

Initial Calibration
All initial calibration requirements have been met for this SDG.

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

Quality Control (QC) Information

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

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

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

QC Sample Designation
A matrix spike was performed on a client sample in SDG 67473.

MS Recovery Statement
All the matrix spike recoveries were within the established acceptance limits.

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

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

Technical Information

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

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

Sample Dilutions
None of the samples in this SDG required dilutions.

Miscellaneous Information

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

Manual Integrations
Some initial calibration standards, continuing calibration standards, and/or samples required manual integrations due to software limitations..

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

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

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

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

Certification Statement

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

Review Validation:

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

Reviewer: Kristen M. Maier **Date:** 10/21/02

QC Summary

Report Date: October 21, 2002

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

Workorder: 67601

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
HPLC Explosives Federal											
Batch 204142											
QC1200306980 LCS											
1,3,5-Trinitrobenzene	800				832	ug/kg		104	(77%-124%)	JLW	10/03/02 12:40
2,4,6-Trinitrotoluene	800				828	ug/kg		104	(80%-120%)		
2,4-Dinitrotoluene	800				812	ug/kg		101	(77%-122%)		
2,6-Dinitrotoluene	800				899	ug/kg		112	(74%-121%)		
2-Amino-4,6-dinitrotoluene	800				862	ug/kg		108	(81%-125%)		
4-Amino-2,6-dinitrotoluene	800				869	ug/kg		109	(79%-123%)		
HMX	800				890	ug/kg		111	(84%-131%)		
Nitrobenzene	800				775	ug/kg		97	(75%-125%)		
RDX	800				863	ug/kg		108	(80%-123%)		
Tetryl	800				836	ug/kg		105	(65%-124%)		
m-Dinitrobenzene	800				812	ug/kg		102	(77%-124%)		
m-Nitrotoluene	800				771	ug/kg		96	(77%-117%)		
o-Nitrotoluene	800				771	ug/kg		96	(75%-119%)		
p-Nitrotoluene	800				786	ug/kg		98	(76%-121%)		
**1,2-dinitrobenzene	400				351	ug/kg		88	(71%-118%)		
QC1200306979 MB											
1,3,5-Trinitrobenzene				U	ND	ug/kg					10/03/02 03:27
2,4,6-Trinitrotoluene				U	ND	ug/kg					
2,4-Dinitrotoluene				U	ND	ug/kg					
2,6-Dinitrotoluene				U	ND	ug/kg					
2-Amino-4,6-dinitrotoluene				U	ND	ug/kg					
4-Amino-2,6-dinitrotoluene				U	ND	ug/kg					
HMX				U	ND	ug/kg					
Nitrobenzene				U	ND	ug/kg					
RDX				U	ND	ug/kg					
Tetryl				U	ND	ug/kg					
m-Dinitrobenzene				U	ND	ug/kg					
m-Nitrotoluene				U	ND	ug/kg					
o-Nitrotoluene				U	ND	ug/kg					
p-Nitrotoluene				U	ND	ug/kg					
**1,2-dinitrobenzene	400				383	ug/kg		96	(71%-118%)		
QC1200306981 67473007 MS											
1,3,5-Trinitrobenzene	800	U	ND		840	ug/kg		105	(66%-133%)		10/03/02 04:52
2,4,6-Trinitrotoluene	800	U	ND		858	ug/kg		107	(77%-132%)		
2,4-Dinitrotoluene	800	U	ND		812	ug/kg		101	(61%-134%)		
2,6-Dinitrotoluene	800	U	ND		862	ug/kg		108	(70%-121%)		
2-Amino-4,6-dinitrotoluene	800	U	ND		820	ug/kg		103	(79%-124%)		
4-Amino-2,6-dinitrotoluene	800	U	ND		672	ug/kg		84	(71%-120%)		
HMX	800	U	ND		870	ug/kg		109	(75%-138%)		
Nitrobenzene	800	U	ND		776	ug/kg		97	(72%-120%)		
RDX	800	U	ND		793	ug/kg		99	(61%-136%)		
Tetryl	800	U	ND		713	ug/kg		89	(65%-135%)		

QC Summary

Workorder: 67601

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
HPLC Explosives Federal											
Batch 204142											
m-Dinitrobenzene	800	U	ND		849	ug/kg		106	(75%-125%)		
m-Nitrotoluene	800	U	ND		801	ug/kg		100	(73%-116%)		
o-Nitrotoluene	800	U	ND		785	ug/kg		98	(68%-122%)		
p-Nitrotoluene	800	U	ND		807	ug/kg		101	(67%-125%)		
**1,2-dinitrobenzene	400		381		386	ug/kg		96	(71%-118%)		
QC1200306982 67473007 MSD											
1,3,5-Trinitrobenzene	800	U	ND		810	ug/kg	4	101	(0%-20%)		10/03/02 05:34
2,4,6-Trinitrotoluene	800	U	ND		828	ug/kg	3	104	(0%-20%)		
2,4-Dinitrotoluene	800	U	ND		777	ug/kg	4	97	(0%-24%)		
2,6-Dinitrotoluene	800	U	ND		808	ug/kg	7	101	(0%-21%)		
2-Amino-4,6-dinitrotoluene	800	U	ND		808	ug/kg	1	101	(0%-20%)		
4-Amino-2,6-dinitrotoluene	800	U	ND		803	ug/kg	18	100	(0%-20%)		
HMX	800	U	ND		839	ug/kg	4	105	(0%-38%)		
Nitrobenzene	800	U	ND		741	ug/kg	5	93	(0%-21%)		
RDX	800	U	ND		790	ug/kg	0	99	(0%-35%)		
Tetryl	800	U	ND		640	ug/kg	11	80	(0%-30%)		
m-Dinitrobenzene	800	U	ND		814	ug/kg	4	102	(0%-23%)		
m-Nitrotoluene	800	U	ND		751	ug/kg	6	94	(0%-20%)		
o-Nitrotoluene	800	U	ND		752	ug/kg	4	94	(0%-23%)		
p-Nitrotoluene	800	U	ND		762	ug/kg	6	95	(0%-22%)		
**1,2-dinitrobenzene	400		381		380	ug/kg		95	(71%-118%)		

Notes:
RER is calculated at the 95% confidence level (2-sigma).
The Qualifiers in this report are defined as follows:

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

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

HPLC Narrative
Sandia National Labs (SNLS)
SDG 67601-1

Method/Analysis Information

Procedure:	**Nitroaromatics and Nitramines by High Performance Liquid Chromatography (HPLC)**
Analytical Method:	SW846 8330
Prep Method:	SW846 8330 PREP
Analytical Batch Number:	204151
Prep Batch Number:	204149

Sample Analysis

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

Sample ID	Client ID
67608007	059856-004
1200307003	XBLK01 (Blank)
1200307004	XBLK01 LCS (Laboratory Control Sample)
1200307005	059856-004MS (Matrix Spike)

System Configuration

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

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

Chromatographic Columns

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

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

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

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

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

Preparation/Analytical Method Verification

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

Calibration Information

Initial Calibration
All initial calibration requirements have been met for this SDG.

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

Quality Control (QC) Information

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

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

LCS Recovery Statement
The LCS failed to meet acceptance criteria. There was not enough sample left to perform a reextraction. Please see nonconformance report 5220.

QC Sample Designation
The following sample analyzed with this SDG was chosen for matrix spike analysis: *67608007* (059856-004).

MS Recovery Statement
One or more of the required spiking analytes were not within the acceptance limits in the matrix spike (MS).

MSD Recovery Statement
There was only enough sample provided for one matrix spike.

Technical Information

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

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

Sample Dilutions
None of the samples in this SDG required dilutions.

Miscellaneous Information

Nonconformance (NCR) Documentation
Nonconformance report 5220 was generated for this SDG.

The LCS failed to meet acceptance criteria. There was not enough sample left to perform a reextraction. Please see nonconformance report 5220.

Manual Integration
Some initial calibration standards, continuing calibration standards, and/or samples required manual integrations due to software limitations.

Additional Comments

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

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

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

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

Certification Statement

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

Review Validation:

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

Reviewer: Herbert K. Mann **Date:** 10/07/02

QC Summary

Report Date: October 7, 2002

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

Workorder: 67608

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
HPLC Explosives Federal										
Batch 204151										
QC1200307004 LCS										
1,3,5-Trinitrobenzene	1.04			1.11	ug/L		107	(84%-110%)	JLW	09/30/02 15:11
2,4,6-Trinitrotoluene	1.04			1.10	ug/L		106	(85%-110%)		
2,4-Dinitrotoluene	1.04			0.866	ug/L		83	(78%-110%)		
2,6-Dinitrotoluene	1.04			0.767	ug/L		74*	(79%-110%)		
2-Amino-4,6-dinitrotoluene	1.04			1.16	ug/L		112*	(77%-110%)		
4-Amino-2,6-dinitrotoluene	1.04			1.04	ug/L		100	(59%-110%)		
HMX	1.04			1.08	ug/L		104	(86%-110%)		
Nitrobenzene	1.04			0.520	ug/L		50*	(68%-110%)		
RDX	1.04			1.14	ug/L		110	(76%-110%)		
Tetryl	1.04			1.02	ug/L		98	(73%-110%)		
m-Dinitrobenzene	1.04			0.760	ug/L		73*	(76%-110%)		
m-Nitrotoluene	1.04			0.536	ug/L		52*	(73%-110%)		
o-Nitrotoluene	1.04			0.537	ug/L		52*	(69%-110%)		
p-Nitrotoluene	1.04			0.539	ug/L		52*	(73%-110%)		
**1,2-dinitrobenzene	0.519			0.388	ug/L		75	(59%-118%)		
QC1200307003 MB										
1,3,5-Trinitrobenzene			U	ND	ug/L					09/30/02 14:29
2,4,6-Trinitrotoluene			U	ND	ug/L					
2,4-Dinitrotoluene			U	ND	ug/L					
2,6-Dinitrotoluene			U	ND	ug/L					
2-Amino-4,6-dinitrotoluene			U	ND	ug/L					
4-Amino-2,6-dinitrotoluene			U	ND	ug/L					
HMX			U	ND	ug/L					
Nitrobenzene			U	ND	ug/L					
RDX			U	ND	ug/L					
Tetryl			U	ND	ug/L					
m-Dinitrobenzene			U	ND	ug/L					
m-Nitrotoluene			U	ND	ug/L					
o-Nitrotoluene			U	ND	ug/L					
p-Nitrotoluene			U	ND	ug/L					
**1,2-dinitrobenzene	0.519			0.348	ug/L		67	(59%-118%)		
QC1200307005 67608007 MS										
1,3,5-Trinitrobenzene	1.04	U	ND	1.13	ug/L		108	(62%-121%)		09/30/02 15:53
2,4,6-Trinitrotoluene	1.04	U	ND	1.14	ug/L		110	(56%-137%)		
2,4-Dinitrotoluene	1.04	U	ND	1.10	ug/L		106	(69%-118%)		
2,6-Dinitrotoluene	1.04	U	ND	1.12	ug/L		108	(63%-123%)		
2-Amino-4,6-dinitrotoluene	1.04	U	ND	1.17	ug/L		113	(60%-133%)		
4-Amino-2,6-dinitrotoluene	1.04	U	ND	1.11	ug/L		107	(50%-121%)		
HMX	1.04	U	ND	1.13	ug/L		108	(66%-131%)		
Nitrobenzene	1.04	U	ND	1.01	ug/L		97	(61%-106%)		
RDX	1.04	U	ND	1.10	ug/L		106	(52%-135%)		
Tetryl	1.04	U	ND	1.32	ug/L		127*	(52%-124%)		

QC Summary

Workorder: 67608

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC Explosives Federal												
Batch 204151												
m-Dinitrobenzene	1.04	U	ND		1.10	ug/L		106	(64%-117%)			
m-Nitrotoluene	1.04	U	ND		1.05	ug/L		101	(56%-129%)			
o-Nitrotoluene	1.04	U	ND		1.07	ug/L		103	(58%-122%)			
p-Nitrotoluene	1.04	U	ND		1.07	ug/L		103	(65%-116%)			
**1,2-dinitrobenzene	0.519		0.488		0.525	ug/L		101	(59%-118%)			

Notes:
RER is calculated at the 95% confidence level (2-sigma).
The Qualifiers in this report are defined as follows:

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

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

PCB Case Narrative
Sandia National Labs (SNLS)
SDG 67601

Method/Analysis Information

Procedure:	**Polychlorinated Biphenyls by Method 8082**
Analytical Method:	SW846 8082
Prep Method:	SW846 3550B
Analytical Batch Number:	203728
Prep Batch Number:	203727

Sample Analysis

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

Sample ID	Client ID
67601013	059813-002
67601014	059814-002
67601015	059815-002
67601016	059816-002
67601017	059917-002
67601018	059918-002
67601019	059919-002
67601020	059920-002
67601021	059921-002
67601022	059922-002
67601023	059923-002
67601024	059924-002
1200305887	PBLK01(Method Blank)
1200305888	PBLK01LCS(Laboratory Control Sample)

1200305889	059813-002MS(Matrix Spike)
1200305890	059813-002MSD(Matrix Spike Duplicate)

System Configuration

Chromatographic Columns

Column ID	Column Description
J&W1	DB-5(5%-Phenyl)-methylsiloxane 30m x 0.53mm x 1.5um DB-608 Durabond stationary phase* 30m x 0.53mm x 0.5um
J&W2	DB-5(5%-Phenyl)-methylsiloxane 30m x 0.32mm x 1.0um DB-1701 Durabond stationary phase* 30m x 0.32mm x 0.5um
J&W3	DB-5(5%-Phenyl)-methylsiloxane 30m x 0.53mm x 1.5um DB-1701(14% Cyanopropylphenyl)-methylsiloxane 30m x 0.53mm x 0.5um
J&W4	DB-608 Durabond stationary phase* 30m x 0.53mm x .83um DB-XLB* 30m x 0.53mm x 1.5um
J&W5	DB-XLB* 30m x 0.25mm x 0.25um DB-17MS(50%-Phenyl)-methylsiloxane 30m x 0.25mm x 0.25um
J&W6	DB-5(5%-Phenyl)-methylsiloxane 30m x 0.25mm x 0.25um DB-17MS(50%-Phenyl)-methylsiloxane 30m x 0.25mm x 0.25um
RESTEK	Rtx-CLPesticides 30m x 0.25mm x 0.25um Rtx-CLPesticides II 30m x 0.25mm x 0.20um

* Durabond and DB-XLB are trademarks of J & W.

Instrument Configuration

The samples reported in this SDG were analyzed on one or more of the following instrument systems. Instrument systems are referenced in the raw data and individual form headers by the Instrument ID designations listed below.

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

Preparation/Analytical Method Verification

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

Calibration Information

Initial Calibration

All initial calibration requirements have been met for this SDG.

CCV Requirements

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

Quality Control (QC) Information

Surrogate Recoveries

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

Blank Acceptance

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

LCS Recovery Statement

The Laboratory Control Sample (LCS) spike recoveries for this SDG were within the established acceptance limits.

QC Sample Designation

The following sample was selected for the PCB method QC:

Client Sample ID#	Laboratory Sample ID#
059813-002	67601013

The method QC included a Matrix Spike (MS) and Matrix Spike Duplicate (MSD).

MS Recovery Statement

The matrix spike recoveries for this SDG were within the established acceptance limits.

MSD Recovery Statement

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

MS/MSD RPD Statement

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

limits.

Technical Information

Holding Time Specifications

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

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

None of the samples in this SDG were required dilution.

Sample Re-prep/Re-analysis

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

Miscellaneous Information

Nonconformance (NCR) Documentation

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

Manual Integrations

Certain standards and samples required manual integrations to correctly position the baseline as set in the calibration standard injections. If manual integrations are performed, copies of all manual integration peak profiles will be included in the raw data section of this package.

Additional Comments

The additional comments field is used to address special issues associated with each analysis, clarify method/contractual issues pertaining to the analysis and to list any report documents generated as a result of sample analysis or review. The following additional comments were required for this sample set:

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

Certification Statement

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

Review Validation:

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

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

Reviewer: Jimi Cao **Date:** 10/18/02

QC Summary

Report Date: October 18, 2002

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

Workorder: 67601

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-PCB Federal										
Batch 203728										
QC1200305888 LCS										
Aroclor-1260	33.3			30.0	ug/kg		90	(48%-116%)	GH1	09/30/02 09:56
**4cmx	6.67			5.08	ug/kg		76	(31%-120%)		
**Decachlorobiphenyl	6.67			5.68	ug/kg		85	(34%-115%)		
QC1200305887 MB										
Aroclor-1016			U	ND	ug/kg					09/30/02 09:44
Aroclor-1221			U	ND	ug/kg					
Aroclor-1232			U	ND	ug/kg					
Aroclor-1242			U	ND	ug/kg					
Aroclor-1248			U	ND	ug/kg					
Aroclor-1254			U	ND	ug/kg					
Aroclor-1260			U	ND	ug/kg					
**4cmx	6.67			4.96	ug/kg		74	(31%-120%)		
**Decachlorobiphenyl	6.67			5.56	ug/kg		83	(34%-115%)		
QC1200305889 67601013 MS										
Aroclor-1260	33.3	7.80		35.1	ug/kg		82	(36%-134%)		09/30/02 10:21
**4cmx	6.67			4.76	ug/kg		71	(31%-120%)		
**Decachlorobiphenyl	6.67			5.21	ug/kg		78	(34%-115%)		
QC1200305890 67601013 MSD										
Aroclor-1260	33.3	7.80		37.5	ug/kg	8	89	(0%-30%)		09/30/02 10:33
**4cmx	6.67			4.83	ug/kg		73	(31%-120%)		
**Decachlorobiphenyl	6.67			5.43	ug/kg		81	(34%-115%)		

Notes:
RER is calculated at the 95% confidence level (2-sigma).
The Qualifiers in this report are defined as follows:

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

QC Summary

Workorder: 67601

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

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

PCB Case Narrative
Sandia National Labs (SNLS)
SDG# 67601-1

Method/Analysis Information

Procedure:	**Polychlorinated Biphenyls by Method 8082**
Analytical Method:	SW846 8082
Prep Method:	SW846 3510C
Analytical Batch Number:	203726
Prep Batch Number:	203725

Sample Analysis

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

Sample ID	Client ID
67608006	059856-003
1200305883	PBLK01(Method Blank)
1200305884	PBLK01LCS(Laboratory Control Sample)

System Configuration

Chromatographic Columns

Column ID	Column Description
J&W1	DB-5(5%-Phenyl)-methylsiloxane 30m x 0.53mm x 1.5um DB-608 Durabond stationary phase* 30m x 0.53mm x 0.5um
J&W2	DB-5(5%-Phenyl)-methylsiloxane 30m x 0.32mm x 1.0um DB-1701 Durabond stationary phase* 30m x 0.32mm x 0.5um
J&W3	DB-5(5%-Phenyl)-methylsiloxane 30m x 0.53mm x 1.5um DB-1701(14% Cyanopropylphenyl)-methylsiloxane 30m x 0.53mm x 0.5um
J&W4	DB-608 Durabond stationary phase* 30m x 0.53mm x .83um DB-XLB* 30m x 0.53mm x 1.5um
J&W5	DB-XLB* 30m x 0.25mm x 0.25um DB-17MS(50%-Phenyl)-methylsiloxane 30m x 0.25mm x 0.25um

J&W6	DB-5(5%-Phenyl)-methylsiloxane 30m x 0.25mm x 0.25um DB-17MS(50%-Phenyl)-methylsiloxane 30m x 0.25mm x 0.25um	
RESTEK	Rtx-CLPesticides	30m x 0.25mm x 0.25um
	Rtx-CLPesticides II	30m x 0.25mm x 0.20um

* Durabond and DB-XLB are trademarks of J & W.

Instrument Configuration

The samples reported in this SDG were analyzed on one or more of the following instrument systems. Instrument systems are referenced in the raw data and individual form headers by the Instrument ID designations listed below.

Instrument ID	System Configuration	Chromatographic Column
ECD1	HP 6890 Series GC ECD/ECD	RESTEK
ECD2	HP 6890 Series GC ECD/ECD	RESTEK
ECD3	HP 6890 Series GC ECD/ECD	RESTEK
ECD4	HP 5890 Series II Plus GC ECD/ECD	J&W5
ECD5	HP 6890 Series GC ECD/ECD	J&W5
ECD7	HP 6890 Series GC ECD/ECD	J&W5
ECD8	HP 6890 Series GC ECD/ECD	RESTEK

Preparation/Analytical Method Verification

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

Calibration Information

Initial Calibration

All initial calibration requirements have been met for this SDG.

CVS Requirements

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

Quality Control (QC) Information

Surrogate Recoveries

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

Blank Acceptance

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

LCS Recovery Statement

The Laboratory Control Sample (LCS) spike recoveries for this SDG were within the established acceptance limits.

QC Sample Designation

The MS and MSD were analyzed on a sample contained in another SNLS SDG (67554).

MSD Recovery Statement

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

MS/MSD RPD Statement

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

Technical Information

Holding Time Specifications

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

Preparation/Analytical Method Verification

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

Sample Dilutions

None of the samples in this SDG was required dilution.

Sample Re-prep/Re-analysis

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

Miscellaneous Information

Nonconformance (NCR) Documentation

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

Manual Integrations

Certain standards and samples required manual integrations to correctly position the baseline as set in the calibration standard injections. If manual integrations are performed, copies of all manual integration peak profiles will be included in the raw data section of this package.

Additional Comments

The additional comments field is used to address special issues associated with each analysis, clarify

method/contractual issues pertaining to the analysis and to list any report documents generated as a result of sample analysis or review. The following additional comments were required for this sample set:

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

Certification Statement

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

Review Validation:

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

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

Reviewer: Jimi Cao **Date:** 10/18/06

QC Summary

Report Date: October 16, 2002

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

Workorder: 67608

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-PCB Federal											
Batch 203726											
QC1200305884 LCS											
Aroclor-1260	1.00				0.860	ug/L		86	(47%-131%)	GH1	09/25/02 15:40
**4cmx	0.200				0.150	ug/L		75	(34%-116%)		
**Decachlorobiphenyl	0.200				0.153	ug/L		76	(21%-122%)		
QC1200305883 MB											
Aroclor-1016				U	ND	ug/L					09/25/02 15:28
Aroclor-1221				U	ND	ug/L					
Aroclor-1232				U	ND	ug/L					
Aroclor-1242				U	ND	ug/L					
Aroclor-1248				U	ND	ug/L					
Aroclor-1254				U	ND	ug/L					
Aroclor-1260				U	ND	ug/L					
**4cmx	0.200				0.142	ug/L		71	(34%-116%)		
**Decachlorobiphenyl	0.200				0.158	ug/L		79	(21%-122%)		
QC1200305885 67554002 MS											
Aroclor-1260	1.00	U	ND		0.490	ug/L		49	(21%-113%)		09/25/02 16:04
*4cmx	0.200		0.121		0.111	ug/L		56	(34%-116%)		
**Decachlorobiphenyl	0.200		0.0572		0.064	ug/L		32	(21%-122%)		
QC1200305886 67554002 MSD											
Aroclor-1260	1.00	U	ND		0.520	ug/L	6	52	(0%-30%)		09/25/02 16:16
**4cmx	0.200		0.121		0.121	ug/L		61	(34%-116%)		
**Decachlorobiphenyl	0.200		0.0572		0.0664	ug/L		33	(21%-122%)		

Notes:
RER is calculated at the 95% confidence level (2-sigma).
The Qualifiers in this report are defined as follows:

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

QC Summary

Workorder: 67608

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

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

Inorganic Case Narrative for
Sandia National Laboratory
SDG# 67601

Sample Analysis:

The following samples were prepared and analyzed using the methods referenced in the "Method/Analysis Information" section of this narrative:

Sample ID	Client ID
67601013	059813-002
67601014	059814-002
67601015	059815-002
67601016	059816-002
67601017	059917-002
67601018	059918-002
67601019	059919-002
67601020	059920-002
67601021	059921-002
67601022	059922-002
67601023	059923-002
67601024	059924-002
1200306108	Method Blank (MB) ICP
1200306112	Laboratory Control Sample (LCS)
1200307690	Method Blank (MB) CVAA
1200307693	Laboratory Control Sample (LCS)
1200307691	059813-002D (67601013) Sample Duplicate (DUP)
1200307692	059813-002S (67601013) Matrix Spike (MS)

Method/Analysis Information:

Analytical Batch:	203818, 204433
Prep Batch :	203817, 204432
Standard Operating Procedures:	GL-MA-E-013 REV.6, GL-MA-E-010 REV.10
Analytical Method:	SW846 6010B, SW846 7471A
Prep Method :	SW846 3050B, SW846 7471A Prep

System Configuration

The ICP analysis was performed on a Thermo Jarrell Ash 61E Trace axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with a Meinhardt nebulizer, cyclonic spray chamber, and yttrium internal standard. Operating conditions for the Trace ICP are set at a power level of 950 watts. The instrument has a peristaltic pump flow rate of 140 RPM (2.0 mL/min sample uptake rate), argon gas flows of 15 L/min and 0.5 L/min for the torch and auxiliary gases, and a pressure setting of 26 PSI for the nebulizer.

Mercury analysis was performed on a Perkin-Elmer Flow Injection Mercury System (FIMS-400) automated mercury analyzer. The instrument consists of a cold vapor atomic absorption spectrometer set to detect mercury at a wavelength of 254 nm. Sample introduction through the flow injection system is performed via a peristaltic pump at 9 mL/min and nitrogen carrier gas rate of 5 L/min.

Sample Preparation

All samples were prepared in accordance with the referenced SW-846 procedures.

Calibration Information:

Initial Calibration
Instrument calibrations are conducted using method and instrument manufacturer's specifications. All initial calibration requirements have been met for this analysis.

CRDL Requirements
All CRDL standards met the referenced advisory control limits.

Continuing Calibration (CCV) Requirements
All CCV standards bracketing this SDG met the established recovery acceptance criteria.

Continuing Calibration Blanks (CCB) Requirements
All continuing calibration blanks (CCB) bracketing this SDG met the established acceptance criteria.

ICSA/ICSAB Requirements
All interference check standard (ICSA and ICSAB) elements associated with this SDG met the established acceptance criteria.

Quality Control (QC) Information:

Method Blank Acceptance
The preparation blanks analyzed with this SDG did not contain analytes of interest at concentrations greater than the required detection limits (RDL).

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

QC Sample Designation
Sample 67473007 from SNLS SDG 67473 was designated as the quality control sample for the ICP batch. Sample 059813-002 (67601013) was designated as the quality control sample for the CVAA batch. Each batch included a sample duplicate (DUP) and a matrix spike (MS). The ICP batch included a serial dilution (SD).

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

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

Serial Dilution % Difference Statement
The serial dilution is used to assess interference caused by matrix suppression or enhancement. Raw element concentrations that are at least 50X the instrument detection limit (IDL) for ICP analyses are applicable for serial dilution assessment. All applicable analytes met the acceptance criteria.

Technical Information:

Holding Time Specifications
All samples were analyzed within the specified holding times.

Sample Dilutions
Dilutions are performed to minimize matrix interference resulting from elevated mineral element concentrations and/or to bring over range target analyte concentrations into the linear calibration range of the instruments. The samples were diluted the standard 2x for soils on the ICP. No dilutions were required for the CVAA analysis.

Miscellaneous Information:

NCR Documentation
Nonconformance reports are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. No NCR's were issued for this SDG.

Additional Comments
The additional comments field is used to address special issues associated with each analysis, clarify method/contractual issues pertaining to the analysis and to list any report documents generated as a result of sample analysis or review. Additional comments were not required for this SDG.

Review/Validation:

GEL requires all analytical data to be verified by a qualified data validator.

The following data validator verified the data presented in this SDG:

Reviewer: _____

Date: 10/16/12

QC Summary

Report Date: October 16, 2002

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

Workorder: 67601

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP Federal											
Batch 203818											
QC1200306109 67473007 DUP											
Arsenic			3.06		2.99	mg/kg	2		(0%-20%)	HSC	10/09/02 20:41
Barium			83.2		65.8	mg/kg	23*		(0%-20%)		
Cadmium		J	0.200	J	0.159	mg/kg	N/A ^		(+/-0.495)		
Chromium			9.20		8.35	mg/kg	10		(0%-20%)		
Lead			4.89		5.11	mg/kg	4		(0%-20%)		
Selenium		J	0.244	J	0.233	mg/kg	N/A ^		(+/-0.495)		
Silver		U	ND	U	ND	mg/kg	N/A		(+/-0.495)		
QC1200306112 LCS											
Arsenic	192				187	mg/kg		98	(79%-121%)		10/09/02 20:23
Barium	417				416	mg/kg		100	(80%-120%)		
Cadmium	125				122	mg/kg		97	(81%-119%)		
Chromium	133				131	mg/kg		99	(77%-123%)		
Lead	160				157	mg/kg		98	(78%-123%)		
Selenium	97.0				92.4	mg/kg		95	(72%-128%)		
Silver	115				118	mg/kg		103	(55%-145%)		
QC1200306108 MB											
Arsenic				U	ND	mg/kg					10/09/02 20:17
Barium				U	ND	mg/kg					
Cadmium				U	ND	mg/kg					
Chromium				U	ND	mg/kg					
Lead				U	ND	mg/kg					
Selenium				U	ND	mg/kg					
Silver				U	ND	mg/kg					
QC1200306111 67473007 MS											
Arsenic	24.3		3.06		25.2	mg/kg		91	(75%-125%)		10/09/02 20:47
Barium	24.3		83.2		108	mg/kg		101	(75%-125%)		
Cadmium	24.3	J	0.200		21.9	mg/kg		90	(75%-125%)		
Chromium	24.3		9.20		32.6	mg/kg		97	(75%-125%)		
Lead	24.3		4.89		27.2	mg/kg		92	(75%-125%)		
Selenium	24.3	J	0.244		20.9	mg/kg		85	(75%-125%)		
Silver	24.3	U	ND		22.7	mg/kg		94	(75%-125%)		
QC1200306110 67473007 SDILT											
Arsenic			31.2	J	2.80	ug/L	55.2				10/09/02 20:35
Barium			849		163	ug/L	3.76				
Cadmium		J	2.04	U	ND	ug/L	N/A				
Chromium			93.8		18.0	ug/L	3.81				
Lead			49.9		10.7	ug/L	6.83				
Selenium		J	2.49	U	ND	ug/L	N/A				
Silver		U	ND	U	ND	ug/L	N/A				
Metals Analysis-Mercury Federal											
Batch 204433											
QC1200307691 67601013 DUP											

QC Summary

Workorder: 67601

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Metals Analysis-Mercury Federal											
Batch 204433											
Mercury		J 0.00621	J	0.00382	mg/kg	N/A		(+/-0.00929)	NOR1	10/14/02	12:07
QC1200307693 LCS											
Mercury	24.0			22.8	mg/kg		95	(66%-134%)		10/14/02	12:03
QC1200307690 MB											
Mercury			U	ND	mg/kg					10/14/02	12:01
QC1200307692 67601013 MS											
Mercury	0.0948	J 0.00621		0.100	mg/kg		99	(75%-125%)		10/14/02	12:10

Notes:
RER is calculated at the 95% confidence level (2-sigma).
The Qualifiers in this report are defined as follows:

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

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

Metals Case Narrative for
Sandia National Labs (SNLS)
SDG# 67601-1

Sample Analysis:
The following samples first extracted by SW 846 method 1311, then prepared and analyzed using the methods referenced in the "Method/Analysis Information" section of this narrative:

Sample ID	Client ID
67608010	059856-007
1200307728	Methods Blank (MB) **ICP**-204455/204453
1200307729	Laboratory Control Sample (LCS)
1200307666	Methods Blank (MB) **CVAA**-204420/204419
1200307669	Laboratory Control Sample (LCS)

Method/Analysis Information:

Analytical Batch #:	204455, 204420
Prep Batch #:	204453, 204419
Analytical Method:	SW846 6010B, SW846 7470A
Prep Method:	SW846 3010, SW846 7470A
Standard Operating Procedure:	GL-MA-E-013 REV.6, GL-MA-E-010 REV.10

System Configuration
The ICP analysis was performed on a Thermo Jarrell Ash 61E Trace axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with a Meinhardt nebulizer, cyclonic spray chamber, and yttrium internal standard. Operating conditions for the Trace ICP are set at a power level of 950 watts. The instrument has a peristaltic pump flow rate of 140 RPM (2.0 mL/min sample uptake rate), argon gas flows of 15 L/min and 0.5 L/min for the torch and auxiliary gases, and a pressure setting of 26 PSI for the nebulizer.

Mercury analysis was performed on a Perkin-Elmer Flow Injection Mercury System (FIMS-400) automated mercury analyzer. The instrument consists of a cold vapor atomic absorption spectrometer set to detect mercury at a wavelength of 254 nm. Sample introduction through the flow injection system is performed via a peristaltic pump at 9 mL/min and nitrogen carrier gas rate of 5 L/min.

Sample Preparation
All samples were prepared in accordance with the referenced SW-846 procedures.

Calibration Information:

Initial Calibration
Instrument calibrations are conducted using method and instrument manufacturer's specifications. All initial calibration requirements have been met for the analyses.

CRDL Requirements
All element recoveries in the CRDL standards met the advisory control limits (70% - 130).
ICSA/ICSAB Requirements
All interference check standard (ICSA and ICSAB) elements associated with this SDG met the established acceptance criteria.

Continuing Calibration (CCV) Requirements
All CCV standards bracketing samples from this SDG met the established recovery acceptance criteria.

Continuing Calibration Blanks (CCB) Requirements
All continuing calibration blanks (CCB) bracketing samples from this SDG met the established acceptance criteria.

Quality Control (QC) Information:

Method Blank Acceptance
The preparation blanks analyzed with this SDG did not contain analytes of interest at concentrations greater than the client required detection limits (CRDL).

LCS Recovery Statement
All LCS spike recoveries for this SDG were within the required acceptance limits.

QC Sample Statement
Sample 060043-003 (67821004) from SNLS SDG 67821 was designated as the quality control sample for the ICP batch. Sample 059582-007 (67354008) from SNLS SDG 67354 was designated as the quality control sample for the CVAA batch. A matrix spike (MS) and a sample duplicate (DUP) were analyzed in each batch. A serial dilution (SD) was analyzed in the ICP batch.

MS Recovery Statement
The percent recoveries (%R) obtained from the MS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The MS analyses met the recommended quality control acceptance criteria for percent recovery (75%-125%) for all applicable analytes.

