SANDIA NATIONAL LABORATORIES ENVIRONMENTAL RESTORATION PROJECT REQUEST FOR SUPPLEMENTAL INFORMATION RESPONSES AND PROPOSALS FOR CORRECTIVE ACTION COMPLETE Drain and Septic Systems SWMUs 49, 101, 116, 138, 149, 154, and 161

Drain and Septic Systems
Round 9
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Sandia National Laboratories/New Mexico
Environmental Restoration Project

REQUEST FOR SUPPLEMENTAL INFORMATION RESPONSE AND PROPOSAL FOR CORRECTIVE ACTION COMPLETE FOR DRAIN AND SEPTIC SYSTEMS SWMU 149, BUILDING 9930 SEPTIC SYSTEM, COYOTE TEST FIELD

June 2005

United States Department of Energy
Sandia Site Office

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ACRONYMS AND ABBREVIATIONS

AOC	Area(s) of Concern
AOP	Administrative Operating Procedure
BA	butyl acetate
bgs	below ground surface
CAC	Corrective Action Complete
COC	constituent of concern
COPEC	constituent of potential ecological concern
DCF	dose conversion factor
DOE	U.S. Department of Energy
DQO	data quality objective
DSS	Drain and Septic Systems
EB	equipment blank
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
GEL	General Engineering Laboratories, Inc.
HE	high explosive(s)
HEAST	Health Effects Assessment Summary Tables
HI	hazard index
HRMB	Hazardous and Radioactive Materials Bureau
IRIS	Integrated Risk Information System
KAFB	Kirtland Air Force Base
MCL	maximum contaminant level
MDA	minimum detectable activity
MDL	method detection limit
mrem	millirem
NFA	no further action
NMED	New Mexico Environment Department
NPN	nitrate plus nitrite
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
QA	quality assurance
QC	quality control
QES	Quanterra Environmental Services
RAGS	Risk Assessment Guidance for Superfund
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RME	reasonable maximum exposure
RPSD	Radiation Protection Sample Diagnostics
RSI	Request for Supplemental Information
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
TMA	Thermo Analytical Inc./Eberline Laboratories

ACRONYMS AND ABBREVIATIONS (Concluded)

TNT	trinitrotoluene
TOP	Technical Operating Procedure
UTL	upper tolerance limit
VOC	volatile organic compound
yr	year

1.0 INTRODUCTION

1.1 Investigation History

Solid Waste Management Unit (SWMU) 149 was originally one of 23 SWMUs designated as Operable Unit (OU) 1295 at Sandia National Laboratories/New Mexico (SNL/NM). This number was reduced to 22 when a petition for Administrative No Further Action (NFA) was approved by the New Mexico Environment Department (NMED) for SWMU 139 in 1995.

In June 1996, an NFA proposal was submitted to the NMED for SWMU 149 (SNL/NM June 1996). In June 1998, the NMED Hazardous and Radioactive Materials Bureau (HRMB) responded with a Request for Supplemental Information (RSI) for the NFA proposal (NMED June 1998) with the following specific requirements for SWMU 149:

- Present final versions of the general location and site figures.
- Complete a borehole and install a soil-vapor monitoring system near one PETREX™ passive soil-vapor location to investigate a possible plume.
- Provide a rationale for establishing PETREX™ passive soil-vapor survey action levels.
- Drill through the center of and beneath the seepage pit at the site to collect soil samples, rather than collect samples from boreholes alongside the structure.
- Provide complete data tables that include such information as: sample identification numbers, analyses performed by off-site laboratories, analytical methods, method detection limits (MDLs) or practical quantitation limits, New Mexico/U.S. Environmental Protection Agency (EPA) maximum contaminant limits (MCLs), and approved upper tolerance limits (UTLs) or 95th percentile values for comparison.
- Do not automatically assume that detections of volatile organic compounds (VOCs) in quality assurance (QA)/quality control (QC) samples are due to laboratory contamination, and include QA/QC samples on the data tables.
- Perform a risk assessment that includes the determination of the horizontal and vertical extent of contamination, and follows the current NMED risk assessment protocols.
- Analyze for high explosive (HE) compounds by EPA Method 8330.
- Collect deeper samples at the seepage pit and the septic tank to intercept potentially contaminated soil/sediment.

SNL/NM addressed the general and site-specific comments in a response to the RSI in November 1998 (SNL/NM November 1998). The SNL/NM responses to the SWMU 149 site-specific comments were to:

- Submit final and updated versions of the general location and site figures.
- Agree to collect an additional VOC soil sample at the single PETREX™ soil-vapor sample location in question.
- Agree to collect soil samples from boreholes through the center of, and beneath, disposal structures at five sites (including SWMU 149), and discuss with the NMED any deviations noted in soil samples collected from boreholes adjacent to such structures.
- Agree to consult, on a site-by-site basis, with the NMED to evaluate exceedences of the 95th percentile or UTL background concentrations in samples.
- Agree to update the analytical results table using the formats specified by the NMED, and acknowledge that EPA Method 8330 is the desired method for HE compound analyses.
- Explain that SNL/NM uses "the Blank Rule" as allowed by the EPA laboratory evaluation guidelines to evaluate VOC detections in samples and that QA/QC issues with contract laboratories are audited and addressed by SNL/NM's Sample Management Office. SNL/NM further agreed to discuss the subject further with the NMED/HRMB.
- Discuss the need for additional, deeper subsurface sampling with the NMED, although SNL/NM did not see any technical justification in attempting to collect deeper soil samples in the shallow and relatively impermeable bedrock occurring at this site.
- Submit a new risk assessment based upon the protocols currently being developed by the NMED.

The NMED/HRMB notified SNL/NM on December 11, 1998 (NMED December 1998) that it had reviewed the results of the seepage pit sampling study specified in the June 1998 RSI (NMED June 1998) with regard to SWMU 149 the following decisions were made:

- Soil samples are required from a borehole drilled through the center of the seepage pit and analyzed for HE by EPA Method 8330.
- A deep sample must be collected and analyzed for all constituents of concern (COCs) since one was not collected during the original investigation.

Negotiations were in process after the November 1998 RSI response submittal (SNL/NM November 1998) to define a technical and decision-making approach to complete environmental assessment and characterization work at the 22 OU 1295 SWMUs and 61 other Drain and Septic Systems (DSS) Area of Concern (AOC) sites at SNL/NM. A Sampling and Analysis Plan (SAP) (SNL/NM October 1999) was written that documented investigations planned for completion at all OU 1295 SWMUs and AOC sites. The plan was approved by the NMED in

January 2000 (Bearzi January 2000). Technical details for soil sampling procedures, soil sample locations, laboratory analytical methods, and passive soil-vapor sampling requirements at these sites were specified in a follow-up Field Implementation Plan (SNL/NM November 2001) that was also approved by the NMED (Moats February 2002).

After the SAP was completed, the NMED issued a second RSI in June 2000 (NMED June 2000) that required additional samples be collected for HE analysis by EPA Method 8330 from a borehole drilled through the center of the seepage pit, and the collection of a second soil sample from a deeper depth interval to be analyzed for all COCs. If these samples could not be collected, as specified in the SAP (SNL/NM October 1999), a downgradient groundwater monitoring well would be required.

SNL/NM responded to this second RSI in September 2000 and again agreed to collect one or two additional HE samples from a single borehole at a location and at a depth agreeable to both the NMED and SNL/NM. SNL/NM also agreed to install a groundwater monitoring well at a location agreed upon by the NMED and SNL/NM; SNL/NM agreed to collect groundwater samples for a minimum of eight quarters, and analyze the samples for VOCs, Resource Conservation and Recovery Act (RCRA) metals, cyanide, and HE compounds (SNL/NM September 2000).

1.2 Remaining RSI Requirements

The remaining requirements to fulfill the November 1998 and the June 2000 RSI for SWMU 149 that are addressed in this RSI response are:

- Submit the analytical results for the additional HE soil sample collected at SWMU 149 in October 2002.
- Submit the analytical results for the eight quarters of groundwater monitoring, beginning in July 2002 and ending in May 2004, from monitoring well CTF-MW3 installed near SWMU 149.
- Submit a revised risk assessment using all available soil data.

An updated general location map (Figure 1.2-1), and an updated site location map showing the soil sampling locations at this site (Figure 1.2 2) are also provided. The location of groundwater monitoring well CTF-MW3 is shown in Figure 1.2-3. Because the site description and operational history were provided in the initial NFA proposal (SNL/NM June 1996), the information is only briefly summarized in the risk assessment report in Chapter 4.0.

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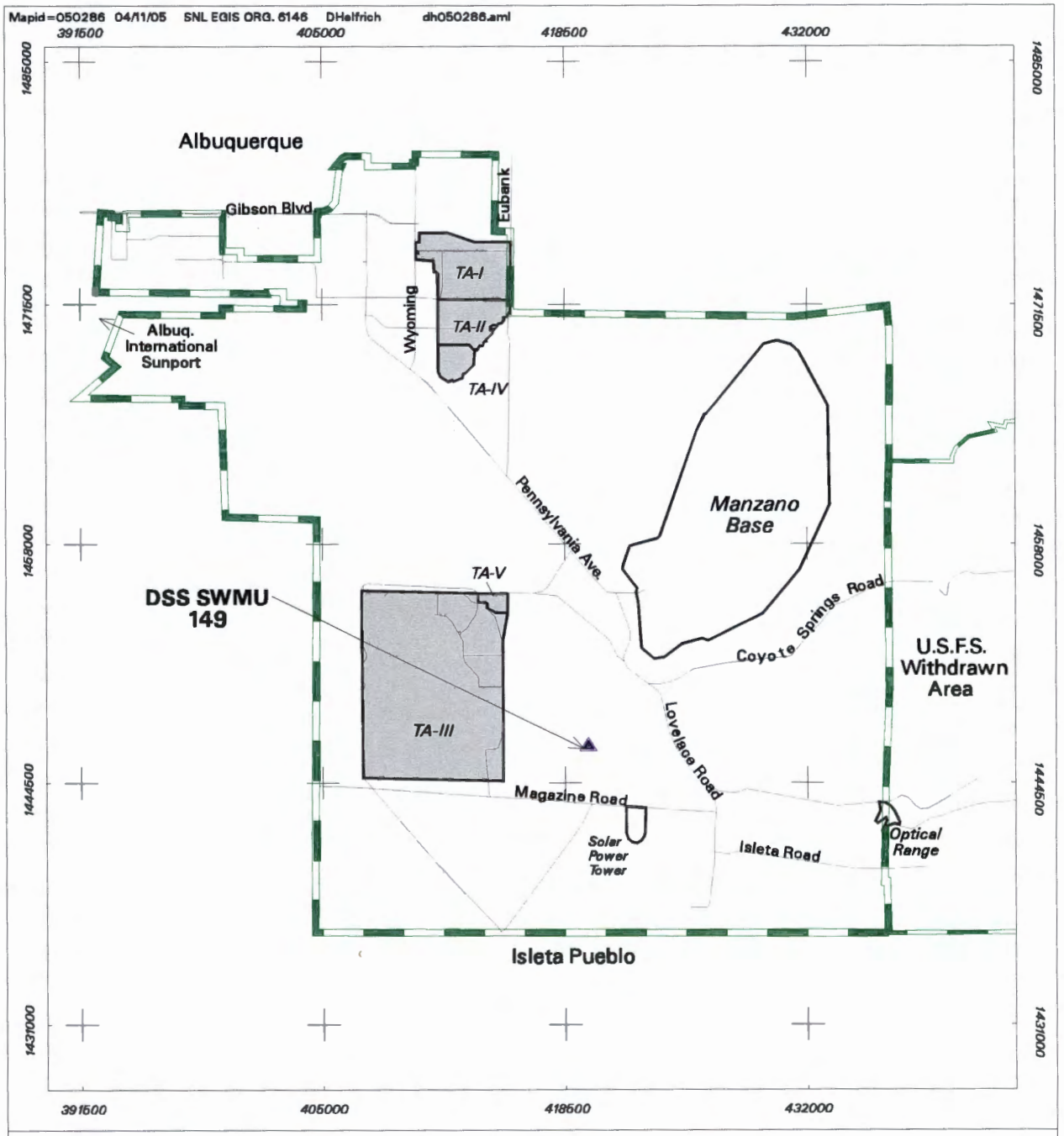