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

Serial Dilution % Difference Statement
The serial dilution is used to assess interference caused by matrix suppression or enhancement. Raw element concentrations that are at least 50X the MDL for ICP analyses are applicable for serial dilution assessment. All applicable analytes met the acceptance criteria.

Technical Information:

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

Sample Dilutions
Dilutions are performed to minimize matrix interferences (e.g., those resulting from elevated mineral element concentrations) present in the sample and/or to bring over range target analyte concentrations into the linear calibration range of the instruments. No dilution was necessary.

Miscellaneous Information:

NCR Documentation
Nonconformance reports (NCR) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. No NCR was generated with this SDG.

Additional Comments
The additional comments field is used to address special issues associated with each analysis, clarify method/contractual issues pertaining to the analysis and to list any report documents generated as a result of sample analysis or review. Additional comments were not required for this SDG.

Review/Validation:

GEL requires all analytical data to be verified by a qualified data validator.

The following data validator verified the data presented in this SDG:

Reviewer: Allison L. S.

Date: 10/3/12

QC Summary

Report Date: October 3, 2002

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

Workorder: 67608

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Tim
Metals Analysis-ICP Federal										
Batch 204455										
QC1200307730 67821004 DUP										
Arsenic		U	ND	U	ND	mg/L	N/A	(+/-0.005)	HSC	10/01/02 23:3
Barium				J	0.00381	mg/L	N/A ^	(+/-0.005)		
Cadmium		J	0.00473	J	0.00469	mg/L	N/A ^	(+/-0.005)		
Chromium		BJ	0.00101	BJ	0.000999	mg/L	N/A ^	(+/-0.005)		
Lead		J	0.00387	J	0.00421	mg/L	N/A ^	(+/-0.005)		
Selenium		U	ND	U	ND	mg/L	N/A	(+/-0.005)		
Silver		U	ND	U	ND	mg/L	N/A	(+/-0.005)		
QC1200307729 LCS										
Arsenic	0.500				0.504	mg/L	101	(80%-120%)		10/01/02 22:5
Barium	0.500				0.516	mg/L	103	(80%-120%)		
Cadmium	0.500				0.510	mg/L	102	(80%-120%)		
Chromium	0.500			B	0.513	mg/L	103	(80%-120%)		
Lead	0.500				0.520	mg/L	104	(80%-120%)		
Selenium	0.500				0.495	mg/L	99	(80%-120%)		
Silver	0.500				0.491	mg/L	98	(80%-120%)		
QC1200307728 MB										
Arsenic				U	ND	mg/L				10/01/02 22:4
Barium				U	ND	mg/L				
Cadmium				U	ND	mg/L				
Chromium				J	0.000567	mg/L				
Lead				U	ND	mg/L				
Selenium				U	ND	mg/L				
Silver				U	ND	mg/L				
QC1200307731 67821004 MS										
Arsenic	0.500	U	ND		0.504	mg/L	101	(75%-125%)		10/01/02 23:3
Barium	0.500				0.523	mg/L	104	(75%-125%)		
Cadmium	0.500	J	0.00473		0.514	mg/L	102	(75%-125%)		
Chromium	0.500	BJ	0.00101	B	0.518	mg/L	103	(75%-125%)		
Lead	0.500	J	0.00387		0.525	mg/L	104	(75%-125%)		
Selenium	0.500	U	ND		0.503	mg/L	101	(75%-125%)		
Silver	0.500	U	ND		0.491	mg/L	98	(75%-125%)		
QC1200307732 67821004 SDILT										
Arsenic		U	ND	J	2.65	ug/L	N/A			10/01/02 23:2
Barium				J	0.888	ug/L	N/A			
Cadmium		J	4.73	J	0.787	ug/L	16.8			
Chromium		BJ	1.01	BJ	0.917	ug/L	352			
Lead		J	3.87	J	1.91	ug/L	146			
Selenium		U	ND	U	ND	ug/L	N/A			
Silver		U	ND	U	ND	ug/L	N/A			
Metals Analysis-Mercury Federal										
Batch 204420										
QC1200307667 67354008 DUP										

QC Summary

Workorder: 67608

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Tim
Metals Analysis-Mercury Federal												
Batch 204420												
Mercury		U	ND	U	ND	mg/L	N/A		(+/-0.0002)	NOR1	10/01/02	11:2
QC1200307669 LCS												
Mercury	0.002				0.00213	mg/L		106	(80%-120%)		10/01/02	11:1
QC1200307666 MB												
Mercury				U	ND	mg/L					10/01/02	11:1
QC1200307668 67354008 MS												
Mercury	0.002	U	ND		0.0021	mg/L		104	(75%-125%)		10/01/02	11:2

Notes:
RER is calculated at the 95% confidence level (2-sigma).
The Qualifiers in this report are defined as follows:

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

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

Method/Analysis Information

Procedure:	**Total Cyanide**
Analytical Method:	SW846 9012A
Prep Method:	SW846 9010B Prep
Analytical Batch Number:	205123
Prep Batch Number:	205122

Sample Analysis

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

Sample ID	Client ID
67601015	059815-002
67601016	059816-002
67601017	059917-002
67601018	059918-002
67601019	059919-002
67601020	059920-002
67601021	059921-002
67601022	059922-002
67601023	059923-002
67601024	059924-002
1200309255	MB
1200309256	DUP of 67601015
1200309257	DUP of 67601016
1200309258	MS of 67601015
1200309259	MS of 67601016
1200309261	LCS

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-095 Rev. 1.

Preparation/Analytical Method Verification

The SOP stated above has been prepared based on technical research and testing conducted by General Engineering Laboratories, Inc. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

Calibration Information:

The instrument used in this analysis was the following: Lachat QuickChem FIA+

Initial Calibration
The instrument was properly calibrated.

Calibration Verification Information
All calibration verification standards were within the required limits.

Quality Control (QC) Information:

Blank Acceptance
The method and calibration blanks associated with this data were within the required acceptance limits.

Laboratory Control Sample Recovery
The recovery for the laboratory control sample was within the required acceptance limits.

Quality Control
The following samples were designated for Quality Control: 67601015 and 67601016

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

Sample Duplicate Acceptance
The values for the samples and duplicates for this sample group are less than the Practical Quantitation Limit (PQL); therefore, the RPDs are not applicable.

Technical Information:

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

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

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

Sample Dilutions
The following QC sample in this sample group was diluted 1:50 due to high concentration for this analysis: 1200309261.

Sample Reanalysis
The method blank (1200309255) was reanalyzed because there was no sample in autosampler cup during the original run.

Miscellaneous Information:

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

Method/Analysis Information

Procedure:	**Hexavalent Chromium**
Analytical Method:	SW846 7196A
Prep Method:	SW846 3060A
Analytical Batch Number:	205618
Prep Batch Number:	205617

Sample Analysis

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

Sample ID	Client ID
67601013	059813-002
67601014	059814-002
67601015	059815-002
67601016	059816-002
67601017	059917-002
67601018	059918-002
67601019	059919-002
67601020	059920-002
67601021	059921-002
67601022	059922-002
67601023	059923-002
67601024	059924-002
1200310247	MB
1200310248	DUP of 67601013
1200310249	DUP of 67601023
1200310250	MS of 67601013

1200310251	MS of 67601023
1200310252	LCS

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-044 REV.4.

Preparation/Analytical Method Verification

The SOP stated above has been prepared based on technical research and testing conducted by General Engineering Laboratories, Inc. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

Calibration Information:

The instrument used in this analysis was the following: Milton Roy Spectrophotometer 200

Initial Calibration
The instrument was properly calibrated.

Calibration Verification Information
All calibration verification standards were within the required limits.

Quality Control (QC) Information:

Blank Acceptance
The method and calibration blanks associated with this data were within the required acceptance limits.

Laboratory Control Sample Recovery
The recovery for the laboratory control sample was within the required acceptance limits.

Quality Control
The following samples were designated for Quality Control: 67601013 and 67601023

Sample Spike Recovery
The spike recoveries for this sample set were within the GEL SPC limits, but were outside of the client's required acceptance limits of 75%-125%. See NCR# 6532.

Sample Duplicate Acceptance
The values for the samples and duplicates for this sample group are less than the Practical Quantitation Limit (PQL); therefore, the RPDs are not applicable.

Technical Information:

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

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

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

Sample Dilutions
No samples in this sample group required dilutions.

Miscellaneous Information:

Nonconformance Reports
NCR# 6532 was written for this sample batch due to matrix spike recoveries outside of the client required limits.

Certification Statement

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

Review Validation:

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

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

Reviewer: _____ Date: 10/18/02

QC Summary

Report Date: October 18, 2002

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

Workorder: 67601

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rapid Flow Analysis Federal										
Batch 204703										
QC1200308223 67473009 DUP										
Cyanide, Total		U	ND	U	ND	mg/kg	N/A		(+/-0.227)	ADF 10/01/02 10:1
QC1200308226 LCS										
Cyanide, Total	277				381	mg/kg		137	(62%-138%)	10/01/02 10:1
QC1200308222 MB										
Cyanide, Total				U	ND	mg/kg				10/01/02 10:0
QC1200308224 67473009 MS										
Cyanide, Total	5.00	U	ND		5.06	mg/kg		101	(55%-145%)	10/01/02 10:1
Batch 205123										
QC1200309256 67601015 DUP										
Cyanide, Total		U	ND	U	ND	mg/kg	N/A		(+/-0.250)	ADF 10/02/02 12:3
QC1200309257 67601016 DUP										
Cyanide, Total		U	ND	U	ND	mg/kg	N/A		(+/-0.250)	10/02/02 12:3
QC1200309261 LCS										
Cyanide, Total	277				252	mg/kg		91	(62%-138%)	10/02/02 12:3
QC1200309255 MB										
Cyanide, Total				U	ND	mg/kg				10/02/02 13:5
QC1200309258 67601015 MS										
Cyanide, Total	5.00	U	ND		5.26	mg/kg		105	(55%-145%)	10/02/02 12:3
QC1200309259 67601016 MS										
Cyanide, Total	4.55	U	ND		4.49	mg/kg		98	(55%-145%)	10/02/02 12:3
Spectrometric Analysis Federal										
Batch 205618										
QC1200310248 67601013 DUP										
Hexavalent Chromium		U	ND	U	ND	mg/kg	N/A		(+/-0.0995)	BEP2 10/11/02 09:0
QC1200310249 67601023 DUP										
Hexavalent Chromium		U	ND	U	ND	mg/kg	N/A		(+/-0.0985)	
QC1200310252 LCS										
Hexavalent Chromium	0.985				0.956	mg/kg		97	(72%-121%)	
QC1200310247 MB										
Hexavalent Chromium				U	ND	mg/kg				
QC1200310250 67601013 MS										
Hexavalent Chromium	0.993	U	ND		0.665	mg/kg		63	(49%-130%)	
QC1200310251 67601023 MS										
Hexavalent Chromium	0.993	U	ND		0.715	mg/kg		71	(49%-130%)	

Notes:
RER is calculated at the 95% confidence level (2-sigma).
The Qualifiers in this report are defined as follows:

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

QC Summary

Workorder: 67661

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

J	Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
P	The response between the confirmation column and the primary column is >40%D
U	The analyte was analyzed for but not detected below this concentration. For Organic and Inorganic analytes the result is less than the effective MDL. I
X	Presumptive evidence that the analyte is not present. Please see narrative for further information.
X	Presumptive evidence that the analyte is not present. Please see narrative for further infromation.
X	Uncertain identification for gamma spectroscopy.

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

REVISED

General Chemistry Narrative
Sandia National Labs (SNLS)
SDG 67601

Method/Analysis Information

Procedure:	**Total Cyanide**
Analytical Method:	SW846 9012A
Prep Method:	SW846 9010B Prep
Analytical Batch Number:	204703
Prep Batch Number:	204701

Sample Analysis

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

Sample ID	Client ID
67601013	059813-002
67601014	059814-002
1200308222	MB
1200308223	DUP of 67473009
1200308224	MS of 67473009
1200308226	LCS

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-095 Rev. 1.

Preparation/Analytical Method Verification

The SOP stated above has been prepared based on technical research and testing conducted by General Engineering Laboratories, Inc. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

Calibration Information:

The instrument used in this analysis was the following: Lachat QuickChem FIA+.

Initial Calibration
The instrument was properly calibrated.

Calibration Verification Information
All calibration verification standards were within the required limits.

Quality Control (QC) Information:

Blank Acceptance
The method and calibration blanks associated with this data were within the required acceptance limits.

Laboratory Control Sample Recovery
The recovery for the laboratory control sample was within the required acceptance limits.

Quality Control
The following SNLS sample was designated for Quality Control: 67473009

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

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

Technical Information:

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

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

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

Sample Dilutions
The following QC sample in this sample group was diluted 1:50 due to high concentration for this analysis: 1200308226.

Miscellaneous Information:

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

General Chemistry Narrative
Sandia National Labs (SNLS)
SDG 67601-1

Method/Analysis Information

Procedure:	**Hexavalent Chromium**
Analytical Method:	SW846 7196A
Analytical Batch Number:	204193

Sample Analysis

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

Sample ID	Client ID
67608009	059856-006
1200307123	MB for batch 204193
1200307124	DUP of 67608009
1200307125	PS of 67608009
1200307126	LCS for batch 204193

SOP Reference

Procedure(s) for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure(s) (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-044 REV.4.

Preparation/Analytical Method Verification

The SOP stated above has been prepared based on technical research and testing conducted by General Engineering Laboratories, Inc. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

Calibration Information:

The instrument used in this analysis was the following: Milton Roy Spectrophotometer 200

Initial Calibration
The instrument was properly calibrated.

Calibration Verification Information
All calibration verification standards were within the required limits.

Quality Control (QC) Information:

Blank Acceptance
The method and calibration blanks associated with this data were within the required acceptance limits.

Laboratory Control Sample Recovery
The recovery for the laboratory control sample was within the required acceptance limits.

Quality Control
The following sample was designated for Quality Control: *67608009.*

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

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

Technical Information:

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

Holding Times
Sample 67608009 was received by the lab outside of the method specified holding time.

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

Sample Dilutions
No samples in this sample group required dilutions.

Miscellaneous Information:

Nonconformance Reports
Nonconformance Report (NCR) 5076 was submitted by the project manager for sample 67608009 because the sample was received out of holding for hexavalent chromium analysis.

Additional Comments
Sample 67608009 was not logged in for hexavalent chromium analysis until 9/26/02.

Method/Analysis Information

Procedure:	**Total Cyanide**
Analytical Method:	SW846 9012A
Prep Method:	SW846 9010B Prep
Analytical Batch Number:	205981
Prep Batch Number:	205980

Sample Analysis

The following samples were analyzed using the analytical protocol as established in EPA 335.3:

Sample ID	Client ID
67608008	059856-005
1200311080	MB for batch 205981
1200311081	LCS for batch 205981
1200311082	DUP of 67798008
1200311083	MS of 67798008
1200311474	LCSD for batch 205981

SOP Reference

Procedure(s) for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure(s) (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-095 Rev. 1.

Preparation/Analytical Method Verification

The SOP stated above has been prepared based on technical research and testing conducted by General Engineering Laboratories, Inc. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

Calibration Information:

The instrument used in this analysis was the following: Lachat QuickChem FIA+

Initial Calibration
The instrument was properly calibrated.

Calibration Verification Information
All calibration verification standards were within the required limits.

Quality Control (QC) Information:

Blank Acceptance
The method and calibration blanks associated with this data were within the required acceptance limits.

Laboratory Control Sample Recovery
The recovery for the laboratory control sample was within the required acceptance limits.

LCS Duplicate Recovery
The LCS Duplicate recovery was within the required acceptance limits.

LCS Duplicate RPD
The Relative Percent Difference between the LCS and LCS Duplicate was within the required acceptance limits.

Quality Control
The following sample was designated for Quality Control: 67798008

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

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

Technical Information:

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

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

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

Sample Dilutions
No samples in this sample group required dilutions.

Miscellaneous Information:

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

Certification Statement

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

Review Validation:

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

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

Reviewer: _____ **Date:** 10/10/02

QC Summary

Report Date: October 9, 2002

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

Workorder: 67608

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rapid Flow Analysis Federal											
Batch 205981											
QC1200311082 67798008 DUP											
Cyanide, Total	U	ND	U	ND	mg/L	N/A		(+/-0.005)	ADF	10/04/02	10:52
QC1200311081 LCS											
Cyanide, Total	0.050			0.0483	mg/L		97			10/04/02	10:48
QC1200311474 LCSD											
Cyanide, Total	0.050			0.0506	mg/L	5	101			10/04/02	10:49
QC1200311080 MB											
Cyanide, Total			U	ND	mg/L					10/04/02	10:47
QC1200311083 67798008 MS											
Cyanide, Total	0.100 U	ND		0.100	mg/L		100			10/04/02	10:56
Spectrometric Analysis Federal											
Batch 204193											
QC1200307124 67608009 DUP											
Hexavalent Chromium	HU	ND	HU	ND	mg/L	N/A		(+/-0.010)	VH1	09/26/02	14:20
QC1200307126 LCS											
Hexavalent Chromium	0.100			0.099	mg/L		99				
QC1200307123 MB											
Hexavalent Chromium			U	ND	mg/L						
QC1200307125 67608009 PS											
Hexavalent Chromium	0.100 HU	ND	H	0.093	mg/L		93				

Notes:
RER is calculated at the 95% confidence level (2-sigma).
The Qualifiers in this report are defined as follows:

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

QC Summary

Workorder: 67608

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

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

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

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

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

Radiochemistry Case Narrative
Sandia National Labs (SNLS)
Workorder 67601

Method/Analysis Information

Batch Number: 205009
Procedure: Determination of Gross Alpha And Gross Non-Volatile Beta in Water
Analytical Method: EPA 900.0

Sample ID	Client ID
67601013	059813-002
67601014	059814-002
67601015	059815-002
67601016	059816-002
67601017	059917-002
67601018	059918-002
67601019	059919-002
67601020	059920-002
67601021	059921-002
67601022	059922-002
67601023	059923-002
67601024	059924-002
1200308982	MB for batch 205009
1200308983	059924-002(67601024DUP)
1200308984	059924-002(67601024MS)
1200308985	059924-002(67601024MSD)
1200308986	LCS for batch 205009

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-001 REV.6.

Calibration Information:

Calibration Information
All initial and continuing calibration requirements have been met. The initial calibration was performed on June 13, 2002.

Standards Information
Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

Sample Geometry
All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information
The blank volume is representative of the sample volume(s) in this batch.

Designated QC
The following sample was used for QC: *67601024.*

QC Information
All of the QC samples met the required acceptance limits.

Technical Information:

Holding Time
All sample procedures for this sample set were performed within the required holding time.

Preparation Information
All preparation criteria have been met for these analyses.

Sample Re-prep/Re-analysis
Samples *1200308983* and *67601024* were recounted due to high alpha relative error ratio.

Gross Alpha/Beta Preparation Information
High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating, especially to a dull red heat. For this sample set, the prepared planchet was counted for beta activity before being flamed. After flaming, the planchet was counted for alpha activity. This sequence causes the alpha count run data to record over the beta count run data in AlphaLims, therefore only the alpha count data will appear on the instrument runlog.

Miscellaneous Information:

NCR Documentation
No NCR were generated for the preparation or analysis of this sample set.

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

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

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

Reviewer: _____ **Date:** 16 Oct 2002

GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

QC Summary

Report Date: October 16, 2002

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

Workorder: 67601

Parameter	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date Time
Gravimetric Solids										
Batch 203825										
QC1200306608 67601013 DUP										
Moisture		3.87		4.76	percent	21		(0%-24%)	TCD	09/25/02 14:48
Rad Gas Flow										
Batch 205009										
QC1200308983 67601024 DUP										
Alpha		13.6		13.0	pCi/g	0.0578		(0%-20%)	JS1	10/15/02 08:57
	Uncert:	+/-4.97		+/-5.36						
	TPU:	5.12		5.41						
Beta		24.2		21.9	pCi/g	0.433		(0%-20%)		
	Uncert:	+/-2.03		+/-1.97						
	TPU:	2.15		3.12						
QC1200308986 LCS										
Alpha	9.89			9.43	pCi/g		95	(75%-125%)		
	Uncert:			+/-1.06						
	TPU:			1.16						
Beta	39.7			42.3	pCi/g		107	(75%-125%)		
	Uncert:			+/-2.51						
	TPU:			5.28						
QC1200308982 MB										
Alpha			U	0.0533	pCi/g					10/14/02 14:39
	Uncert:			+/-0.0842						
	TPU:			0.0843						
Beta			U	0.115	pCi/g					
	Uncert:			+/-0.127						
	TPU:			0.128						
QC1200308984 67601024 MS										
Alpha	95.1	13.6		103	pCi/g		95	(75%-125%)		10/11/02 16:23
	Uncert:	+/-4.97		+/-18.8						
	TPU:	5.12		20.7						
Beta	382	24.2		368	pCi/g		90	(75%-125%)		
	Uncert:	+/-2.03		+/-23.2						
	TPU:	2.15		25.6						
QC1200308985 67601024 MSD										
Alpha	96.0	13.6		102	pCi/g		92			
	Uncert:	+/-4.97		+/-18.7						
	TPU:	5.12		20.6						
Beta	385	24.2		414	pCi/g		101			
	Uncert:	+/-2.03		+/-24.3						
	TPU:	2.15		63.8						

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GENERAL ENGINEERING LABORATORIES
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QC Summary

Workorder: 67601

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

Notes:
The Qualifiers in this report are defined as follows:

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

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

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Radiochemistry Case Narrative
Sandia National Labs (SNLS)
SDG 67601-1

Method/Analysis Information

Batch Number: 204950
Procedure: Determination of Gross Alpha And Gross Non-Volatile Beta in Water
Analytical Method: EPA 900.0

Sample ID	Client ID
67608011	059856-008
1200308804	MB for batch 204950
1200308805	059826-008(67169011DUP)
1200308806	059826-008(67169011MS)
1200308807	059826-008(67169011MSD)
1200308808	LCS for batch 204950

SOP Reference
Procedure(s) for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure(s) (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-001 REV.6.

Calibration Information:

Calibration Information
All initial and continuing calibration requirements have been met. The initial calibration was performed on June 12, 2002.

Standards Information
Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

Sample Geometry
All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information
The blank volume is representative of the sample volume(s) in this batch.

Designated QC
The following sample was used for QC: *67169011*. The QC sample is from SNLS work order 67169.

QC Information
All of the QC samples met the required acceptance limits.

Technical Information:

Holding Time
All sample procedures for this sample set were performed within the required holding time.

Preparation Information
All preparation criteria have been met for these analyses.

Sample Re-prep/Re-analysis
None of the samples in this sample set required reprep or reanalysis.

Gross Alpha/Beta Preparation Information
High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating, especially to a dull red heat. For this sample set, the prepared planchet was counted for beta activity before being flamed. After flaming, the planchet was counted for alpha activity. This sequence causes the alpha count run data to record over the beta count run data in AlphaLims, therefore only the alpha count data will appear on the instrument runlog.

Miscellaneous Information:

NCR Documentation
No NCR's were generated for the preparation or analysis of this sample set.

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

Review Validation:
GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.
The following data validator verified the information presented in this case narrative:

Reviewer: M. Morris **Date:** 12 Oct 2002

GENERAL ENGINEERING LABORATORIES
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QC Summary

Report Date: October 12, 2002

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

Workorder: 67608

Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date Time
Rad Gas Flow										
Batch 204950										
QC1200308805 67169011 DUP										
Alpha	U	-0.293	U	-0.582	pCi/L	0.389	^	(+/-1.00)	HOB1	10/08/02 05:44
	Uncert:	+/-0.333		+/-0.403						
	TPU:	0.334		0.408						
Beta	U	-0.0536	U	0.077	pCi/L	0.188	^	(+/-1.00)		
	Uncert:	+/-0.341		+/-0.354						
	TPU:	0.341		0.354						
QC1200308808 LCS										
Alpha	9.89			10.9	pCi/L		110	(75%-125%)		10/07/02 21:03
	Uncert:			+/-1.84						
	TPU:			2.18						
Beta	39.7			44.1	pCi/L		111	(75%-125%)		
	Uncert:			+/-2.45						
	TPU:			2.52						
QC1200308804 MB										
Alpha			U	0.0431	pCi/L					10/08/02 05:44
	Uncert:			+/-0.0745						
	TPU:			0.0746						
Beta			U	0.126	pCi/L					
	Uncert:			+/-0.162						
	TPU:			0.162						
QC1200308806 67169011 MS										
Alpha	49.4 U	-0.293		56.9	pCi/L		116	(75%-125%)		10/07/02 21:03
	Uncert:	+/-0.333		+/-9.21						
	TPU:	0.334		12.7						
Beta	199 U	-0.0536		227	pCi/L		114	(75%-125%)		
	Uncert:	+/-0.341		+/-12.3						
	TPU:	0.341		12.4						
QC1200308807 67169011 MSD										
Alpha	49.4 U	-0.293		55.3	pCi/L		113	(75%-125%)		
	Uncert:	+/-0.333		+/-9.67						
	TPU:	0.334		11.9						
Beta	199 U	-0.0536		214	pCi/L		108	(75%-125%)		
	Uncert:	+/-0.341		+/-12.3						
	TPU:	0.341		12.9						

Notes:
The Qualifiers in this report are defined as follows:

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

QC Summary

Workorder: 67608

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

H	Holding time was exceeded
J	Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
P	The response between the confirmation column and the primary column is >40%D
U	The analyte was analyzed for but not detected below this concentration. For Organic and Inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the Decision Level
X	Presumptive evidence that the analyte is not present. Please see narrative for further information.
X	Presumptive evidence that the analyte is not present. Please see narrative for further information.
X	Uncertain identification for gamma spectroscopy.

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

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Sandia National Laboratories

Drain and Septic Systems Project Quality Control (QC) Report

April 2005

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

Environmental
Restoration
Project

United States Department of Energy
Sandia Site Office

[redacted] COC# 605731 [redacted]

RPSD QC CROSS REFERENCE

COC 605731
BATCH NO. 201342

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

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program *
* 9/26/02 9:57:52 AM *
****

* Analyzed by: 9/26/02 Reviewed by: 9/30/02 *

Customer : SANDERS M (6135)
Customer Sample ID : 059903-003
Lab Sample ID : 20134201

Sample Description : 6710/1034-SP1-BH1-14-S
Sample Quantity : 884.000 gram
Sample Date/Time : 9/19/02 11:25:00 AM
Acquire Start Date/Time : 9/26/02 8:17:38 AM
Detector Name : LAB01
Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	4.26E-001
RA-226	1.17E+000	4.46E-001	6.32E-001
PB-214	5.20E-001	8.08E-002	4.61E-002
[illegible]214	4.78E-001	8.29E-002	4.95E-002
[illegible]210	Not Detected	---	7.12E+000
TH-232	3.22E-001	1.85E-001	1.82E-001
RA-228	3.44E-001	1.36E-001	1.82E-001
AC-228	4.99E-001	1.16E-001	1.05E-001
TH-228	5.89E-001	1.91E-001	3.60E-001
RA-224	5.17E-001	1.38E-001	6.63E-002
PB-212	4.98E-001	7.60E-002	3.33E-002
BI-212	1.87E-001	2.17E-001	3.48E-001
TL-208	4.36E-001	8.56E-002	7.12E-002
U-235	Not Detected	---	1.74E-001
TH-231	Not Detected	---	5.72E+000
PA-231	Not Detected	---	1.22E+000
TH-227	Not Detected	---	2.67E-001
RA-223	Not Detected	---	1.42E-001
RN-219	Not Detected	---	3.20E-001
PB-211	Not Detected	---	7.30E-001
TL-207	Not Detected	---	1.32E+001
AM-241	Not Detected	---	1.47E-001
PU-239	Not Detected	---	3.00E+002
NP-237	Not Detected	---	1.63E+000
[illegible]233	Not Detected	---	4.79E-002
[illegible]229	Not Detected	---	1.70E-001

[Summary Report] - Sample ID: : 20134201

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.67E-002
AG-110m	Not Detected	---------	2.91E-002
BA-133	Not Detected	---------	3.64E-002
BE-7	Not Detected	---------	2.33E-001
CD-115	Not Detected	---------	4.73E-001
CE-139	Not Detected	---------	2.19E-002
CE-141	Not Detected	---------	4.41E-002
CE-144	Not Detected	---------	1.67E-001
CM-243	Not Detected	---------	1.49E-001
CO-56	Not Detected	---------	3.08E-002
CO-57	Not Detected	---------	2.12E-002
CO-58	Not Detected	---------	3.21E-002
CO-60	Not Detected	---------	3.86E-002
CR-51	Not Detected	---------	2.38E-001
CS-134	Not Detected	---------	3.84E-002
CS-137	1.16E-002	1.16E-002	1.83E-002
EU-152	Not Detected	---------	6.28E-002
EU-154	Not Detected	---------	1.70E-001
EU-155	Not Detected	---------	9.47E-002
FE-59	Not Detected	---------	7.98E-002
GD-153	Not Detected	---------	5.63E-002
HG-203	Not Detected	---------	2.99E-002
I-131	Not Detected	---------	4.39E-002
IR-192	Not Detected	---------	2.44E-002
K-40	1.83E+001	2.49E+000	2.82E-001
MN-52	Not Detected	---------	7.84E-002
MN-54	Not Detected	---------	3.29E-002
MO-99	Not Detected	---------	1.27E+000
NA-22	Not Detected	---------	4.58E-002
NA-24	Not Detected	---------	6.53E+001
ND-147	Not Detected	---------	2.97E-001
NI-57	Not Detected	---------	1.24E+000
RU-103	Not Detected	---------	2.66E-002
RU-106	Not Detected	---------	2.51E-001
SB-122	Not Detected	---------	1.98E-001
SB-124	Not Detected	---------	2.66E-002
SB-125	Not Detected	---------	7.32E-002
SN-113	Not Detected	---------	3.37E-002
SR-85	Not Detected	---------	3.34E-002
TA-182	Not Detected	---------	1.52E-001
TA-183	Not Detected	---------	3.21E-001
TL-201	Not Detected	---------	3.28E-001
Y-88	Not Detected	---------	2.45E-002
ZN-65	Not Detected	---------	1.03E-001
ZR-95	Not Detected	---------	5.72E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/26/02 1:19:59 PM

* Analyzed by: 9/26/02 Reviewed by: 9/30/02

Customer : SANDERS M (6135)
Customer Sample ID : 059904-003
Lab Sample ID : 20134202

Sample Description : 6710/1034-SP1-BH1-19-S
Sample Quantity : 871.000 gram
Sample Date/Time : 9/19/02 12:00:00 PM
Acquire Start Date/Time : 9/26/02 9:59:58 AM
Detector Name : LAB01
Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	4.28E-001
RA-226	1.24E+000	4.20E-001	5.72E-001
PB-214	6.17E-001	9.42E-002	5.35E-002
BI-214	5.60E-001	9.33E-002	4.77E-002
PB-210	Not Detected	---	7.57E+000
TH-232	4.43E-001	2.33E-001	1.93E-001
RA-228	5.17E-001	1.21E-001	1.44E-001
AC-228	Not Detected	---	1.77E-001
TH-228	3.90E-001	1.71E-001	3.87E-001
RA-224	7.30E-001	1.81E-001	8.77E-002
PB-212	5.24E-001	7.95E-002	3.43E-002
BI-212	6.08E-001	2.44E-001	3.21E-001
TL-208	4.48E-001	9.21E-002	8.53E-002
U-235	Not Detected	---	1.74E-001
TH-231	Not Detected	---	5.84E+000
PA-231	Not Detected	---	1.24E+000
TH-227	Not Detected	---	2.70E-001
RA-223	Not Detected	---	1.48E-001
RN-219	Not Detected	---	3.11E-001
PB-211	Not Detected	---	7.08E-001
TL-207	Not Detected	---	1.35E+001
AM-241	Not Detected	---	1.49E-001
PU-239	Not Detected	---	3.12E+002
NP-237	Not Detected	---	1.64E+000
PA-233	Not Detected	---	5.17E-002
TH-229	Not Detected	---	1.69E-001

[Summary Report] - Sample ID: : 20134202

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---	3.62E-002
AG-110m	Not Detected	---	2.63E-002
BA-133	Not Detected	---	3.72E-002
BE-7	Not Detected	---	2.48E-001
CD-115	Not Detected	---	4.86E-001
CE-139	Not Detected	---	2.28E-002
CE-141	Not Detected	---	4.36E-002
CE-144	Not Detected	---	1.73E-001
CM-243	Not Detected	---	1.48E-001
CO-56	Not Detected	---	3.26E-002
CO-57	Not Detected	---	2.20E-002
CO-58	Not Detected	---	3.13E-002
CO-60	Not Detected	---	3.80E-002
CR-51	Not Detected	---	2.38E-001
CS-134	Not Detected	---	3.96E-002
CS-137	Not Detected	---	2.85E-002
EU-152	Not Detected	---	6.52E-002
EU-154	Not Detected	---	1.69E-001
EU-155	Not Detected	---	9.76E-002
FE-59	Not Detected	---	8.06E-002
GD-153	Not Detected	---	5.76E-002
HG-203	Not Detected	---	2.93E-002
I-131	Not Detected	---	4.41E-002
IR-192	Not Detected	---	2.53E-002
K-40	1.46E+001	2.01E+000	2.85E-001
MN-52	Not Detected	---	6.89E-002
MN-54	Not Detected	---	3.21E-002
MO-99	Not Detected	---	1.28E+000
NA-22	Not Detected	---	4.46E-002
NA-24	Not Detected	---	7.20E+001
ND-147	Not Detected	---	2.87E-001
NI-57	Not Detected	---	1.33E+000
RU-103	Not Detected	---	2.77E-002
RU-106	Not Detected	---	2.52E-001
SB-122	Not Detected	---	2.17E-001
SB-124	Not Detected	---	2.71E-002
SB-125	Not Detected	---	7.52E-002
SN-113	Not Detected	---	3.45E-002
SR-85	Not Detected	---	3.23E-002
TA-182	Not Detected	---	1.59E-001
TA-183	Not Detected	---	3.24E-001
TL-201	Not Detected	---	3.40E-001
Y-88	Not Detected	---	2.70E-002
ZN-65	Not Detected	---	1.04E-001
ZR-95	Not Detected	---	5.58E-002

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* Sandia National Laboratories *

* Radiation Protection Sample Diagnostics Program *

* 9/26/02 1:22:31 PM *

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* Analyzed by: Beverly Key 9/27/02 Reviewed by: 9/30/02 *

****

Customer : SANDERS M (6135)
Customer Sample ID : 059905-003
Lab Sample ID : 20134203

Sample Description : 803/1052-SP1-BH1-22-S
Sample Quantity : 932.000 gram
Sample Date/Time : 9/19/02 3:05:00 PM
Acquire Start Date/Time : 9/26/02 11:42:16 AM
Detector Name : LAB01
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

****

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	4.60E-001
RA-226	1.00E+000	4.36E-001	6.37E-001
PB-214	6.18E-001	9.56E-002	6.08E-002
BI-214	5.58E-001	9.38E-002	5.44E-002
PB-210	Not Detected	---	7.96E+000
TH-232	7.42E-001	3.66E-001	2.49E-001
RA-228	7.16E-001	1.46E-001	1.51E-001
AC-228	6.74E-001	1.37E-001	1.02E-001
TH-228	6.35E-001	1.96E-001	4.01E-001
RA-224	7.86E-001	1.86E-001	6.64E-002
PB-212	7.57E-001	1.11E-001	3.30E-002
BI-212	7.95E-001	2.92E-001	3.83E-001
TL-208	6.43E-001	1.15E-001	8.87E-002
U-235	2.38E-001	1.60E-001	1.87E-001
TH-231	Not Detected	---	6.29E+000
PA-231	Not Detected	---	1.28E+000
TH-227	Not Detected	---	3.03E-001
RA-223	Not Detected	---	1.55E-001
RN-219	Not Detected	---	3.42E-001
PB-211	Not Detected	---	7.76E-001
TL-207	Not Detected	---	1.46E+001
AM-241	Not Detected	---	1.55E-001
PU-239	Not Detected	---	3.32E+002
NP-237	Not Detected	---	1.80E+000
PA-233	Not Detected	---	5.09E-002
TH-229	Not Detected	---	1.79E-001

[Summary Report] - Sample ID: : 20134203

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.87E-002
AG-110m	Not Detected	---------	2.90E-002
BA-133	Not Detected	---------	3.84E-002
BE-7	Not Detected	---------	2.51E-001
CD-115	Not Detected	---------	5.13E-001
CE-139	Not Detected	---------	2.35E-002
CE-141	Not Detected	---------	4.71E-002
CE-144	Not Detected	---------	1.85E-001
CM-243	Not Detected	---------	1.56E-001
CO-56	Not Detected	---------	3.33E-002
CO-57	Not Detected	---------	2.31E-002
CO-58	Not Detected	---------	3.38E-002
CO-60	Not Detected	---------	3.84E-002
CR-51	Not Detected	---------	2.47E-001
CS-134	Not Detected	---------	4.10E-002
CS-137	Not Detected	---------	3.03E-002
EU-152	Not Detected	---------	6.86E-002
EU-154	Not Detected	---------	1.81E-001
EU-155	Not Detected	---------	1.05E-001
FE-59	Not Detected	---------	8.90E-002
GD-153	Not Detected	---------	6.13E-002
HG-203	Not Detected	---------	3.09E-002
I-131	Not Detected	---------	4.39E-002
IR-192	Not Detected	---------	2.61E-002
K-40	2.16E+001	2.91E+000	3.30E-001
MN-52	Not Detected	---------	6.91E-002
MN-54	Not Detected	---------	3.44E-002
MO-99	Not Detected	---------	1.32E+000
NA-22	Not Detected	---------	4.59E-002
NA-24	Not Detected	---------	7.22E+001
ND-147	Not Detected	---------	2.97E-001
NI-57	Not Detected	---------	1.23E+000
RU-103	Not Detected	---------	2.88E-002
RU-106	Not Detected	---------	2.66E-001
SB-122	Not Detected	---------	2.29E-001
SB-124	Not Detected	---------	2.95E-002
SB-125	Not Detected	---------	7.98E-002
SN-113	Not Detected	---------	3.63E-002
SR-85	Not Detected	---------	3.55E-002
TA-182	Not Detected	---------	1.72E-001
TA-183	Not Detected	---------	3.37E-001
TL-201	Not Detected	---------	3.58E-001
Y-88	Not Detected	---------	3.18E-002
ZN-65	Not Detected	---------	1.17E-001
ZR-95	Not Detected	---------	6.50E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/26/02 3:41:01 PM

Analyzed by: Beverly Key 9/27/02 Reviewed by: 9/30/02

Customer : SANDERS M (6135)
Customer Sample ID : 059906-003
Lab Sample ID : 20134204

Sample Description : 803/1052-SP1-BH1-27-S
Sample Quantity : 812.000 gram
Sample Date/Time : 9/19/02 3:45:00 PM
Acquire Start Date/Time : 9/26/02 1:24:37 PM
Detector Name : LAB01
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	4.93E-001
RA-226	1.34E+000	5.34E-001	7.68E-001
PB-214	6.78E-001	1.04E-001	6.09E-002
BI-214	5.68E-001	9.71E-002	5.67E-002
PB-210	Not Detected	---	8.55E+000
TH-232	7.37E-001	3.58E-001	2.23E-001
RA-228	7.66E-001	1.57E-001	1.56E-001
AC-228	7.32E-001	1.51E-001	1.14E-001
TH-228	7.71E-001	2.30E-001	4.35E-001
RA-224	8.85E-001	2.10E-001	7.56E-002
PB-212	7.88E-001	1.16E-001	3.70E-002
BI-212	8.03E-001	3.03E-001	3.98E-001
TL-208	6.01E-001	1.10E-001	8.36E-002
U-235	1.25E-001	1.72E-001	2.01E-001
TH-231	Not Detected	---	6.33E+000
PA-231	Not Detected	---	1.36E+000
TH-227	Not Detected	---	3.26E-001
RA-223	Not Detected	---	1.60E-001
RN-219	Not Detected	---	3.60E-001
PB-211	Not Detected	---	8.28E-001
TL-207	Not Detected	---	1.41E+001
AM-241	Not Detected	---	1.68E-001
PU-239	Not Detected	---	3.57E+002
NP-237	Not Detected	---	1.84E+000
PA-233	Not Detected	---	5.48E-002
TH-229	Not Detected	---	1.84E-001

[Summary Report] - Sample ID: : 20134204

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	4.35E-002
AG-110m	Not Detected	---------	3.19E-002
BA-133	Not Detected	---------	4.33E-002
BE-7	Not Detected	---------	2.60E-001
CD-115	Not Detected	---------	5.58E-001
CE-139	Not Detected	---------	2.51E-002
CE-141	Not Detected	---------	5.12E-002
CE-144	Not Detected	---------	1.94E-001
CM-243	Not Detected	---------	1.71E-001
CO-56	Not Detected	---------	3.56E-002
CO-57	Not Detected	---------	2.43E-002
CO-58	Not Detected	---------	3.55E-002
CO-60	Not Detected	---------	4.02E-002
CR-51	Not Detected	---------	2.61E-001
CS-134	Not Detected	---------	4.26E-002
CS-137	Not Detected	---------	3.36E-002
EU-152	Not Detected	---------	7.21E-002
EU-154	Not Detected	---------	2.02E-001
EU-155	Not Detected	---------	1.11E-001
FE-59	Not Detected	---------	9.05E-002
GD-153	Not Detected	---------	6.39E-002
HG-203	Not Detected	---------	3.40E-002
I-131	Not Detected	---------	4.96E-002
IR-192	Not Detected	---------	2.74E-002
K-40	1.74E+001	2.39E+000	3.53E-001
MN-52	Not Detected	---------	8.11E-002
MN-54	Not Detected	---------	3.57E-002
MO-99	Not Detected	---------	1.40E+000
NA-22	Not Detected	---------	4.91E-002
NA-24	Not Detected	---------	7.67E+001
ND-147	Not Detected	---------	3.24E-001
NI-57	Not Detected	---------	1.38E+000
RU-103	Not Detected	---------	3.10E-002
RU-106	Not Detected	---------	2.81E-001
SB-122	Not Detected	---------	2.49E-001
SB-124	Not Detected	---------	3.09E-002
SB-125	Not Detected	---------	8.71E-002
SN-113	Not Detected	---------	3.80E-002
SR-85	Not Detected	---------	3.78E-002
TA-182	Not Detected	---------	1.79E-001
TA-183	Not Detected	---------	3.65E-001
TL-201	Not Detected	---------	3.81E-001
Y-88	Not Detected	---------	2.81E-002
ZN-65	Not Detected	---------	1.16E-001
ZR-95	Not Detected	---------	6.60E-002

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program *
* 9/26/02 5:22:25 PM *
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*
* Analyzed by: Beverly Ley 9/27/02 Reviewed by: 9/30/02 *
****

Customer : SANDERS (6135)
Customer Sample ID : 059907-003
Lab Sample ID : 20134205

Sample Description : 829/276-SP1-BH1-8-S
Sample Quantity : 730.000 gram
Sample Date/Time : 9/24/02 2:05:00 PM
Acquire Start Date/Time : 9/26/02 3:42:11 PM
Detector Name : LAB01
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.
****

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	5.54E-001
RA-226	1.79E+000	6.26E-001	8.72E-001
PB-214	9.41E-001	1.38E-001	6.98E-002
BI-214	7.43E-001	1.23E-001	6.53E-002
PB-210	Not Detected	---	9.33E+000
TH-232	9.08E-001	4.31E-001	2.32E-001
RA-228	8.82E-001	1.77E-001	1.65E-001
AC-228	8.67E-001	1.72E-001	1.16E-001
TH-228	9.76E-001	2.76E-001	5.02E-001
RA-224	1.11E+000	2.58E-001	9.44E-002
PB-212	9.41E-001	1.38E-001	4.13E-002
BI-212	8.97E-001	3.62E-001	4.91E-001
TL-208	8.04E-001	1.38E-001	9.03E-002
U-235	9.46E-002	1.86E-001	2.17E-001
TH-231	Not Detected	---	7.20E+000
PA-231	Not Detected	---	1.57E+000
TH-227	Not Detected	---	3.67E-001
RA-223	Not Detected	---	1.38E-001
RN-219	Not Detected	---	4.18E-001
PB-211	Not Detected	---	9.28E-001
TL-207	Not Detected	---	1.56E+001
AM-241	Not Detected	---	1.93E-001
PU-239	Not Detected	---	3.89E+002
NP-237	Not Detected	---	2.07E+000
PA-233	Not Detected	---	6.18E-002
TH-229	Not Detected	---	2.11E-001

[Summary Report] - Sample ID: : 20134205

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---	4.74E-002
AG-110m	Not Detected	---	3.45E-002
BA-133	Not Detected	---	4.92E-002
BE-7	Not Detected	---	2.72E-001
CD-115	Not Detected	---	1.48E-001
CE-139	Not Detected	---	2.72E-002
CE-141	Not Detected	---	4.89E-002
CE-144	Not Detected	---	2.16E-001
CM-243	Not Detected	---	1.94E-001
CO-56	Not Detected	---	3.69E-002
CO-57	Not Detected	---	2.71E-002
CO-58	Not Detected	---	3.70E-002
CO-60	Not Detected	---	4.39E-002
CR-51	Not Detected	---	2.53E-001
CS-134	Not Detected	---	5.09E-002
CS-137	Not Detected	---	3.86E-002
EU-152	Not Detected	---	8.11E-002
EU-154	Not Detected	---	2.21E-001
EU-155	~~1.71E-001~~	~~8.59E-002~~ Not Detected	1.27E-001
FE-59	Not Detected	---	9.06E-002
GD-153	Not Detected	---	7.04E-002
HG-203	Not Detected	---	3.53E-002
I-131	Not Detected	---	3.61E-002
IR-192	Not Detected	---	2.93E-002
K-40	1.66E+001	2.30E+000	3.12E-001
MN-52	Not Detected	---	5.10E-002
MN-54	Not Detected	---	4.01E-002
MO-99	Not Detected	---	4.78E-001
NA-22	Not Detected	---	5.21E-002
NA-24	Not Detected	---	3.83E-001
ND-147	Not Detected	---	2.45E-001
NI-57	Not Detected	---	1.55E-001
RU-103	Not Detected	---	3.31E-002
RU-106	Not Detected	---	3.24E-001
SB-122	Not Detected	---	7.48E-002
SB-124	Not Detected	---	3.26E-002
SB-125	Not Detected	---	9.58E-002
SN-113	Not Detected	---	4.30E-002
SR-85	Not Detected	---	4.03E-002
TA-182	Not Detected	---	1.92E-001
TA-183	Not Detected	---	2.16E-001
TL-201	Not Detected	---	1.42E-001
Y-88	Not Detected	---	3.45E-002
ZN-65	Not Detected	---	1.32E-001
ZR-95	Not Detected	---	6.46E-002

```
**********************************************************************
*                    Sandia National Laboratories                    *
*     Radiation Protection Sample Diagnostics Program                *
*                        9/26/02  9:34:00 AM                         *
**********************************************************************
*                                                                    *
* Analyzed by:                  9/26/02   Reviewed by:               *
**********************************************************************
```

Customer : SANDERS M (6135)
Customer Sample ID : 059908-003
Lab Sample ID : 20134206

Sample Description : 829/276-SP1-BH1-13-S
Sample Quantity : 743.000 gram
Sample Date/Time : 9/24/02 2:20:00 PM
Acquire Start Date/Time : 9/26/02 7:53:41 AM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

****

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	7.14E-001
RA-226	1.59E+000	5.45E-001	7.58E-001
PB-214	8.54E-001	1.23E-001	6.15E-002
BI-214	7.11E-001	1.13E-001	5.58E-002
PB-210	Not Detected	---	2.81E+001
TH-232	7.55E-001	3.62E-001	2.12E-001
RA-228	9.43E-001	1.65E-001	1.21E-001
AC-228	8.11E-001	1.56E-001	1.11E-001
TH-228	1.30E+000	4.65E-001	6.35E-001
RA-224	1.05E+000	2.24E-001	6.88E-002
PB-212	8.87E-001	1.28E-001	3.87E-002
BI-212	7.76E-001	2.69E-001	3.48E-001
TL-208	7.25E-001	1.38E-001	1.33E-001
U-235	9.72E-002	1.82E-001	2.30E-001
TH-231	Not Detected	---	1.13E+001
PA-231	Not Detected	---	1.42E+000
TH-227	Not Detected	---	3.56E-001
RA-223	Not Detected	---	1.95E-001
RN-219	Not Detected	---	3.69E-001
PB-211	Not Detected	---	8.28E-001
TL-207	Not Detected	---	1.31E+001
AM-241	Not Detected	---	4.25E-001
PU-239	Not Detected	---	4.19E+002
NP-237	Not Detected	---	2.28E+000
PA-233	Not Detected	---	5.57E-002
TH-229	Not Detected	---	2.42E-001

[Summary Report] - Sample ID: : 20134206

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---	3.41E-002
AG-110m	Not Detected	---	2.75E-002
BA-133	Not Detected	---	4.85E-002
BE-7	Not Detected	---	2.38E-001
CD-115	Not Detected	---	1.11E-001
CE-139	Not Detected	---	2.88E-002
CE-141	Not Detected	---	5.18E-002
CE-144	Not Detected	---	2.32E-001
CM-243	Not Detected	---	1.72E-001
CO-56	Not Detected	---	3.19E-002
CO-57	Not Detected	---	3.04E-002
CO-58	Not Detected	---	3.07E-002
CO-60	Not Detected	---	3.47E-002
CR-51	Not Detected	---	2.31E-001
CS-134	Not Detected	---	3.97E-002
CS-137	Not Detected	---	2.90E-002
EU-152	Not Detected	---	9.13E-002
EU-154	Not Detected	---	1.57E-001
EU-155	Not Detected	---	1.32E-001
FE-59	Not Detected	---	7.06E-002
GD-153	Not Detected	---	9.62E-002
HG-203	Not Detected	---	3.16E-002
I-131	Not Detected	---	3.14E-002
IR-192	Not Detected	---	2.68E-002
K-40	2.41E+001	3.20E+000	3.14E-001
MN-52	Not Detected	---	3.58E-002
MN-54	Not Detected	---	3.32E-002
MO-99	Not Detected	---	3.28E-001
NA-22	Not Detected	---	3.99E-002
NA-24	Not Detected	---	2.17E-001
ND-147	Not Detected	---	1.98E-001
NI-57	~~1.54E-001~~	~~5.11E-002~~	~~5.75E-002~~
RU-103	Not Detected	---	2.68E-002
RU-106	Not Detected	---	2.41E-001
SB-122	Not Detected	---	5.73E-002
SB-124	Not Detected	---	2.65E-002
SB-125	Not Detected	---	7.95E-002
SN-113	Not Detected	---	3.51E-002
SR-85	Not Detected	---	3.40E-002
TA-182	Not Detected	---	1.55E-001
TA-183	Not Detected	---	4.62E-001
TL-201	Not Detected	---	2.31E-001
Y-88	Not Detected	---	2.42E-002
ZN-65	Not Detected	---	9.91E-002
ZR-95	Not Detected	---	5.15E-002

not detected 9/26/02

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/26/02 12:58:06 PM

Analyzed by: 9/26/02 Reviewed by: 10/1/02

Customer : SANDERS M (6135)
Customer Sample ID : 059912-003
Lab Sample ID : 20134208

Sample Description : 915-922/1003-SP1-BH1-27-S
Sample Quantity : 881.000 gram
Sample Date/Time : 9/24/02 8:45:00 AM
Acquire Start Date/Time : 9/26/02 11:17:42 AM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6004 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)	
U-238	Not Detected	---	6.58E-001	
RA-226	1.39E+000	4.83E-001	6.76E-001	
PB-214	7.10E-001	1.04E-001	5.86E-002	
BI-214	6.43E-001	1.02E-001	5.06E-002	
PB-210	Not Detected	---	2.56E+001	
TH-232	9.28E-001	4.27E-001	1.84E-001	
RA-228	8.53E-001	1.49E-001	1.16E-001	
AC-228	8.86E-001	1.55E-001	7.75E-002	
TH-228	8.57E-001	4.08E-001	5.99E-001	
RA-224	9.75E-001	2.05E-001	5.81E-002	
PB-212	8.55E-001	1.23E-001	3.60E-002	
BI-212	1.08E+000	2.81E-001	3.18E-001	
TL-208	7.57E-001	1.19E-001	6.79E-002	
U-235	Not Detected	---	2.04E-001	
TH-231	Not Detected	---	1.03E+001	
PA-231	Not Detected	---	1.24E+000	
TH-227	Not Detected	---	3.21E-001	
RA-223	Not Detected	---	1.82E-001	
RN-219	~~1.64E-001~~	~~2.75E-001~~	~~3.16E-001~~	Not Detected ICAS 9-26-02
PB-211	Not Detected	---	6.87E-001	
TL-207	Not Detected	---	1.15E+001	
AM-241	Not Detected	---	3.74E-001	
PU-239	Not Detected	---	3.78E+002	
NP-237	Not Detected	---	2.03E+000	
PA-233	Not Detected	---	4.85E-002	
TH-229	Not Detected	---	2.19E-001	

[Summary Report] - Sample ID: : 20134208

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---	2.98E-002
AG-110m	Not Detected	---	2.45E-002
BA-133	Not Detected	---	4.21E-002
BE-7	Not Detected	---	2.05E-001
CD-115	Not Detected	---	1.12E-001
CE-139	Not Detected	---	2.48E-002
CE-141	Not Detected	---	4.59E-002
CE-144	Not Detected	---	2.03E-001
CM-243	Not Detected	---	1.53E-001
CO-56	Not Detected	---	2.74E-002
CO-57	Not Detected	---	2.66E-002
CO-58	Not Detected	---	2.67E-002
CO-60	Not Detected	---	3.14E-002
CR-51	Not Detected	---	2.04E-001
CS-134	Not Detected	---	3.50E-002
CS-137	Not Detected	---	2.56E-002
EU-152	Not Detected	---	7.96E-002
EU-154	Not Detected	---	1.37E-001
EU-155	Not Detected	---	1.21E-001
FE-59	Not Detected	---	6.26E-002
GD-153	Not Detected	---	8.93E-002
HG-203	Not Detected	---	2.87E-002
I-131	Not Detected	---	2.86E-002
IR-192	Not Detected	---	2.32E-002
K-40	2.35E+001	3.11E+000	2.25E-001
MN-52	Not Detected	---	3.25E-002
MN-54	Not Detected	---	2.88E-002
MO-99	Not Detected	---	3.28E-001
NA-22	Not Detected	---	3.56E-002
NA-24	Not Detected	---	2.77E-001
ND-147	Not Detected	---	1.85E-001
NI-57	Not Detected	---	6.93E-002
RU-103	Not Detected	---	2.41E-002
RU-106	Not Detected	---	2.32E-001
SB-122	Not Detected	---	5.73E-002
SB-124	Not Detected	---	2.48E-002
SB-125	Not Detected	---	7.09E-002
SN-113	Not Detected	---	3.07E-002
SR-85	Not Detected	---	3.06E-002
TA-182	Not Detected	---	1.27E-001
TA-183	Not Detected	---	4.28E-001
TL-201	Not Detected	---	2.30E-001
Y-88	Not Detected	---	2.14E-002
ZN-65	Not Detected	---	8.24E-002
ZR-95	Not Detected	---	4.74E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/26/02 4:58:56 PM

Analyzed by: 9/26/02 Reviewed by: 10/1/02

Customer : SANDERS M (6135)
Customer Sample ID : 059913-003
Lab Sample ID : 20134209

Sample Description : 915-922/1003-SP1-BH1-33-S
Sample Quantity : 846.000 gram
Sample Date/Time : 9/24/02 9:35:00 AM
Acquire Start Date/Time : 9/26/02 12:59:51 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	6.43E-001
RA-226	1.70E+000	4.88E-001	6.40E-001
PB-214	6.63E-001	9.88E-002	5.92E-002
BI-214	6.56E-001	1.04E-001	4.99E-002
PB-210	Not Detected	---	2.48E+001
TH-232	8.00E-001	3.74E-001	1.84E-001
RA-228	7.84E-001	1.41E-001	1.19E-001
AC-228	7.79E-001	1.46E-001	9.82E-002
TH-228	9.10E-001	3.36E-001	4.57E-001
RA-224	9.45E-001	2.00E-001	5.01E-002
PB-212	7.88E-001	1.14E-001	3.47E-002
BI-212	8.00E-001	2.56E-001	3.22E-001
TL-208	7.09E-001	1.14E-001	6.78E-002
U-235	8.15E-002	1.61E-001	2.04E-001
TH-231	Not Detected	---	1.03E+001
PA-231	Not Detected	---	1.23E+000
TH-227	Not Detected	---	3.18E-001
RA-223	Not Detected	---	1.80E-001
RN-219	Not Detected	---	3.11E-001
PB-211	Not Detected	---	7.12E-001
TL-207	Not Detected	---	1.12E+001
AM-241	Not Detected	---	3.83E-001
PU-239	Not Detected	---	3.81E+002
NP-237	Not Detected	---	2.02E+000
PA-233	Not Detected	---	4.90E-002
TH-229	Not Detected	---	2.17E-001

[Summary Report] - Sample ID: : 20134209

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	----------	3.02E-002
AG-110m	Not Detected	----------	2.51E-002
BA-133	Not Detected	----------	4.23E-002
BE-7	Not Detected	----------	2.10E-001
CD-115	Not Detected	----------	1.10E-001
CE-139	Not Detected	----------	2.60E-002
CE-141	Not Detected	----------	4.57E-002
CE-144	Not Detected	----------	2.08E-001
CM-243	Not Detected	----------	1.49E-001
CO-56	Not Detected	----------	2.89E-002
CO-57	Not Detected	----------	2.75E-002
CO-58	Not Detected	----------	2.66E-002
CO-60	Not Detected	----------	3.03E-002
CR-51	Not Detected	----------	2.10E-001
CS-134	Not Detected	----------	3.53E-002
CS-137	Not Detected	----------	2.66E-002
EU-152	Not Detected	----------	8.23E-002
EU-154	Not Detected	----------	1.39E-001
EU-155	Not Detected	----------	1.20E-001
FE-59	Not Detected	----------	6.01E-002
GD-153	Not Detected	----------	8.88E-002
HG-203	Not Detected	----------	2.78E-002
I-131	Not Detected	----------	2.80E-002
IR-192	Not Detected	----------	2.40E-002
K-40	2.12E+001	2.83E+000	2.43E-001
MN-52	Not Detected	----------	3.31E-002
MN-54	Not Detected	----------	1.83E-002
MO-99	Not Detected	----------	3.15E-001
NA-22	Not Detected	----------	3.53E-002
NA-24	Not Detected	----------	2.82E-001
ND-147	Not Detected	----------	1.88E-001
NI-57	Not Detected	----------	6.72E-002
RU-103	Not Detected	----------	2.43E-002
RU-106	Not Detected	----------	2.31E-001
SB-122	Not Detected	----------	5.62E-002
SB-124	Not Detected	----------	2.44E-002
SB-125	Not Detected	----------	6.79E-002
SN-113	Not Detected	----------	3.17E-002
SR-85	Not Detected	----------	2.89E-002
TA-182	Not Detected	----------	1.35E-001
TA-183	Not Detected	----------	4.40E-001
TL-201	Not Detected	----------	2.30E-001
Y-88	Not Detected	----------	2.02E-002
ZN-65	Not Detected	----------	8.60E-002
ZR-95	Not Detected	----------	4.63E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/26/02 4:22:12 PM

Analyzed by: Beverly Key 9/27/02 Reviewed by:

Customer : SANDERS M (6135)
Customer Sample ID : 059914-003
Lab Sample ID : 20134210

Sample Description : 915-922/1003-SP1-BH1-26-S
Sample Quantity : 767.000 gram
Sample Date/Time : 9/24/02 11:10:00 AM
Acquire Start Date/Time : 9/26/02 2:41:52 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Bgk 9/27/02

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	7.24E-001
RA-226	1.80E+000	5.48E-001	7.36E-001
PB-214	8.05E-001	1.18E-001	6.45E-002
BI-214	6.89E-001	1.10E-001	5.74E-002
PB-210	Not Detected	---	2.78E+001
TH-232	9.31E-001	4.32E-001	2.01E-001
RA-228	7.92E-001	1.47E-001	1.38E-001
AC-228	9.11E-001	1.68E-001	1.10E-001
TH-228	8.37E-001	3.96E-001	5.77E-001
RA-224	1.03E+000	2.21E-001	8.12E-002
PB-212	9.87E-001	1.42E-001	3.85E-002
BI-212	1.08E+000	2.89E-001	3.24E-001
TL-208	8.14E-001	1.31E-001	8.09E-002
U-235	Not Detected	---	2.28E-001
TH-231	Not Detected	---	1.12E+001
PA-231	Not Detected	---	1.38E+000
TH-227	Not Detected	---	3.64E-001
RA-223	Not Detected	---	2.04E-001
RN-219	Not Detected	---	3.51E-001
PB-211	Not Detected	---	8.11E-001
TL-207	Not Detected	---	1.25E+001
AM-241	Not Detected	---	4.10E-001
PU-239	Not Detected	---	4.16E+002
NP-237	Not Detected	---	2.21E+000
PA-233	Not Detected	---	5.39E-002
TH-229	Not Detected	---	2.35E-001

[Summary Report] - Sample ID: : 20134210

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.53E-002
AG-110m	Not Detected	---------	2.69E-002
BA-133	Not Detected	---------	4.68E-002
BE-7	Not Detected	---------	2.27E-001
CD-115	Not Detected	---------	1.22E-001
CE-139	Not Detected	---------	2.85E-002
CE-141	Not Detected	---------	5.12E-002
CE-144	Not Detected	---------	2.25E-001
CM-243	Not Detected	---------	1.68E-001
CO-56	Not Detected	---------	3.00E-002
CO-57	Not Detected	---------	2.95E-002
CO-58	Not Detected	---------	2.93E-002
CO-60	Not Detected	---------	3.35E-002
CR-51	Not Detected	---------	2.23E-001
CS-134	Not Detected	---------	3.92E-002
CS-137	Not Detected	---------	2.94E-002
EU-152	Not Detected	---------	8.79E-002
EU-154	Not Detected	---------	1.62E-001
EU-155	Not Detected	---------	1.32E-001
FE-59	Not Detected	---------	6.83E-002
GD-153	Not Detected	---------	9.66E-002
HG-203	Not Detected	---------	3.10E-002
I-131	Not Detected	---------	3.17E-002
IR-192	Not Detected	---------	2.58E-002
K-40	2.26E+001	3.01E+000	3.04E-001
MN-52	Not Detected	---------	3.31E-002
MN-54	Not Detected	---------	3.16E-002
MO-99	Not Detected	---------	3.86E-001
NA-22	Not Detected	---------	3.89E-002
NA-24	Not Detected	---------	3.26E-001
ND-147	Not Detected	---------	2.06E-001
NI-57	Not Detected	---------	7.68E-002
RU-103	Not Detected	---------	2.53E-002
RU-106	Not Detected	---------	2.65E-001
SB-122	Not Detected	---------	6.10E-002
SB-124	Not Detected	---------	2.67E-002
SB-125	Not Detected	---------	7.73E-002
SN-113	Not Detected	---------	3.40E-002
SR-85	Not Detected	---------	3.37E-002
TA-182	Not Detected	---------	1.46E-001
TA-183	Not Detected	---------	4.72E-001
TL-201	Not Detected	---------	2.52E-001
Y-88	Not Detected	---------	2.40E-002
ZN-65	Not Detected	---------	9.94E-002
ZR-95	Not Detected	---------	4.95E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/26/02 8:26:56 AM

Analyzed by: 9/26/02 Reviewed by: 10/1/02

Customer : SANDERS, M (6135)
Customer Sample ID : 059915-003
Lab Sample ID : 20134211

Sample Description : 915-922/1003-SP2-BH1-31-S
Sample Quantity : 859.000 gram
Sample Date/Time : 9/24/02 11:40:00 AM
Acquire Start Date/Time : 9/25/02 10:50:23 AM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	6.23E-001
RA-226	1.63E+000	4.77E-001	6.30E-001
PB-214	6.47E-001	1.04E-001	8.34E-002
BI-214	6.05E-001	9.61E-002	4.62E-002
PB-210	Not Detected	---	2.44E+001
TH-232	7.09E-001	3.37E-001	1.90E-001
RA-228	7.26E-001	1.32E-001	1.12E-001
AC-228	7.58E-001	1.39E-001	8.39E-002
TH-228	8.12E-001	3.48E-001	4.96E-001
RA-224	9.13E-001	1.96E-001	7.09E-002
PB-212	7.58E-001	1.09E-001	3.12E-002
BI-212	7.85E-001	2.84E-001	3.82E-001
TL-208	6.10E-001	1.00E-001	6.35E-002
U-235	Not Detected	---	2.01E-001
TH-231	Not Detected	---	9.60E+000
PA-231	Not Detected	---	1.18E+000
TH-227	Not Detected	---	3.02E-001
RA-223	Not Detected	---	1.62E-001
RN-219	Not Detected	---	3.00E-001
PB-211	Not Detected	---	6.78E-001
TL-207	Not Detected	---	1.15E+001
AM-241	Not Detected	---	3.73E-001
PU-239	Not Detected	---	3.73E+002
NP-237	Not Detected	---	1.92E+000
PA-233	Not Detected	---	4.86E-002
TH-229	Not Detected	---	2.09E-001

[Summary Report] - Sample ID: : 20134211

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.02E-002
AG-110m	Not Detected	---------	2.38E-002
BA-133	Not Detected	---------	4.17E-002
BE-7	Not Detected	---------	2.01E-001
CD-115	Not Detected	---------	7.50E-002
CE-139	Not Detected	---------	2.47E-002
CE-141	Not Detected	---------	4.42E-002
CE-144	Not Detected	---------	1.99E-001
CM-243	Not Detected	---------	1.43E-001
CO-56	Not Detected	---------	2.68E-002
CO-57	Not Detected	---------	2.62E-002
CO-58	Not Detected	---------	2.55E-002
CO-60	Not Detected	---------	2.96E-002
CR-51	Not Detected	---------	1.94E-001
CS-134	Not Detected	---------	3.30E-002
CS-137	Not Detected	---------	2.63E-002
EU-152	Not Detected	---------	7.90E-002
EU-154	Not Detected	---------	1.39E-001
EU-155	Not Detected	---------	1.18E-001
FE-59	Not Detected	---------	6.10E-002
GD-153	Not Detected	---------	8.66E-002
HG-203	Not Detected	---------	2.64E-002
I-131	Not Detected	---------	2.61E-002
IR-192	Not Detected	---------	2.28E-002
K-40	2.31E+001	3.06E+000	2.25E-001
MN-52	Not Detected	---------	2.92E-002
MN-54	Not Detected	---------	2.79E-002
MO-99	Not Detected	---------	2.34E-001
NA-22	Not Detected	---------	3.55E-002
NA-24	Not Detected	---------	7.81E-002
ND-147	Not Detected	---------	1.67E-001
NI-57	Not Detected	---------	3.37E-002
RU-103	Not Detected	---------	2.23E-002
RU-106	Not Detected	---------	2.20E-001
SB-122	Not Detected	---------	4.04E-002
SB-124	Not Detected	---------	2.32E-002
SB-125	Not Detected	---------	6.82E-002
SN-113	Not Detected	---------	3.08E-002
SR-85	Not Detected	---------	2.92E-002
TA-182	Not Detected	---------	1.28E-001
TA-183	Not Detected	---------	3.66E-001
TL-201	Not Detected	---------	1.75E-001
Y-88	Not Detected	---------	2.20E-002
ZN-65	Not Detected	---------	8.44E-002
ZR-95	Not Detected	---------	4.62E-002

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program *
* 9/25/02 2:12:55 PM *
****

* Analyzed by: 9/26/02 Reviewed by: 10/1/02 *

Customer : SANDERS, M (6135)
Customer Sample ID : 059917-003
Lab Sample ID : 20134212