Legend

- DSS SWMU 149
- Major Road
- KAFB Boundary
- USFS Withdrawn Area Boundary
- SNL Technical Area

Figure 1.2-1
Location Map of Drain and Septic Systems (DSS) SWMU 149, Bldg. 9930 Septic System, 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 A240

Legend

- Soil Boring Location
- Petrex™ Sample Location
- Unpaved Road
- Septic Tank, Seepage Pit
- Drainline, Sanitary Sewerline
- Building / Structure
- DSS SWMU 149

Figure 1.2-2
Site Map of Drain and Septic Systems (DSS) SWMU 149, Bldg. 9930 Septic System, Coyote Test Field

0 17.5 35
Scale in Feet

0 4.2 8.4
Scale in Meters

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Environmental Geographic Information System

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Legend

- Groundwater Monitoring Well
- Sanitary Sewerline, Drainline
- Septic Tank, Seepage Pit
- Unpaved Road
- Fence
- Building / Structure
- SWMU 149

Figure 1.2-3
Location Map of Groundwater Monitoring Well CTF-MW3 at Drain and Septic Systems (DSS) SWMU 149, Bldg. 9930 Septic System Coyote Test Field

0 50 100
Scale in Feet

0 12 24
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

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2.0 ADDITIONAL SOIL SAMPLING AT DSS SWMU 149

On October 10, 2002, one additional sample for HE compounds was collected at DSS SWMU 149. The original intent was to collect the sample from a borehole drilled through the center of, and beneath, the seepage pit. However, underground utilities had been installed across the location of the abandoned seepage pit, and the borehole had to be shifted approximately 3 feet further to the south (location SP-3 on Figure 1.2-2). Sampling details and results are presented in the following sections.

2.1 2002 HE Compound Soil Sampling Methodology

An auger drill rig was used to collect the additional HE soil sample at DSS SWMU 149. The HE sample was collected starting at 8 feet below ground surface (bgs), using a Geoprobe™ sampler inside the drill rig augers at location SP-3 (Figure 1.2 2). 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 to 4 feet to partially fill the BA tube with soil. Refusal, due to shallow bedrock, was encountered at approximately 12 feet bgs in borehole SP-3.

Once the sample tube was retrieved from the borehole, the sample for HE analysis was collected by emptying the soil from the BA sleeve into a decontaminated mixing bowl, blending with a spatula, and then transferring an aliquot of the blended soil into the sample container.

The sample was documented and handled in accordance with applicable SNL/NM operating procedures and was transported to an off-site laboratory for HE compound analysis by EPA Method 8330.

2.2 2002 HE Compound Soil Sampling Results and Conclusions

HE compound analytical results for the one soil sample collected from the seepage pit borehole are summarized in Table 2.2-1. MDLs for the HE soil analysis are presented in Table 2.2-2. No HE compounds were detected in the sample collected.

2.3 Soil Sampling Quality Assurance/Quality Control Samples and Data Validation Results

The laboratory data for the HE soil sample analysis were reviewed and verified/validated according to "Verification and Validation of Chemical and Radiochemical Data," Technical Operating Procedure (TOP) 94-03, Rev. 0 (SNL/NM July 1994). Annex A contains the data validation reports for the HE soil sample collected at DSS SWMU 149. The data are acceptable for use in this request for a determination of Corrective Action Complete (CAC) without controls.

No duplicate HE soil samples or equipment blanks (EBs) were collected when the additional HE sample was collected at DSS SWMU 149.

Table 2.2-1
Summary of DSS SWMU 149, Building 9930 Septic System
Confirmatory Soil Sampling, HE Compound Analytical Results
October 2002
(Off-Site Laboratory)

Sample Attributes			HE (EPA Method 8330[a]) (µg/kg)
Record Number[b]	ER Sample ID	Sample Depth (ft)	
605785	9930-SP-3-8-S	8	ND

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

Table 2.2-2
Summary of DSS SWMU 149, Building 9930 Septic System
Confirmatory Soil Sampling, HE Compound Analytical MDLs
October 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.
SWMU = Solid Waste Management Unit.
Tetryl = Methyl-2,4,6-trinitrophenylnitramine.

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3.0 GROUNDWATER SAMPLING AT DSS SWMU 149

3.1 Groundwater Monitoring Well CTF-MW3 Installation and Sampling

Groundwater monitoring well CTF-MW3 was installed with an air-rotary casing hammer (ARCH) drilling rig in August 2001 at a location agreed upon by the NMED and SNL/NM. The monitoring well location is shown in Figure 1.2-3. Figure 3.1-1 shows the borehole for the monitoring well being drilled with Building 9930 in the background. The borehole for the well was drilled to 430 feet bgs and backfilled to 365 feet bgs. The screened interval is from 340 to 360 feet bgs, with a sump from 360 to 365 feet bgs. Annex B contains the borehole lithologic log and construction diagram for this well. Depth to groundwater was 302.21 feet bgs on January 7, 2005.

Monitoring well CTF-MW3 was sampled on a quarterly basis from July 2002 to June 2004 to acquire the eight quarters of groundwater data required by the NMED in the June 2000 RSI (NMED June 2000). Groundwater sample collection and handling were performed in accordance with SNL/NM Field Operating Procedure 94-48, "Sampling Groundwater Monitoring Wells" (SNL/NM July 1996a).

There are no current plans to continue sampling or to plug and abandon this well. At some point in the future the well may be incorporated into the SNL/NM Groundwater Protection Program or Long-Term Environmental Stewardship monitoring networks.

3.2 Groundwater Monitoring Well CTF-MW3 Sampling Results and Conclusions

Analytical results for the eight quarters of groundwater samples collected from monitoring well CTF-MW3 are presented and discussed in this section. As agreed upon by the NMED and SNL/NM, the eight quarters of groundwater samples were analyzed for VOCs, HE compounds, RCRA metals, and cyanide (SNL/NM September 2000). Although not required by the NMED, additional samples were also collected and analyzed for nitrate plus nitrite (NPN) and anions and cations. These additional samples were collected to further characterize the general ion chemistry of groundwater in this well and for purge-water waste characterization purposes.

VOCs

VOC analytical results for the eight groundwater samples collected from monitoring well CTF-MW3 are summarized in Table 3.2-1. MDLs for the VOC groundwater analyses are presented in Table 3.2-2. Trace amounts of five VOCs have been detected in the groundwater samples collected. Acetone was detected only in the July 16, 2002 sample. Bromodichloromethane was detected in the last two samples collected on March 23, 2004 and June 1, 2004. Dibromochloromethane was detected in three of the eight sampling events. Chloroform was detected in samples collected from six of the eight sampling events. Toluene was detected only in the sample collected on June 1, 2004 and in the associated trip blank (TB). No other VOCs were detected in the TBs associated with these samples.

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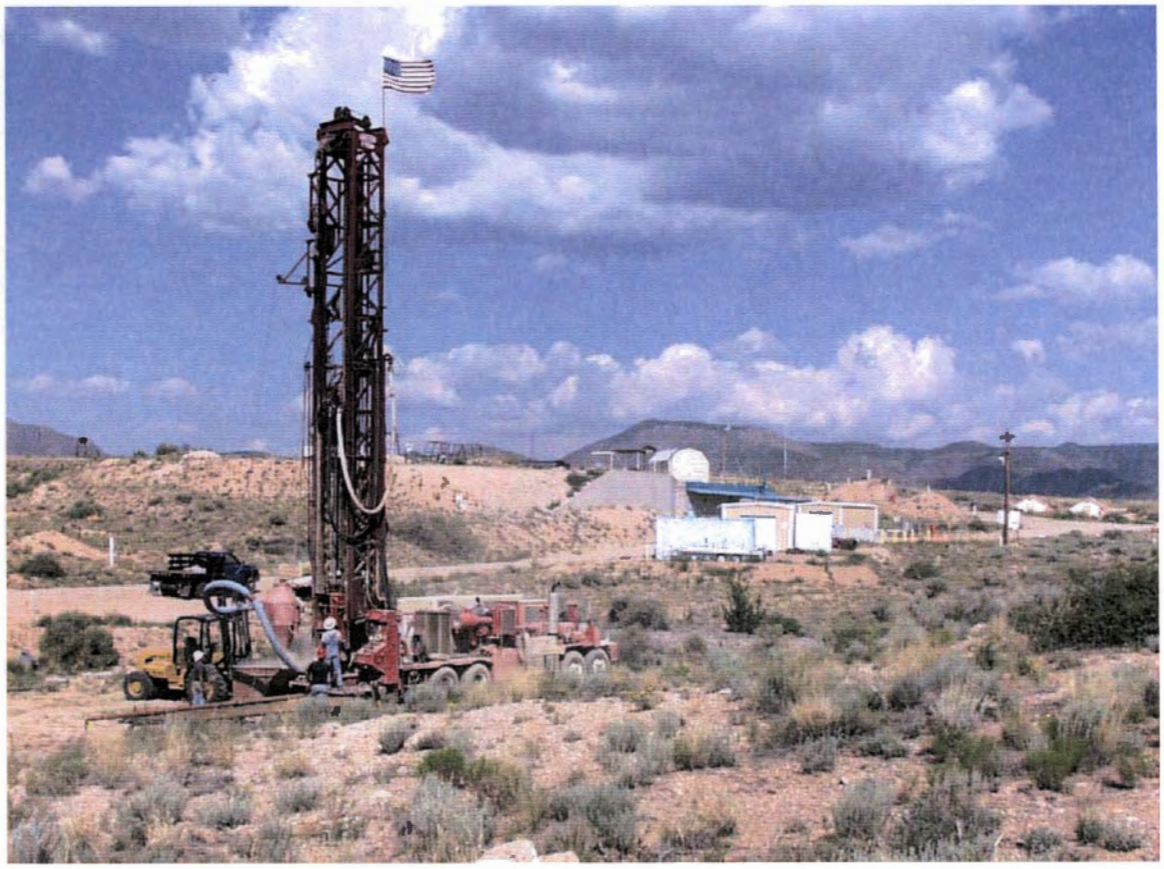

Figure 3.1-1

Drilling the borehole for groundwater monitoring well CTF-MW3 west of DSS SWMU 149 with Building 9930 in the background. View to the northeast. August 20, 2001