Sample Description : 6969/1004-DF1-BH1-8-S
Sample Quantity : 675.000 gram
Sample Date/Time : 9/20/02 9:20:00 AM
Acquire Start Date/Time : 9/25/02 12:32:34 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	7.98E-001
RA-226	1.93E+000	5.82E-001	7.74E-001
PB-214	7.89E-001	1.17E-001	6.80E-002
BI-214	6.99E-001	1.13E-001	5.82E-002
PB-210	Not Detected	---	2.99E+001
TH-232	9.56E-001	4.45E-001	2.11E-001
RA-228	1.17E+000	1.97E-001	1.20E-001
AC-228	9.86E-001	1.84E-001	1.24E-001
TH-228	1.10E+000	4.57E-001	6.48E-001
RA-224	1.21E+000	2.56E-001	7.02E-002
PB-212	1.04E+000	1.50E-001	3.92E-002
BI-212	1.14E+000	3.32E-001	3.99E-001
TL-208	9.46E-001	1.48E-001	7.89E-002
U-235	Not Detected	---	2.35E-001
TH-231	Not Detected	---	1.19E+001
PA-231	Not Detected	---	1.38E+000
TH-227	Not Detected	---	3.89E-001
RA-223	Not Detected	---	2.61E-001
RN-219	Not Detected	---	3.74E-001
PB-211	Not Detected	---	8.40E-001
TL-207	Not Detected	---	1.17E+001
AM-241	Not Detected	---	4.56E-001
PU-239	Not Detected	---	4.39E+002
NP-237	Not Detected	---	2.34E+000
PA-233	Not Detected	---	5.73E-002
TH-229	Not Detected	---	2.47E-001

[Summary Report] - Sample ID: : 20134212

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.66E-002
AG-110m	Not Detected	---------	2.87E-002
BA-133	Not Detected	---------	5.04E-002
BE-7	Not Detected	---------	2.45E-001
CD-115	Not Detected	---------	3.44E-001
CE-139	Not Detected	---------	2.98E-002
CE-141	Not Detected	---------	5.83E-002
CE-144	Not Detected	---------	2.42E-001
CM-243	Not Detected	---------	1.77E-001
CO-56	Not Detected	---------	3.31E-002
CO-57	Not Detected	---------	3.10E-002
CO-58	Not Detected	---------	3.14E-002
CO-60	Not Detected	---------	3.48E-002
CR-51	Not Detected	---------	2.61E-001
CS-134	Not Detected	---------	4.11E-002
CS-137	Not Detected	---------	3.02E-002
EU-152	Not Detected	---------	9.18E-002
EU-154	Not Detected	---------	1.68E-001
EU-155	Not Detected	---------	1.40E-001
FE-59	Not Detected	---------	6.84E-002
GD-153	Not Detected	---------	1.01E-001
HG-203	Not Detected	---------	3.38E-002
I-131	Not Detected	---------	4.26E-002
IR-192	Not Detected	---------	2.83E-002
K-40	1.84E+001	2.48E+000	3.02E-001
MN-52	Not Detected	---------	5.45E-002
MN-54	Not Detected	---------	3.42E-002
MO-99	Not Detected	---------	8.01E-001
NA-22	Not Detected	---------	4.03E-002
NA-24	Not Detected	---------	9.80E+000
ND-147	Not Detected	---------	2.58E-001
NI-57	Not Detected	---------	5.29E-001
RU-103	Not Detected	---------	3.01E-002
RU-106	Not Detected	---------	2.73E-001
SB-122	Not Detected	---------	1.48E-001
SB-124	Not Detected	---------	2.88E-002
SB-125	Not Detected	---------	7.97E-002
SN-113	Not Detected	---------	3.78E-002
SR-85	Not Detected	---------	3.71E-002
TA-182	Not Detected	---------	1.52E-001
TA-183	Not Detected	---------	7.87E-001
TL-201	Not Detected	---------	5.33E-001
Y-88	Not Detected	---------	2.59E-002
ZN-65	Not Detected	---------	9.97E-002
ZR-95	Not Detected	---------	5.35E-002

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program *
* 9/25/02 3:55:00 PM *
****
*
* Analyzed by: 9/26/02 Reviewed by: 10/1/02
****

Customer : SANDERS, M (6135)
Customer Sample ID : 059918-003
Lab Sample ID : 20134213

Sample Description : 6969/1004-DF1-BH1-13-S
Sample Quantity : 770.000 gram
Sample Date/Time : 9/20/02 9:35:00 AM
Acquire Start Date/Time : 9/25/02 2:14:41 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.
****

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	7.02E-001
RA-226	2.17E+000	5.71E-001	7.20E-001
PB-214	7.90E-001	1.15E-001	6.04E-002
BI-214	7.36E-001	1.15E-001	5.15E-002
PB-210	Not Detected	---	2.78E+001
TH-232	1.00E+000	4.74E-001	2.63E-001
RA-228	9.73E-001	1.70E-001	1.32E-001
AC-228	9.77E-001	1.75E-001	9.94E-002
TH-228	9.36E-001	4.35E-001	6.35E-001
RA-224	1.26E+000	2.62E-001	7.86E-002
PB-212	1.06E+000	1.51E-001	3.58E-002
BI-212	1.08E+000	3.14E-001	3.81E-001
TL-208	9.21E-001	1.44E-001	7.91E-002
U-235	Not Detected	---	2.31E-001
TH-231	Not Detected	---	1.13E+001
PA-231	Not Detected	---	1.33E+000
TH-227	Not Detected	---	3.67E-001
RA-223	Not Detected	---	2.41E-001
RN-219	~~2.31E-001~~	~~3.11E-001~~	~~3.60E-001~~
PB-211	Not Detected	---	7.91E-001
TL-207	Not Detected	---	1.19E+001
AM-241	Not Detected	---	4.13E-001
PU-239	Not Detected	---	4.17E+002
NP-237	Not Detected	---	2.19E+000
PA-233	Not Detected	---	5.40E-002
TH-229	Not Detected	---	2.37E-001

NOT Detected kms 9-26-02

[Summary Report] - Sample ID: : 20134213

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---	3.45E-002
AG-110m	Not Detected	---	2.59E-002
BA-133	Not Detected	---	4.69E-002
BE-7	Not Detected	---	2.23E-001
CD-115	Not Detected	---	3.30E-001
CE-139	Not Detected	---	2.79E-002
CE-141	Not Detected	---	5.55E-002
CE-144	Not Detected	---	2.29E-001
CM-243	Not Detected	---	1.68E-001
CO-56	Not Detected	---	3.03E-002
CO-57	Not Detected	---	2.97E-002
CO-58	Not Detected	---	2.81E-002
CO-60	Not Detected	---	3.24E-002
CR-51	Not Detected	---	2.43E-001
CS-134	Not Detected	---	3.76E-002
CS-137	Not Detected	---	2.85E-002
EU-152	Not Detected	---	8.82E-002
EU-154	Not Detected	---	1.59E-001
EU-155	Not Detected	---	1.33E-001
FE-59	Not Detected	---	6.51E-002
GD-153	Not Detected	---	9.82E-002
HG-203	Not Detected	---	3.30E-002
I-131	Not Detected	---	4.01E-002
IR-192	Not Detected	---	2.66E-002
K-40	1.82E+001	2.44E+000	2.60E-001
MN-52	Not Detected	---	4.79E-002
MN-54	Not Detected	---	2.92E-002
MO-99	Not Detected	---	7.54E-001
NA-22	Not Detected	---	3.65E-002
NA-24	Not Detected	---	8.75E+000
ND-147	Not Detected	---	2.43E-001
NI-57	Not Detected	---	3.31E-001
RU-103	Not Detected	---	2.75E-002
RU-106	Not Detected	---	2.50E-001
SB-122	Not Detected	---	1.33E-001
SB-124	Not Detected	---	2.59E-002
SB-125	Not Detected	---	7.72E-002
SN-113	Not Detected	---	3.53E-002
SR-85	Not Detected	---	3.40E-002
TA-182	Not Detected	---	1.38E-001
TA-183	Not Detected	---	7.19E-001
TL-201	Not Detected	---	5.11E-001
Y-88	Not Detected	---	2.43E-002
ZN-65	Not Detected	---	9.09E-002
ZR-95	Not Detected	---	4.94E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/25/02 5:37:06 PM

* Analyzed by: 9/26/02 Reviewed by: 10/1/02

Customer : SANDERS, M (6135)
Customer Sample ID : 059919-003
Lab Sample ID : 20134214

Sample Description : 6969/1004-DF1-BH2-8-S
Sample Quantity : 762.000 gram
Sample Date/Time : 9/20/02 10:35:00 AM
Acquire Start Date/Time : 9/25/02 3:56:45 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	7.44E-001
RA-226	2.37E+000	5.86E-001	7.16E-001
PB-214	8.97E-001	1.28E-001	6.35E-002
BI-214	8.14E-001	1.35E-001	9.40E-002
PB-210	Not Detected	---	2.81E+001
TH-232	8.82E-001	4.11E-001	1.95E-001
RA-228	9.36E-001	1.63E-001	1.18E-001
AC-228	1.02E+000	1.81E-001	9.97E-002
TH-228	9.84E-001	3.80E-001	5.24E-001
RA-224	1.05E+000	2.25E-001	7.81E-002
PB-212	9.73E-001	1.40E-001	3.73E-002
BI-212	1.16E+000	2.99E-001	3.28E-001
TL-208	8.87E-001	1.39E-001	7.47E-002
U-235	1.66E-001	1.81E-001	2.30E-001
TH-231	Not Detected	---	1.11E+001
PA-231	Not Detected	---	1.31E+000
TH-227	Not Detected	---	3.55E-001
RA-223	Not Detected	---	2.40E-001
RN-219	Not Detected	---	3.33E-001
PB-211	Not Detected	---	7.46E-001
TL-207	Not Detected	---	1.18E+001
AM-241	Not Detected	---	4.16E-001
PU-239	Not Detected	---	4.09E+002
NP-237	Not Detected	---	2.25E+000
PA-233	Not Detected	---	5.17E-002
TH-229	Not Detected	---	2.31E-001

[Summary Report] - Sample ID: : 20134214

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---	3.38E-002
AG-110m	Not Detected	---	2.67E-002
BA-133	Not Detected	---	5.00E-002
BE-7	Not Detected	---	2.28E-001
CD-115	Not Detected	---	3.22E-001
CE-139	Not Detected	---	2.87E-002
CE-141	Not Detected	---	5.50E-002
CE-144	Not Detected	---	2.27E-001
CM-243	Not Detected	---	1.68E-001
CO-56	Not Detected	---	2.91E-002
CO-57	Not Detected	---	2.93E-002
CO-58	Not Detected	---	2.92E-002
CO-60	Not Detected	---	3.10E-002
CR-51	Not Detected	---	2.46E-001
CS-134	Not Detected	---	4.01E-002
CS-137	Not Detected	---	2.85E-002
EU-152	Not Detected	---	8.71E-002
EU-154	Not Detected	---	1.56E-001
EU-155	Not Detected	---	1.37E-001
FE-59	Not Detected	---	6.35E-002
GD-153	Not Detected	---	9.58E-002
HG-203	Not Detected	---	3.28E-002
I-131	Not Detected	---	4.07E-002
IR-192	Not Detected	---	2.63E-002
K-40	1.67E+001	2.25E+000	2.74E-001
MN-52	Not Detected	---	5.11E-002
MN-54	Not Detected	---	2.99E-002
MO-99	Not Detected	---	7.38E-001
NA-22	Not Detected	---	3.56E-002
NA-24	Not Detected	---	9.45E+000
ND-147	Not Detected	---	2.49E-001
NI-57	Not Detected	---	2.66E-001
RU-103	Not Detected	---	2.55E-002
RU-106	Not Detected	---	2.55E-001
SB-122	Not Detected	---	1.37E-001
SB-124	Not Detected	---	2.79E-002
SB-125	Not Detected	---	7.63E-002
SN-113	Not Detected	---	3.57E-002
SR-85	Not Detected	---	3.46E-002
TA-182	Not Detected	---	1.47E-001
TA-183	Not Detected	---	7.28E-001
TL-201	Not Detected	---	5.00E-001
Y-88	Not Detected	---	2.37E-002
ZN-65	Not Detected	---	9.62E-002
ZR-95	Not Detected	---	4.97E-002

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Sandia National Laboratories

Radiation Protection Sample Diagnostics Program

9/25/02 7:19:08 PM

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* Analyzed by: 9/26/02 Reviewed by: 10/1/02

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Customer : SANDERS, M (6135)
Customer Sample ID : 059920-003
Lab Sample ID : 20134215

Sample Description : 6969/1004-DF1-BH2-13-S
Sample Quantity : 765.000 gram
Sample Date/Time : 9/20/02 10:55:00 AM
Acquire Start Date/Time : 9/25/02 5:38:51 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

****

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	6.98E-001
RA-226	2.10E+000	5.51E-001	6.92E-001
PB-214	7.90E-001	1.14E-001	5.88E-002
BI-214	6.62E-001	1.06E-001	5.45E-002
PB-210	Not Detected	---	2.65E+001
TH-232	9.66E-001	4.45E-001	1.93E-001
RA-228	9.35E-001	1.64E-001	1.27E-001
AC-228	8.67E-001	1.58E-001	9.12E-002
TH-228	8.49E-001	3.71E-001	5.29E-001
RA-224	1.10E+000	2.32E-001	6.64E-002
PB-212	9.54E-001	1.37E-001	3.59E-002
BI-212	1.40E+000	3.28E-001	3.35E-001
TL-208	8.63E-001	1.35E-001	7.31E-002
U-235	2.03E-001	1.75E-001	2.23E-001
TH-231	Not Detected	---	1.06E+001
PA-231	Not Detected	---	1.31E+000
TH-227	Not Detected	---	3.49E-001
RA-223	Not Detected	---	2.26E-001
RN-219	Not Detected	---	3.42E-001
PB-211	Not Detected	---	7.56E-001
TL-207	Not Detected	---	1.15E+001
AM-241	Not Detected	---	4.33E-001
PU-239	Not Detected	---	4.09E+002
NP-237	Not Detected	---	2.16E+000
PA-233	Not Detected	---	5.15E-002
TH-229	Not Detected	---	2.31E-001

[Summary Report] - Sample ID: : 20134215

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.46E-002
AG-110m	Not Detected	---------	2.61E-002
BA-133	Not Detected	---------	4.65E-002
BE-7	Not Detected	---------	2.23E-001
CD-115	Not Detected	---------	3.23E-001
CE-139	Not Detected	---------	2.78E-002
CE-141	Not Detected	---------	5.33E-002
CE-144	Not Detected	---------	2.26E-001
CM-243	Not Detected	---------	1.62E-001
CO-56	Not Detected	---------	2.91E-002
CO-57	Not Detected	---------	2.92E-002
CO-58	Not Detected	---------	2.88E-002
CO-60	Not Detected	---------	3.02E-002
CR-51	Not Detected	---------	2.40E-001
CS-134	Not Detected	---------	3.77E-002
CS-137	Not Detected	---------	2.81E-002
EU-152	Not Detected	---------	8.70E-002
EU-154	Not Detected	---------	1.59E-001
EU-155	Not Detected	---------	1.32E-001
FE-59	Not Detected	---------	6.81E-002
GD-153	Not Detected	---------	9.79E-002
HG-203	Not Detected	---------	3.14E-002
I-131	Not Detected	---------	3.96E-002
IR-192	Not Detected	---------	2.60E-002
K-40	1.72E+001	2.32E+000	2.58E-001
MN-52	Not Detected	---------	5.08E-002
MN-54	Not Detected	---------	3.23E-002
MO-99	Not Detected	---------	7.14E-001
NA-22	Not Detected	---------	3.56E-002
NA-24	Not Detected	---------	9.53E+000
ND-147	Not Detected	---------	2.30E-001
NI-57	Not Detected	---------	3.31E-001
RU-103	Not Detected	---------	2.69E-002
RU-106	Not Detected	---------	2.47E-001
SB-122	Not Detected	---------	1.34E-001
SB-124	Not Detected	---------	2.64E-002
SB-125	Not Detected	---------	7.72E-002
SN-113	Not Detected	---------	3.31E-002
SR-85	Not Detected	---------	3.31E-002
TA-182	Not Detected	---------	1.34E-001
TA-183	Not Detected	---------	7.63E-001
TL-201	Not Detected	---------	5.09E-001
Y-88	Not Detected	---------	2.47E-002
ZN-65	Not Detected	---------	8.64E-002
ZR-95	Not Detected	---------	4.99E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/25/02 9:01:10 PM

* Analyzed by: 9/26/02 Reviewed by: 10/1/02

Customer : SANDERS, M (6135)
Customer Sample ID : 059921-003
Lab Sample ID : 20134216

Sample Description : 6969/1004-DF1-BH3-8-S
Sample Quantity : 873.000 gram
Sample Date/Time : 9/20/02 11:30:00 AM
Acquire Start Date/Time : 9/25/02 7:20:52 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	6.21E-001
RA-226	1.35E+000	4.62E-001	6.43E-001
PB-214	6.43E-001	9.51E-002	5.43E-002
BI-214	5.98E-001	9.55E-002	4.86E-002
PB-210	Not Detected	---	2.45E+001
TH-232	6.67E-001	3.21E-001	1.94E-001
RA-228	7.40E-001	1.35E-001	1.17E-001
AC-228	6.86E-001	1.34E-001	1.02E-001
TH-228	7.95E-001	3.99E-001	5.91E-001
RA-224	8.03E-001	1.75E-001	5.90E-002
PB-212	7.78E-001	1.12E-001	3.35E-002
BI-212	1.05E+000	2.67E-001	2.93E-001
TL-208	7.10E-001	1.13E-001	6.58E-002
U-235	Not Detected	---	2.02E-001
TH-231	Not Detected	---	1.01E+001
PA-231	Not Detected	---	1.21E+000
TH-227	Not Detected	---	3.08E-001
RA-223	Not Detected	---	2.15E-001
RN-219	Not Detected	---	3.06E-001
PB-211	Not Detected	---	6.84E-001
TL-207	Not Detected	---	1.17E+001
AM-241	Not Detected	---	3.78E-001
PU-239	Not Detected	---	3.66E+002
NP-237	Not Detected	---	2.00E+000
PA-233	Not Detected	---	4.75E-002
TH-229	Not Detected	---	2.12E-001

[Summary Report] - Sample ID: : 20134216

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	2.99E-002
AG-110m	Not Detected	---------	2.40E-002
BA-133	Not Detected	---------	4.19E-002
BE-7	Not Detected	---------	2.19E-001
CD-115	Not Detected	---------	2.90E-001
CE-139	Not Detected	---------	2.55E-002
CE-141	Not Detected	---------	4.82E-002
CE-144	Not Detected	---------	2.07E-001
CM-243	Not Detected	---------	1.51E-001
CO-56	Not Detected	---------	2.88E-002
CO-57	Not Detected	---------	2.70E-002
CO-58	Not Detected	---------	2.72E-002
CO-60	Not Detected	---------	3.25E-002
CR-51	Not Detected	---------	2.19E-001
CS-134	Not Detected	---------	3.47E-002
CS-137	Not Detected	---------	2.58E-002
EU-152	Not Detected	---------	8.00E-002
EU-154	Not Detected	---------	1.38E-001
EU-155	Not Detected	---------	1.17E-001
FE-59	Not Detected	---------	6.83E-002
GD-153	Not Detected	---------	8.85E-002
HG-203	Not Detected	---------	2.97E-002
I-131	Not Detected	---------	3.67E-002
IR-192	Not Detected	---------	2.33E-002
K-40	2.53E+001	3.35E+000	2.35E-001
MN-52	Not Detected	---------	4.40E-002
MN-54	Not Detected	---------	2.92E-002
MO-99	Not Detected	---------	7.23E-001
NA-22	Not Detected	---------	3.70E-002
NA-24	Not Detected	---------	1.03E+001
ND-147	Not Detected	---------	2.24E-001
NI-57	Not Detected	---------	2.52E-001
RU-103	Not Detected	---------	2.53E-002
RU-106	Not Detected	---------	2.24E-001
SB-122	Not Detected	---------	1.30E-001
SB-124	Not Detected	---------	2.49E-002
SB-125	Not Detected	---------	7.15E-002
SN-113	Not Detected	---------	3.23E-002
SR-85	Not Detected	---------	3.05E-002
TA-182	Not Detected	---------	1.29E-001
TA-183	Not Detected	---------	6.71E-001
TL-201	Not Detected	---------	4.57E-001
Y-88	Not Detected	---------	1.98E-002
ZN-65	Not Detected	---------	8.64E-002
ZR-95	Not Detected	---------	4.68E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/25/02 10:43:10 PM

* Analyzed by: 9/26/02 Reviewed by: 10/1/02

Customer : SANDERS, M (6135)
Customer Sample ID : 059922-003
Lab Sample ID : 20134217

Sample Description : 6969/1004-DF1-BH3-13-S
Sample Quantity : 779.000 gram
Sample Date/Time : 9/20/02 11:50:00 AM
Acquire Start Date/Time : 9/25/02 9:02:55 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	7.01E-001
RA-226	1.94E+000	5.38E-001	6.94E-001
PB-214	7.27E-001	1.06E-001	5.71E-002
BI-214	6.68E-001	1.06E-001	5.06E-002
PB-210	Not Detected	---	2.67E+001
TH-232	9.21E-001	4.26E-001	1.89E-001
RA-228	8.98E-001	1.57E-001	1.08E-001
AC-228	8.46E-001	1.56E-001	9.69E-002
TH-228	9.37E-001	4.16E-001	5.99E-001
RA-224	9.66E-001	2.08E-001	6.58E-002
PB-212	9.26E-001	1.33E-001	3.65E-002
BI-212	8.84E-001	3.01E-001	3.94E-001
TL-208	7.70E-001	1.24E-001	7.71E-002
U-235	Not Detected	---	2.19E-001
TH-231	Not Detected	---	1.06E+001
PA-231	Not Detected	---	1.26E+000
TH-227	Not Detected	---	3.43E-001
RA-223	Not Detected	---	2.36E-001
RN-219	Not Detected	---	3.27E-001
PB-211	Not Detected	---	7.46E-001
TL-207	Not Detected	---	1.17E+001
AM-241	Not Detected	---	4.13E-001
PU-239	Not Detected	---	4.05E+002
NP-237	Not Detected	---	2.09E+000
PA-233	Not Detected	---	5.13E-002
TH-229	Not Detected	---	2.30E-001

[Summary Report] - Sample ID: : 20134217

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---	3.09E-002
AG-110m	Not Detected	---	2.59E-002
BA-133	Not Detected	---	4.34E-002
BE-7	Not Detected	---	2.22E-001
CD-115	Not Detected	---	3.31E-001
CE-139	Not Detected	---	2.69E-002
CE-141	Not Detected	---	5.40E-002
CE-144	Not Detected	---	2.20E-001
CM-243	Not Detected	---	1.55E-001
CO-56	Not Detected	---	2.94E-002
CO-57	Not Detected	---	2.84E-002
CO-58	Not Detected	---	2.93E-002
CO-60	Not Detected	---	3.12E-002
CR-51	Not Detected	---	2.38E-001
CS-134	Not Detected	---	3.65E-002
CS-137	Not Detected	---	2.78E-002
EU-152	Not Detected	---	8.43E-002
EU-154	Not Detected	---	1.42E-001
EU-155	Not Detected	---	1.27E-001
FE-59	Not Detected	---	6.75E-002
GD-153	Not Detected	---	9.43E-002
HG-203	Not Detected	---	3.07E-002
I-131	Not Detected	---	3.90E-002
IR-192	Not Detected	---	2.58E-002
K-40	1.81E+001	2.43E+000	2.74E-001
MN-52	Not Detected	---	5.08E-002
MN-54	Not Detected	---	3.02E-002
MO-99	Not Detected	---	7.68E-001
NA-22	Not Detected	---	3.50E-002
NA-24	Not Detected	---	1.08E+001
ND-147	Not Detected	---	2.35E-001
NI-57	Not Detected	---	5.19E-001
RU-103	Not Detected	---	2.54E-002
RU-106	~~7.35E-002~~	~~7.05E-002~~	~~1.10E-001~~
SB-122	Not Detected	---	1.36E-001
SB-124	Not Detected	---	2.50E-002
SB-125	Not Detected	---	7.27E-002
SN-113	Not Detected	---	3.36E-002
SR-85	Not Detected	---	3.34E-002
TA-182	Not Detected	---	1.39E-001
TA-183	Not Detected	---	7.39E-001
TL-201	Not Detected	---	5.11E-001
Y-88	Not Detected	---	2.06E-002
ZN-65	Not Detected	---	8.56E-002
ZR-95	Not Detected	---	5.11E-002

NOT Detected KDS 9-26-02

```
**********************************************************************
*                    Sandia National Laboratories                    *
*     Radiation Protection Sample Diagnostics Program                *
*                        9/26/02 12:25:14 AM                         *
**********************************************************************
*                                                                    *
* Analyzed by:                    Reviewed by:                       *
**********************************************************************
```

9/26/02 9/26/02

Customer : SANDERS, M (6135)
Customer Sample ID : 059923-003
Lab Sample ID : 20134218

Sample Description : 9978/1114-DW1-BH1-6-S
Sample Quantity : 711.000 gram
Sample Date/Time : 9/23/02 8:45:00 AM
Acquire Start Date/Time : 9/25/02 10:44:54 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	6.46E-001
RA-226	1.83E+000	4.84E-001	5.99E-001
PB-214	6.57E-001	1.00E-001	6.21E-002
BI-214	5.48E-001	9.14E-002	5.25E-002
PB-210	Not Detected	---	2.64E+001
TH-232	6.04E-001	2.95E-001	1.89E-001
RA-228	7.15E-001	1.36E-001	1.12E-001
AC-228	5.75E-001	1.21E-001	9.73E-002
TH-228	6.60E-001	4.00E-001	6.07E-001
RA-224	6.85E-001	1.65E-001	9.51E-002
PB-212	6.50E-001	9.59E-002	3.36E-002
BI-212	8.65E-001	2.76E-001	3.41E-001
TL-208	5.67E-001	9.98E-002	7.22E-002
U-235	Not Detected	---	2.10E-001
TH-231	Not Detected	---	1.03E+001
PA-231	Not Detected	---	1.22E+000
TH-227	Not Detected	---	3.16E-001
RA-223	Not Detected	---	1.85E-001
RN-219	Not Detected	---	3.30E-001
PB-211	Not Detected	---	7.39E-001
TL-207	Not Detected	---	1.12E+001
AM-241	Not Detected	---	3.92E-001
PU-239	Not Detected	---	3.69E+002
NP-237	Not Detected	---	2.00E+000
PA-233	Not Detected	---	5.12E-002
TH-229	Not Detected	---	2.06E-001

[Summary Report] - Sample ID: : 20134218

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---	3.04E-002
AG-110m	Not Detected	---	2.53E-002
BA-133	Not Detected	---	4.51E-002
BE-7	Not Detected	---	2.07E-001
CD-115	Not Detected	---	1.28E-001
CE-139	Not Detected	---	2.60E-002
CE-141	Not Detected	---	4.76E-002
CE-144	Not Detected	---	2.02E-001
CM-243	Not Detected	---	1.49E-001
CO-56	Not Detected	---	2.70E-002
CO-57	Not Detected	---	2.59E-002
CO-58	Not Detected	---	2.53E-002
CO-60	Not Detected	---	2.98E-002
CR-51	Not Detected	---	2.05E-001
CS-134	Not Detected	---	3.64E-002
CS-137	Not Detected	---	2.75E-002
EU-152	Not Detected	---	7.79E-002
EU-154	Not Detected	---	1.40E-001
EU-155	Not Detected	---	1.18E-001
FE-59	Not Detected	---	5.86E-002
GD-153	Not Detected	---	8.38E-002
HG-203	Not Detected	---	2.78E-002
I-131	Not Detected	---	3.01E-002
IR-192	Not Detected	---	2.38E-002
K-40	1.48E+001	2.02E+000	2.50E-001
MN-52	Not Detected	---	3.64E-002
MN-54	Not Detected	---	2.92E-002
MO-99	Not Detected	---	3.54E-001
NA-22	Not Detected	---	3.34E-002
NA-24	Not Detected	---	4.89E-001
ND-147	Not Detected	---	1.94E-001
NI-57	~~2.17E-001~~	~~8.31E-002~~	~~1.04E-001~~
RU-103	Not Detected	---	2.37E-002
RU-106	Not Detected	---	2.33E-001
SB-122	Not Detected	---	6.11E-002
SB-124	Not Detected	---	2.50E-002
SB-125	Not Detected	---	6.80E-002
SN-113	Not Detected	---	3.13E-002
SR-85	Not Detected	---	3.10E-002
TA-182	Not Detected	---	1.29E-001
TA-183	Not Detected	---	4.79E-001
TL-201	Not Detected	---	2.52E-001
Y-88	Not Detected	---	2.36E-002
ZN-65	Not Detected	---	8.63E-002
ZR-95	Not Detected	---	4.67E-002

NOT DETECTED
ICRS 9-16-02

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/26/02 2:07:15 AM

Analyzed by: 9/26/02 Reviewed by: 9/26/02

Customer : SANDERS, M (6135)
Customer Sample ID : 059924-003
Lab Sample ID : 20134219

Sample Description : 9978/1114-DW1-BH1-11-S
Sample Quantity : 906.000 gram
Sample Date/Time : 9/23/02 9:10:00 AM
Acquire Start Date/Time : 9/26/02 12:26:59 AM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	5.82E-001
RA-226	1.33E+000	4.34E-001	5.95E-001
PB-214	4.86E-001	7.74E-002	5.65E-002
BI-214	5.03E-001	8.23E-002	4.65E-002
PB-210	Not Detected	---	2.30E+001
TH-232	6.51E-001	3.10E-001	1.75E-001
RA-228	6.45E-001	1.22E-001	1.17E-001
AC-228	5.80E-001	1.45E-001	1.64E-001
TH-228	9.08E-001	3.71E-001	5.25E-001
RA-224	7.33E-001	1.62E-001	5.94E-002
PB-212	6.32E-001	9.21E-002	3.15E-002
BI-212	8.13E-001	2.61E-001	3.34E-001
TL-208	5.67E-001	9.57E-002	6.68E-002
U-235	Not Detected	---	1.92E-001
TH-231	Not Detected	---	9.16E+000
PA-231	Not Detected	---	1.12E+000
TH-227	Not Detected	---	2.76E-001
RA-223	Not Detected	---	1.70E-001
RN-219	Not Detected	---	2.92E-001
PB-211	Not Detected	---	6.57E-001
TL-207	Not Detected	---	1.05E+001
AM-241	Not Detected	---	3.40E-001
PU-239	Not Detected	---	3.44E+002
NP-237	Not Detected	---	1.85E+000
PA-233	Not Detected	---	4.66E-002
TH-229	Not Detected	---	1.97E-001

[Summary Report] - Sample ID: : 20134219

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---	2.84E-002
AG-110m	Not Detected	---	2.26E-002
BA-133	Not Detected	---	3.77E-002
BE-7	Not Detected	---	1.94E-001
CD-115	Not Detected	---	1.17E-001
CE-139	Not Detected	---	2.39E-002
CE-141	Not Detected	---	4.45E-002
CE-144	Not Detected	---	1.89E-001
CM-243	Not Detected	---	1.35E-001
CO-56	Not Detected	---	2.83E-002
CO-57	Not Detected	---	2.54E-002
CO-58	Not Detected	---	2.45E-002
CO-60	Not Detected	---	3.00E-002
CR-51	Not Detected	---	1.90E-001
CS-134	Not Detected	---	3.15E-002
CS-137	Not Detected	---	2.42E-002
EU-152	Not Detected	---	7.63E-002
EU-154	Not Detected	---	1.31E-001
EU-155	Not Detected	---	1.10E-001
FE-59	Not Detected	---	5.72E-002
GD-153	Not Detected	---	8.03E-002
HG-203	Not Detected	---	2.55E-002
I-131	Not Detected	---	2.78E-002
IR-192	Not Detected	---	2.23E-002
K-40	2.31E+001	3.06E+000	2.44E-001
MN-52	Not Detected	---	2.92E-002
MN-54	Not Detected	---	2.59E-002
MO-99	Not Detected	---	3.35E-001
NA-22	Not Detected	---	3.57E-002
NA-24	Not Detected	---	4.82E-001
ND-147	Not Detected	---	1.74E-001
NI-57	Not Detected	---	6.76E-002
RU-103	Not Detected	---	2.25E-002
RU-106	Not Detected	---	2.17E-001
SB-122	Not Detected	---	5.99E-002
SB-124	Not Detected	---	2.34E-002
SB-125	Not Detected	---	6.49E-002
SN-113	Not Detected	---	2.95E-002
SR-85	Not Detected	---	2.77E-002
TA-182	Not Detected	---	1.23E-001
TA-183	Not Detected	---	4.18E-001
TL-201	Not Detected	---	2.37E-001
Y-88	Not Detected	---	1.65E-002
ZN-65	Not Detected	---	8.13E-002
ZR-95	Not Detected	---	4.11E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/26/02 11:15:58 AM

Analyzed by: 9/26/02 Reviewed by: 9/26/02

Customer : SANDERS M (6135)
Customer Sample ID : 059931-001
Lab Sample ID : 20134207

Sample Description : 829/276-SP1-BH1-8-DU
Sample Quantity : 735.000 gram
Sample Date/Time : 9/24/02 2:00:00 PM
Acquire Start Date/Time : 9/26/02 9:35:43 AM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	7.37E-001
RA-226	2.02E+000	5.63E-001	7.28E-001
PB-214	9.18E-001	1.30E-001	6.03E-002
BI-214	7.84E-001	1.21E-001	4.84E-002
PB-210	Not Detected	---	2.80E+001
TH-232	1.00E+000	4.61E-001	1.90E-001
RA-228	9.91E-001	1.72E-001	1.23E-001
AC-228	9.13E-001	1.66E-001	9.81E-002
TH-228	1.21E+000	4.61E-001	6.42E-001
RA-224	1.05E+000	2.27E-001	8.66E-002
PB-212	1.04E+000	1.49E-001	3.75E-002
BI-212	1.15E+000	3.15E-001	3.65E-001
TL-208	8.85E-001	1.40E-001	8.07E-002
U-235	Not Detected	---	2.31E-001
TH-231	Not Detected	---	1.16E+001
PA-231	Not Detected	---	1.34E+000
TH-227	Not Detected	---	3.75E-001
RA-223	Not Detected	---	2.03E-001
RN-219	Not Detected	---	3.68E-001
PB-211	Not Detected	---	8.25E-001
TL-207	Not Detected	---	1.16E+001
AM-241	Not Detected	---	4.27E-001
PU-239	Not Detected	---	4.13E+002
NP-237	Not Detected	---	2.22E+000
PA-233	Not Detected	---	5.35E-002
TH-229	Not Detected	---	2.35E-001