Table 3.2-1
Summary of DSS SWMU 149, Building 9930 Septic System
Monitoring Well CTF-MW3 Groundwater Sampling, VOC Analytical Results
July 2002–June 2004
(Off-Site Laboratory)

Sample Attributes			VOCs (EPA Method 8260B[a]) (µg/L)				
Record Number[b]	ER Sample ID	Sample Date	Acetone	Bromodichloromethane	Chloroform	Dibromochloromethane	Toluene
605578	049494-001	07-16-02	**14.0**	ND (0.38)	ND (0.36)	ND (0.29)	ND (0.39)
605762	060022-001	11-07-02	ND (4.5)	ND (0.38)	**0.481 J (1.0)**	ND (0.29)	ND (0.39)
606085	061026-001	02-11-03	ND (4.5)	ND (0.38)	**0.503 J (1.0)**	**0.297 J (1.0)**	ND (0.39)
606259	061681-001	04-29-03	ND (4.5)	ND (0.38)	**0.649 J (1.0)**	ND (0.29)	ND (0.39)
606694	063016-001	08-28-03	ND (4.5)	ND (0.38)	**0.402 J (1.0)**	ND (0.29)	ND (0.39)
606914	063529-001	12-03-03	ND (4.5)	ND (0.38)	ND (0.36)	ND (0.29)	ND (0.39)
607338	064411-001	03-23-04	ND (4.5)	**0.547 J (1.0)**	**0.559 J (1.0)**	**0.467 J (1.0)**	ND (0.39)
607545	065030-001	06-01-04	ND (4.5)	**0.496 J (1.0)**	**0.527 J (1.0)**	**0.330 J (1.0)**	**0.447 J (1.0)**
Quality Assurance/Quality Control Samples—Trip Blank Samples (µg/L)							
605578	049499-001	07-16-02	ND (4.5)	ND (0.38)	ND (0.36)	ND (0.29)	ND (0.39)
605762	060030-001	11-07-02	ND (4.5)	ND (0.38)	ND (0.36)	ND (0.29)	ND (0.39)
606085	061032-001	02-11-03	ND (4.5)	ND (0.38)	ND (0.36)	ND (0.29)	ND (0.39)
606259	061684-001	04-29-03	ND (4.5)	ND (0.38)	ND (0.36)	ND (0.29)	ND (0.39)
606694	063017-001	08-28-03	ND (4.5)	ND (0.38)	ND (0.36)	ND (0.29)	ND (0.39)
606914	063530-001	12-03-03	ND (4.5)	ND (0.38)	ND (0.36)	ND (0.29)	ND (0.39)
607338	064412-001	03-23-04	ND (4.5)	ND (0.38)	ND (0.36)	ND (0.29)	ND (0.39)
607545	065031-001	06-01-04	ND (4.5)	ND (0.38)	ND (0.36)	ND (0.29)	**0.713 J (1.0)**
Regulatory Limits							
Maximum Contaminant Level[c]			NE	NE	NE	NE	1,000
Maximum Allowable Concentration[d]			NE	NE	NE	NE	750

Note: Values in **bold** represent detected analytes.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
[c]Maximum contaminant level established by the EPA National Primary Drinking Water Regulations (40 CFR 141.11 [b]).
[d]Maximum allowable concentration in groundwater for the contaminants specified in 20 NMAC 6.2, Sec. 3103.

CFR = Code of Federal Regulations.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
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/L = Microgram(s) per liter.
ND ( ) = Analyte not detected above the MDL, shown in parentheses.
NE = Not established.
NMAC = New Mexico Administrative Code.
SWMU = Solid Waste Management Unit.
VOC = Volatile organic compound.

Table 3.2-2
Summary of DSS SWMU 149, Building 9930 Septic System
Monitoring Well CTF-MW3 Groundwater Sampling, VOC Analytical MDLs
July 2002–June 2004
(Off-Site Laboratory)

Analyte	EPA Method 8260B[a] Detection Limit (µg/L)
Acetone	4.5
Benzene	0.33
Bromodichloromethane	0.38
Bromoform	0.5
Bromomethane	0.5
2-Butanone	2.31
Carbon disulfide	1.91
Carbon tetrachloride	0.29
Chlorobenzene	0.32
Chloroethane	0.5
Chloroform	0.36
Chloromethane	0.5
Dibromochloromethane	0.29
1,1-Dichloroethane	0.41
1,2-Dichloroethane	0.29
1,1-Dichloroethene	0.41
cis-1,2-Dichloroethene	0.3
trans-1,2-Dichloroethene	0.37
1,2-Dichloropropane	0.25
cis-1,3-Dichloropropene	0.3
trans-1,3-Dichloropropene	0.29
Ethylbenzene	0.21
2-Hexanone	1.45
Methylene chloride	3.3
4-Methyl-2-pentanone	1.78
Styrene	0.25
1,1,2,2-Tetrachloroethane	0.49
Tetrachloroethene	0.33
Toluene	0.39
1,1,1-Trichloroethane	0.34
1,1,2-Trichloroethane	0.44
Trichloroethene	0.36
Vinyl acetate	1.32
Vinyl chloride	0.55
Xylene	0.25–0.83

[a]EPA November 1986.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
MDL = Method detection limit.
µg/L = Microgram(s) per liter.
SWMU = Solid Waste Management Unit.
VOC = Volatile organic compound.

HE Compounds

HE compound analytical results for the eight groundwater samples collected from monitoring well CTF-MW3 are summarized in Table 3.2-3. MDLs for the HE groundwater analyses are presented in Table 3.2-4. A trace amount of 2-amino-4,6-dinitrotoluene was detected in the sample collected on July 16, 2002 during the first sampling event. No HE compounds were detected in any subsequent groundwater sample collected from this well.

Table 3.2-3
Summary of DSS SWMU 149, Building 9930 Septic System
Monitoring Well CTF-MW3 Groundwater Sampling, HE Compound Analytical Results
July 2002–June 2004
(Off-Site Laboratory)

Sample Attributes			HE (EPA Method 8330B[a]) (µg/L)
Record Number[b]	ER Sample ID	Sample Date	2-Amino-4,6-dinitrotoluene
605578	049494-015	07-16-02	**0.085 J (0.104)**
605762	060022-015	11-07-02	ND (0.0779)
605762	060022-R15[c]	11-07-02	ND (0.0779)
606085	061026-015	02-11-03	ND (0.0779)
606259	061681-015	04-29-03	ND (0.0779)
606694	063016-015	08-28-03	ND (0.0822)
606914	063529-015	12-03-03	ND (0.0779)
607338	064411-015	03-23-04	ND (0.325)
607545	065030-015	06-01-04	ND (0.325)

Note: Values in **bold** represent detected analytes.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
[c]Reanalysis.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
HE = High explosive(s).
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/L = Microgram(s) per liter.
ND ( ) = Not detected above the MDL, shown in parentheses.
SWMU = Solid Waste Management Unit.

Table 3.2-4
Summary of DSS SWMU 149, Building 9930 Septic System
Monitoring Well CTF-MW3 Groundwater Sampling, HE Compound Analytical MDLs
July 2002–June 2004
(Off-Site Laboratory)

Analyte	EPA Method 8330B[a] Detection Limit (µg/L)
2-Amino-4,6-dinitrotoluene	0.0779–0.325
4-Amino-2,6-dinitrotoluene	0.0409–0.162
1,3-Dinitrobenzene	0.033–0.325
2,4-Dinitrotoluene	0.0349–0.325
2,6-Dinitrotoluene	0.0501–0.182
HMX	0.0779–0.162
Nitrobenzene	0.0131–0.162
2-Nitrotoluene	0.064–0.162
3-Nitrotoluene	0.064–0.325
4-Nitrotoluene	0.064–0.325
RDX	0.053–0.162
Tetryl	0.032–0.487
1,3,5-Trinitrobenzene	0.0249–0.325
2,4,6-Trinitrotoluene	0.0779–0.162

[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/L = Microgram(s) per liter.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
SWMU = Solid Waste Management Unit.
Tetryl = Methyl-2,4,6-trinitrophenylnitramine.

RCRA Metals

RCRA metals analytical results for the eight groundwater samples collected from monitoring well CTF-MW3 are summarized in Table 3.2-5. MDLs for the RCRA metals in groundwater analyses are presented in Table 3.2-6. Selenium was detected in all eight groundwater samples at concentrations slightly above the NMED-approved background concentration (Dinwiddie September 1997). All other metal concentrations were below the NMED-approved background or other promulgated regulatory limits.

Total Cyanide, NPN, Anions and Cations

Cyanide, NPN, and anions and cations analytical results for the eight sets of groundwater samples collected from monitoring well CTF-MW3 are summarized in Table 3.2-7. MDLs for the cyanide, NPN, and anions and cations analyses are presented in Table 3.2-8. Cyanide was detected in one of the eight samples collected. NPN was detected at concentrations slightly

Table 3.2-5
Summary of DSS SWMU 149, Building 9930 Septic System Monitoring Well CTF-MW3 Groundwater Sampling, RCRA Metals Analytical Results July 2002–June 2004 (Off-Site Laboratory)

Sample Attributes			Metals (EPA Method 3005/7470[a]) (mg/L)							
Record Number[b]	ER Sample ID	Sample Date	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
605578	049494-008	07-16-02	0.00103 J (0.003)	0.0228	ND (0.00004)	ND (0.00038)	0.000081 J (0.002)	ND (0.000047)	**0.0147**	ND (0.00004)
605762	060022-008	11-07-02	0.00211 J (0.003)	0.0229	ND (0.00004)	0.000915 J (0.003)	0.000672 J (0.002)	ND (0.000047 J)	**0.0152**	ND (0.00004)
606085	061026-008	02-11-03	0.00256 J (0.003)	0.0271	0.000071 J (0.001)	0.00116 J (0.003)	0.000392 J (0.002)	ND (0.000047)	**0.0163**	0.000105 J (0.001)
606259	061681-008	04-29-03	ND (0.001)	0.0271	0.00005 J (0.001)	ND (0.00038 J)	0.00028 J (0.002)	ND (0.000047)	**0.0174**	0.000061 J (0.001)
606694	063016-008	08-28-03	0.00354	0.0281	ND (0.00004)	0.00209 J (0.003)	0.000334 J (0.002)	ND (0.000047 J)	**0.0176**	0.000052 J (0.001)
606914	063529-008	12-03-03	0.00361	0.0320	0.000052 J (0.001)	0.00177 J (0.003)	0.000263 J (0.002)	ND (0.000047)	**0.0155**	ND (0.00004)
607338	064411-010	03-23-04	0.0014 J (0.003)	0.0278	ND (0.00004)	0.00125 J (0.003)	0.000226 J (0.002)	ND (0.000047 J)	**0.0174**	0.000046 J (0.001)
607545	065030-010	06-01-04	0.00129 J (0.003)	0.0281	0.000045 J (0.001)	0.00114 J (0.003)	0.0005 J (0.002)	0.000103 J (0.0002)	**0.0163**	ND (0.00004)
Regulatory Limits (mg/L)										
Maximum Contaminant Level[c]			0.010	2.0	0.005	0.1	NE	0.002	0.05	NE
Maximum Allowable Concentration[d]			0.1	1.0	0.01	0.05	0.05	0.002	0.05	0.05
Background Concentration[e]			0.014	0.12	0.00047	0.043	0.01	0.002	0.005	< 0.010

Note: Values in **bold** exceed background groundwater concentrations.

[a]EPA November 1986.

[b]Analysis request/chain-of-custody record.

[c]Maximum contaminant level. Established by the EPA National Primary Drinking Water Regulations (40 CFR 141.11 [b]).

[d]Maximum allowable concentration in groundwater for the contaminants specified in 20 NMAC 6.2, Sec. 3103.

[e]Dinwiddie September 1997.

CFR = Code of Federal Regulations.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ID = Identification.
J = Analytical result was qualified as an estimated value.
J ( ) = The reported value is greater than or equal to the MDL, but is less than the practical quantitation limit, shown in parentheses.
MDL = Method detection limit.
mg/L = Milligram(s) per liter.
ND ( ) = Not detected above the MDL, shown parentheses.
NE = Not established.
NMAC = New Mexico Administrative Code.
RCRA = Resource Conservation and Recovery Act.
SWMU = Solid Waste Management Unit.

Table 3.2-6
Summary of DSS SWMU 149, Building 9930 Septic System
Monitoring Well CTF-MW3 Groundwater Sampling, RCRA Metals Analytical MDLs
July 2002–May 2004
(Off-Site Laboratory)

Analyte	EPA Methods 3005/7470[a] Detection Limits (mg/L)
Arsenic	0.001
Barium	0.00019
Cadmium	0.00004
Chromium	0.00038
Lead	0.00005
Mercury	0.000047
Selenium	0.00064
Silver	0.00004

[a]EPA November 1986.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
MDL = Method detection limit.
mg/L = Milligram(s) per liter.
RCRA = Resource Conservation and Recovery Act.
SWMU = Solid Waste Management Unit.

Table 3.2-7
Summary of DSS SWMU 149, Building 9930 Septic System Monitoring Well CTF-MW3 Groundwater Sampling, Total Cyanide, Nitrate plus Nitrite Anions and Cations Analytical Results July 2002–June 2004 (Off-Site Laboratory)

Sample Attributes			(EPA Methods 353.1/3005/9012/9056)[a] (mg/L)									
Record Number[b]	ER Sample ID	Sample Date	Total Cyanide	Nitrate plus Nitrite	Bromide	Calcium	Chloride	Fluoride	Magnesium	Potassium	Sodium	Sulfate
605578	049494	07-16-02	ND (0.00172)	**5.55**	1.21	236	141	**1.91**	59.7	15.1	184	481
605762	060022	11-07-02	ND (0.00172)	**5.30**	0.947	213	155	**1.84**	49.1	14.1	191	543
606085	061026	02-11-03	ND (0.00172)	**4.98**	1.24	211	141	**2.27**	50.5	13.2	188	540
606259	061681	04-29-03	ND (0.00172 J)	**5.95**	1.20	219	127	**2.16**	55.0	13.4	173	505
606694	063016	08-28-03	ND (0.00172)	**6.35**	1.18	198	133	**2.16**	53.0	12.1	168	522
606914	063529	12-03-03	0.00197 J (0.005)	2.59	1.33	223	133	**2.23**	53.3	13.1	200	547
607338	064411	3-23-04	ND (0.00172)	1.67	0.848	210	130	**2.22**	49.7	12.4	152	513
607545	065030	06-01-04	ND (0.00172 J)	1.99	1.30	207	132	**2.49**	53.5	12.9	170	531
Regulatory Limits												
Maximum Contaminant Level[c]			0.2	10	NE	NE	NE	4.0	NE	NE	NE	NE
Maximum Allowable Concentration[d]			0.2	10	NE	NE	NE	1.6	NE	NE	NE	NE
Background Concentration[e]			NE	4.0	NE	NE	NE	NE	NE	NE	NE	NE

Note: Values in **bold** exceed either background or maximum allowable groundwater concentrations.

[a]EPA November 1986.

[b]Analysis request/chain-of-custody record.

[c]Maximum contaminant level. Established by the EPA National Primary Drinking Water Regulations (40 CFR 141.11 [b]).

[d]Maximum allowable concentration in groundwater for the contaminants specified in 20 NMAC 6.2, Sec. 3103.

[e]Dinwiddie September 1997.

CFR = Code of Federal Regulations.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ID = Identification.
J = Analytical result was qualified as an estimated value.
J ( ) = The reported value is greater than or equal to the MDL, but is less than the practical quantitation limit, shown in parentheses.
MDL = Method detection limit.
mg/L = Milligram(s) per liter.
ND ( ) = Not detected above the MDL, shown in parentheses.
NE = Not established.
NMAC = New Mexico Administrative Code.
SWMU = Solid Waste Management Unit.

Table 3.2-8
Summary of DSS SWMU 149, Building 9930 Septic System
Monitoring Well CTF-MW3 Groundwater Sampling, Total Cyanide, Nitrate plus Nitrite
Anions and Cations Analytical MDLs
July 2002–May 2004
(Off-Site Laboratory)

Analyte	EPA Method 353.1/3005/9012/9056[a] Detection Limits (mg/L)
Total Cyanide	0.00172
Nitrate plus Nitrite	0.05–0.1
Bromide	0.0978–0.489
Calcium	0.04
Chloride	0.161–0.322
Fluoride	0.0553
Magnesium	0.00633–0.0317
Potassium	0.0151
Sodium	0.00968
Sulfate	0.965–1.93

[a]EPA November 1986.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
MDL = Method detection limit.
mg/L = Milligram(s) per liter.
SWMU = Solid Waste Management Unit.

above the NMED-approved background (Dinwiddie September 1997) in the first five samples collected. No regulatory or background limits have been established for bromide, calcium, chloride, magnesium, potassium, sodium, or sulfate in groundwater. The concentrations measured for these individual anions and cations were similar for the eight quarters of sampling.

Fluoride concentrations slightly exceeded the maximum allowable concentration (20 NMAC [New Mexico Administrative Code] 6.2, Sec. 3101) in all eight samples collected. The fluoride detected in well CTF-MW3 groundwater is most likely naturally occurring. None of the known activities conducted at Building 9930 would have produced a discharge of fluoride contamination to the environment. Additionally, abandoned fluorite mines occur in the foothills of the Manzanita Mountains approximately 5 miles east and southeast of SWMU 149. These mines were developed on deposits of fluorite (CaF_2) that were emplaced by calcium fluoride-bearing groundwater circulating along deep seated, high-angle faults bounding the east side of the Rio Grande rift.

3.3 Groundwater Sampling Quality Assurance/Quality Control Samples and Data Validation Results

The laboratory data for the eight sets of groundwater sample analyses were reviewed and verified/validated according to "Verification and Validation of Chemical and Radiochemical Data," TOP 94-03, Rev. 0 (SNL/NM July 1994). Annex C contains the data validation reports for the eight groundwater samples collected at this site.

As part of the SNL/NM groundwater sampling program, QA/QC samples were collected. These included duplicate, EB, and TB samples. Aqueous EB samples were randomly collected to demonstrate the efficacy of the equipment decontamination process; therefore EB samples were not necessarily collected prior to the sampling of each DSS well. No EB samples were collected prior to the sampling of DSS monitoring well CTF-MW3.

Aqueous TB samples, for VOC analysis only, were included in every sample cooler containing VOC groundwater samples. A trace of toluene was detected in the last TB shipped with the June 4, 2004, samples. Toluene was the only VOC detected in the TBs associated with the eight VOC groundwater samples collected from this monitoring well (Table 3.2-1).

No duplicate groundwater samples were collected during the eight rounds of sampling from monitoring well CTF-MW3.

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4.0 RISK ASSESSMENT REPORT FOR DSS SWMU 149

4.1 Site Description and History

DSS SWMU 149, the Building 9930 Septic System at 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 abandoned septic system consisted of a 750-gallon septic tank connected to a single seepage pit. Available information indicates that Building 9930 was constructed in 1961 (SNL/NM March 2003), and it is assumed that the septic system was constructed at the same time. By 1993, the septic system discharges were routed to the City of Albuquerque sanitary sewer system (Jones July 1993). The old septic system line was disconnected and capped, and the system was abandoned in place concurrent with this change (Romero September 2003). Waste in the septic tank was removed and managed according to SNL/NM policy. The empty and decontaminated septic tank was inspected by the NMED on November 7, 1995, and a closure form was signed (SNL/NM November 1995). The septic tank and seepage pit were then backfilled with clean, native soil from the area in early 1996.

Environmental concern about DSS SWMU 149 is based upon the potential for the release of COCs in effluent discharged to the environment via the septic system seepage pit 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 slopes to the west. The closest drainage lies approximately 1,300 feet south of the site and terminates in the playa just west of KAFB. No springs or perennial surface-water bodies are located within 3.3 miles of the site. Average annual rainfall in the SNL/NM and KAFB area, as measured at Albuquerque International Sunport, is 8.1 inches (NOAA 1990). Surface-water runoff in the vicinity of the site is potentially rapid because the surface slopes to the west. Infiltration of precipitation is almost nonexistent as virtually all of the moisture subsequently undergoes evapotranspiration. The estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL/NM March 1996). Most of the area immediately surrounding DSS SWMU 149 is unpaved with some native vegetation, and no storm sewers are used to direct surface water away from the site.

DSS SWMU 149 lies at an average elevation of approximately 5,570 feet above mean sea level. The groundwater beneath the site occurs in unconfined conditions in Precambrian granite and quartzite bedrock. As measured in the nearest groundwater monitoring well, CTF-MW3, approximately 320 feet to the west of Building 9930, groundwater is 302 feet bgs. Groundwater flow is thought to be to the west in this area (SNL/NM April 2004). The nearest production wells are KAFB-4, approximately 4.7 miles to the northwest, and KAFB-11, approximately 4.5 miles to the north.

4.2 Data Quality Objectives

Soil sampling was conducted in 1995 and 2002 in accordance with the rationale and procedures described in the approved "Septic Tanks and Drainfields ADS [Activity Data Sheet]-1295 RCRA

Facility Investigation [RFI] Work Plan" (SNL/NM March 1993), the SAP for the RFI of the septic tanks and drainfields (IT March 1994), and subsequent site-specific addenda to the Work Plan and SAP based upon discussions with the NMED/HRMB.

Groundwater sampling was conducted at DSS SWMU 149 on a quarterly basis from July 2002 to June 2004. Groundwater is not evaluated in this risk assessment because, with the exception of fluoride, concentrations of detected COCs were below promulgated regulatory limits, and because no groundwater exposure pathway exists at this site. Fluoride groundwater concentrations slightly exceeded the New Mexico maximum allowable concentration, but were below the EPA maximum contaminant level. Fluoride concentrations are probably naturally occurring and not associated with a release.

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 4.2-1 summarizes the rationale for determining the soil sampling locations at this site. The source of potential COCs at DSS SWMU 149 was effluent discharged to the environment from the seepage pit at this site.