[Summary Report] - Sample ID: : 20134207

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.57E-002
AG-110m	Not Detected	---------	2.75E-002
BA-133	Not Detected	---------	4.90E-002
BE-7	Not Detected	---------	2.29E-001
CD-115	Not Detected	---------	1.14E-001
CE-139	Not Detected	---------	2.89E-002
CE-141	Not Detected	---------	5.23E-002
CE-144	Not Detected	---------	2.25E-001
CM-243	Not Detected	---------	1.62E-001
CO-56	Not Detected	---------	3.01E-002
CO-57	Not Detected	---------	2.98E-002
CO-58	Not Detected	---------	2.85E-002
CO-60	Not Detected	---------	3.38E-002
CR-51	Not Detected	---------	2.22E-001
CS-134	Not Detected	---------	3.96E-002
CS-137	Not Detected	---------	2.96E-002
EU-152	Not Detected	---------	8.96E-002
EU-154	Not Detected	---------	1.64E-001
EU-155	Not Detected	---------	1.34E-001
FE-59	Not Detected	---------	6.20E-002
GD-153	Not Detected	---------	9.58E-002
HG-203	Not Detected	---------	2.95E-002
I-131	Not Detected	---------	3.19E-002
IR-192	Not Detected	---------	2.62E-002
K-40	1.71E+001	2.30E+000	2.65E-001
MN-52	Not Detected	---------	3.49E-002
MN-54	Not Detected	---------	3.09E-002
MO-99	Not Detected	---------	3.32E-001
NA-22	Not Detected	---------	3.61E-002
NA-24	Not Detected	---------	2.28E-001
ND-147	Not Detected	---------	1.95E-001
NI-57	Not Detected	---------	7.28E-002
RU-103	Not Detected	---------	2.55E-002
RU-106	Not Detected	---------	2.39E-001
SB-122	Not Detected	---------	5.81E-002
SB-124	Not Detected	---------	2.49E-002
SB-125	Not Detected	---------	7.27E-002
SN-113	Not Detected	---------	3.49E-002
SR-85	Not Detected	---------	3.38E-002
TA-182	Not Detected	---------	1.43E-001
TA-183	Not Detected	---------	4.70E-001
TL-201	Not Detected	---------	2.38E-001
Y-88	Not Detected	---------	2.49E-002
ZN-65	Not Detected	---------	9.51E-002
ZR-95	Not Detected	---------	4.93E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/26/02 7:40:07 AM

* Analyzed by: 9/26/02 Reviewed by: 10/1/02

Customer : SANDERS M (6135)
Customer Sample ID : LAB_CONTROL_SAMPLE_USING_CG-134
Lab Sample ID : 20134220

Sample Description : MIXED_GAMMA_STANDARD_CG-134
Sample Quantity : 1.000 Each
Sample Date/Time : 11/1/90 12:00:00 PM
Acquire Start Date/Time : 9/26/02 7:29:51 AM
Detector Name : LAB01
Elapsed Live/Real Time : 600 / 604 seconds

Comments:

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
BE-7	Not Detected	---	1.00E+026
NA-22	Not Detected	---	4.50E+003
NA-24	Not Detected	---	1.00E+026
K-40	Not Detected	---	1.34E+003
CR-51	Not Detected	---	1.00E+026
MN-52	Not Detected	---	1.00E+026
MN-54	Not Detected	---	5.15E+006
CO-56	Not Detected	---	2.96E+019
CO-57	Not Detected	---	1.11E+007
NI-57	Not Detected	---	1.00E+026
CO-58	Not Detected	---	8.61E+020
FE-59	Not Detected	---	1.00E+026
CO-60	7.93E+004	1.05E+004	9.20E+002
ZN-65	Not Detected	---	1.90E+008
SR-85	Not Detected	---	1.00E+026
Y-88	Not Detected	---	2.94E+014
ZR-95	Not Detected	---	1.00E+026
MO-99	Not Detected	---	1.00E+026
RU-103	Not Detected	---	1.00E+026
RU-106	Not Detected	---	9.72E+006
AG-108m	Not Detected	---	3.24E+002
AG-110m	Not Detected	---	2.87E+008
SN-113	Not Detected	---	1.01E+014
CD-115	Not Detected	---	1.00E+026
SB-122	Not Detected	---	1.00E+026
SB-124	Not Detected	---	1.00E+026
SB-125	Not Detected	---	2.38E+004
I-131	Not Detected	---	1.00E+026
BA-133	Not Detected	---	9.09E+002

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
CS-134	Not Detected	---------	1.51E+004
CS-137	6.80E+004	8.63E+003	3.65E+002
CE-139	Not Detected	---------	5.72E+011
CE-141	Not Detected	---------	1.00E+026
CE-144	Not Detected	---------	5.17E+007
ND-147	Not Detected	---------	1.00E+026
EU-152	Not Detected	---------	9.43E+002
GD-153	Not Detected	---------	1.11E+008
EU-154	Not Detected	---------	3.66E+003
EU-155	Not Detected	---------	4.26E+003
TA-182	Not Detected	---------	2.50E+014
TA-183	Not Detected	---------	1.00E+026
IR-192	Not Detected	---------	1.48E+020
TL-201	Not Detected	---------	1.00E+026
HG-203	Not Detected	---------	1.00E+026
TL-207	Not Detected	---------	2.34E+005
TL-208	Not Detected	---------	6.32E+004
PB-210	Not Detected	---------	9.80E+004
PB-211	Not Detected	---------	1.51E+004
BI-212	Not Detected	---------	2.99E+005
PB-212	Not Detected	---------	3.36E+004
BI-214	Not Detected	---------	5.79E+002
PB-214	Not Detected	---------	6.74E+002
RN-219	Not Detected	---------	6.71E+003
RA-223	Not Detected	---------	1.00E+026
RA-224	Not Detected	---------	1.86E+004
RA-226	Not Detected	---------	5.65E+003
TH-227	Not Detected	---------	2.57E+003
AC-228	Not Detected	---------	1.45E+003
RA-228	Not Detected	---------	2.46E+003
TH-228	Not Detected	---------	4.75E+005
TH-229	Not Detected	---------	1.26E+003
PA-231	Not Detected	---------	1.39E+004
TH-231	Not Detected	---------	4.04E+004
TH-232	Not Detected	---------	2.05E+003
PA-233	Not Detected	---------	5.84E+002
U-235	Not Detected	---------	1.38E+003
NP-237	Not Detected	---------	1.23E+004
U-238	Not Detected	---------	2.59E+003
PU-239	Not Detected	---------	2.32E+006
AM-241	8.91E+004	1.29E+004	1.91E+003
CM-243	Not Detected	---------	2.16E+003

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Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
Quality Assurance Report

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Report Date : 9/26/02 7:40:12 AM
QA File : C:\GENIE2K\CAMFILES\LCS1.QAF
Analyst : KICHAVE
Sample ID : 20134220
Sample Quantity : 1.00 Each
Sample Date : 11/1/90 12:00:00 PM
Measurement Date : 9/26/02 7:29:51 AM
Elapsed Live Time : 600 seconds
Elapsed Real Time : 604 seconds

Parameter	Mean	1S Error	New Value	< LU	SD	UD	BS >
AM-241 ACTIVITY	8.574E-002	3.464E-003	8.909E-002	<	:	:	>
CS-137 Activity	6.836E-002	1.361E-003	6.799E-002	<	:	:	>
CO-60 Activity	7.658E-002	3.463E-003	7.716E-002	<	:	:	>

Flags Key:
LU = Boundary Test (Ab = Above , Be = Below)
SD = Sample Driven N-Sigma Test (In = Investigate, Ac = Action)
UD = User Driven N-Sigma Test (In = Investigate, Ac = Action)
BS = Measurement Bias Test (In = Investigate, Ac = Action)

Reviewed by: _____ 10/1/02

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/26/02 7:36:45 AM

Analyzed by: 9/26/02 Reviewed by: 10/1/02

Customer : SANDERS M (6135)
Customer Sample ID : LAB_CONTROL_SAMPLE_USING_CG-134
Lab Sample ID : 20134221

Sample Description : MIXED_GAMMA_STANDARD_CG-134
Sample Quantity : 1.000 Each
Sample Date/Time : 11/01/90 12:00:00 PM
Acquire Start Date/Time : 9/26/02 7:26:30 AM
Detector Name : LAB02
Elapsed Live/Real Time : 600 / 604 seconds

Comments:

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
U-238	Not Detected	---------	3.94E+003
RA-226	Not Detected	---------	5.61E+003
PB-214	Not Detected	---------	5.75E+002
BI-214	Not Detected	---------	4.66E+002
PB-210	Not Detected	---------	2.67E+005
TH-232	Not Detected	---------	1.77E+003
RA-228	Not Detected	---------	1.77E+003
AC-228	Not Detected	---------	1.05E+003
TH-228	Not Detected	---------	4.27E+005
RA-224	Not Detected	---------	1.90E+004
PB-212	Not Detected	---------	3.36E+004
BI-212	Not Detected	---------	2.08E+005
TL-208	Not Detected	---------	5.50E+004
U-235	Not Detected	---------	1.55E+003
TH-231	Not Detected	---------	6.77E+004
PA-231	Not Detected	---------	1.22E+004
TH-227	Not Detected	---------	2.58E+003
RA-223	Not Detected	---------	1.00E+026
RN-219	Not Detected	---------	5.66E+003
PB-211	Not Detected	---------	1.26E+004
TL-207	Not Detected	---------	1.74E+005
AM-241	8.21E+004	1.22E+004	3.94E+003
PU-239	Not Detected	---------	2.60E+006
NP-237	Not Detected	---------	1.41E+004
PA-233	Not Detected	---------	5.09E+002
TH-229	Not Detected	---------	1.49E+003

[Summary Report] - Sample ID: : 20134221

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected	---	2.21E+002
AG-110m	Not Detected	---	2.27E+008
BA-133	Not Detected	---	7.80E+002
BE-7	Not Detected	---	1.00E+026
CD-115	Not Detected	---	1.00E+026
CE-139	Not Detected	---	6.26E+011
CE-141	Not Detected	---	1.00E+026
CE-144	Not Detected	---	5.81E+007
CM-243	Not Detected	---	1.88E+003
CO-56	Not Detected	---	2.28E+019
CO-57	Not Detected	---	1.28E+007
CO-58	Not Detected	---	6.47E+020
CO-60	8.15E+004	1.06E+004	7.25E+002
CR-51	Not Detected	---	1.00E+026
CS-134	Not Detected	---	1.22E+004
CS-137	7.02E+004	8.88E+003	3.35E+002
EU-152	Not Detected	---	1.09E+003
EU-154	Not Detected	---	2.49E+003
EU-155	Not Detected	---	4.92E+003
FE-59	Not Detected	---	1.00E+026
GD-153	Not Detected	---	1.61E+008
HG-203	Not Detected	---	1.00E+026
I-131	Not Detected	---	1.00E+026
IR-192	Not Detected	---	1.28E+020
K-40	Not Detected	---	1.06E+003
MN-52	Not Detected	---	1.00E+026
MN-54	Not Detected	---	3.76E+006
MO-99	Not Detected	---	1.00E+026
NA-22	Not Detected	---	3.47E+003
NA-24	Not Detected	---	1.00E+026
ND-147	Not Detected	---	1.00E+026
NI-57	Not Detected	---	1.00E+026
RU-103	Not Detected	---	1.00E+026
RU-106	Not Detected	---	8.00E+006
SB-122	Not Detected	---	1.00E+026
SB-124	Not Detected	---	1.00E+026
SB-125	Not Detected	---	1.98E+004
SN-113	Not Detected	---	8.64E+013
SR-85	Not Detected	---	1.00E+026
TA-182	Not Detected	---	1.84E+014
TA-183	Not Detected	---	1.00E+026
TL-201	Not Detected	---	1.00E+026
Y-88	Not Detected	---	2.73E+014
ZN-65	Not Detected	---	1.38E+008
ZR-95	Not Detected	---	1.00E+026

****

Sandia National Laboratories

Radiation Protection Sample Diagnostics Program

Quality Assurance Report

****

Report Date : 9/26/02 7:36:51 AM
QA File : C:\GENIE2K\CAMFILES\LCS2.QAF
Analyst : KICHAVE
Sample ID : 20134221
Sample Quantity : 1.00 Each
Sample Date : 11/01/90 12:00:00 PM
Measurement Date : 9/26/02 7:26:30 AM
Elapsed Live Time : 600 seconds
Elapsed Real Time : 604 seconds

Parameter	Mean	1S Error	New Value	< LU	SD	UD	BS >
AM-241 Activity	8.240E-002	3.922E-003	8.212E-002	<	:	:	>
CS-137 Activity	7.182E-002	3.734E-003	7.023E-002	<	:	:	>
CO-60 Activity	8.001E-002	5.095E-003	8.027E-002	<	:	:	>

Flags Key: LU = Boundary Test (Ab = Above , Be = Below)
SD = Sample Driven N-Sigma Test (In = Investigate, Ac = Action)
UD = User Driven N-Sigma Test (In = Investigate, Ac = Action)
BS = Measurement Bias Test (In = Investigate, Ac = Action)

Reviewed by: _____ 10/1/02

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
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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 1114, BUILDING 9978 DRYWELL

September 2005

United States Department of Energy
Sandia Site Office

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A DSS Site 1114 Soil Sample Data Validation Results

B DSS Site 1114 Risk Assessment

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ACRONYMS AND ABBREVIATIONS

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

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1.0 PROJECT BACKGROUND

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

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

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

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

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

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

2.0 DSS SITE 1114: BUILDING 9978 DRYWELL

2.1 Summary

The SNL/NM ER Project conducted an assessment of DSS Site 1114, the Building 9978 Drywell. 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 drywell present at the site. This report provides documentation that the site was specifically characterized, that no significant releases of contaminants to the environment occurred via the Building 9978 drywell, and that it does not pose a threat to human health or the environment under either the industrial or residential land-use scenarios. Current operations at the site are conducted in accordance with applicable laws and regulations that are protective of the environment.

Review and analysis of all relevant data for DSS Site 1114 indicate that concentrations of constituents of concern (COCs) at this site were found to be below applicable risk assessment action levels. Thus, a determination of Corrective Action Complete (CAC) without controls (NMED April 2004) is recommended for DSS Site 1114 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 1114 is located in the Coyote Test Field on federally owned land controlled by Kirtland Air Force Base (KAFB) and permitted to the U.S. Department of Energy. The site is located approximately 1,700 feet east of the intersection of Optical Range Road with Lovelace Road (Figure 2.2.1-1). The drywell is southeast of Building 9978 and consists of a vertically buried piece of metal culvert, 3 feet in diameter and 5.5 feet deep, filled with aggregate to within 1.5 feet of the surface (Figure 2.2.1-2). Construction details are based upon engineering drawings (SNL/NM September 1964), site inspections, and a backhoe excavation of the system. The system is still active and receives discharges from a sink and water fountain in Building 9978, approximately 21 feet to the northwest.

The surface geology at DSS Site 1114 is characterized by a veneer of aeolian sediments underlain by Upper Santa Fe Group alluvial fan deposits that interfinger with sediments of the ancestral Rio Grande west of the site. These deposits extend to, and probably far below, the water table at this site. The alluvial fan materials originated in the Manzanita Mountains east of DSS Site 1114, and typically consist of a mixture of silts, sands, and gravels that are poorly sorted, and exhibit moderately connected lenticular bedding. Individual beds range from 1 to 5 feet in thickness with a preferred east-west orientation and have moderate to low hydraulic conductivities (SNL/NM March 1996). Site vegetation primarily consists of desert grasses, shrubs, and cacti.

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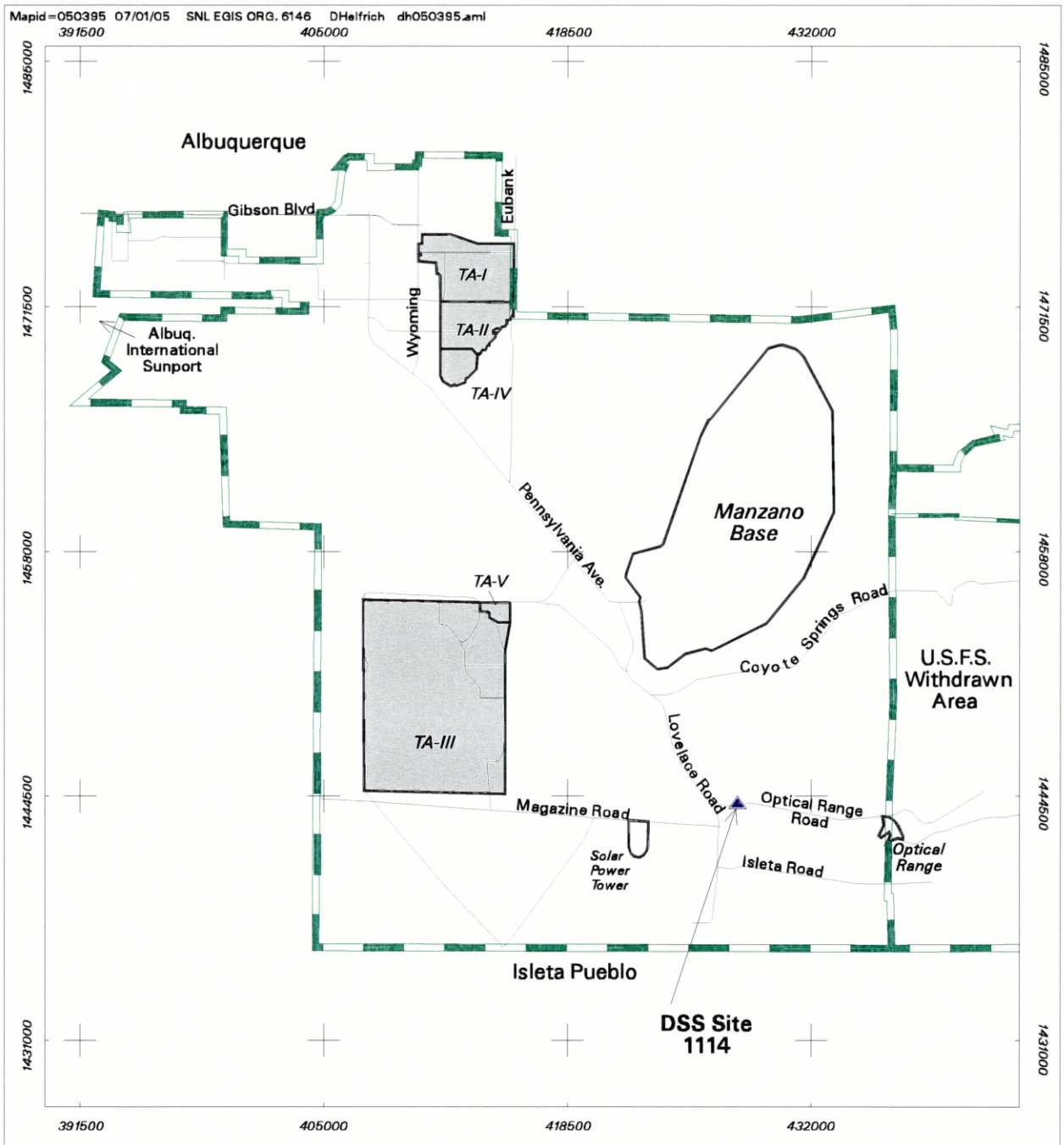


Legend

- DSS Site 1114
- Major Road
- KAFB Boundary
- USFS Withdrawn Area Boundary
- SNL Technical Area

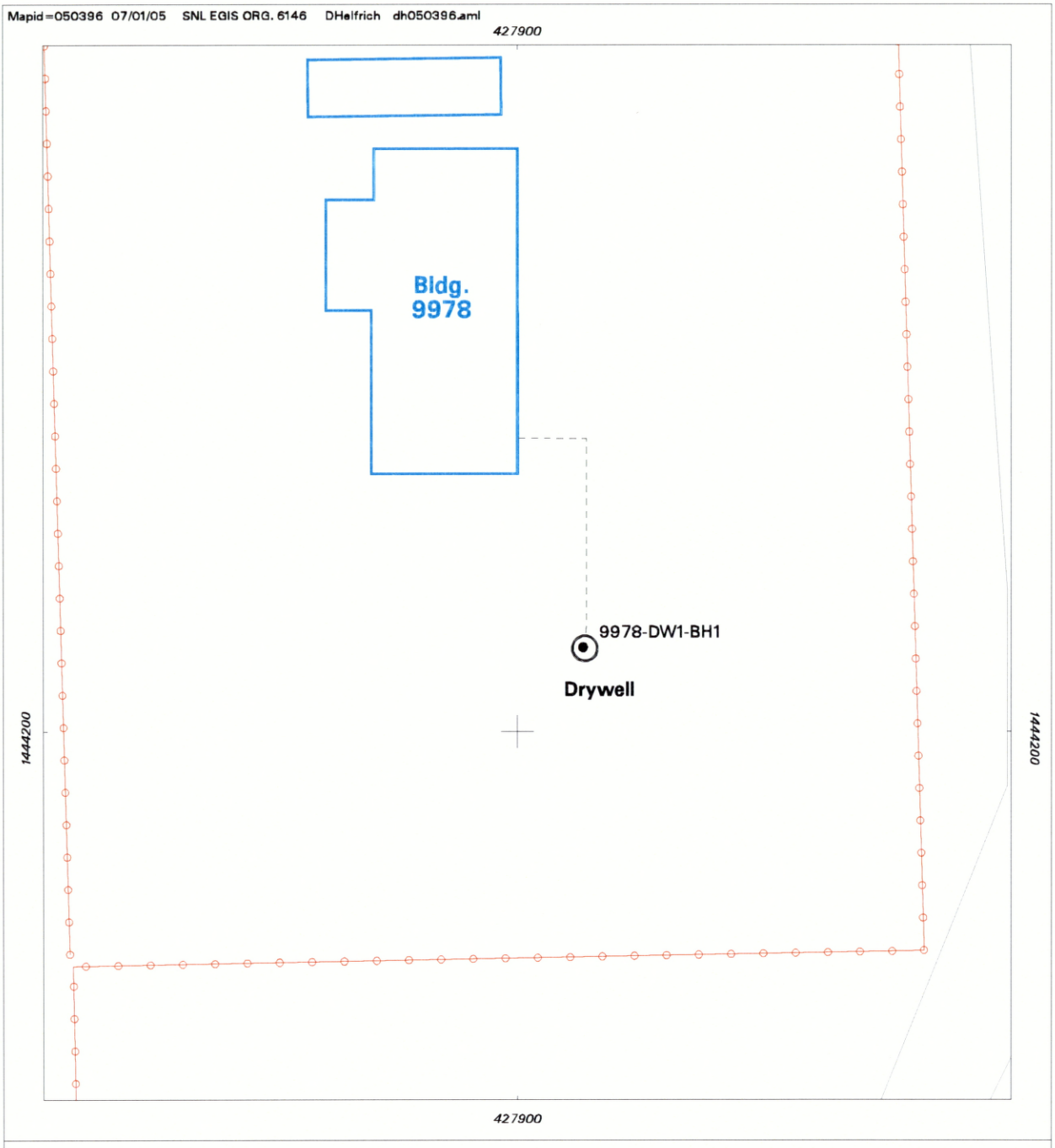
Figure 2.2.1-1
Location Map of Drain and Septic Systems (DSS) Site 1114, Bldg. 9978 Drywell, Coyote Test Field

0 4500 9000
Scale in Feet

0 1080 2160
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

840857.03010000 A251



Legend

- Borehole Location
- Drywell
- Drain Line
- Building / Structure
- Unpaved Road
- Fence

Figure 2.2.1-2
Site Map of Drain and Septic Systems (DSS) Site 1114, Bldg. 9978 Drywell, Coyote Test Field

0 10 20
Scale in Feet

0 2.4 4.8
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

840857.03010000 A252

The ground surface in the vicinity of the site is flat to very slightly sloping to the west. The closest major drainage is the Arroyo del Coyote, located approximately 1.3 miles northwest of the site. No perennial surface-water bodies are present in the vicinity of the site. Average annual rainfall in the SNL/NM and KAFB area, as measured at Albuquerque International Sunport, is 8.1 inches (NOAA 1990). Infiltration of precipitation is almost nonexistent as virtually all of the moisture subsequently undergoes evapotranspiration. The estimates of evapotranspiration rates for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL/NM March 1996).

The site lies at an average elevation of approximately 5,707 feet above mean sea level (SNL/NM April 2003). Depth to groundwater is unknown, but at the nearest monitoring well, KAFB-1903, 1,300 feet to the south, groundwater is found at 41 feet below ground surface (bgs) and a similar depth is assumed for DSS Site 1114. The specific groundwater flow direction is unknown for this area of KAFB, but is assumed to be generally west toward the Rio Grande (Van Hart June 2003). The nearest production wells to DSS Site 1114 are KAFB-4 and KAFB-11, which are approximately 5.9 and 5.2 miles to the northwest, respectively.

2.2.2 Operational History

Available information indicates that Building 9978 was constructed in 1971 (SNL/NM March 2003), and it is assumed the drywell was constructed at the same time. Building 9978 is currently used as a shop and storage facility to support the ER Project field operations. 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 a sink and water fountain inside Building 9978.

2.3 Land Use

2.3.1 Current Land Use

The current land use for DSS Site 1114 is industrial.

2.3.2 Future/Proposed Land Use

The projected future land use for DSS Site 1114 is industrial (DOE and USAF March 1996).

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3.0 INVESTIGATORY ACTIVITIES

3.1 Summary

Two assessment investigations have been conducted at this site. In March 2002, a backhoe was used to physically locate the buried drywell at the site (Investigation 1). In September 2002, subsurface soil samples were collected from one boring drilled through the center of, and beneath, the drywell (Investigation 2). Investigation 2 was required by the NMED/HWB to adequately characterize the site and was conducted in accordance with procedures presented in the SAP (SNL/NM October 1999) and FIP (SNL/NM November 2001) described in Chapter 1.0. These investigations are discussed in the following sections.

3.2 Investigation 1—Backhoe Excavation

On March 22, 2002, a backhoe was used to determine the location, dimensions, and depth of the DSS Site 1114 drywell. The drywell was found to consist of a vertically buried piece of metal culvert, 3 feet in diameter, 5.5 feet deep, and filled with aggregate to within 1.5 feet of the surface (Figure 3.2-1). No visible evidence of stained or discolored soil or odors indicating residual contamination was observed during the excavation. No samples were collected during the backhoe excavation at the site.

3.3 Investigation 2—Soil Sampling

Once the drywell was located, soil sampling was conducted in accordance with the rationale and procedures outlined in the SAP (SNL/NM October 1999) approved by the NMED. On September 23, 2002, soil samples were collected from one borehole drilled through the center of, and beneath, the drywell. The soil boring location is shown in Figure 2.2.1-2. Figure 3.3-1 shows soil samples being collected at DSS Site 1114. A summary of the borehole, sample depths, sample analyses, analytical methods, laboratories, and sample dates is presented in Table 3.3-1.

3.3.1 Soil Sampling Methodology

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

Once the sampling tube was retrieved from the borehole, the sample for volatile organic compound (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.

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Figure 3.2-1
The metal culvert side of the drywell exposed during the backhoe excavation of the Building 9978 system. The base of the drywell was located at 5.5 feet below ground surface. View to the northwest. March 22, 2002

Figure 3.3-1
Collecting soil samples with the Geoprobe™ at
DSS Site 1114, Building 9978 Drywell. View to the northwest. September 23, 2002

Table 3.3-1
Summary of Area Sampled, Analytical Methods, and Laboratories Used for
DSS Site 1114, Building 9978 Drywell 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
Drywell	1	6, 11	2	VOCs EPA Method 8260	GEL	09-23-02
	1	6, 11	2	SVOCs EPA Method 8270	GEL	09-23-02
	1	6, 11	2	PCBs EPA Method 8082	GEL	09-23-02
	1	6, 11	2	HE Compounds EPA Method 8330	GEL	09-23-02
	1	6, 11	2	RCRA Metals EPA Methods 6000/7000	GEL	09-23-02
	1	6, 11	2	Hexavalent Chromium EPA Method 7196A	GEL	09-23-02
	1	6, 11	2	Total Cyanide EPA Method 9012A	GEL	09-23-02
	1	6, 11	2	Gamma Spectroscopy EPA Method 901.1	RPSD	09-23-02
	1	6, 11	2	Gross Alpha/Beta Activity EPA Method 900.0	GEL	09-23-02

[a]EPA November 1986.
bgs = Below ground surface.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
ft = Foot (feet).
GEL = General Engineering Laboratories, Inc.
HE = High explosive(s).
PCB = Polychlorinated biphenyl.
RCRA = Resource Conservation and Recovery Act.
RPSD = Radiation Protection Sample Diagnostics Laboratory.
SVOC = Semivolatile organic compound.
VOC = Volatile organic compound.

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

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

3.3.2 Soil Sampling Results and Conclusions

Analytical results for the soil samples collected at DSS Site 1114 are presented and discussed in this section.

VOCs

VOC analytical results for the two soil samples collected from the drywell borehole 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. Two VOCs (2-butanone and toluene) were detected in the 11-foot-bgs sample. Only 2-butanone was detected in the 6-foot-bgs sample. Acetone and 1,2-dichloropropane were detected only in the trip blank (TB) associated with these samples. Even though 2-butanone and toluene were not detected in the associated TB, they are common laboratory contaminants and may not indicate soil contamination at this site.

SVOCs

Semivolatile organic compound (SVOC) analytical results for the two soil samples collected from the drywell borehole 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 these soil samples.

PCBs

Polychlorinated biphenyl (PCB) analytical results for the two soil samples collected from the drywell borehole 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 these soil samples.

HE Compounds

High explosive (HE) compound analytical results for the two soil samples collected from the drywell borehole 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 these soil samples.

Table 3.3.2-1
Summary of DSS Site 1114, Building 9978 Drywell
Confirmatory Soil Sampling, VOC Analytical Results
September 2002
(Off-Site Laboratory)

Sample Attributes			VOCs (EPA Method 8260[a]) (µg/kg)			
Record Number[b]	ER Sample ID	Sample Depth (ft)	Acetone	2-Butanone	1,2-Dichloropropane	Toluene
605730	9978-DW1-BH1-6-S	6	ND (3.59)	**5.24**	ND (0.49)	ND (0.347)
605730	9978-DW1-BH1-11-S	11	ND (3.45)	**8.56**	ND (0.471)	**0.376 J (0.98)**
Quality Assurance/Quality Control Sample (µg/L)						
605730	9978-DW1-TB	NA	**8.93**	ND (2.31)	**7.66**	ND (0.39)

Note: Values in **bold** represent detected analytes.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
BH = Borehole.
DSS = Drain and Septic Systems.
DW = Drywell.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
J ( ) = The reported value is greater than or equal to the MDL but is less than the practical quantitation limit, shown in parentheses.
MDL = Method detection limit.
µg/kg = Microgram(s) per kilogram.
µg/L = Microgram(s) per liter.
NA = Not applicable.
ND ( ) = Not detected above the MDL, shown in parentheses.
S = Soil sample.
TB = Trip blank.
VOC = Volatile organic compound.

Table 3.3.2-2
Summary of DSS Site 1114, Building 9978 Drywell
Confirmatory Soil Sampling, VOC Analytical MDLs
September 2002
(Off-Site Laboratory)

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

[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 1114, Building 9978 Drywell
Confirmatory Soil Sampling, SVOC Analytical Results
September 2002
(Off-Site Laboratory)

Sample Attributes			SVOCs (EPA Method 8270[a]) (µg/kg)
Record Number[b]	ER Sample ID	Sample Depth (ft)	
605730	9978-DW1-BH1-6-S	6	ND
605730	9978-DW1-BH1-11-S	11	ND

[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
BH = Borehole.
DSS = Drain and Septic Systems.
DW = Drywell.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
µg/kg = Microgram(s) per kilogram.
ND = Not detected.
S = Soil sample.
SVOC = Semivolatile organic compound.

Table 3.3.2-4
Summary of DSS Site 1114, Building 9978 Drywell
Confirmatory Soil Sampling, SVOC Analytical MDLs
September 2002
(Off-Site Laboratory)

Analyte	EPA Method 8270[a] Detection Limit (µg/kg)
Acenaphthene	8
Acenaphthylene	16.7
Anthracene	16.7
Benzo(a)anthracene	16.7
Benzo(a)pyrene	16.7
Benzo(b)fluoranthene	16.7
Benzo(g,h,i)perylene	16.7
Benzo(k)fluoranthene	16.7
4-Bromophenyl phenyl ether	34
Butylbenzyl phthalate	28.7
Carbazole	16.7
4-Chlorobenzenamine	167
bis(2-Chloroethoxy)methane	12.3
bis(2-Chloroethyl)ether	37.3
bis-Chloroisopropylether	11
4-Chloro-3-methylphenol	167
2-Chloronaphthalene	13.7
2-Chlorophenol	15.3
4-Chlorophenyl phenyl ether	19.7
Chrysene	16.7
o-Cresol	26
Dibenz[a,h]anthracene	16.7
Dibenzofuran	17
1,2-Dichlorobenzene	10
1,3-Dichlorobenzene	11.3
1,4-Dichlorobenzene	15.7
3,3'-Dichlorobenzidine	167
2,4-Dichlorophenol	20.7
Diethylphthalate	17.7
2,4-Dimethylphenol	167
Dimethylphthalate	18.3
Di-n-butylphthalate	24
Dinitro-o-cresol	167
2,4-Dinitrophenol	167
2,4-Dinitrotoluene	25.3
2,6-Dinitrotoluene	33.3
Di-n-octylphthalate	30.3
Diphenylamine	22.3
bis(2-Ethylhexyl) phthalate	30
Fluoranthene	16.7
Fluorene	4
Hexachlorobenzene	20

Refer to footnotes at end of table.

Table 3.3.2-4 (Concluded)
Summary of DSS Site 1114, Building 9978 Drywell
Confirmatory Soil Sampling, SVOC Analytical MDLs
September 2002
(Off-Site Laboratory)

Analyte	EPA Method 8270[a] Detection Limit (µg/kg)
Hexachlorobutadiene	12.7
Hexachlorocyclopentadiene	167
Hexachloroethane	22
Indeno(1,2,3-cd)pyrene	16.7
Isophorone	16
2-Methylnaphthalene	16.7
4-Methylphenol	33.3
Naphthalene	16.7
2-Nitroaniline	167
3-Nitroaniline	167
4-Nitroaniline	37
Nitrobenzene	20.3
2-Nitrophenol	17
4-Nitrophenol	167
n-Nitrosodipropylamine	22.7
Pentachlorophenol	167
Phenanthrene	16.7
Phenol	12.7
Pyrene	16.7
1,2,4-Trichlorobenzene	12.7
2,4,5-Trichlorophenol	17.3
2,4,6-Trichlorophenol	27.3

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

Table 3.3.2-5
Summary of DSS Site 1114, Building 9978 Drywell
Confirmatory Soil Sampling, PCB Analytical Results
September 2002
(Off-Site Laboratory)

Sample Attributes			PCBs (EPA Method 8082[a]) (µg/kg)
Record Number[b]	ER Sample ID	Sample Depth (ft)	
605730	9978-DW1-BH1-6-S	6	ND
605730	9978-DW1-BH1-11-S	11	ND

[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
BH = Borehole.
DSS = Drain and Septic Systems.
DW = Drywell.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
µg/kg = Microgram(s) per kilogram.
ND = Not detected.
PCB = Polychlorinated biphenyl.
S = Soil sample.