Table 4.2-1
Summary of Sampling Performed to Meet Data Quality Objectives

DSS SWMU 149 Sampling Area(s)	Potential COC Source	Number of Sampling Locations	Sample Density (samples/acre)	Sampling Location Rationale
Soil adjacent to, and beneath, the septic tank	Effluent discharged to the environment from the septic tank	2	NA	Evaluate potential COC releases to the environment from effluent discharged from septic tank
Soil adjacent to, and beneath, the seepage pit	Effluent discharged to the environment from the seepage pit.	3	NA	Evaluate potential COC releases to the environment from effluent discharged from the seepage pit

COC = Constituent of concern.
DSS = Drain and Septic Systems.
NA = Not applicable.
SWMU = Solid Waste Management Unit.

Initial attempts in January 1995 to collect soil samples using a Geoprobe™ were only partially successful due to the presence of shallow bedrock in the area. As a result, it was not possible to collect soil samples from the deep sampling intervals. The 1995 sampling intervals started at 7 feet bgs in the two boreholes adjacent to the septic tank and at 8 feet bgs in the two boreholes

adjacent to the seepage pit. The depths were approximately equal to the bases of these structures. Soil samples were collected using procedures described in the NFA proposal (SNL/NM June 1996).

The 1995 soil samples were analyzed for VOCs, semivolatile organic compounds (SVOCs), RCRA metals, hexavalent chromium, cyanide, tritium, and radionuclides by gamma spectroscopy. The samples were analyzed by off-site laboratories (Quanterra Environmental Services [QES], General Engineering Laboratories, Inc. [GEL], and Thermo Analytical Inc./Eberline Laboratories [TMA]) and the on-site Radiation Protection Sample Diagnostics (RPSD) Laboratory. Samples were also screened for trinitrotoluene (TNT) and soil pH at the on-site Environmental Restoration Chemistry Laboratory. No TNT was detected; therefore, these TNT samples are not used in the risk assessment analysis. Table 4.2-3 summarizes the analytical methods and data quality requirements from the RFI Work Plan (SNL/NM March 1993) and the SAP for the RFI of septic tanks and drainfields (IT March 1994).

As described in Chapter 2.0, on October 10, 2002, one additional sample for HE compounds was collected at this site and analyzed by GEL using EPA Method 8330.

QA/QC samples were collected during the sampling effort according to the ER Project Quality Assurance Project Plan. The QA/QC samples consisted of one TB (for VOCs only), one set of field duplicate samples, and one set of EB samples. No significant QA/QC problems were identified in the QA/QC samples. Table 4.2-2 summarizes the types of confirmatory and QA/QC samples collected at the site and the laboratories that performed the analyses.

All of the DSS SWMU 149 soil sample results were verified/validated by SNL/NM. The off-site laboratory results from QES, GEL, and TMA were reviewed according to "Verification and Validation of Chemical and Radiochemical Data," TOP 94-03, Rev. 0 (SNL/NM July 1994) or earlier ER Project Administrative Operating Procedures (AOPs). The 2002 HE sample data were verified/validated according to "Data Validation Procedure for Chemical and Radiochemical Data," ER Project AOP 00-003 (SNL/NM December 1999). 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 1996b) or an earlier procedure. The reviews confirmed that the analytical data are defensible and therefore acceptable for use in this RSI response. Therefore, the data quality objectives (DQOs) have been fulfilled.

4.3 Determination of Nature, Rate, and Extent of Contamination

4.3.1 Introduction

The determination of the nature, migration rate, and extent of contamination at DSS SWMU 149 is based upon an initial conceptual model validated with confirmatory sampling at the site. The initial conceptual model was developed from archival site research, site inspections, soil sampling, and passive soil-vapor sampling. The DQOs contained in the RFI Work Plan (SNL/NM March 1993), the SAP for the RFI of septic tanks and drainfields (IT March 1994), and subsequent negotiations with the NMED/HRMB identified the sample locations, sample density, sample depth, and analytical requirements. The sample data were subsequently used to

Table 4.2-2
Number of Confirmatory Soil and QA/QC Samples Collected from DSS SWMU 149

Sample Type	VOCs	SVOCs	HE Compounds	RCRA Metals	Hexavalent Chromium	Total Cyanide	Tritium	Gamma Spectroscopy Radionuclides
Confirmatory	4	4	1	4	4	4	1	1
Duplicates	1	1	0	1	1	1	0	0
EBs and TBs[a]	2	1	0	1	0	1	0	0
Total Samples	7	6	1	6	5	6	1	1
Analytical Laboratory	QES	QES	GEL	QES	QES	QES	TMA	RPSD

[a]TBs for VOCs only.
DSS = Drain and Septic Systems.
EB = Equipment blank.
GEL = General Engineering Laboratories, Inc.
HE = High explosive(s)
QA/QC = Quality assurance/quality control.
QES = Quanterra Environmental Services.
RCRA = Resource Conservation and Recovery Act.
RPSD = Radiation Protection Sample Diagnostics Laboratory.
SVOC = Semivolatile organic compound.
SWMU = Solid Waste Management Unit.
TB = Trip blank.
TMA = Thermo Analytical Inc./Eberline Laboratories.
VOC = Volatile organic compound.

Table 4.2-3
Summary of Data Quality Requirements for DSS SWMU 149

Analytical Method[a]	Data Quality Level	QES	GEL	TMA	RPSD
VOCs EPA Method 8260	Defensible	4	None	None	None
SVOCs EPA Method 8270	Defensible	4	None	None	None
HE Compounds EPA Method 8330	Defensible	None	1	None	None
RCRA Metals EPA Method 6000/7000	Defensible	4	None	None	None
Hexavalent Chromium EPA Method 7196A	Defensible	4	None	None	None
Total Cyanide EPA Method 9012A	Defensible	4	None	None	None
Tritium EPA Method 906.0 or equivalent	Defensible	None	None	1	None
Gamma Spectroscopy Radionuclides EPA Method 901.1	Defensible	None	None	None	1

Note: The number of samples does not include composite samples or 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).
QA/QC = Quality assurance/quality control.
QES = Quanterra Environmental Services.
RCRA = Resource Conservation and Recovery Act.
RPSD = Radiation Protection Sample Diagnostics Laboratory.
SVOC = Semivolatile organic compound.
SWMU = Solid Waste Management Unit.
TMA = Thermo Analytical Inc./Eberline.
VOC = Volatile organic compound.

develop the final conceptual site model for SWMU 149, which is presented in this risk assessment report. The quality of the data specifically used to determine the nature, migration rate, and extent of contamination is described in the following sections.

4.3.2 Nature of Contamination

Both the nature of contamination and the potential for the degradation of COCs at DSS SWMU 149 are evaluated using laboratory analyses of the soil samples. The analytical requirements include analyses for VOCs, SVOCs, HE compounds, RCRA metals, hexavalent chromium, cyanide, tritium, and radionuclides by gamma spectroscopy. The analytes and methods listed in Tables 4.2-2 and 4.2-3 are appropriate to characterize the COCs and potential degradation products at SWMU 149.

4.3.3 Rate of Contaminant Migration

The septic system at DSS SWMU 149 was deactivated in the early 1990s when Building 9930 was connected to an extension of the City of Albuquerque sanitary sewer system. The migration rate of COCs that may have been introduced into the subsurface via the septic system at this site was therefore dependent upon the volume of aqueous effluent discharged to the environment from this system when it was operational. Any migration of COCs from this site after use of the septic system was discontinued has been predominantly dependent upon precipitation. However, it is highly unlikely that sufficient precipitation has fallen on the site to reach the depth at which COCs may have been discharged to the subsurface from this system. Analytical data generated from the soil sampling conducted at the site are adequate to characterize the rate of COC migration at SWMU 149.

4.3.4 Extent of Contamination

Subsurface soil samples were collected from boreholes drilled at five locations adjacent to the effluent release points and areas (septic tank and seepage pit) at the site to assess whether releases of effluent from the septic system caused any environmental contamination.

The soil samples were collected at sampling depths starting at 7 feet bgs adjacent to the septic tank and 8 feet bgs adjacent to the seepage pit. Sampling intervals started at the depths at which effluent discharged from the septic tank seepage pit would have entered the subsurface environment at the site. This sampling procedure was required by 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 of COCs.

4.4 Comparison of COCs to Background Levels

Site history and characterization activities are used to identify potential COCs. The DSS SWMU 149 NFA proposal (SNL/NM June 1996) 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 4.4-1 and 4.4-2.

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 4.4-1
Nonradiological COCs for Human Health Risk Assessment at DSS SWMU 149 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	4.1	7	Yes	44[c]	--	**Yes**
Barium	147	214	Yes	170[d]	--	**Yes**
Cadmium	0.25[e]	0.9	Yes	64[c]	--	**Yes**
Chromium, total	3.9	12.8	Yes	16[c]	--	No
Chromium VI	0.05[e]	NC	**Unknown**	16[c]	--	No
Cyanide	0.5[e]	NC	**Unknown**	NC	--	**Unknown**
Lead	7.4	11.8	Yes	49[c]	--	**Yes**
Mercury	0.05[e]	<0.1	Yes	5,500[c]	--	**Yes**
Selenium	0.25[e]	<1	Yes	800[f]	--	**Yes**
Silver	0.55 J	<1	Yes	0.5[c]	--	No
Organic						
Acetone	0.0091 J	NA	**NA**	0.69[g]	-0.24[g]	No
Methylene Chloride	0.0022 J	NA	**NA**	5[g]	1.25[g]	No

Note: **Bold** indicates the COCs that exceed the background screening values and/or are bioaccumulators.
[a]Dinwiddie September 1997, Coyote Test Field Supergroup.
[b]NMED March 1998a.
[c]Yanicak March 1997.
[d]Neumann 1976.
[e]Nondetected concentration (i.e., one-half the maximum detection limit is greater than the maximum detected concentration).
[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.
SWMU = Solid Waste Management Unit.
-- = Information not available.

Table 4.4-2
Radiological COCs for Human Health Risk Assessment at DSS SWMU 149 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)
Cesium-137	ND (0.0569)	0.079	Yes	3,000[d]	**Yes**
Thorium-232	0.814	1.01	Yes	3,000[d]	**Yes**
Tritium	**0.0255**	0.021[e]	**No**	NA	No
Uranium-235	**ND (0.304)**	0.18	**No**	900[d]	**Yes**
Uranium-238	1.26	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 Supergroup.
[c]NMED March 1998a.
[d]Baker and Soldat 1992.
[e]Tharp February 1999, 420 pCi/L = 0.21 pCi/g assuming a soil density of 1 gram/cubic centimeter and 5 percent soil moisture.
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) exceed background activity.
NMED = New Mexico Environment Department.
pCi/g = Picocurie(s) per gram.
SNL/NM = Sandia National Laboratories/New Mexico.
SWMU = Solid Waste Management Unit.

Table 4.4-1 lists the nonradiological COCs and Table 4.4-2 lists the radiological COCs for the human health risk assessment at DSS SWMU 149. 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 4.6.4.2 discusses the results presented in Tables 4.4-1 and 4.4-2.

4.5 Fate and Transport

The primary releases of COCs at DSS SWMU 149 were to the subsurface soil resulting from the discharge of effluents from the Building 9930 septic system. Wind, water, and biota are natural mechanisms of COC transport from the primary release point; however, because the discharge was to subsurface soil, none of these mechanisms are considered to be of potential significance as transport mechanisms at this site. Because the seepage pit is no longer active, additional infiltration of water is not expected. Infiltration of precipitation is essentially nonexistent at SWMU 149, as virtually all of the moisture either drains away from the site or evaporates. Because groundwater at this site is approximately 302 feet bgs, the potential for COCs to reach groundwater through the unsaturated zone above the water table is extremely low.