Table 3.3.2-6
Summary of DSS Site 1114, Building 9978 Drywell
Confirmatory Soil Sampling, PCB Analytical MDLs
September 2002
(Off-Site Laboratory)

Analyte	EPA Method 8082[a] Detection Limit (µg/kg)
Aroclor-1016	1
Aroclor-1221	2.82
Aroclor-1232	1.67
Aroclor-1242	1.67
Aroclor-1248	1
Aroclor-1254	0.5
Aroclor-1260	1

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

Table 3.3.2-7
Summary of DSS Site 1114, Building 9978 Drywell
Confirmatory Soil Sampling, HE Compound Analytical Results
September 2002
(Off-Site Laboratory)

Sample Attributes			HE (EPA Method 8330[a]) (µg/kg)
Record Number[b]	ER Sample ID	Sample Depth (ft)	
605730	9978-DW1-BH1-6-S	6	ND
605730	9978-DW1-BH1-11-S	11	ND

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

Table 3.3.2-8
Summary of DSS Site 1114, Building 9978 Drywell
Confirmatory Soil Sampling, HE Compound Analytical MDLs
September 2002
(Off-Site Laboratory)

Analyte	EPA Method 8330[a] Detection Limit (µg/kg)
2-Amino-4,6-dinitrotoluene	18.1
4-Amino-2,6-dinitrotoluene	34.1
1,3-Dinitrobenzene	34.1
2,4-Dinitrotoluene	55
2,6-Dinitrotoluene	48
HMX	48
Nitrobenzene	48
2-Nitrotoluene	24
3-Nitrotoluene	24
4-Nitrotoluene	24
RDX	48
Tetryl	22.1
1,3,5-Trinitrobenzene	29
2,4,6-Trinitrotoluene	48

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

RCRA Metals and Hexavalent Chromium

Resource Conservation and Recovery Act (RCRA) metals and hexavalent chromium analytical results for the two soil samples collected from the drywell borehole are summarized in Table 3.3.2-9. MDLs for the metals in soil analyses are presented in Table 3.3.2-10. None of the metal concentrations detected in the samples exceed the corresponding NMED-approved background concentrations.

Total Cyanide

Total cyanide analytical results for the two soil samples collected from the drywell borehole are summarized in Table 3.3.2-11. MDLs for the cyanide soil analyses are presented in Table 3.3.2-12. A low concentration of cyanide was detected in the 6-foot-bgs sample.

Table 3.3.2-9
Summary of DSS Site 1114, Building 9978 Drywell
Confirmatory Soil Sampling, Metals Analytical Results
September 2002
(Off-Site Laboratory)

Sample Attributes			Metals (EPA Methods 6000/7000/7196A[a]) (mg/kg)								
Record Number[b]	ER Sample ID	Sample Depth (ft)	Arsenic	Barium	Cadmium	Chromium	Chromium (VI)	Lead	Mercury	Selenium	Silver
605730	9978-DW1-BH1-6-S	6	3.82	158	0.111 J (0.476)	6.52	ND (0.0541 J)	4.45	0.00936	0.27 J (0.476)	ND (0.0859)
605730	9978-DW1-BH1-11-S	11	2.88	78.1	0.142 J (0.442)	5.91	ND (0.0537 J)	4.78	0.00154 J (0.00958)	0.248 J (0.442)	ND (0.0798)
Background Concentration—Coyote Test Field or Southwest Area Supergroups[c]			7	214	0.9	12.8	NC	11.8	<0.1	<1	<1

[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
[c]Dinwiddie September 1997.
BH = Borehole.
DSS = Drain and Septic Systems.
DW = Drywell.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
J ( ) = The reported value is greater than or equal to the MDL but is less than the practical quantitation limit, shown in parentheses.
J = Analytical result was qualified as an estimated value.
MDL = Method detection limit.
mg/kg = Milligram(s) per kilogram.
NC = Not calculated.
ND ( ) = Not detected above the MDL, shown in parentheses.
S = Soil sample.

Table 3.3.2-10
Summary of DSS Site 1114, Building 9978 Drywell
Confirmatory Soil Sampling, Metals Analytical MDLs
September 2002
(Off-Site Laboratory)

Analyte	EPA Method 6000/7000/7196A[a] Detection Limit (mg/kg)
Arsenic	0.183–0.197
Barium	0.059–0.0635
Cadmium	0.0423–0.0455
Chromium	0.143–0.153
Chromium (VI)	0.0537–0.0541
Lead	0.251–0.27
Mercury	0.0009–0.000942
Selenium	0.143–0.154
Silver	0.0798–0.0859

[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 1114, Building 9978 Drywell
Confirmatory Soil Sampling, Total Cyanide Analytical Results
September 2002
(Off-Site Laboratory)

Sample Attributes			Total Cyanide (EPA Method 9012A[a]) (mg/kg)
Record Number[b]	ER Sample ID	Sample Depth (ft)	
605730	9978-DW1-BH1-6-S	6	**0.0713 J (0.25)**
605730	9978-DW1-BH1-11-S	11	ND (0.0381)

Note: Values in **bold** represent detected analytes.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
BH = Borehole.
DSS = Drain and Septic Systems.
DW = Drywell.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
J ( ) = The reported value is greater than or equal to the MDL but is less than the practical quantitation limit, shown in parentheses.
MDL = Method detection limit.
mg/kg = Milligram(s) per kilogram.
ND ( ) = Not detected above the MDL, shown in parentheses.
S = Soil sample.

Table 3.3.2-12
Summary of DSS Site 1114, Building 9978 Drywell
Confirmatory Soil Sampling, Total Cyanide Analytical MDLs
September 2002
(Off-Site Laboratory)

Analyte	EPA Method 9012A[a] Detection Limit (mg/kg)
Total Cyanide	0.0381–0.0419

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

Radionuclides

Analytical results for the gamma spectroscopy analysis of the two soil samples collected from the drywell borehole 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 two soil samples collected from the drywell borehole 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, equipment blank (EB), and TB samples. Typically, samples were shipped to the laboratory in batches of up to 20 samples, so that any one shipment might contain samples from several sites. Aqueous EB samples were collected at an approximate frequency of 1 per 20 site samples. The EB samples were analyzed for the same analytical suite as the soil samples in that shipment. The analytical results for the EB samples appear only in 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.

Table 3.3.2-13
Summary of DSS Site 1114, Building 9978 Drywell
Confirmatory Soil Sampling, Gamma Spectroscopy Analytical Results
September 2002
(On-Site Laboratory)

Sample Attributes			Activity (EPA Method 901.1[a]) (pCi/g)							
Record Number[b]	ER Sample ID	Sample Depth (ft)	Cesium-137		Thorium-232		Uranium-235		Uranium-238	
			Result	Error[c]	Result	Error[c]	Result	Error[c]	Result	Error[c]
605731	9978-DW1-BH1-6-S	6	ND (0.0275)	--	0.604	0.295	**ND (0.21)**	--	ND (0.646)	--
605731	9978-DW1-BH1-11-S	11	ND (0.0242)	--	0.651	0.31	**ND (0.192)**	--	ND (0.582)	--
Background Activity—Coyote Test Field or Southwest Area Supergroups[d]			0.079	NA	1.01	NA	0.18	NA	1.4	NA

Note: Values in **bold** exceed background soil activities.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
[c]Two standard deviations about the mean detected activity.
[d]Dinwiddie September 1997. Cesium-137, thorium-232, and uranium-238 values from the Southwest Area Supergroup.
BH = Borehole.
DSS = Drain and Septic Systems.
DW = Drywell.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
MDA = Minimum detectable activity.
NA = Not applicable.
ND ( ) = Not detected above the MDA, shown in parentheses.
ND ( ) = Not detected, but the MDA (shown in parentheses) exceeds background activity.
pCi/g = Picocurie(s) per gram.
S = Soil sample.
-- = Error not calculated for nondetect results.

Table 3.3.2-14
Summary of DSS Site 1114, Building 9978 Drywell
Confirmatory Soil Sampling, Gross Alpha/Beta Activity Analytical Results
September 2002
(Off-Site Laboratory)

Sample Attributes			Activity (EPA Method 900.0[a]) (pCi/g)			
			Gross Alpha		Gross Beta	
Record Number[b]	ER Sample ID	Sample Depth (ft)	Result	Error[c]	Result	Error[c]
605730	9978-DW1-BH1-6-S	6	13.6	3.29	17.3	2.15
605730	9978-DW1-BH1-11-S	11	13.6	5.12	24.2	2.15
Background Activity[d]			17.4	NA	35.4	NA

[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
[c]Two standard deviations about the mean detected activity.
[d]Miller September 2003.
BH = Borehole.
DSS = Drain and Septic Systems.
DW = Drywell.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
NA = Not applicable.
pCi/g = Picocurie(s) per gram.
S = Soil sample.

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 in 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. Low concentrations of acetone and 1,2-dichloropropane were detected in the TB associated with these samples. However, these VOCs were not detected in the soil samples.

No duplicate or EB samples were collected at this site.

All laboratory data were reviewed and verified/validated according to 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 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 1114.

4.0 CONCEPTUAL SITE MODEL

The conceptual site model for DSS Site 1114, the Building 9978 Drywell, is based upon the COCs identified in the soil samples collected from beneath the drywell 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 1114 are VOCs, SVOCs, PCBs, HE compounds, RCRA metals, hexavalent chromium, cyanide, and radionuclides. Two VOCs (2-butanone and toluene) were detected in the samples collected at this site. No SVOCs, PCBs, HE compounds, or hexavalent chromium were detected in any of the soil samples collected. None of the eight RCRA metals were detected at concentrations above the approved maximum background concentrations for SNL/NM Coyote Test Field Supergroup soils (Dinwiddie September 1997). Cyanide was detected in one sample; however, because it does not have a quantified background screening concentration, it is unknown whether this COC exceeds background.

None of the four representative gamma spectroscopy radionuclides were detected at levels exceeding the corresponding background activity. However, the MDAs for both of the uranium-235 analyses exceeded the 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 drywell. Possible secondary release mechanisms include the uptake of COCs that may have been released into the soil beneath the drywell (Figure 4.2-1). The depth to groundwater at the site (approximately 41 feet bgs) reduces the migration of potential COCs into the groundwater system. The potential pathways to receptors include soil ingestion, dermal contact, and inhalation, which could occur as a result of receptor exposure to contaminated subsurface soil at the site. No intake routes through plant, meat, or milk ingestion are considered appropriate for either the industrial or residential land-use scenarios. Annex B provides additional discussion on the fate and transport of COCs at DSS Site 1114.

Table 4.2-1 summarizes the potential COCs for DSS Site 1114. All potential COCs were retained in the conceptual site model and evaluated in both the human health and ecological risk assessments. The current and future land use for DSS Site 1114 is industrial (DOE and USAF March 1996).

The potential human receptors at the site are considered to be an industrial worker and resident. The exposure routes for the receptors are dermal contact and ingestion/inhalation; however, these are realistic possibilities only if contaminated soil is excavated at the site. The major exposure route modeled in the human health risk assessment is soil ingestion for COCs. The inhalation pathway is included because of the potential to inhale dust and volatiles. The

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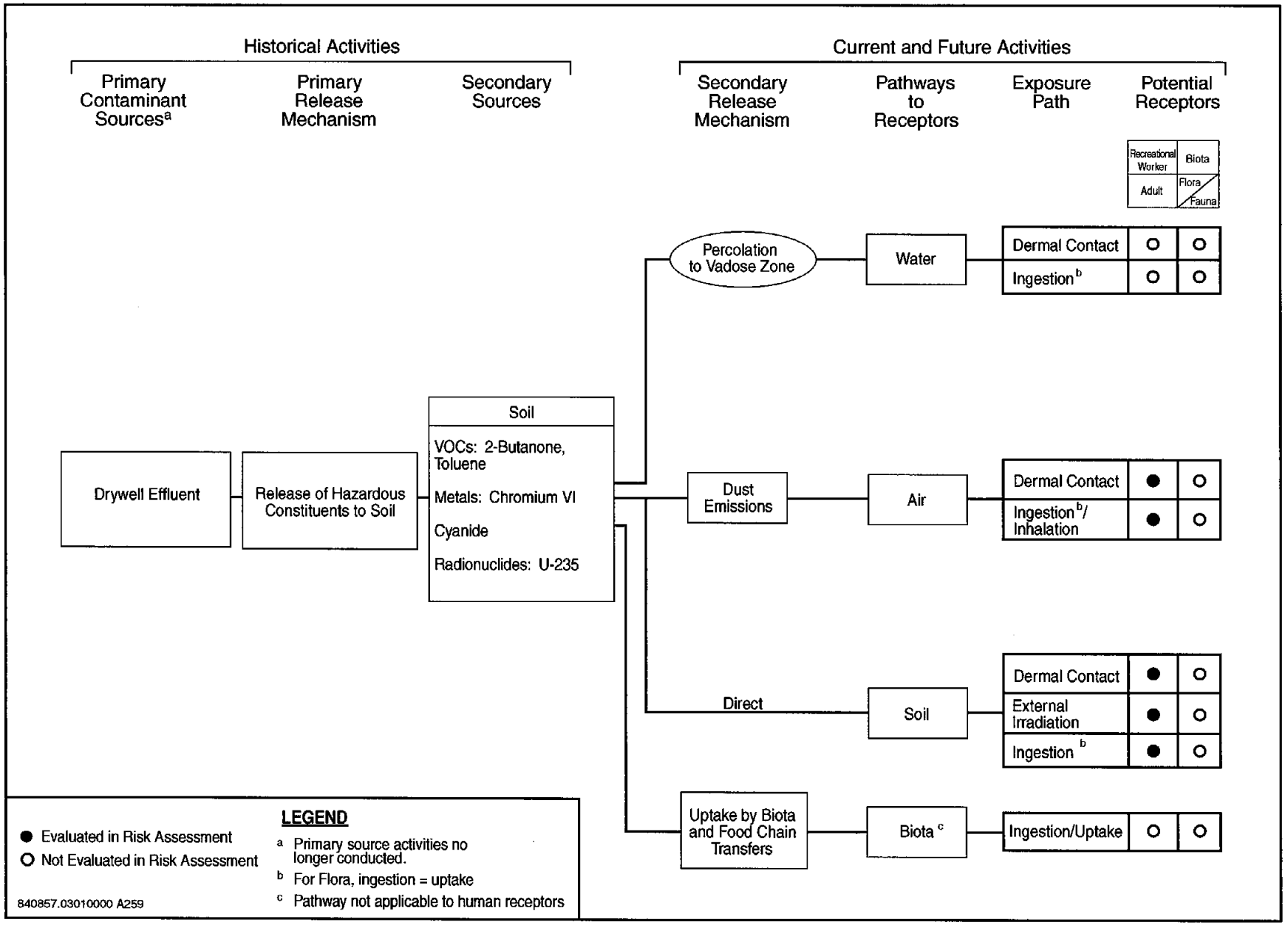

Figure 4.2-1

Conceptual Site Model Flow Diagram for DSS Site 1114, Building 9978 Drywell

Table 4.2-1
Summary of Potential COCs for DSS Site 1114, Building 9978 Drywell

COC Type		Number of Samples[a]	COCs Detected or with Concentrations Greater than Background or Nonquantified Background	Maximum Background Limit Coyote Test Field or Southwest Area Supergroups[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		2	2-Butanone	NA	0.0086	0.0069	2
		2	Toluene	NA	0.0004 J	0.0003	1
SVOCs		2	None	NA	NA	NA	None
PCBs		2	None	NA	NA	NA	None
HE Compounds		2	None	NA	NA	NA	None
RCRA Metals		2	None	NA	NA	NA	None
Hexavalent Chromium		2	None	NC	NA	NA	None
Cyanide		2	Cyanide	NC	0.0713 J	0.0452	1
Radionuclides (pCi/g)	Gamma Spectroscopy	2	Uranium-235	0.18	ND (0.21)	NC[f]	2
	Gross Alpha	2	None	NA	NA	NA	None
	Gross Beta	2	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.

dermal pathway is included because of the potential for receptors to be exposed to the contaminated soil.

No pathways to groundwater and no intake routes through flora or fauna are considered appropriate for either the industrial or residential land-use scenarios. Annex B provides additional discussion of the exposure routes and receptors at DSS Site 1114.

4.3 Site Assessment

Site assessment at DSS Site 1114 included risk assessments for both human health and ecological risk. This section briefly summarizes the site assessment results, and Annex B discusses the risk assessment performed for DSS Site 1114 in more detail.

4.3.1 Summary

The site assessment concluded that DSS Site 1114 poses no significant threat to human health under either the industrial or residential land-use scenarios. Ecological risks were found to be insignificant because no pathways exist.

4.3.2 Risk Assessments

Risk assessments were performed for both human health and ecological risk at DSS Site 1114. This section summarizes the results.

4.3.2.1 Human Health

DSS Site 1114 has been recommended for an industrial land-use scenario (DOE and USAF March 1996). Because 2-butanone, toluene, and uranium-235 were detected or have MDAs above background levels and cyanide was detected above its nonquantified background value and hexavalent chromium was not detected, it was necessary to perform a human health risk assessment analysis for the site, which included these COCs. Annex B provides a complete discussion of the risk assessment process, results, and uncertainties. The risk assessment process provides a quantitative evaluation of the potential adverse human health effects from constituents in the site's soil by calculating the hazard index (HI) and excess cancer risk for both industrial and residential land-use scenarios.

The HI calculated for the COCs at DSS Site 1114 is 0.00 for the industrial land-use scenario, which is less than the numerical standard of 1.0 suggested by risk assessment guidance (EPA 1989). The incremental HI risk, determined by subtracting risk associated with background from potential nonradiological COC risk (without rounding), is 0.00. The excess cancer risk for DSS Site 1114 COCs is 6E-11 for an industrial land-use scenario. NMED guidance states that cumulative excess lifetime cancer risk must be less than 1E-5 (Bearzi January 2001); thus the excess cancer risk for this site is below the suggested acceptable risk value. The estimated incremental excess cancer risk is 5.85E-11. Both the incremental HI and excess cancer risk are below NMED guidelines.

The HI calculated for the COCs at DSS Site 1114 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 1114 COCs is 1E-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 1.25E-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 U.S. Environmental Protection Agency (EPA) guidance values; the estimated TEDE is 4.3E-3 millirem (mrem)/year (yr) for the industrial land-use scenario. This value is much lower than the EPA's numerical guidance of 15 mrem/yr (EPA 1997a). The corresponding estimated incremental excess cancer risk value is 3.8E-8 for the industrial land-use scenario. Furthermore, the incremental TEDE for the residential land-use scenario that results from a complete loss of institutional controls is 1.1E-2 mrem/yr with an associated estimated incremental excess cancer risk of 1.1E-7. The guideline for this scenario is 75 mrem/yr (SNL/NM February 1998). Therefore, DSS Site 1114 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 1114, Building 9978 Drywell Carcinogens

Scenario	Nonradiological Risk	Radiological Risk	Total Risk
Industrial	5.85E-11	3.8E-8	3.8E-8
Residential	1.25E-10	1.1E-7	1.1E-7

DSS = Drain and Septic Systems.

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

4.3.2.2 Ecological

An ecological assessment that corresponds with the procedures in the EPA's Ecological Risk Assessment Guidance for Superfund (EPA 1997b) also was performed as set forth by the NMED Risk-Based Decision Tree in the "RPMP [RCRA Permits Management Program] Document Requirement Guide" (NMED March 1998). An early step in the evaluation compared COC concentrations and identified potentially bioaccumulative constituents (see Annex B, 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 1114 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 1114 poses insignificant risk to human health under both the industrial and residential land-use scenarios, a baseline human health risk assessment is not required for this site.

4.4.2 Ecological

Because the results of the ecological risk assessment summarized in Section 4.3.2.2 indicate that no complete pathways exist at DSS Site 1114, 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 1114 for the following reasons:

- The soil has been sampled for all potential COCs.
- No COCs are present in the soil at levels considered hazardous to human health for either an industrial or residential land-use scenario.
- None of the COCs warrant ecological concern because no complete pathways exist at the site.

5.2 Criterion

Based upon the evidence provided in Section 5.1, a determination of CAC without controls (NMED April 2004) is recommended for DSS Site 1114. 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 1114
Soil Sample Data Validation Results

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Page 1 of 2

Internal Lab

Batch No. N/A

SMO Use

AR/COC 605730

Dept. No./Mail Stop:	6135/1089	Date Samples Shipped:	9-23-02	Project/Task No.:	7223.02.03.02
Project/Task Manager:	~~Mike Sanders~~ Sue Collins	Carrier/Waybill No.	13762	SMO Authorization:	
Project Name:	DSS soil sampling	Lab Contact:	Edie Kent 803-556-8171	Contract #:	PO 21671
Record Center Code:	ER/1295/DSS/DAT	Lab Destination:	GEL		
Logbook Ref. No.:	ER 090	SMO Contact/Phone:	Pam Puissant/505-844-3185		
Service Order No.	CF032-073	Send Report to SMO:	Wendy Palencia/505-844-3132		
Location	Tech Area				
Building 6969,9978	Room				

Waste Characterization -Send preliminary/copy report to:

Released by COC No.:

Validation Required

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

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
059917-001	6969/1004-DF1-BH1- 8 -S	8'	1004	9-20-02/0910	S	AS	4oz	4c	G	SA	VOC(8260B)	
059918-001	6969/1004-DF1-BH1- 13 -S	13'		0925	S	AS	4oz	4c	G	SA	VOC(8260B)	
059917-002	6969/1004-DF1-BH1- 8 -S	8'		0915	S	AG	500ml	4c	G	SA	see below for parameter	
059918-002	6969/1004-DF1-BH1- 13 -S	13'		0930	S	AG	500ml	4c	G	SA	see below for parameter	
059919-001	6969/1004-DF1-BH2- 8 -S	8'		1025	S	AS	4oz	4c	G	SA	VOC(8260B)	
059920-001	6969/1004-DF1-BH2- 13 -S	13'		1045	S	AS	4oz	4c	G	SA	VOC(8260B)	
059919-002	6969/1004-DF1-BH2- 8 -S	8'		1030	S	AG	500ml	4c	G	SA	see below for parameter	
059920-002	6969/1004-DF1-BH2- 13 -S	13'		1050	S	AG	500ml	4c	G	SA	see below for parameter	
059921-001	6969/1004-DF1-BH3- 8 -S	8'		1120	S	AS	4oz	4c	G	SA	VOC(8260B)	
059922-001	6969/1004-DF1-BH3- 13 -S	13'		1140	S	AS	4oz	4c	G	SA	VOC(8260B)	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☑ Normal ☐ Rush

Return Samples By: Level of Rush:

Sample Tracking Date Entered(mm/dd/yy): 09/25/02 Entered by: RL

Smo Use QC Inits.

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

*Send report to:
Mike Sanders
Dept6135/MS/1089
Phone/505-284/2478

SVOC(8270C_ PCB(8082)HE(8330) Total Cyanide(9010) Cr6+(7197) RCRA metals(6020, 7000,7471)Gross alpha-beta(900)

*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	J.Lee			Weston/6135/505-284-3309
	~~J.W.Gibson~~			~~MDM/6130/505-845-5867~~
	G.Quintana			Shaw/6135/505-284-3309

1.Relinquished by		Org. 6135	Date 9/23/02	Time 1005	4.Relinquished by	Org.	Date Time
1. Received by		Org. 6137	Date 9/23/02	Time 1005	4. Received by	Org.	Date Time
2.Relinquished by		Org. 6132	Date 9/23/02	Time 1100	5.Relinquished by	Org.	Date Time
2. Received by		Org.	Date	Time	5. Received by	Org.	Date Time
3.Relinquished by		Org.	Date	Time	6.Relinquished by	Org.	Date Time
3. Received by		Org.	Date	Time	6. Received by	Org.	Date Time

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

AR/COC 605730

Project Name:		Project/Task Manger:		Project/Task No.: 7220.02.03.02								
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 (hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab use Lab Sample ID
059921-002	6969/1004-DF1-BH3- 8 -S	8'	1004	9-20-02/1125	S	AG	500ml	4c	G	SA	see below for parameter	
059922-002	6969/1004-DF1-BH3- 13 -S	13'	1004	↓ 1145	S	AG	500ml	4c	G	SA	see below for parameter	
059923-001	9978/1114-DW1-BH1- 6 -S	6'	1114	9-23-02/0855	S	AS	4oz	4c	G	SA	VOC(8260B)	
059924-001	9978/1114-DW1-BH1- 11 -S	11'	↑	0900	S	AS	4oz	4c	G	SA	VOC(8260B)	
059923-002	9978/1114-DW1-BH1- 6 -S	6'		0840	S	AG	500ml	4c	G	SA	see below for parameter	
059924-002	9978/1114-DW1-BH1- 11 -S	11'		0905	S	AG	500ml	4c	G	SA	see below for parameter	
059925-001	9978/1114-DW1-TB	N/A	↓	↓ 0915	DIW	G	3x40ml	HCL	G	TB	VOC(8260B)	

Abnormal Conditions on Receipt

Recipient Initials

LAB USE

Data Validation Qualifiers and Descriptive Flags*

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

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

Descriptive Flags

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

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

Updated: September 14, 1999

Beginning January 2000

Application of Data Validation Qualifiers to Data Tables

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

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

Sample Findings Summary

Site: DSS soil sampling **ARCOC:** 505670, 605730 **Data:** Organic, inorganic and Radiochemistry

Sample ID	VOC(8260)	67-64-1 (acetone)	SVOC(8270)	PCBs (8082)	All HE(8330) compounds	Metals	7440-39-3 (barium)	7440-47-3 (chromium)	7782-49-2 (selenium)	General Chemistry	18540-29-9 (hexavalent chromium)	Radiochemistry
059813-001 6530/1027-SP1-BH1-20-S		5.29U,B1										
059814-001 6530/1027-SP1-BH1-25-S		8.04U,B1										
059922-001 6969/1004-DF1-BH3-13-S		4.81U,B1										
059856-004 6530/1027-SP2-EB			All QC acceptance criteria were met. No data will be qualified.	All QC acceptance criteria were met. No data will be qualified.	P2							All QC acceptance criteria were met. No data will be qualified.
059856-006 6530/1027-SP2-EB											R,HT	
059856-007 6530/1027-SP2-EB							J,B3	J,B				
059813-002 6530/1027-SP1-BH1-20-S												
059814-002 6530/1027-SP1-BH1-25-S									J,B3		UJ,A2	
059815-002 6530/1027-SP2-BH1-15-S									J,B3		UJ,A2	
059816-002 6530/1027-SP2-BH1-20-S									J,B3		UJ,A2	
059917-002 6969/1004-DF1-BH1-8-S									J,B3		UJ,A2	
059918-002 6969/1004-DF1-BH1-13-S									J,B3		UJ,A2	
059919-002 6969/1004-DF1-BH2-8-S									J,B3		J,A2	
059920-002 6969/1004-DF1-BH2-13-S									J,B3		J,A2	
059921-002 6969/1004-DF1-BH3-8-S									J,B3		UJ,A2	
059922-002 6969/1004-DF1-BH3-13-S									J,B3		UJ,A2	
059923-002 9978/1114-DW1-BH1-8-S									J,B3		UJ,A2	
059924-002 9978/1114-DW1-BH1-11-S									J,B3		UJ,A2	

Validated By: K Mak **Date:** 11/22/02

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MEMORANDUM

DATE: 11/20/02

TO: File

FROM: Linda Thal

SUBJECT: Organic Data Review and Validation - SNL
Site: DSS soil sampling
ARCOC # 605670, -730 GEL SDG # 67601 and 67608
Project/Task No. 7223.02.03.02

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

Summary

The samples were prepared and analyzed with approved procedures using methods SW-846 8260A/B (VOC), 8270C (SVOC), 8082 (PCBs) and 8330 (HEs). Problems were identified with the data package that resulted in the qualification of data.

VOC Batch # 203934 (Sample 67601-001 through –012)
Acetone was detected in the trip blanks (TB) (67608-001 and –004) at a value > RL. Sample 67601-001 and –002 had acetone values > RL but < 10X the TB value and will be qualified "U, B1" at the reported value. Sample 67601-010 had an acetone value > DL, < RL and < 10X TB value and will be qualified "U, B1" at the RL.

HE - Batch # 204151 (Sample 67608-007)
No MS/MSD, LCS/LCSD or replicate was extracted with this batch. As there is no measure of precision all the sample results will be qualified "P2".

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

Holding Times/Preservation

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

Calibration

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

VOC Batch # 203934

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

VOC Batch # 204910
Carbon disulfide had %D > 20% but < 40% in the CCV preceding the samples. All associated sample results were non-detect and no data will be qualified.

SVOC Batch # 203764 and 204261
The CCVs preceding the samples had a %D > 20% but < 40% for several compounds (see DV worksheet). All associated sample results were non-detect and no data will be qualified.

Blanks

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

VOC Batch # 203934 (Sample 67601-001 through –012)
Both TBs (67608-001 and –004) had a 1,2-dichloropropane value > RL. All associated samples were non-detect and no data will be qualified.

Surrogates

All Analysis: All surrogate acceptance criteria were met.

Internal Standards (ISs)

All Analysis: All internal standard acceptance criteria were met.

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

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

VOC Batch # 204910
No MS/MSD was reported for this batch. The LCS/LCSD met all QC acceptance criteria for accuracy and precision. No data will be qualified.

SVOC Batch # 203764 and 204261
Several compounds (see DV worksheet) had %R < QC acceptance criteria (75 – 125%). Using professional judgment, no data will be qualified.

SVOC Batch # 204261
It should be noted that only 500ml (DF=2x) of sample was used for the MS/MSD. It is not known what affect this would have on the extraction procedure and no data will be qualified.

PCB Batch # 203726
It should be noted that the sample used for the MS/MSD was of similar matrix from another SNL SDG. No data will be qualified.

HE - Batch 204142
It should be noted that the sample used for the MS/MSD was of similar matrix from another SNL SDG. No data will be qualified.

HE - Batch 204151

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

Laboratory Control Samples (LCS/LCSD) Analysis

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

VOC Batch # 204910 and 203934
The QC acceptance criteria for the LCS were met by the successful analysis of a second source CCV.
It should be noted that no compound was associated with internal standard 1,4-dichlorobenzene-d4. No data will be qualified as a result.

SVOC Batch # 203764 and 204261
It should be noted that no compound was associated with internal standard perylene-d12. No data will be qualified as a result.

HE - Batch # 204151 (Sample 67608-007 (EB))
The LCS %R failed QC acceptance criteria for several compounds. However, a MS was performed on sample 67608-007 and all the %R were in criteria with the exception of tetryl that failed high. Sample 67608-007 was non-detect for all HE compounds, as were all the soils that were associated with it. There was no more sample remaining to perform a re-extraction. Using professional judgment, no data will be qualified.

Detection Limits/Dilutions

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

Confirmation Analyses

VOC and SVOC: No confirmation analyses required.

PCB: All confirmation acceptance criteria were met.

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

Other QC

VOC: A trip blank and equipment blank were submitted on the ARCOC. No field duplicate pair was submitted on the ARCOC. It should be noted that vinyl acetate is on the TAL for soils but not for waters.

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

No raw data was submitted with the package.

No other specific issues were identified which affect data quality.

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MEMORANDUM

DATE: 11/21/02

TO: File

FROM: Linda Thal

SUBJECT: Inorganic Data Review and Validation - SNL
Site: DSS soil sampling
ARCOC # 605670, 605730
GEL SDG # 67601 and 67608
Project/Task No. 7223.02.03.02

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

Summary

The samples were prepared and analyzed with approved procedures using methods SW-846 6010 (ICP-AES metals), SW-846 7471/7470 (Hg), SW-846 9012A (total CN) and SW-846 7196A (hexavalent chromium).

Problems were identified with the data package that resulted in the qualification of data.

ICP-AES – Metals Batch # 203818 (Samples 67601-013 through –024)
Selenium was detected in the ICB/CCB at a value > DL but < RL. The sample results for 67601-014 through –024 were detect, < 5X the blank value and will be qualified "J, B3".

ICP-AES – Metals Batch # 204455 (Sample 67608 –010)
Barium was detected in the CCB and chromium in the MB at values > DL but < RL. Sample 67608 –010 results were detect, < 5X the blank values and will be qualified "J, B3" for barium and "J, B" for chromium.

Hexavalent Chromium - Batch #205618 (Samples 67601-013 through –024)
The MS %R (63/71%) were < QC acceptance criteria (75-125%). Samples 67601-019 and –020 were detect and will be qualified "J, A2". All remaining samples were non-detect and will be qualified "UJ, A2".

Hexavalent Chromium – Batch # 204193 (Sample 67608-009)
Sample 67608-009 was received by the laboratory and analyzed after 2X the holding time had expired. The sample result was non-detect and will be qualified "R, HT".

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

Holding Times/Preservation

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

Calibration

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

Blanks

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

ICP-AES – Metals Batch # 203818 (Samples 67601-013 through –024)
Selenium was detected in the ICB/CCB at a value > DL but < RL. Sample 67601-013 was non-detect and will not be qualified.

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

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

ICP-AES – Metals Batch # 204455 (Sample 67608 –010)
Cadmium and arsenic were detected in the CCB at values > DL but < RL. The sample results were non-detect and no data will be qualified.

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

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

Matrix Spike (MS) Analysis

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

ICP-AES – Metals Batch # 203818 (Samples 67601-013 through –024)
The sample used for the MS was of similar matrix from another SNL SDG. No data will be qualified as a result.

ICP-AES – Metals Batch # 204455 (Sample 67608 –010)
The sample used for the MS was of similar matrix from another SNL SDG. No data will be qualified as a result.

CVAA-Hg Batch # 204420 (Sample 67608--008)
The sample used for the MS was of similar matrix from another SNL SDG. No data will be qualified as a result.
Total Cyanide - Batch #204703 (Samples 67601-013 and -014)
The sample used for the MS was of similar matrix from another SNL SDG. No data will be qualified as a result.

Total Cyanide - Batch #205981 (Samples 67608-008)
The sample used for the MS was of similar matrix from another SNL SDG. No data will be qualified as a result.

Replicate Analysis

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

ICP-AES -- Metals Batch # 203818 (Samples 67601-013 through -024)
The sample used for the replicate was of similar matrix from another SNL SDG. No data will be qualified as a result.

ICP-AES -- Metals Batch # 204455 (Sample 67608 -010)
The sample used for the replicate was of similar matrix from another SNL SDG. No data will be qualified as a result.

CVAA-Hg Batch # 204420 (Sample 67608--008)
The sample used for the replicate was of similar matrix from another SNL SDG. No data will be qualified as a result.

Total Cyanide - Batch #204703 (Samples 67601-013 and -014)
The sample used for the replicate was of similar matrix from another SNL SDG. No data will be qualified as a result.

Total Cyanide - Batch #205981 (Samples 67608-008)
The sample used for the replicate was of similar matrix from another SNL SDG. No data will be qualified as a result.

ICP Interference Check Sample (ICS)

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

All Other Analyses: No ICS required.

ICP Serial Dilution

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

ICP-AES -- Metals Batch # 203818 (Samples 67601-013 through -024)
The sample used for the serial dilution was of similar matrix from another SNL SDG. No data will be qualified as a result.

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

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

All Other Analyses: No serial dilutions required.

Detection Limits/Dilutions

All Analyses: All detection limits were properly reported.

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

All Other Analyses: No dilutions were performed.

Other QC

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

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

No raw data was submitted with the package.

No other specific issues were identified which affect data quality.

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MEMORANDUM

DATE: November 22, 2002

TO: File

FROM: Linda Thal

SUBJECT: Radiochemical Data Review and Validation - SNL
Site: DSS soil sampling
ARCOC 605670 and 605730
GEL SDG # 67601 and 67608 Project/Task No. 7223.02.03.02

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM ER Project AOP 00-03.

Summary

All samples were prepared and analyzed with approved procedures using method EPA 900.0 (Gross Alpha/Beta). No problems were identified with the data package that resulted in the qualification of data.

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

Holding Times/Preservation

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

Calibration

All Analyses: The case narrative stated the instruments used were properly calibrated.

Blanks

No target analytes were detected in the method blank or equipment blank at concentrations > the associated MDAs.

Matrix Spike (MS) Analysis

The MS/MSD analyses met all QC acceptance criteria.

Batch # 204950 (Sample 67608-011)
The sample used for the MS/MSD was of similar matrix from another SNL SDG. No data will be qualified.

Laboratory Control Sample (LCS) Analysis

The LCS analyses met all QC acceptance criteria.

Replicates

The replicate analyses met all QC acceptance criteria.

Batch # 204950 (Sample 67608-011)
The sample used for the replicate was of similar matrix from another SNL SDG. No data will be qualified.

Tracer/Carrier Recoveries

No tracer/carrier required.

Negative Bias

All sample results met negative bias QC acceptance criteria.

Detection Limits/Dilutions

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

Other QC

An equipment blank was submitted on the ARCOC. No field blank or field duplicate were submitted on the ARCOC.

No raw data was submitted with the package.

No other specific issues were identified which affect data quality.

Data Validation Summary

Site/Project: OSS Soil Sampling Project/Task #: 7223.02.03.02 # of Samples: 24 & 11 Matrix: Soils & H2O

AR/COC #: 605670 605730 Laboratory Sample IDs: 67601 - 001 thru - 024

Laboratory: GEL 67608 - 001 thru - 011

Laboratory Report #: 67601

QC Element	Analysis									
	Organics				Inorganics				RAD	Hexavalent Chromium / Other
	VOC	SVOC	Pesticide/ PCB	HPLC (HE)	ICP/AES	GFAA/ AA	CVAA (Hg)	CN		
1. Holding Times/Preservation	V, I	✓	✓	✓	✓	NA	✓	✓	✓	✓ / R, HT
2. Calibrations	✓ / ✓	✓	✓	✓	✓		✓	✓	✓	✓
3. Method Blanks	U, B, ✓	✓	✓	✓	J, B3 / J, B, B3		✓	✓	✓	✓
4. MS/MSD	✓	✓	✓	✓ / P2	✓		✓	✓	✓	J, UJ, A2 / ✓
5. Laboratory Control Samples	✓	✓	✓		✓		✓	✓	✓	✓
6. Replicates					✓		✓	✓	✓	✓
7. Surrogates	✓	✓	✓	✓						NA
8. Internal Standards	✓	✓								
9. TCL Compound Identification	✓	✓								
10. ICP Interference Check Sample					✓					
11. ICP Serial Dilution					✓					
12. Carrier/Chemical Tracer Recoveries									NA	
13. Other QC	FB TB	FB	FB	FB	FB		FB	FB	FB	FB

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: _____ Date: 11.22.02

Holding Time and Preservation

Site/Project: DSS Soil Sampling AR/COC #: 605670 605730 Laboratory Sample IDs: 67601 - 001 thru - 024

Laboratory: GEL Laboratory Report #: 67601 67608 - 001 thru - 011

# of Samples: 24 & 11 Matrix: Soil & H2O

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

Reviewed By: [signature] Date: 11.21.02

WS lot 2 soils

Volatile Organics (SW 846 Method 8260)

Site/Project: DOS Soil Sampling AR/COC #: 605670, 605730 # of Samples: 12 Matrix: Soils

Laboratory: GEL Laboratory Report #: 67601 Laboratory Sample IDs: 67601-001 thru -012

Methods: SW-846 8260 A Batch #s: 203934

67608

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF >.05	Calib. RSD/ R^2 <20%/ 0.99	CCV %D 20% 1 2 3	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	67080-T Equip. Blanks 002	67080-T Trip Blanks -001, 004	67080-T -003 TB.
1	71-55-6	1,1,1-trichloroethane	✓	0.10		✓	✓	✓ ✓ ✓	✓		NA					NA	✓	✓	✓
2	79-34-5	1,1,2,2-tetrachloroethane		0.30															
2	79-00-5	1,1,2-trichloroethane		0.10															
1	75-34-3	1,1-dichloroethane		0.10															
1	75-35-4	1,1-dichloroethene		0.20						✓			✓	✓	✓				
1	107-06-2	1,2-dichloroethane		0.10															
1	540-59-0	1,2-dichloroethene(total)		0.01															
1	78-87-5	1,2-dichloropropane	✓	0.01															
1	78-93-3	2-butanone (MEK) (10xblk)	✓	0.01														6.63/7.66 ✓	
1	110-75-8	2-chloroethyl vinyl ether																	
2	591-78-6	2-hexanone (MBK)	✓	0.01															
2	108-10-1	4-methyl-2-pentanone (MIBK)		0.10															
1	67-64-1	acetone(10xblk)		0.01	✓	✓	✓												
1	71-43-2	benzene		0.50						✓			✓	✓	✓			19.9/8.93 ✓	
1	75-27-4	bromodichloromethane		0.20															
3	75-25-2	bromoform		0.10	✓	✓	✓												
1	74-83-9	bromomethane		0.10															
1	75-15-0	carbon disulfide		0.10															
1	56-23-5	carbon tetrachloride		0.10															
2	108-90-7	chlorobenzene		0.50						✓			✓	✓	✓				
1	75-00-3	chloroethane		0.01															
1	67-66-3	chloroform		0.20															
1	74-87-3	chloromethane		0.10															
1	10061-01-5	cis-1,3-dichloropropene		0.20															
2	124-48-1	dibromochloromethane		0.10	✓	✓	✓												
2	100-41-4	ethylbenzene		0.10															
1	75-09-2	methylene chloride (10xblk)		0.01	✓	✓	✓												
2	100-42-5	styrene		0.30															
2	127-18-4	tetrachloroethene		0.20															
2	108-88-3	toluene(10xblk)		0.40						✓			✓	✓	✓				
2	10061-02-6	trans-1,3-dichloropropene		0.10	✓	✓	✓												
1	79-01-6	trichloroethene		0.30		.288, .3				✓			✓	✓	✓				
1	75-01-4	vinyl chloride		0.10															
2	1330-20-7	xylenes(total)		0.30		✓													
		Cis-1,2-DICHLOROETHENE																	
		Trans-1,2-DICHLOROETHENE																	

Comments: Vinyl Acetate (soils only)

Notes: Shaded rows are RCRA compounds. 1 - 27 - 21 - 26

Reviewed By: Khal Date: 11.20.02

TB 1. SA 1 2 3 4 SA 5 → 12 CCV & LCS same for

WS lot 2 soils

Volatile Organics

Site/Project: _____ AR/COC #: 605670, 605730 Batch #s: _____

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

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

Sample	SMC 1	SMC 2	SMC 3	IS 1 Area	IS 1 RT	IS 2 area	IS 2 RT	IS 3 area	IS 3 RT
IN CRITERIA									

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

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

Comments:

CCV

1. SA 1 – 4 2CS & CCV 9.25 8.02
2. SA. 6 – 11 2CS & CCV 9.25 20.45
3. SA 5, 12 2CS & CCV 9.27 8.11

WS 2 of 2 Water ~~Soils~~ LT

Volatile Organics (SW 846 Method 8260)

Site/Project: OSS Soil Sampling AR/COC #: 605670, - 730 # of Samples: 4 Matrix: Aqueous

Laboratory: GEL Laboratory Report #: 67601 (~~67000~~ 67608) LT Laboratory Sample IDs: ~~67000~~ 67608 LT - 001 thru - 004

Methods: SW-846 8260 B Batch #s: 204910

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF >.05	Calib. RSD/ R^2 <20% / 0.99	CCV %D 20%	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks		
1	71-55-6	1,1,1-trichloroethane	✓	0.10		✓	✓	✓	✓				NA							
2	79-34-5	1,1,2,2-tetrachloroethane		0.30																
2	79-00-5	1,1,2-trichloroethane		0.10																
1	75-34-3	1,1-dichloroethane		0.10																
1	75-35-4	1,1-dichloroethene		0.20						✓	✓	✓								
1	107-06-2	1,2-dichloroethane		0.10																
1	540-59-0	1,2-dichloroethene(total)		0.01																
1	78-87-5	1,2-dichloropropane	✓	0.01																
1	78-93-3	2-butanone (MEK) (10xblk)	✓	0.01																
1	110-75-8	2-chloroethyl vinyl ether																		
2	591-78-6	2-hexanone (MBK)	✓	0.01																
2	108-10-1	4-methyl-2-pentanone (MIBK)		0.10																
1	67-64-1	acetone(10xblk)		0.01	✓	✓	✓													
1	71-43-2	benzene		0.50						✓	✓	✓								
1	75-27-4	bromodichloromethane		0.20																
3	75-25-2	bromoform		0.10	✓	✓	✓													
1	74-83-9	bromomethane		0.10																
1	75-15-0	carbon disulfide		0.10				-20.6												
1	56-23-5	carbon tetrachloride		0.10				✓												
2	108-90-7	chlorobenzene		0.50						✓	✓	✓								
1	75-00-3	chloroethane		0.01																
1	67-66-3	chloroform		0.20																
1	74-87-3	chloromethane		0.10																
1	10061-01-5	cis-1,3-dichloropropene		0.20																
2	124-48-1	dibromochloromethane		0.10	✓	✓	✓													
2	100-41-4	ethylbenzene		0.10	✓ LT	✓	✓													
1	75-09-2	methylene chloride (10xblk)		0.01	✓	✓	✓													
2	100-42-5	styrene		0.30																
2	127-18-4	tetrachloroethene		0.20																
2	108-88-3	toluene(10xblk)		0.40						✓	✓	✓								
2	10061-02-6	trans-1,3-dichloropropene		0.10	✓	✓	✓													
1	79-01-6	trichloroethene		0.30		.288 ✓				✓	✓	✓								
1	75-01-4	vinyl chloride		0.10		✓														
2	1330-20-7	xylenes(total)		0.30																
	cis -	1,2 - Dichloroethene																		
	trans -	1,2 - Dichloroethene																		

Comments:

LCS/LCSD used to assess accuracy & precision.

CCV & LCS same bvc

Notes: Shaded rows are RCRA compounds.

Reviewed By: [signature] Date: 11.20.02

WS 2 of 2 Waters

Volatile Organics

Site/Project: _____ AR/COC #: 605670, -730 Batch #s: _____

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

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

Sample	SMC 1	SMC 2	SMC 3	IS 1 Area	IS 1 RT	IS 2 area	IS 2 RT	IS 3 area	IS 3 RT
IN CRITERIA									

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

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

Comments:

Semivolatile Organics (SW 846 Method 8270)

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

Laboratory: GFA Laboratory Report #: 67608-005 (EB)

Methods: SW-846 8270C ① ②

# of Samples: 12 0 1 Matrix: Soil & H2O Batch #s: 203764 (Soils) 204261 (EB)

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF >.05	Calib. RSD/ R^2 <20%/ 0.99	CCV %D 20%	Method Blanks ① ②	LCS ①	LCSD ②	LCS RPD	MS ①	MSD ①	MS RPD ①	Field Dup. RPD	Equip. Blanks	Field Blanks	MS ②	MSD ②	RPD ②
2	BN	120-82-1	1,2,4-Trichlorobenzene	✓	0.20		✓	✓	✓		✓	✓	NA	✓	✓	✓	NA	✓	NA	✓	✓	✓
1	BN	95-50-1	1,2-Dichlorobenzene		0.40																	
1	BN	541-73-1	1,3-Dichlorobenzene		0.60																	
1	BN	106-46-7	1,4-Dichlorobenzene		0.50						✓	✓		✓	✓	✓				✓	✓	✓
3	A	95-95-4	2,4,5-Trichlorophenol		0.20						✓	✓		✓	72	✓				✓	✓	✓
3	A	88-06-2	2,4,6-Trichlorophenol		0.20						✓	✓		65	65	✓				✓	✓	✓
2	A	120-83-2	2,4-Dichlorophenol		0.20																	
2	A	105-67-9	2,4-Dimethylphenol		0.20				39													
3	A	51-28-5	2,4-dinitrophenol		0.01				✓													
3	BN	121-14-2	2,4-Dinitrotoluene		0.20						✓	✓		✓	✓	✓				✓	✓	✓
3	BN	606-20-2	2,6-Dinitrotoluene		0.20																	
3	BN	91-58-7	2-Chloronaphthalene		0.80																	
1	A	95-57-8	2-Chlorophenol		0.80						✓	✓		✓	✓	✓				✓	✓	✓
2	BN	91-57-6	2-Methylnaphthalene		0.40																	
1	A	95-48-7	2-Methylphenol (o-cresol)		0.70						✓	✓		69	69	✓				74	✓	✓
3	BN	88-74-4	2-Nitroaniline		0.01																	
2	A	88-75-5	2-Nitrophenol		0.10																	
5	BN	91-94-1	3,3'-Dichlorobenzidine		0.01																	
3	BN	99-09-2	3-Nitroaniline		0.01																	
4	A	534-52-1	4,6-Dinitro-2-methylphenol		0.01				27													
4	BN	101-55-3	4-Bromophenyl-phenylether		0.10			✓														
3	BN	7005-72-3	4-Chlorophenyl-phenylether		0.40																	
2	A	59-50-7	4-Chloro-3-methylphenol		0.20						✓	✓		✓	✓	✓				✓	✓	✓
2	BN	106-47-8	4-Chloroaniline		0.01																	
1	A	106-44-5	4-Methylphenol (p-cresol)		0.60																	
											✓	✓		71	72	✓				73	✓	✓

Comments: m,p - cresol ✓

Notes: Shaded rows are RCRA compounds.

Reviewed By: [signature] Date: 11.20.02

Semivolatile Organics

Site/Project: _____ AR/COC #: 605670, 605730 Batch #s: _____

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

Is	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks	② MS	② MSD	② RPD
							>.05	<20% / 0.99	20%	① ②	①	②	NA	①	①	①							
3	BN	100-01-6	4-Nitroaniline	✓	0.01		✓	✓	-21								NA	✓	NA				
3	A	100-02-7	4-Nitrophenol		0.01				✓		✓	✓		✓	✓	✓				✓	✓	✓
3	BN	83-32-9	Acenaphthene		0.90						✓	✓		✓	✓	✓				✓	✓	✓
3	BN	208-96-8	Acenaphthylene		0.90																	
4	BN	120-12-7	Anthracene		0.70																	
5	BN	56-55-3	Benzo(a)anthracene		0.80																	
6	BN	50-32-8	Benzo(a)pyrene		0.70																	
6	BN	205-99-2	Benzo(b)fluoranthene		0.70																	
6	BN	191-24-2	Benzo(g,h,i)perylene		0.50				-25													
6	BN	207-08-9	Benzo(k)fluoranthene		0.70				✓													
2	BN	111-91-1	bis(2-Chloroethoxy)methane		0.30																	
1	BN	111-44-4	bis(2-Chloroethyl)ether		0.70				-21													
1	BN	108-60-1	bis(2-chloroisopropyl)ether		0.01				✓													
5	BN	117-81-7	bis(2-Ethylhexyl)phthalate		0.01																	
5	BN	85-68-7	Butylbenzylphthalate		0.01																	
4	BN	86-74-8	Carbazole		0.01																	
5	BN	218-01-9	Chrysene		0.70																	
6	BN	53-70-3	Dibenz(a,h)anthracene	✓	0.40		✓	✓	-22													
3	BN	132-64-9	Dibenzofuran		0.80				✓													
3	BN	84-66-2	Diethylphthalate		0.01																	
3	BN	131-11-3	Dimethylphthalate		0.01																	
4	BN	84-74-2	Di-n-butylphthalate		0.01																	
6	BN	117-84-0	Di-n-octylphthalate		0.01																	
4	BN	206-44-0	Fluoranthene		0.60																	
3	BN	86-73-7	Fluorene		0.90																	
4	BN	118-74-1	Hexachlorobenzene		0.10						✓	✓		71	71	✓				✓	✓	✓
2	BN	87-68-3	Hexachlorobutadiene		0.01						✓	✓		65	66	✓				✓	✓	✓
3	BN	77-47-4	Hexachlorocyclopentadiene		0.01	✓	✓	✓	-33													
1	BN	67-72-1	Hexachloroethane		0.30		✓	✓	✓		✓	✓		59	61	✓				✓	✓	✓

Comments:

Semivolatile Organics

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

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

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blanks	LCS	LCS D	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks	② MS	② MSD	② RPD
						>	>.05 ① ②	<20%/ ①.99 ②	±20% ① ②	① ②	①	②	NA	①	①	①						
6	BN	193-39-5	Indeno(1,2,3-cd)pyrene	✓	0.50	✓✓	✓✓	✓✓	-23								NA	✓	NA			
2	BN	78-59-1	Isophorone		0.40				✓													
2	BN	91-20-3	Naphthalene		0.70																	
2	BN	98-95-3	Nitrobenzene		0.20						✓			67	66	✓				✓	✓	✓
4	BN	86-30-6	N-Nitrosodiphenylamine (1)		0.01																	
1	BN	621-64-7	N-Nitroso-di-propylamine	✓	0.50						✓			✓	✓	✓				✓	✓	✓
4	A	87-86-5	Pentachlorophenol		0.05	✓	✓	✓	✓		✓			✓	✓	✓				✓	✓	✓
4	BN	85-01-8	Phenanthrene		0.70																	
1	A	108-95-2	Phenol		0.80						✓			✓	✓	✓				✓	✓	✓
5	BN	129-00-0	Pyrene		0.60						✓			✓	✓	✓				✓	✓	✓
			Diphenylamine						-21													

Surrogate Recovery Outliers

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

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

Internal Standard Outliers

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

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: SA 22 del HX due to viscosity

203764 *MS08 CCV 16.01 16.22 SA 13→22
MS05 CCV 12.12 13.17 SA 23&24

* 204261 MS08 CCV 16.01 16.22 SA-001
* Same ICal & CCV. only 500ml used for MS/MSD

WS lot 2 (soils)

Inorganic Metals

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

Laboratory: GEL Laboratory Report #: 67601

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

# of Samples: 12 Matrix: Soils Batch #s: 204433 (Hg) 203818 (metals)

CAS # / Analyte	QC Element																				
	ug/L																ug/L				
	TAL	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	<35% Rep. RPD	ICS AB	Serial Dilution	Field Dup. RPD	Equip. Blanks	Field Blanks			
7429-90-5 Al								NA			NA										
7440-39-3 Ba	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓	NA	.767	NA			
7440-41-7 Be																					
7440-43-9 Cd	✓	✓	✓	✓	✓	✓	✓			✓			NA	✓	NA		✓				
7440-70-2 Ca																					
7440-47-3 Cr	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓		.882				
7440-48-4 Co																					
7440-50-8 Cu																					
7439-89-6 Fe																					
7439-95-4 Mg																					
7439-96-5 Mn																					
7440-02-0 Ni																					
7440-09-7 K																					
7440-22-4 Ag	✓	✓	✓	✓	✓	✓	✓			✓			NA	✓	NA		✓				
7440-23-5 Na																					
7440-62-2 V																					
7440-66-6 Zn																					
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓		✓				
7782-49-2 Se	✓	✓	✓	1.95	3.24	✓	✓			✓			NA	✓	NA		✓				
7440-38-2 As	✓	✓	✓	[2.08]	✓	✓	✓			✓			✓	✓	NA		✓				
7440-36-0 Sb																					
7440-28-0 Tl																					
7439-97-6 Hg	✓	✓	✓	✓	✓	✓	✓			✓			NA				✓				
Cyanide CN																					

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

Comments: All soils 2X ICP.

203818 DUP/MS/SD 67473 SNL SOG

Reviewed By: [signature] Date: 11.21.02

			13	14	15	16	17	18	19	20	21	22	23	24						
Ba in EB			>	>	>	>	>	>	>	>	>	>	>	>						
.767 X 5 = 3.835 ug/l																				
Cr in EB																				
.882 X 5 = 4.41 ug/l			>	>	>	>	>	>	>	>	>	>	>	>						
Se in ICB/CCB			ND	<																
3.24 X 5 = 16.2 ug/l				J,B3	J,B3	J,B3	J,B3	J,B3	J,B3	J,B3	J,B3	J,B3	J,B3	J,B3						
As in ICB neg																				
NDS = UJ																				
DS < 5X MDL = J			>	>	>	>	>	>	>	>	>	>	>	>						

DL .202 X 5 = 1.01

WS 2 of 2 (EB)

Inorganic Metals

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

Laboratory: GEL Laboratory Report #: 67601

Methods: SW-846 7470A (Hg) 6010B (Metals)

# of Samples: 1 Matrix: Aqueous Batch #s: 204420 (Hg) 204455 (Metals)

CAS #/ Analyte	QC Element																				
	TAL	ICV	CCV	ICB	CCB	Method Blanks	~~LCS~~	LCS#	LCSD RPD	MS	MSD	MSD RPD	~~Rep.~~ RPD	ICS AB	Serial Dilu-tion	~~Field Dup.~~ LT RPD	Equip. Blanks	Field Blanks	Bxs		
						ug/L	LT ~~ug~~ mg/L									REP					
7429-90-5 Al							NA		NA		NA						NA				
7440-39-3 Ba	✓	✓	✓	✓	.429	✓		✓		✓				✓	NA	NA			2.145	ug/L	J,B3
7440-41-7 Be																					
7440-43-9 Cd	✓	✓	✓	✓	.343	✓		✓		✓				✓	NA	NA					ND
7440-70-2 Ca																					
7440-47-3 Cr	✓	✓	✓	✓	✓	.567		✓		✓				✓	NA	NA			2.835	ug/L	J,B
7440-48-4 Co																					
7440-50-8 Cu																					
7439-89-6 Fe																					
7439-95-4 Mg																					
7439-96-5 Mn																					
7440-02-0 Ni																					
7440-09-7 K																					
7440-22-4 Ag	✓	✓	✓	✓	✓	✓		✓		✓				✓	NA	NA					
7440-23-5 Na																					
7440-62-2 V																					
7440-66-6 Zn																					
7439-92-1 Pb	✓	✓	✓	✓	✓	✓		✓		✓				✓	NA	NA					
7782-49-2 Se	✓	✓	✓	✓	✓	✓		✓		✓				✓							
7440-38-2 As	✓	✓	✓	✓	4.0	✓		✓		✓				✓	⊥	⊥					
7440-36-0 Sb																					ND
7440-28-0 Tl																					
7439-97-6 Hg	✓	✓	✓	✓	✓	✓		✓		✓						NA					
Cyanide CN																					

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

Comments: 204455 67821 SMA SOG DUP/MS/SD

204420 67354 SMA SOG DUP/MS

Reviewed By: _____ Date: 11.21.02

General Chemistry

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

67608 - 008 (EB TCN) 67608 - 009 (EB - Cr^6)

Laboratory: GEL Laboratory Report #: 67601

Methods: SW- 846 9012A (TCN) 7196A (Cr_6)

# of Samples: 12 & 2 Matrix: Soil & H2O Batch #s: 204703 & 205123 (TCN) 205618 (Cr^6)

205981 (TCN EB) 204X93 (Cr^6 EB)

	CAS #	Analyte	QC Element: TAL	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dilution	Field Dup. RPD	Equip. Blanks	Field Blanks
204703 ✓ -13 & 14		Total Cyanide		✓	✓	✓	✓	✓	✓			✓			NA	NA	NA	NA	NO	NA
205123 ✓ -15 → 24				✓	✓	✓	✓	✓	✓			✓ ✓			NA NA				NO	
205981 EB				✓	✓	✓	✓	✓	✓	✓	✓	✓			NA				NA	
205618 ✓ -13 → 24		Hexavalent Chromium		✓	✓	✓	✓	✓	✓			63 ✱ ✱ 71	(75-125 %)		NA NA				NO	
204X93 LT EB.				✓	✓	✓	✓	✓	✓			✓			NA				NA	

Comments:

204703 : 67473 DUP/MS SMA SOG.

204X93 : 67608 - 009 "R HT" SX past HT NCR 5076

205981 : 67798 DUP/MS SMA SOG.

Reviewed By: [signature] Date: 11.22.02

605618 : ✱ MS (x2) LT WIthin Gens limits NCR 6532.

B-16 Detects 90 J A2 SA-19,-20
NDs 90 UJ A2.

Radiochemistry

Site/Project: DSS Soil Sampling AR/COC #: 605670, 605730 Laboratory Sample IDs: 67601 - 013 thru - 024
67608 - 011 (EB)

Laboratory: GEL Laboratory Report #: 67601

Methods: EPA 900.0

# of Samples: 12 Matrix: Soils Batch #s: 205009 (Soils) 204950 (EB)

	Analyte	QC Element												
		Method Blanks	LCS	MS / MSD	Rep RER	Equip. Blanks	Field Dup. RER	Field Blanks	Sample ID	Isotope	IS/Trace	Sample ID	Isotope	IS/Trace
	Criteria	U	20%	25%	<1.0	U	<1.0	U	NA		50-105			50-105
	H3													
	U-238													
	U-234													
	U-235/-236													
	Th-232													
	Th-228													
	Th-230													
	Pu-239/-240													
205009	Gross Alpha ✓	✓	✓	✓✓	✓	✓	NA	NA						
	Nonvolatile Beta ✓	✓	✓	✓✓	✓	✓	NA	NA						
	Ra-226													
	Ra-28													
	Ni-63													
	Gamma Spec. Am-241													
	Gamma Spec. Cs-137													
	Gamma Spec. Co-60													
204950	Gross Alpha	✓	✓	✓✓	✓	NA	NA	NA						
	Non Volatile B	✓	✓	✓✓	✓	NA	NA	NA						

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

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

Comments: 204950: 67169 DUP / MS/MSD
SWLO SOG

Reviewed By: [signature] Date: 11.22.02

Contract Verification Review (CVR)

Project Leader COLLINS Project Name DSS SOIL SAMPLING Case No. 7223_02.03.02

AR/COC No. 605670 & 605730 Analytical Lab GEL SDG No. 67601A & B

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

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

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

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X				
2.4	Matrix spike/matrix spike duplicate data provided (if requested)	X				
2.5	Detection limits provided; PQL and MDL (or IDL), MDA and L_c	X				
2.6	QC batch numbers provided	X				
2.7	Dilution factors provided and all dilution levels reported	X				
2.8	Data reported in appropriate units and using correct significant figures	X				
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	X				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met	X		HEXAVALENT CHROMIUM SAMPLE #059856-006 RECEIVED PAST HOLDING TIME	X	
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X		PAGE 1 OF 2 MISSING FOR VOC SAMPLE #059919-001		

Contract Verification Review (Continued)

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1 Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2 Quantitation limit met for all samples	X		
3.3 Accuracy a) Laboratory control samples accuracy reported and met for all samples		X	SEVERAL ANALYTES FAILED RECOVERY LIMITS FOR EXPLOSIVES LCS—NO SAMPLE LEFT FOR RE-EXTRACT
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	X		
c) Matrix spike recovery data reported and met		X	TETRYL FAILED RECOVERY LIMITS FOR EXPLOSIVES MATRIX SPIKE (aq)
3.4 Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	X		
b) Matrix spike duplicate RPD data reported and met for all organic samples	X		
3.5 Blank data a) Method or reagent blank data reported and met for all samples		X	CHROMIUM DETECTED IN AQUEOUS BLANK
b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	1,2-DICHLOROPROPANE & ACETONE DETECTED IN TRIP BLANKS BARIUM & CHROMIUM DETECTED IN EQUIPMENT BLANK
3.6 Contractual qualifiers provided: "J"- estimated quantity; "B"-analyte found in method blank above the MDL for organic or above the PQL for inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"-analysis done beyond the holding time	X		
3.7 Narrative addresses planchet flaming for gross alpha/beta	X		
3.8 Narrative included, correct, and complete	X		
3.9 Second column confirmation data provided for methods 8330 (high explosives) and 8082 (pesticides/PCBs)	X		

Contract Verification Review (Continued)

4.0 Calibration and Validation Documentation

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

Palencia, Wendy J

From: Palencia, Wendy J
Sent: Friday, November 08, 2002 9:33 AM
To: 'Nicole McCleary'
Subject: RE: Corrections for ARCOC 605670 & 605730 / SDG 67601A & B

Nicole,
I did not receive corrections for the extraction form, the cyanide technical narrative, or any revised VOC forms. Can you please forward these?

Thanks.

-----Original Message-----
From: Nicole McCleary [mailto:nsb@mail.gel.com]
Sent: Thursday, November 07, 2002 7:44 AM
To: Palencia, Wendy J
Cc: Edie Kent (E-mail)
Subject: Re: Corrections for ARCOC 605670 & 605730 / SDG 67601A & B

Attached please find the requested revisions.

Sincerely
--
Nicole S. McCleary
Quality Assurance Officer
General Engineering Laboratories, Inc.
2040 Savage Road · Charleston, SC 29407
P.O. Box 30712 · Charleston, SC 29417
Phone : (843) 556-8171 ext. 4208
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"Palencia, Wendy J" wrote:

> Name: corredie11-5-2002.doc
> corredie11-5-2002.doc Type: WINWORD File (application/msword)
> Encoding: base64

Date: 11-5-2002

To:	Nicole McCleary	From:	Wendy J. Palencia
Company:	GEL	Org:	6133
Phone:	(843) 556-8171	Phone:	(505) 844-3132
Fax:	(843) 766-1178	Fax:	(505) 844-3128

Correction Request

COC: 605670 & 605730 SDG: 67601A & B Tracking No: 5206

NOTE: Nicole,

The following problems were noted in this data package:

- Page 1 of the COA for voc sample #059919-001 was omitted.
- The wrong extraction form was sent for svoc sample #059856-002.
- The QC statement in the technical narrative for cyanide states that a LANL sample was used for the QC. This was an SNL sample (pg.788).
- Sample #059857-001 was changed to #059933-001. Apparently GEL was not notified of the change (I apologize for this). Please correct this number on the COA and associated forms.

Thank you,
Wendy

Sandia National Laboratories
Sample Management Office
P.O. Box 5800
Albuquerque, New Mexico 87185-1331

ANNEX B
DSS Site 1114
Risk Assessment

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DSS Site 1114: RISK ASSESSMENT REPORT

I. Site Description and History

Drain and Septic Systems (DSS) Site 1114, the Building 9978 Drywell at Sandia National Laboratories/New Mexico (SNL/NM), is located in the Coyote Test Field on federally owned land controlled by Kirtland Air Force Base (KAFB) and permitted to the U.S. Department of Energy (DOE). The drywell consists of a vertically buried piece of metal culvert, 3 feet in diameter and 5.5 feet deep, filled with aggregate to within 1.5 feet of the surface. Available information indicates that Building 9978 was constructed in 1971 (SNL/NM March 2003), and it is assumed that the drywell was also constructed at that time. The system is still active and receives discharges from a sink and water fountain in Building 9978, approximately 21 feet to the northwest.

Environmental concern about DSS Site 1114 is based upon the potential for the release of constituents of concern (COCs) in effluent discharged to the environment via the drywell at this site. Because operational records were not available, the investigation was planned to be consistent with other DSS site investigations and to sample for possible COCs that may have been released during facility operations.

The ground surface in the vicinity of the site is flat or slopes slightly to the west. The closest major drainage is the Arroyo del Coyote, located approximately 1.3 miles northwest of the site. No springs or perennial surface-water bodies are located within 1.4 miles of the site. Average annual rainfall in the SNL/NM and KAFB area, as measured at Albuquerque International Sunport, is 8.1 inches (NOAA 1990). Surface-water runoff in the vicinity of the site is minor because the surface is nearly flat. 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 1114 is unpaved with some native vegetation, and no storm sewers are used to direct surface water away from the site.

DSS Site 1114 lies at an average elevation of approximately 5,707 feet above mean sea level. The groundwater beneath the site occurs in unconfined conditions in essentially unconsolidated silts, sands, and gravels. Depth to groundwater is unknown, but at the nearest monitoring well, KAFB-1093, 1,300 feet to the south, groundwater is found at 41 feet below ground surface (bgs) and a similar depth is assumed for DSS Site 1114. The specific groundwater flow direction is unknown for this area of KAFB, but is assumed to be generally west toward the Rio Grande (Van Hart June 2003). The nearest production wells are northwest of the site and include KAFB-4 and KAFB-11, which are approximately 5.9 and 5.2 miles away, respectively.

II. Data Quality Objectives

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

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

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

Table 1 summarizes the rationale for determining the sampling locations at this site. The source of potential COCs at DSS Site 1114 was effluent discharged to the environment from the drywell at this site.