The COCs at DSS SWMU 149 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 uranium-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 SWMU 149 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 acetone and methylene chloride through volatilization is expected to be minimal.

Table 4.5-1 summarizes the fate and transport processes that can occur at DSS SWMU 149. 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 uranium-235 is insignificant because of its long half-life.

Table 4.5-1
Summary of Fate and Transport at DSS SWMU 149

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.
SWMU = Solid Waste Management Unit.

4.6 Human Health Risk Assessment

4.6.1 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 EPA, NMED, and DOE to determine whether further evaluation and potential site cleanup are required. Nonradiological COC risk values also are compared to background risk so that an incremental risk can be calculated.
Step 7.	Uncertainties of the above steps are addressed.

4.6.2 Step 1. Site Data

Section 4.1 of this risk assessment provides the site description and history for DSS SWMU 149. Section 4.2 presents a comparison of results to DQOs. Section 4.3 discusses the nature, rate, and extent of contamination.

4.6.3 Step 2. Pathway Identification

DSS SWMU 149 has been designated with a future land-use scenario of industrial (DOE et al. September 1995) (see Annex D 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 SWMU 149 is approximately 302 feet bgs. No intake routes through plant, meat, or milk ingestion are considered appropriate for either the industrial or residential land-use scenarios. Figure 4.6.3-1 shows the conceptual site model flow diagram for DSS SWMU 149.

Pathway Identification

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

4.6.4 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.

4.6.4.1 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 4.4-1 and used to calculate risk attributable to background in Section 4.6.6.2. 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.

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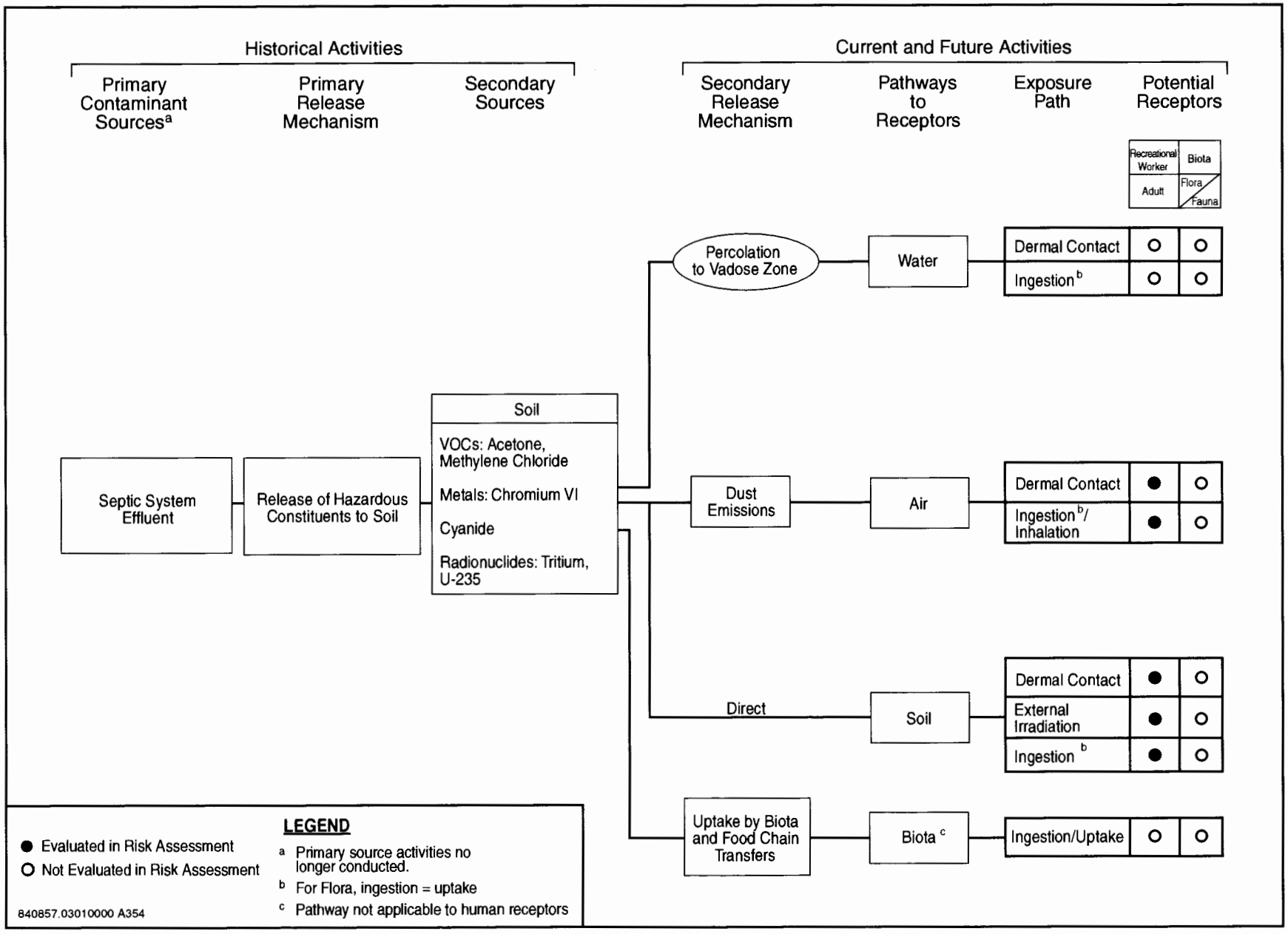

Figure 4.6.3-1

Conceptual Site Model Flow Diagram for SWMU 149, Building 9930 Septic System

4.6.4.2 Results

Tables 4.4-1 and 4.4-2 show the DSS SWMU 149 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, no constituents were measured at concentrations greater than the background screening values. Two constituents (cyanide and hexavalent chromium) do not have quantified background screening concentrations; therefore it is unknown whether these COCs exceed background. Two constituents (acetone and methylene chloride) are organic compounds that do not have corresponding background screening values.

For the radiological COCs, two constituents (tritium and uranium-235) exhibited a detection or MDA greater than the background screening levels.

4.6.5 Step 4. Identification of Toxicological Parameters

Tables 4.6.5-1 (nonradiological) and 4.6.5-2 (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 4.6.5-1 were obtained from the Integrated Risk Information System (IRIS) (EPA 2004a), the Health Effects Assessment Summary Tables (HEAST) (EPA 1997a), the Risk Assessment Information System (ORNL 2003), the EPA Region 6 electronic database (EPA 2004b), 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).

4.6.6 Step 5. Exposure Assessment and Risk Characterization

Section 4.6.6.1 describes the exposure assessment for this risk assessment. Section 4.6.6.2 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 COCs for both the industrial and residential land-use scenarios.

Table 4.6.5-1
Toxicological Parameter Values for DSS SWMU 149 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	A	0.01[d]
Cyanide	2E-2[c]	M	--	--	--	--	D	0.1[d]
Organic								
Acetone	1E-1[c]	L	1E-1[e]	--	--	--	D	0.01[f]
Methylene Chloride	6E-2[c]	M	8.6E-1[g]	--	7.5E-3[c]	1.6E-3[c]	B2	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.
B2 = Probable human carcinogen. Sufficient evidence in animals and inadequate or no evidence in humans.
D = Not classifiable as to human carcinogenicity.
[c]Toxicological parameter values from IRIS electronic database (EPA 2004a).
[d]Toxicological parameter values from NMED (February 2004).
[e]Toxicological parameter values from EPA Region 6 (EPA 2004b).
[f]Toxicological parameter values from Risk Assessment Information System (ORNL 2003).
[g]Toxicological parameter values from HEAST (EPA 1997a).

ABS = Gastrointestinal absorption coefficient.
COC = Constituent of concern.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
HEAST = Health Effects Assessment Summary Tables.
IRIS = Integrated Risk Information System.
mg/kg-d = Milligram(s) per kilogram-day.
$(mg/kg\text{-}d)^{-1}$ = 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.
SWMU = Solid Waste Management Unit.
-- = Information not available.

Table 4.6.5-2
Radiological Toxicological Parameter Values for DSS SWMU 149 COCs
Obtained from RESRAD Risk Coefficients[a]

COC	SF_o (1/pCi)	SF_{inh} (1/pCi)	SF_{ev} (g/pCi-yr)	Cancer Class[b]
Tritium	7.2E-14	9.6E-14	0.00E+0	A
Uranium-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.
SWMU = Solid Waste Management Unit.

4.6.6.1 Exposure Assessment

Annex D 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 COCs, the coded equation provided in RESRAD computer code is used to estimate the incremental TEDE and cancer risk for individual exposure pathways. Further discussion of this process is provided in the "Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD" (Yu et al. 1993a). Although the designated land-use scenario for this site is industrial, risk and TEDE values for a residential land-use scenario are also presented.

4.6.6.2 Risk Characterization

Table 4.6.6-1 shows an HI of 0.00 for the DSS SWMU 149 nonradiological COCs and an estimated excess cancer risk of 2E-8 for the designated industrial land-use scenario. The numbers presented include exposure from soil ingestion, dermal contact, and dust and volatile inhalation for nonradiological COCs. Table 4.6.6-2 shows an HI of 0.00 and no quantified estimated excess cancer risk for the SWMU 149 associated background constituents under the designated industrial land-use scenario.

Table 4.6.6-1
Risk Assessment Values for DSS SWMU 149 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	0.5[b]	0.00	1E-9	0.00	2E-9
Cyanide	0.5[b]	0.00	--	0.00	--
Organic					
Acetone	0.0091 J	0.00	--	0.00	--
Methylene Chloride	0.0022 J	0.00	1E-8	0.00	3E-8
Total		**0.00**	**1E-8**	**0.00**	**3E-8**

[a]EPA 1989.
[b]Nondetected concentration (i.e., one-half the maximum detection limit is greater than the maximum detected concentration).
COC = Constituent of concern.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
J = Estimated concentration.
mg/kg = Milligram(s) per kilogram.
SWMU = Solid Waste Management Unit.
-- = Information not available.

Table 4.6.6-2
Risk Assessment Values for DSS SWMU 149 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, Southwest Area 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.
SWMU = Solid Waste Management Unit.
-- = Information not quantified.

For the radiological COCs, 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 2.1E-2 millirem (mrem)/year (yr). In accordance with EPA guidance found in Office of Solid Waste and Emergency Response (OSWER) Directive No. 9200.4-18 (EPA 1997b), an incremental TEDE of 15 mrem/yr is used for the probable land-use scenario (industrial in this case); the calculated dose value for DSS SWMU 149 for the industrial land-use scenario is well below this guideline. The estimated excess cancer risk is 2.4E-7.

For nonradiological COCs under the residential land-use scenario, the HI is 0.00 with an estimated excess cancer risk of 3E-8 (Table 4.6.6-1). The numbers in the table include exposure from soil ingestion, dermal contact, and dust and volatile inhalation. Although the EPA (1991) guidelines generally recommend that inhalation not be included in a residential land-use scenario, this pathway is included because of the potential for soil in Albuquerque, New Mexico, to be eroded and for dust to be present in predominantly residential areas. Because of the nature of the local soil, other exposure pathways are not considered (see Annex D). Table 4.6.6-2 shows an HI of 0.00 and no quantified estimated excess cancer risk for the DSS SWMU 149 associated background constituents under the residential land-use scenario.

For the radiological COCs, the incremental TEDE for the residential land-use scenario is 5.3E-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 SWMU 149 for the residential land-use scenario is well below this guideline. Consequently, SWMU 149 is eligible for unrestricted radiological release as the residential land-use scenario resulted in an incremental TEDE of less than 75 mrem/yr to the on-site receptor. The estimated excess cancer risk is 5.1E-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 1997b). This summation is tabulated in Section 4.6.9.

4.6.7 Step 6. Comparison of Risk Values to Numerical Guidelines

The human health risk assessment analysis evaluates the potential for adverse health effects for both the industrial (the designated land-use scenario for this site) and residential land-use scenarios. For the nonradiological COCs under the industrial land-use scenario, the HI is 0.00 (less than the numerical guideline of 1 suggested in the RAGS [EPA 1989]). The estimated excess cancer risk is 2E-8. NMED guidance states that cumulative excess lifetime cancer risk must be less than 1E-5 (Bearzi January 2001); thus the excess cancer risk for this site is below the suggested acceptable risk value. This assessment also 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 1.54E-8 for the industrial land-use scenario. These

incremental risk calculations indicate insignificant risk to human health from nonradiological COCs under an industrial land-use scenario.

For the radiological COCs under the industrial land-use scenario, the incremental TEDE is 2.1E-2 mrem/yr, which is significantly lower than the EPA's numerical guideline of 15 mrem/yr (EPA 1997b). The estimated incremental excess cancer risk is 2.4E-7.

The calculated HI for the nonradiological COCs under the residential land-use scenario is 0.00, which is below numerical guidance. The estimated excess cancer risk is 3E-8. NMED guidance states that cumulative excess lifetime cancer risk must be less than 1E-5 (Bearzi January 2001); thus the excess cancer risk for this site is below the suggested acceptable risk value. The incremental HI is 0.00 and the estimated incremental cancer risk is 3.27E-8 for the residential land-use scenario. These incremental risk calculations indicate insignificant risk to human health from nonradiological COCs under the residential land-use scenario.

The incremental TEDE for a residential land-use scenario from the radiological components is 5.3E-2 mrem/yr, which is significantly lower than the numerical guideline of 75 mrem/yr suggested in the SNL/NM "RESRAD Input Parameter Assumptions and Justification" (SNL/NM February 1998). The estimated excess cancer risk is 5.1E-7.

4.6.8 Step 7. Uncertainty Discussion

The determination of the nature, rate, and extent of contamination at DSS SWMU 149 is based upon an initial conceptual model that was validated with sampling conducted at the site. The sampling was implemented in accordance with procedures and DQOs in the RFI Work Plan (SNL/NM March 1993), the SAP for the RFI of septic tanks and drainfields (IT March 1994), and subsequent negotiations with the NMED/HRMB. The data from soil samples collected at effluent release points are representative of potential COC releases to the site. The analytical requirements and results satisfy the DQOs, and data quality was verified/validated in accordance with SNL/NM procedures. Therefore, there is no uncertainty associated with the data quality used to perform the risk assessment at SWMU 149.

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

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

Table 4.6.5-1 shows the uncertainties (confidence levels) in nonradiological toxicological parameter values. There is a combination of estimated values and values from the IRIS (EPA 2004a), HEAST (EPA 1997a), EPA Region 6 (EPA 2004b), Risk Assessment Information System (ORNL 2003), and Technical Background Document for Development of Soil Screening Levels (NMED February 2004). Where values are not provided, information is not available from the HEAST (EPA 1997a), IRIS (EPA 2004a), Technical Background Document for Development of Soil Screening Levels (NMED February 2004), Risk Assessment Information System (ORNL 2003), or EPA regions (EPA 2004b, EPA 2002a, EPA 2002b). Because of the

conservative nature of the RME approach, uncertainties in toxicological values are not expected to change the conclusion from the risk assessment analysis.

Risk assessment values for 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 COCs, 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.

4.6.9 Summary

DSS SWMU 149 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 2E-8; thus, excess cancer risk is also below the acceptable risk value provided by the NMED for an industrial land-use scenario (Bearzi January 2001). The incremental HI is 0.00 and the estimated incremental excess cancer risk is 1.54E-8 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 3E-8. Thus, excess cancer risk is below the acceptable risk value provided by the NMED for a residential land-use scenario (Bearzi January 2001). The incremental HI is 0.00 and the estimated incremental excess cancer risk is 3.27E-8 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 radiological COCs are much less than EPA guidance values. The estimated TEDE is 2.1E-2 mrem/yr for the industrial land-use scenario, which is much lower than the EPA's numerical guidance of 15 mrem/yr (EPA 1997b). The corresponding estimated incremental cancer risk value is 2.4E-7 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 5.3E-2 mrem/yr with an associated risk of 5.1E-7. The guideline for this scenario is 75 mrem/yr (SNL/NM February 1998). Therefore, DSS SWMU 149 is eligible for unrestricted radiological release.

The excess cancer risk from the nonradiological and radiological COCs should be summed to provide risk estimates for persons exposed to both types of carcinogenic contaminants, as noted in OSWER Directive No. 9200.4-18 (EPA 1997b). The summation of the nonradiological and radiological carcinogenic risks is tabulated in Table 4.6.9-1.

Table 4.6.9-1
Summation of Incremental Nonradiological and Radiological Risks from DSS SWMU 149, Building 9930 Septic System Carcinogens

Scenario	Nonradiological Risk	Radiological Risk	Total Risk
Industrial	1.54E-8	2.4E-7	2.6E-7
Residential	3.27E-8	5.1E-7	5.4E-7

DSS = Drain and Septic Systems.
SWMU = Solid Waste Management Unit.

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.

4.7 Ecological Risk Assessment

4.7.1 Introduction

This section addresses the ecological risks associated with exposure to constituents of potential ecological concern (COPECs) in the soil at DSS SWMU 149. A component of the NMED Risk-Based Decision Tree (NMED March 1998a) is to conduct an ecological risk assessment that corresponds with that presented in the EPA's Ecological RAGS (EPA 1997c). The current methodology is tiered and contains an initial scoping assessment followed by a more detailed risk assessment if warranted by the results of the scoping assessment. Initial components of NMED's decision tree (a discussion of DQOs, data assessment, and evaluations of bioaccumulation as well as fate and transport potential) are addressed in previous sections of this report. At the end of the scoping assessment, a determination is made as to whether a more detailed examination of potential ecological risk is necessary.

4.7.2 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 4.7.2.4) summarizes the scoping results and assesses the need for further examination of potential ecological impacts.

4.7.2.1 Data Assessment

As indicated in Section 4.4, all COCs at DSS SWMU 149 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.

4.7.2.2 Bioaccumulation

Because no COPECs are associated with this site, bioaccumulation potential is not evaluated.

4.7.2.3 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 4.5. As noted in Table 4.5-1, 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.

4.7.2.4 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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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 SWMU 149 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.
- Groundwater is not evaluated in the risk assessment because, with the exception of fluoride, concentrations of detected COCs were below promulgated regulatory limits, and because no groundwater exposure pathway exists at this site. Fluoride groundwater concentrations slightly exceeded the New Mexico maximum allowable concentration, but were below the EPA MCL. Fluoride concentrations are probably naturally occurring and not associated with a release.
- 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 SWMU 149. This is consistent with the NMED's NFA Criterion 5, which states, "the SWMU/AOC 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 1998b).

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ANNEX A
DSS SWMU 149
Soil Sample Data Validation Results

RECORDS CENTER CODE: ER/1295/DSS/DAT

SMO ANALYTICAL DATA ROUTING FORM

PROJECT NAME: DSS Soil Sampling
PROJECT/TASK: 7223_02.03.02
SNL TASK LEADER: Collins
ORG/MS/CF0#: 6133/1089/CF032-02
SMO PROJECT LEAD: Herrera
SAMPLE SHIP DATE: 10/15/2002

ARCOC	LAB	LAB ID	PRELIM DATE	FINAL DATE	EDD	EDD ON Q	BY
605785	GEL	68835A		11/13/2002	X	X	JAC
605805	GEL	68835B		11/13/2002	X	X	JAC

	NAME	DATE
CORRECTIONS REQUESTED/RECEIVED:		
PROBLEM #:		
REVIEW COMPLETED BY/DATE:	W. Palencia	12/6/02
FINAL TRANSMITTED TO/DATE:	Sanders	12/6/02
SENT TO VALIDATION BY/DATE:	Conn	12/11/02
RUSH VALIDATION REQUIRED EST. TAT:		
VALIDATION COMPLETED BY/DATE:	KAL 12-19-02	
TO ERDMS OR RECORDS CENTER BY/DATE:	Conn	12/24/02

COMMENTS:

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. N/A

SMO Use

AR/COC [redacted]

Dept. No./Mail Stop:	6135/1089	Date Samples Shipped:		Project/Task No.:	7223.02.03.02
Project/Task Manager:	Mike Sanders	Carrier/Waybill No.		SMO Authorization:	R Gallegos
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.	CF032-02-03	Send Report to SMO:	Wendy Palencia/505-844-3132		

☐ 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

Location Tech Area
Building 9990,30,25 Room

Reference LOV(available at SMO) 68835

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	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
060069-001	9990/116-SP-3- 8 -S	8'	116	10-10-02/1130	S	AG	500ml	4c	G	SA	HE (8330) . 1	001
060138-001	9990/116-SP-5- 8 -S	8'	116	10-10-02/1040	S	AG	500ml	4c	G	SA	HE (8330) . 1	002
060072-001	9930/149-SP-3- 8 -S	8'	149	10-10-02/0845	S	AG	500ml	4c	G	SA	HE (8330) . 1	003
060073-001	9925/147-DF1-1- 5 -S	5'	147	10-9-02/0950	S	AG	500ml	4c	G	SA	HE (8330) . 1	004
060080-001	9925/147-DF1-6- 5 -S	5'	↑	↑ 1005	S	AG	500ml	4c	G	SA	HE (8330) . 1	005
060074-001	9925/147-DF3- 9 -S	9'		1115	S	AG	500ml	4c	G	SA	HE (8330) . 1	006
060081-001	9925/147-DF3-6- 9 -S	9'		1150	S	AG	500ml	4c	G	SA	HE (8330) . 1	007
060075-001	9925/147-DF2-2- 5 -S	5'	↓	↓ 1410	S	AG	500ml	4c	G	SA	HE (8330) . 1	008

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 Smo Use
Date Entered(mm/dd/yy)
Entered by:
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

*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use
4°C

	Name	Signature	Init	Company/Organization/Phone/Cellular
Sample Team Members	J.Lee	[signature]	[illegible]	Weston/6135/505-284-3309
	G.Quintana	[signature]	[illegible]	Shaw/6135/505-284-3309

1.Relinquished by [signature]	Org. 6135	Date 10/14/02	Time 0855	4.Relinquished by	Org.	Date	Time
1. Received by [signature]	Org. 6134	Date 10/14/02	Time 0855	4. Received by	Org.	Date	Time
2.Relinquished by [signature]	Org. 6134	Date 10/15/02	Time 1015	5.Relinquished by	Org.	Date	Time
2. Received by [signature]	Org.	Date 10/16/02	Time 0730	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

Sample Findings Summary

Site: DSS Soil Sampling **AR/COC:** 605785 & 605805 **Data Type:** Organic, Inorganic, G. Chem, & Rad

Sample ID	108-10-1 (acetone)	7440-39-3 (barium)	7782-49-2 (selenium)												
060057-001 / 6590/1112-SP1-BH1-15-S	6.34 U, B1														
060057-002 / 6590/1112-SP1-BH1-15-S		J, P1	J, B, B3												
060058-002 / 6590/1112-SP1-BH1-20-S		J, P1	J, B, B3												

Validated By: Kevin A Lambert **Date:** 12/19/02

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

MEMORANDUM

DATE: December 19, 2002

TO: File

FROM: Kevin Lambert

SUBJECT: Radiochemical Data Review and Validation – SNL DSS Soil Sampling, AR/COC No. 605785 & 605805, SDG No. 68835 & 68837 (GEL), and 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 method EPA900.0 gross alpha/beta. No problems were identified with the data package that result in the qualification of data.