Table 1
Summary of Sampling Performed to Meet Data Quality Objectives

DSS Site 1114 Sampling Area	Potential COC Source	Number of Sampling Locations	Sample Density (samples/acre)	Sampling Location Rationale
Soil beneath the drywell	Effluent discharged to the environment from the drywell	1	NA	Evaluate potential COC releases to the environment from effluent discharged from the drywell

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 one borehole location at DSS Site 1114. Drywell sampling intervals started at 6 and 11 feet bgs in the drywell boring. The soil samples were collected in accordance with the procedures described in the SAP (SNL/NM October 1999) and FIP (SNL/NM November 2001). Table 2 summarizes the types of confirmatory and QA/QC samples collected at the site and the laboratories that performed the analyses.

The DSS Site 1114 soil samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), high explosive (HE) compounds, Resource Conservation and Recovery Act (RCRA) metals, hexavalent chromium, cyanide, radionuclides by gamma spectroscopy, and gross alpha/beta activity. The samples were analyzed by an off-site laboratory (General Engineering Laboratories, Inc.) and the on-site Radiation Protection Sample Diagnostics (RPSD) Laboratory. Table 3 summarizes the analytical methods and the data quality requirements from the SAP (SNL/NM October 1999) and FIP (SNL/NM November 2001).

Table 2
Number of Confirmatory Soil and QA/QC Samples Collected from DSS Site 1114

Sample Type	VOCs	SVOCs	PCBs	HE	RCRA Metals	Hexavalent Chromium	Cyanide	Gamma Spectroscopy Radionuclides	Gross Alpha/Beta
Confirmatory	2	2	2	2	2	2	2	2	2
Duplicates	0	0	0	0	0	0	0	0	0
EBs and TBs[a]	1	0	0	0	0	0	0	0	0
Total Samples	3	2	2	2	2	2	2	2	2
Analytical Laboratory	GEL	GEL	GEL	GEL	GEL	GEL	GEL	RPSD	GEL

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

Table 3
Summary of Data Quality Requirements for DSS Site 1114

Analytical Method[a]	Data Quality Level	GEL	RPSD
VOCs EPA Method 8260	Defensible	2	None
SVOCs EPA Method 8270	Defensible	2	None
PCBs EPA Method 8082	Defensible	2	None
HE Compounds EPA Method 8330	Defensible	2	None
RCRA Metals EPA Method 6000/7000	Defensible	2	None
Hexavalent Chromium EPA Method 7196A	Defensible	2	None
Total Cyanide EPA Method 9012A	Defensible	2	None
Gamma Spectroscopy Radionuclides EPA Method 901.1	Defensible	None	2
Gross Alpha/Beta Activity EPA Method 900.0	Defensible	2	None

Note: The number of samples does not include QA/QC samples such as duplicates, trip blanks, and equipment blanks.
[a]EPA November 1986.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
GEL = General Engineering Laboratories, Inc.
HE = High explosive(s).
PCB = Polychlorinated biphenyl.
QA/QC = Quality assurance/quality control.
RCRA = Resource Conservation and Recovery Act.
RPSD = Radiation Protection Sample Diagnostics Laboratory.
SVOC = Semivolatile organic compound.
VOC = Volatile organic compound.

QA/QC samples were collected during the sampling effort according to the Environmental Restoration (ER) Project Quality Assurance Project Plan. The QA/QC samples consisted of one trip blank (for VOCs only). No significant QA/QC problems were identified in the QA/QC sample.

All of the DSS Site 1114 soil sample results were verified/validated by SNL/NM according to SNL/NM ER Project "Data Validation Procedure for Chemical and Radiochemical Data, AOP [Administrative Operating Procedure] 00-03" (SNL/NM December 1999). The data validation reports are presented in the associated DSS Site 1114 request for a determination of Corrective Action Complete (CAC) without controls. The gamma spectroscopy data from the RPSD Laboratory were reviewed according to "Laboratory Data Review Guidelines," Procedure No. RPSD-02-11, Issue No. 2 (SNL/NM July 1996). The gamma spectroscopy results are presented in the CAC proposal. The reviews confirmed that the analytical data are

defensible and therefore acceptable for use in the request for a determination of CAC without controls. Therefore, the DQOs have been fulfilled.

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

III.1 Introduction

The determination of the nature, migration rate, and extent of contamination at DSS Site 1114 is based upon an initial conceptual model validated with confirmatory sampling at the site. The initial conceptual model was developed from archival site research, site inspections, and soil sampling. The DQOs contained in the SAP (SNL/NM October 1999) and FIP (SNL/NM November 2001) identified the sample locations, sample density, sample depth, and analytical requirements. The sample data were subsequently used to develop the final conceptual site model for DSS Site 1114, which is presented in Chapter 4.0 of the 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 1114 were evaluated using laboratory analyses of the soil samples. The analytical requirements included analyses for VOCs, SVOCs, PCBs, HE compounds, RCRA metals, hexavalent chromium, cyanide, radionuclides by gamma spectroscopy, and gross alpha/beta activity. The analytes and methods listed in Tables 2 and 3 are appropriate to characterize the COCs and any potential degradation products at DSS Site 1114.

III.3 Rate of Contaminant Migration

The drywell at DSS Site 1114 is still active. However, the building is currently used only for storage, and discharges from the sink and water fountain to the drywell are minimal. The migration rate of COCs that may have been and might be introduced into the subsurface via the drywell at this site is therefore dependent upon the volume of aqueous effluent discharged to the environment from this drywell. Analytical data generated from the soil sampling conducted at the site are adequate to characterize the rate of COC migration at DSS Site 1114 up to the date of sampling in September 2002.

III.4 Extent of Contamination

Subsurface soil samples were collected from a borehole drilled through, and beneath, the effluent release point (drywell) at the site to assess whether releases of effluent from the drywell caused any environmental contamination.

The soil samples were collected at sampling depths starting at 6 and 11 feet bgs beneath the drywell. Sampling intervals started at the depths at which effluent discharged from the drywell 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 1114 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 1114. 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 1114 were to the subsurface soil resulting from the discharge of effluents from the Building 9978 drywell. 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 1114, as virtually all of the moisture either drains away from the site or evaporates. Because there is little or no infiltrating precipitation and minimal discharge to the drywell, the potential for COCs to reach groundwater through the unsaturated zone above the water table is extremely low.

Table 4
Nonradiological COCs for Human Health Risk Assessment at DSS Site 1114 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	3.82	7	Yes	44[c]	–	**Yes**
Barium	158	214	Yes	170[d]	–	**Yes**
Cadmium	0.142 J	0.9	Yes	64[c]	–	**Yes**
Chromium, total	6.52	12.8	Yes	16[c]	–	No
Chromium VI	0.0271[e]	NC	**Unknown**	16[c]	–	No
Cyanide	0.0713 J	NC	**Unknown**	NC	–	**Unknown**
Lead	4.78	11.8	Yes	49[c]	–	**Yes**
Mercury	0.0094	<0.1	Yes	5,500[c]	–	**Yes**
Selenium	0.27 J	<1	Yes	800[f]	–	**Yes**
Silver	0.043[e]	<1	Yes	0.5[c]	–	No
Organic						
2-Butanone	0.0086	NA	**NA**	1[g]	0.29[g]	No
Toluene	0.00038 J	NA	**NA**	10.7[c]	2.69[c]	No

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

[a]Dinwiddie September 1997, Coyote Test Field or Southwest Area Supergroups.

[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.

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 1114 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 (0.0275)	0.079	Yes	3,000[d]	**Yes**
Th-232	0.651	1.01	Yes	3,000[d]	**Yes**
U-235	**ND (0.21)**	0.18	**No**	900[d]	**Yes**
U-238	ND (0.646)	1.4	Yes	900[d]	**Yes**

Note: **Bold** indicates COCs that exceed the background screening values and/or are bioaccumulators.
[a]Value listed is the greater of either the maximum detection or the highest MDA.
[b]Dinwiddie September 1997, Coyote Test Field or Southwest Area Supergroups.
[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.

The COCs at DSS Site 1114 include both inorganic and organic constituents. The inorganic COCs include both radiological and nonradiological analytes. With the exception of cyanide, the inorganic COCs are elemental in form and are not considered to be degradable. Transformations of these inorganic constituents could include changes in valence (oxidation/reduction reactions) or incorporation into organic forms (e.g., the conversion of selenite or selenate from soil to seleno-amino acids in plants). Cyanide can be metabolized by soil biota. Radiological COCs will undergo decay to stable isotopes or radioactive daughter elements. However, because of the long half-life of the radiological COC (U-235), the aridity of the environment at this site, and the lack of potential contact with biota, none of these mechanisms are expected to result in significant losses or transformations of the inorganic COCs.

The organic COCs at DSS Site 1114 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 1114. 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 1114

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

DSS = Drain and Septic Systems.

VI. Human Health Risk Assessment

VI.1 Introduction

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

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

VI.2 Step 1. Site Data

Section I of this risk assessment provides the site description and history for DSS Site 1114. 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 1114 has been designated with a future land-use scenario of industrial (DOE and USAF March 1996) (see Appendix 1 for default exposure pathways and parameters). However, the residential land-use scenario is also considered in the pathway analysis. Because of the location and characteristics of the potential contaminants, the primary pathway for human exposure is considered to be soil ingestion for the nonradiological COCs and direct gamma exposure for the radiological COCs. The inhalation pathway for both nonradiological and radiological COCs is included because the potential exists to inhale dust and volatiles. Soil ingestion is included for the radiological COCs as well. The dermal pathway is included for the nonradiological COCs because of the potential for the receptor to be exposed to contaminated soil. No water pathways to the groundwater are considered. Depth to groundwater at DSS Site 1114 is approximately 47 feet bgs. No intake routes through plant, meat, or milk ingestion are considered appropriate for either the industrial or residential land-use scenarios. Figure 1 shows the conceptual site model flow diagram for DSS Site 1114.

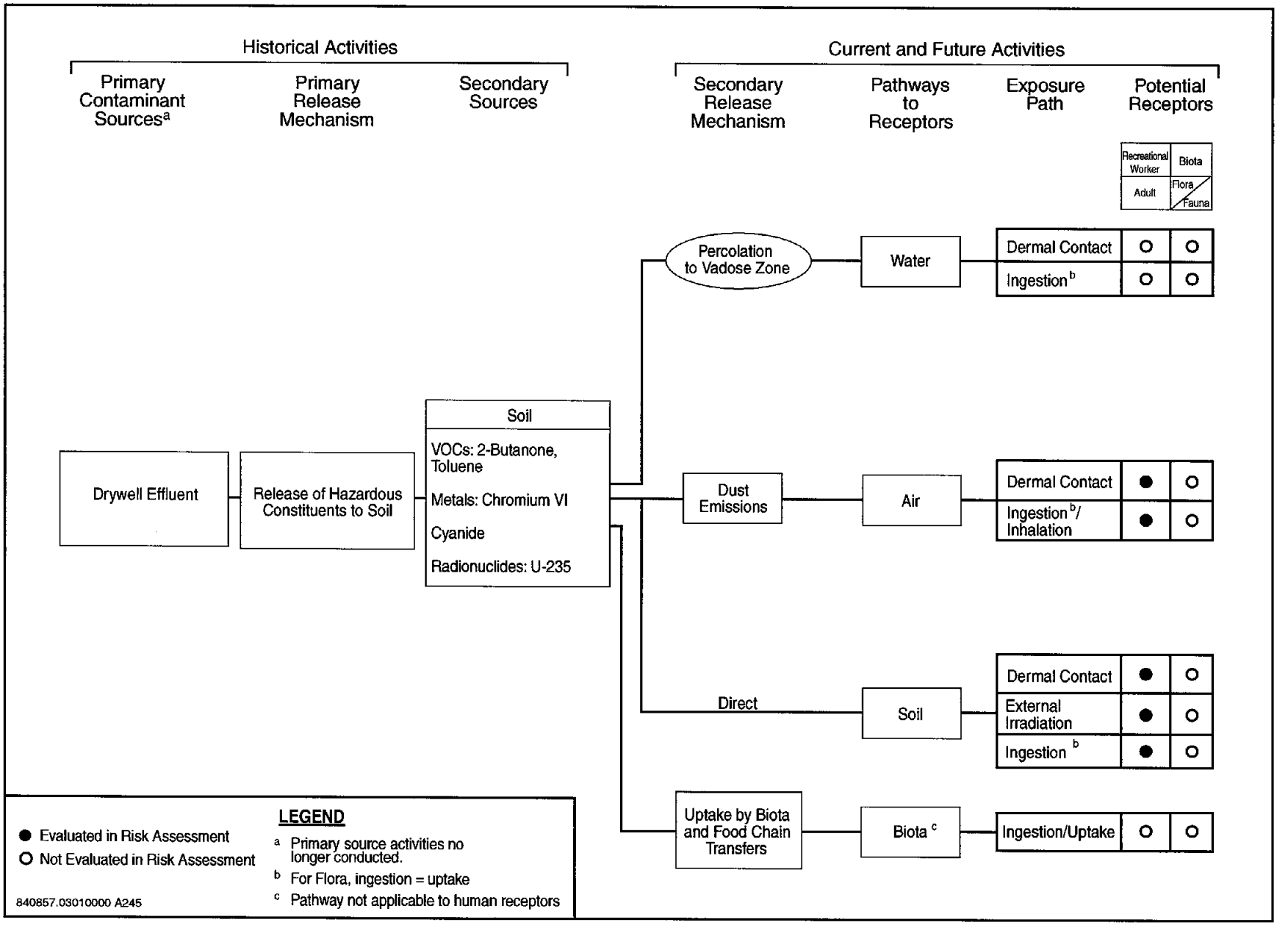

Figure 1

Conceptual Site Model Flow Diagram for DSS Site 1114, Building 9978 Drywell

Pathway Identification

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

VI.4 Step 3. Background Screening Procedure

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

VI.4.1 Methodology

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

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

VI.4.2 Results

Tables 4 and 5 show the DSS Site 1114 maximum COC concentrations that were compared to the SNL/NM maximum background values (Dinwiddie September 1997) for the human health risk assessment. For the nonradiological COCs, two constituents (cyanide, hexavalent chromium) do not have quantified background screening concentrations; therefore it is unknown whether these COCs exceed background. Two constituents (2-butanone, toluene) 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 provide 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) and the Technical Background Document for Development of Soil Screening Levels (NMED February 2004). 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:

- DCFs for ingestion and inhalation were taken from "Federal Guidance Report No. 11, Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion" (EPA 1988).
- DCFs for surface contamination (contamination on the surface of the site) were taken from DOE/EH-0070, "External Dose-Rate Conversion Factors for Calculation of Dose to the Public" (DOE 1988).
- DCFs for volume contamination (exposure to contamination deeper than the immediate surface of the site) were calculated using the methods discussed in "Dose-Rate Conversion Factors for External Exposure to Photon Emitters in Soil" (Kocher 1983) and in ANL/EAIS-8, "Data Collection Handbook to Support Modeling the Impacts of Radioactive Material in Soil" (Yu et al. 1993b).

VI.6 Step 5. Exposure Assessment and Risk Characterization

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

VI.6.1 Exposure Assessment

Appendix 1 provides the equations and parameter input values used in calculating intake values and subsequent HI and excess cancer risk values for the individual exposure pathways. The appendix shows parameters for both industrial and residential land-use scenarios. The equations for nonradiological COCs are based upon the Risk Assessment Guidance for Superfund (RAGS) (EPA 1989). Parameters are based upon information from the RAGS (EPA 1989), the Technical Background Document for Development of Soil Screening Levels (NMED February 2004), as well as other EPA and NMED guidance documents, and reflect the reasonable maximum exposure (RME) approach advocated by the RAGS (EPA 1989). For the radiological COC, the coded equation provided in RESRAD computer code is used to estimate the incremental TEDE and cancer risk for individual exposure pathways. Further discussion of this process is provided in the "Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD" (Yu et al. 1993a). Although the designated land-use scenario

Table 7
Toxicological Parameter Values for DSS Site 1114 Nonradiological COCs

COC	RfD_o (mg/kg-d)	Confidence[a]	RfD_{inh} (mg/kg-d)	Confidence[a]	SF_o $(mg/kg\text{-}d)^{-1}$	SF_{inh} $(mg/kg\text{-}d)^{-1}$	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]
Organic								
2-Butanone	6E-1[c]	L	2.9E-1[c]	L	–	–	D	0.1[d]
Toluene	2E-1[c]	M	1.1E-1[c]	M	–	–	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).

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.
$(mg/kg\text{-}d)^{-1}$ = 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 1114 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.

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

VI.6.2 Risk Characterization

Table 9 shows an HI of 0.00 for the DSS Site 1114 nonradiological COCs and an estimated excess cancer risk of 6E-11 for the designated industrial land-use scenario. The numbers presented include exposure from soil ingestion, dermal contact, and dust and volatile inhalation for nonradiological COCs. Table 10 shows an HI of 0.00 and no quantified estimated excess cancer risk for the DSS Site 1114 associated background constituents under the designated industrial land-use scenario.

For the radiological COC, contribution from the direct gamma exposure pathway is included. For the industrial land-use scenario, a TEDE was calculated that results in an incremental TEDE of 4.3E-3 millirem (mrem)/year (yr). In accordance with EPA guidance found in Office of Solid Waste and Emergency Response (OSWER) Directive No. 9200.4-18 (EPA 1997a), an incremental TEDE of 15 mrem/yr is used for the probable land-use scenario (industrial in this case); the calculated dose value for DSS Site 1114 for the industrial land-use scenario is well below this guideline. The estimated excess cancer risk is 3.8E-8.

For nonradiological COCs under the residential land-use scenario, the HI is 0.00 with an estimated excess cancer risk of 1E-10 (Table 9). The numbers in the table include exposure from soil ingestion, dermal contact, and dust and volatile inhalation. Although the EPA (1991) guidelines generally recommend that inhalation not be included in a residential land-use scenario, this pathway is included because of the potential for soil in Albuquerque, New Mexico,

Table 9
Risk Assessment Values for DSS Site 1114 Nonradiological COCs

COC	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Chromium VI	0.0271[b]	0.00	6E-11	0.00	1E-10
Cyanide	0.0713 J	0.00	–	0.00	–
Organic					
2-Butanone	0.00856	0.00	–	0.00	–
Toluene	0.00038 J	0.00	–	0.00	–
Total		0.00	6E-11	0.00	1E-10

[a]EPA 1989.
[b]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).
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 1114 Nonradiological Background Constituents

COC	Background Concentration[a] (mg/kg)	Industrial Land-Use Scenario[b]		Residential Land-Use Scenario[b]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Chromium VI	NC	–	–	–	–
Cyanide	NC	–	–	–	–
Total		0.00	–	0.00	–

[a]Dinwiddie September 1997, Coyote Test Field Supergroup.
[b]EPA 1989.
COC = Constituent of concern.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
mg/kg = Milligram(s) per kilogram.
NC = Not calculated.
– = Information not quantified.

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 1114 associated background constituents under the residential land-use scenario.

For the radiological COC, the incremental TEDE for the residential land-use scenario is 1.1E-2 mrem/yr. The guideline being used is an excess TEDE of 75 mrem/yr (SNL/NM February 1998) for a complete loss of institutional controls (residential land use in this case); the calculated dose value for DSS Site 1114 for the residential land-use scenario is well below this guideline. Consequently, DSS Site 1114 is eligible for unrestricted radiological release as the residential land-use scenario resulted in an incremental TEDE of less than 75 mrem/yr to the on-site receptor. The estimated incremental excess cancer risk is 1.1E-7. The excess cancer risk from the nonradiological and radiological COCs should be summed to provide risk estimates for persons exposed to both types of carcinogenic contaminants, as noted in OSWER Directive No. 9200.4-18 "Establishment of Cleanup Levels for CERCLA [Comprehensive Environmental Response, Compensation, and Liability Act] Sites with Radioactive Contamination," (EPA 1997a). This summation is tabulated in Section VI.9.

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

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

For the nonradiological COCs under the industrial land-use scenario, the HI is 0.00 (less than the numerical guideline of 1 suggested in the RAGS [EPA 1989]). The estimated excess cancer risk is 6E-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 industrial and residential land-use scenarios. Assuming the industrial land-use scenario, there is neither a quantifiable HI nor an excess cancer risk for nonradiological COCs. The incremental risk is determined by subtracting risk associated with background from potential COC risk. These numbers are not rounded before the difference is determined and therefore may appear to be inconsistent with numbers presented in tables and within the text. For conservatism, the background constituents that do not have quantified background screening concentrations are assumed to have a hazard quotient of 0.00. The incremental HI is 0.00 and the estimated incremental excess cancer risk is 5.85E-11 for the industrial land-use scenario. These incremental risk calculations indicate insignificant risk to human health from nonradiological COCs under an industrial land-use scenario.

For the radiological COC under the industrial land-use scenario, the incremental TEDE is 4.3E-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 3.8E-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 1E-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 1.25E-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 components is 1.1E-2 mrem/yr, which is significantly lower than the numerical guideline of 75 mrem/yr suggested in the SNL/NM "RESRAD Input Parameter Assumptions and Justification" (SNL/NM February 1998). The estimated incremental excess cancer risk is 1.1E-7.

VI.8 Step 7. Uncertainty Discussion

The determination of the nature, rate, and extent of contamination at DSS Site 1114 is based upon an initial conceptual model that was validated with sampling conducted at the site. The sampling was implemented in accordance with the SAP (SNL/NM October 1999) and FIP (SNL/NM November 2001). The DQOs contained in these two documents are appropriate for use in risk assessments. The data from soil samples collected at the effluent release point 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 1114.

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

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

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

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

For the radiological COC, the conclusion of the risk assessment is that potential effects on human health for both the industrial and residential land-use scenarios are below background

and represent only a small fraction of the estimated 360 mrem/yr received by the average U.S. population (NCRP 1987).

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

VI.9 Summary

DSS Site 1114 contains identified COCs consisting of some inorganic, organic, and radiological compounds. Because of the location of the site, the designated industrial land-use scenario, and the nature of contamination, potential exposure pathways identified for this site include soil ingestion, dermal contact, and dust and volatile inhalation for chemical COCs, and soil ingestion, dust inhalation, and direct gamma exposure for radionuclides. The same exposure pathways are applied to the residential land-use scenario.

Using conservative assumptions and an RME approach to risk assessment, calculations for the nonradiological COCs show that for the industrial land-use scenario the HI (0.00) is significantly lower than the accepted numerical guidance from the EPA. The estimated excess cancer risk is 6E-11; thus, excess cancer risk is also below the acceptable risk value provided by the NMED for an industrial land-use scenario (Bearzi January 2001). The incremental HI is 0.00 and the estimated incremental excess cancer risk is 5.85E-11 for the industrial land-use scenario. These incremental risk calculations indicate insignificant risk to human health for the industrial land-use scenario.

Using conservative assumptions and an RME approach to risk assessment, calculations for the nonradiological COCs show that for the residential land-use scenario the HI (0.00) is below the accepted numerical guidance from the EPA. The estimated excess cancer risk is 1E-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 1.25E-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 4.3E-3 mrem/yr for the industrial land-use scenario, which is much less than the EPA's numerical guidance of 15 mrem/yr (EPA 1997a). The corresponding estimated incremental excess cancer risk value is 3.8E-8 for the industrial land-use scenario. Furthermore, the incremental TEDE for the residential land-use scenario that results from a complete loss of institutional control is 1.1E-2 mrem/yr with an associated estimated incremental excess cancer risk of 1.1E-7. The guideline for this scenario is 75 mrem/yr (SNL/NM February 1998). Therefore, DSS Site 1114 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 1114, Building 6636 Septic System Carcinogens

Scenario	Nonradiological Risk	Radiological Risk	Total Risk
Industrial	5.85E-11	3.8E-8	3.8E-8
Residential	1.25E-10	1.1E-7	1.1E-7

DSS = Drain and Septic Systems.

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

VII. Ecological Risk Assessment

VII.1 Introduction

This section addresses the ecological risks associated with exposure to constituents of potential ecological concern (COPECs) in the soil at DSS Site 1114. A component of the NMED Risk-Based Decision Tree (NMED March 1998) is to conduct an ecological risk assessment that corresponds with that presented in EPA's Ecological RAGS (EPA 1997c). The current methodology is tiered and contains an initial scoping assessment followed by a more detailed risk assessment if warranted by the results of the scoping assessment. Initial components of NMED's decision tree (a discussion of DQOs, data assessment, and evaluations of bioaccumulation as well as fate and transport potential) are addressed in previous sections of this report. At the end of the scoping assessment, a determination is made as to whether a more detailed examination of potential ecological risk is necessary.

VII.2 Scoping Assessment

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

VII.2.1 Data Assessment

As indicated in Section IV, all COCs at DSS Site 1114 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.

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APPENDIX 1
EXPOSURE PATHWAY DISCUSSION FOR CHEMICAL AND RADIONUCLIDE CONTAMINATION

Introduction

Sandia National Laboratories/New Mexico (SNL/NM) uses a default set of exposure routes and associated default parameter values developed for each future land-use designation being considered for SNL/NM Environmental Restoration (ER) Project sites. This default set of exposure scenarios and parameter values are invoked for risk assessments unless site-specific information suggests other parameter values. Because many SNL/NM solid waste management units (SWMUs) have similar types of contamination and physical settings, SNL/NM believes that the risk assessment analyses at these sites can be similar. A default set of exposure scenarios and parameter values facilitates the risk assessments and subsequent review.

The default exposure routes and parameter values used are those that SNL/NM views as resulting in a Reasonable Maximum Exposure (RME) value. Subject to comments and recommendations by the U.S. Environmental Protection Agency (EPA) Region VI and New Mexico Environment Department (NMED), SNL/NM will use these default exposure routes and parameter values in future risk assessments.

At SNL/NM, all SWMUs exist within the boundaries of the Kirtland Air Force Base. Approximately 240 potential waste and release sites have been identified where hazardous, radiological, or mixed materials may have been released to the environment. Evaluation and characterization activities have occurred at all of these sites to varying degrees. Among other documents, the SNL/NM ER draft Environmental Assessment (DOE 1996) presents a summary of the hydrogeology of the sites and the biological resources present. When evaluating potential human health risk the current or reasonably foreseeable land use negotiated and approved for the specific SWMU/AOC, aggregate, or watershed will be used. The following references generally document these land uses: *Workbook: Future Use Management Area 2 (DOE et al. September 1995); Workbook: Future Use Management Area 1 (DOE et al. October 1995); Workbook: Future Use Management Areas 3, 4, 5, and 6 (DOE and USAF January 1996); Workbook: Future Use Management Area 7 (DOE and USAF March 1996)*. At this time, all SNL/NM SWMUs have been tentatively designated for either industrial or recreational future land use. The NMED has also requested that risk calculations be performed based upon a residential land-use scenario. Therefore, all three land-use scenarios will be addressed in this document.

The SNL/NM ER Project has screened the potential exposure routes and identified default parameter values to be used for calculating potential intake and subsequent hazard index (HI), excess cancer risk and dose values. The EPA (EPA 1989) provides a summary of exposure routes that could potentially be of significance at a specific waste site. These potential exposure routes consist of:

- Ingestion of contaminated drinking water
- Ingestion of contaminated soil

- Ingestion of contaminated fish and shellfish
- Ingestion of contaminated fruits and vegetables
- Ingestion of contaminated meat, eggs, and dairy products
- Ingestion of contaminated surface water while swimming
- Dermal contact with chemicals in water
- Dermal contact with chemicals in soil
- Inhalation of airborne compounds (vapor phase or particulate)
- External exposure to penetrating radiation (immersion in contaminated air; immersion in contaminated water; and exposure from ground surfaces with photon-emitting radionuclides)

Based upon the location of the SNL/NM SWMUs and the characteristics of the surface and subsurface at the sites, we have evaluated these potential exposure routes for different land-use scenarios to determine which should be considered in risk assessment analyses (the last exposure route is pertinent to radionuclides only). At SNL/NM SWMUs, there is currently no consumption of fish, shellfish, fruits, vegetables, meat, eggs, or dairy products that originate on site. Additionally, no potential for swimming in surface water is present due to the high-desert environmental conditions. As documented in the RESRAD computer code manual (ANL 1993), risks resulting from immersion in contaminated air or water are not significant compared to risks from other radiation exposure routes.

For the industrial and recreational land-use scenarios, SNL/NM ER has, therefore, excluded the following five potential exposure routes from further risk assessment evaluations at any SNL/NM SWMU:

- Ingestion of contaminated fish and shellfish
- Ingestion of contaminated fruits and vegetables
- Ingestion of contaminated meat, eggs, and dairy products
- Ingestion of contaminated surface water while swimming
- Dermal contact with chemicals in water

That part of the exposure pathway for radionuclides related to immersion in contaminated air or water is also eliminated.

Based upon this evaluation, for future risk assessments the exposure routes that will be considered are shown in Table 1.

Table 1
Exposure Pathways Considered for Various Land-Use Scenarios

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

Equations and Default Parameter Values for Identified Exposure Routes

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

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

Generic Equation for Calculation of Risk Parameter Values

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

Risk (or Dose) = Intake x Toxicity Effect (either carcinogenic, noncarcinogenic, or radiological)

$$= C \times (CR \times EFD/BW/AT) \times \text{Toxicity Effect} \quad (1)$$

where;

C = contaminant concentration (site specific)
CR = contact rate for the exposure pathway
EFD= exposure frequency and duration
BW = body weight of average exposure individual
AT = time over which exposure is averaged.

For nonradiological constituents of concern (COCs), the total risk/dose (either cancer risk or HI) is the sum of the risks/doses for all of the site-specific exposure pathways and contaminants. For radionuclides, the calculated radiation exposure, expressed as TEDE is compared directly to the exposure guidelines of 15 millirem per year (mrem/year) for industrial and recreational future use and 75 mrem/year for the unlikely event that institutional control of the site is lost and the site is used for residential purposes (EPA 1997).

The evaluation of the carcinogenic health hazard produces a quantitative estimate for excess cancer risk resulting from the COCs present at the site. This estimate is evaluated for determination of further action by comparison of the quantitative estimate with the potentially acceptable risk of 1E-5 for nonradiological carcinogens. The evaluation of the noncarcinogenic health hazard produces a quantitative estimate (i.e., the HI) for the toxicity resulting from the COCs present at the site. This estimate is evaluated for determination of further action by comparison of this quantitative estimate with the EPA standard HI of unity (1). The evaluation of the health hazard from radioactive compounds produces a quantitative estimate of doses resulting from the COCs present at the site. This estimated dose is used to calculate an assumed risk. However, this calculated risk is presented for illustration purposes only, not to determine compliance with regulations.

The specific equations used for the individual exposure pathways can be found in RAGS (EPA 1989) and are outlined below. The RESRAD Manual (ANL 1993) describes similar equations for the calculation of radiological exposures.

Soil Ingestion

A receptor can ingest soil or dust directly by working in the contaminated soil. Indirect ingestion can occur from sources such as unwashed hands introducing contaminated soil to food that is then eaten. An estimate of intake from ingesting soil will be calculated as follows:

$$I_s = \frac{C_s * IR * CF * EF * ED}{BW * AT}$$

where:

I_s = Intake of contaminant from soil ingestion (milligrams [mg]/kilogram [kg]-day)
C_s = Chemical concentration in soil (mg/kg)
IR = Ingestion rate (mg soil/day)
CF = Conversion factor (1E-6 kg/mg)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
BW = Body weight (kg)
AT = Averaging time (period over which exposure is averaged) (days)

It should be noted that it is conservatively assumed that the receptor only ingests soil from the contaminated source.

Soil Inhalation

A receptor can inhale soil or dust directly by working in the contaminated soil. An estimate of intake from inhaling soil will be calculated as follows (EPA August 1997):

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

where:

I_s = Intake of contaminant from soil inhalation (mg/kg-day)
C_s = Chemical concentration in soil (mg/kg)
IR = Inhalation rate (cubic meters [m^3]/day)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
VF = soil-to-air volatilization factor (m^3/kg)
PEF = particulate emission factor (m^3/kg)
BW = Body weight (kg)
AT = Averaging time (period over which exposure is averaged) (days)

Soil Dermal Contact

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

where:

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

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

Groundwater Ingestion

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

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

where:

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

Groundwater Inhalation

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

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

where:

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

For volatile compounds, volatilization from groundwater can be an important exposure pathway from showering and other household uses of groundwater. This exposure pathway will only be evaluated for organic chemicals with a Henry's Law constant greater than 1x10^{-5} and with a molecular weight of 200 grams/mole or less (EPA 1991).

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

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

Summary

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

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

Parameter	Industrial	Recreational	Residential
General Exposure Parameters			
Exposure Frequency (day/yr)	250[a,b]	8.7 (4 hr/wk for 52 wk/yr)[a,b]	350[a,b]
Exposure Duration (yr)	25[a,b,c]	30[a,b,c]	30[a,b,c]
Body Weight (kg)	70[a,b,c]	70 Adult[a,b,c] 15 Child[a,b,c]	70 Adult[a,b,c] 15 Child[a,b,c]
Averaging Time (days) for Carcinogenic Compounds (= 70 yr x 365 day/yr)	25,550[a,b]	25,550[a,b]	25,550 [a,b]
for Noncarcinogenic Compounds (= ED x 365 day/yr)	9,125 [a,b]	10,950[a,b]	10,950 [a,b]
Soil Ingestion Pathway			
Ingestion Rate (mg/day)	100[a,b]	200 Child[a,b] 100 Adult[a,b]	200 Child [a,b] 100 Adult [a,b]
Inhalation Pathway			
Inhalation Rate (m^3/day)	20[a,b]	15 Child[a] 30 Adult[a]	10 Child[a] 20 Adult[a]
Volatilization Factor (m^3/kg)	Chemical Specific	Chemical Specific	Chemical Specific
Particulate Emission Factor (m^3/kg)	1.36E9[a]	1.36E9[a]	1.36E9[a]
Water Ingestion Pathway			
Ingestion Rate (liter/day)	2.4[a]	2.4[a]	2.4[a]
Dermal Pathway			
Skin Adherence Factor (mg/cm^2)	0.2[a]	0.2 Child[a] 0.07 Adult[a]	0.2 Child[a] 0.07 Adult[a]
Exposed Surface Area for Soil/Dust (cm^2/day)	3,300[a]	2,800 Child[a] 5,700 Adult[a]	2,800 Child[a] 5,700 Adult[a]
Skin Adsorption Factor	Chemical Specific	Chemical Specific	Chemical Specific

[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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