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

Holding Times/Preservation

The samples were properly preserved and analyzed within the prescribed holding times for applicable analyses.

Calibration

The case narratives state initial and continuing calibration met requirements for applicable analyses.

Blanks

No target analytes were detected above the MDA in the method blanks except for beta. Beta sample results were > 5x the blank concentration; no data are qualified as a result.

Tracer/Carrier Recovery

Not Applicable

Laboratory Control Sample (LCS)

The LCS met QC acceptance criteria for applicable analyses.

Matrix Spike (MS)

The MS met QC acceptance criteria for applicable analyses

Laboratory Replicate

The replicate met QC acceptance criteria for applicable analyses.

Negative Bias

Not Applicable

Detection Limits/Dilutions

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

Other QC

No field duplicate pair, equipment blank (EB), or field blank (FB) was submitted on the ARCOCs.

No other specific issues were identified which affect data quality.

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

MEMORANDUM

DATE: December 17, 2002

TO: File

FROM: Kevin Lambert

SUBJECT: Organic Data Review and Validation – SNL DSS Soil Sampling, AR/COC No. 605785 & 605805, SDG No. 68835 & 68837 (GEL), and 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

All samples were prepared and analyzed with accepted procedures using method EPA8260A/B VOC, EPA 8270C SVOC, EPA8330 HE, and EPA8082 PCB. All compounds were successfully analyzed. Problems were identified with the data package that result in the qualification of data.

1. VOC: The following target analytes were detected (≥ DL) in one or more of the blanks (TB). The associated sample results are qualified as noted below.

Sample 68835-009	Acetone was > the RL but < 10x the TB concentration and is qualified non-detect (ND) at the reported value, "6.34 U, B1."
Sample 68835-010	Acetone was ND and is not qualified as a result.

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

Holding Times

All samples were extracted and analyzed within the prescribed holding times and properly preserved for the applicable analyses.

Calibration

The initial calibration and continuing calibration data met QC acceptance criteria for the applicable analyses except as follows.

VOC: The calibration RFs for trichloroethene (0.23 and 0.24) were < the specified minimum RF (0.30). However, the calibration RSDs and CCV %Ds for trichloroethene met QC acceptance criteria. Associated sample results were ND and as a result based on professional judgment no data are qualified.

SVOC: The calibration R^2 for 4-nitrophenol (0.985) was >0.90 but < 0.99 and the CCV %Ds (27% and –29% respectively) were > 20% but ≤ 40%. Associated sample results were ND and as a result based on professional judgment no data are qualified. The CCV %D for 2,4,5-trichlorophenol (26%), 2,4-dinitrophenol (-22%), and hexachlorocyclopentadiene (-32%) were > 20% but ≤ 40%. Associated sample results were ND and as a result based on professional judgment no data are qualified. The CCV %D for o-cresol (51%) was > 40% but ≤ 60% with a high bias. Associated sample results were ND and as a result based on professional judgment no data are qualified.

Blanks

No target analytes were detected in the blanks for the applicable analyses except as noted above in the summary section.

Surrogates

The surrogate recoveries met QC acceptance criteria for the applicable analyses.

Internal Standards

Internal standards data met QC acceptance criteria for the applicable analyses.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS/MSD met QC acceptance criteria for the applicable analyses except as follows.

VOC: The MS/MSD was run on sample of similar matrix from another SNL SDG. No data are qualified as a result. The MS/MSD met QC acceptance criteria.

Laboratory Control Sample (LCS)

The LCS met QC acceptance criteria for the applicable analyses. No LCSD was provided with the SDG. Laboratory precision was assessed using the MS/MSD, which met QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported for the applicable analyses. No dilutions were required.

Confirmation

Not required for the applicable analyses. Sample results were ND.

Other QC

A trip blank was submitted on the ARCOCs. No field duplicate pair, equipment blank (EB) or field blank (FB) was submitted on the ARCOCs.

No other specific issues were identified which affect data quality.

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

MEMORANDUM

DATE: December 19, 2002

TO: File

FROM: Kevin Lambert

SUBJECT: Inorganic Data Review and Validation – SNL
DSS Soil Sampling, AR/COC No. 605785 & 605805, SDG No. 68835 & 68837 (GEL), and 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 accepted procedures using methods EPA6010B ICP-AES, EPA7471A CVAA, EPA9012A total cyanide, and EPA7196A hexavalent chromium. Problems were identified with the data package that result in the qualification of data.

1. ICP-AES: The following target analytes were detected (≥ DL) in one or more of the blanks (ICB, MB). The associated sample results are qualified as noted below.

   Samples 68835-011 and -012 — Selenium was < 5x the blank concentration and is qualified "J, B, B3."

   Chromium was non-detect (ND) or > 5x the blank concentrations; no data are qualified as a result.

2. ICP-AES: The replicate RPD for barium (22%) was outside QC acceptance criteria (20%). Associated sample results were detects and are qualified "J, P1."

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

Holding Times/Preservation

All samples were analyzed within the prescribed holding times and properly preserved for the applicable analyses.

Calibration

The initial and continuing calibration data met QC acceptance criteria for the applicable analyses. The case narratives state the instruments used were properly calibrated.

Blanks

No target analytes were detected in the blanks for the applicable analyses except as follows.

> ICP-AES: Chromium and selenium were detected in one or more of the blanks (see Data Validation Worksheet). Sample results are qualified as noted above in the summary section.

ICP Interference Check Sample (ICS)

ICP-AES: The ICS data met QC acceptance criteria.

Matrix Spike (MS)

The MS met QC acceptance criteria for the applicable analyses except as follows.

> ICP-AES: It should be noted the MS %R limits do not apply for barium since the sample concentrations are > 4x the spike concentrations. No data are qualified as a result.
>
> CVAA: The MS was run on a sample from another SNL SDG and met QC acceptance criteria. No data are qualified as a result.

Replicate

The replicate met QC acceptance criteria for the applicable analyses except as follows.

> ICP-AES: Barium RPD was outside QC acceptance criteria (see Data Validation Worksheet). Sample results are qualified as noted above in the summary section.

Laboratory Control Sample (LCS)

The LCS met QC acceptance criteria for the applicable analyses except as follows.

> Total Cyanide: The LCS %R (165%) was > the upper QC acceptance limit (138%). Sample results were ND and no data are qualified as a result.

It should be noted that no LCSD was provided with the SDG. No data are qualified as a result. Laboratory precision was assessed using the replicate, which met QC acceptance criteria except as noted above in the summary section.

ICP Serial Dilution

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

Detection Limits/Dilutions

All detection limits were properly reported for the applicable analyses. No dilutions were required except as follows.

> ICP-AES: Sample 68835-012 required a 5x dilution for chromium due to matrix interference for this analysis.

Other QC

No equipment blank (EB), field blank (FB), or field duplicate pair was submitted on the ARCOC.

No other specific issues were identified which affect data quality.

Data Validation Summary

Site/Project: DSS Soil Sampling Project/Task #: 7223.02.03.02 # of Samples: 13 Matrix: 12 soil, 1 aqueous

AR/COC #: 605785, 605805 Laboratory Sample IDs: 68835-001 to -012 (soil)

Laboratory: GEL 68837-001 (TB)

SDG #: 68835, 68837

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

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

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

Reviewed By: Kevin A Lambert Date: 12-19-02

Volatile Organics (SW 846 Method 8260)

Site/Project: DSS Soil Sampling AR/COC #: 605785, 605805 # of Samples: 2 Matrix: soil

Laboratory: GEL SDG #: 68835, 68837 Laboratory Sample IDs: 68835-009 & -010

Methods: EPA 8260A Batch #s: 211012/211014

156-59-2 cis-1,2-dichloroethene

156-60-5 trans-1,2-dichloroethene

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF (2)	Calib. RSD/ R^2	CCV %D	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks 68837-001	10x blk (1)
						>.05	<20% / 0.99	20%											
1	71-55-6	1,1,1-trichloroethane	✓	0.10		✓	✓	✓	✓									✓	
2	79-34-5	1,1,2,2-tetrachloroethane	✓	0.30		✓	✓												
2	79-00-5	1,1,2-trichloroethane	✓	0.10		✓	✓												
1	75-34-3	1,1-dichloroethane	✓	0.10		✓	✓												
1	75-35-4	1,1-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		✓	✓											4.76 J	47.6
1	71-43-2	benzene	✓	0.50		✓	✓			✓		N/A	✓	✓	✓	N/A		✓	
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		0.23	✓			✓			✓	✓	✓				
1	75-01-4	vinyl chloride	✓	0.10		✓	✓												
2	1330-20-7	xylenes(total)	✓	0.30		✓	✓												
	108-05-4	vinyl acetate	✓			✓	✓											✓	

Comments:

Notes: Shaded rows are RCRA compounds.

(1) 68835-009 > KRL & < 10x blk, result qualified UB @ reported value (6.34)

68835-010 ND, no data qualified

(2) Calib RSD & CCV %D met criteria, Sample results ND, no data qualified as a result

Reviewed By: Kevin A Lambert Date: 12-19-02

Volatile Organics

Site/Project: DSS Soil Sampling AR/COC #: 605785, 605805 Batch #s: 211012/211014

Laboratory: _____ SDG #: _____ # 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
		Met				Met			
		Criteria					Criteria		

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

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

Comments:

Volatile Organics (SW 846 Method 8260)

Site/Project: DSS Soil Sampling AR/COC #: 605785, 605805 # of Samples: 1 Matrix: Agueous

Laboratory: GEL SDG #: 68835, 68837 Laboratory Sample IDs: 68837-001 (TB)

Methods: EPA8260B Batch #s: 210994

156-59-2 cis-1,2-dichloroethene

156-60-5 trans-1,2-dichloroethene

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF (1) >.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		✓	✓	✓	✓											
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		✓	✓													
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		0.24	✓			✓										
1	75-01-4	vinyl chloride	✓	0.10	✓	✓	✓													
2	1330-20-7	xylenes(total)	✓	0.30		✓	✓													

N/A

Comments: Notes: Shaded rows are RCRA compounds.

(1) Calib RSD & CCV %D met criteria, Sample result ND, No data qualified as a result

Reviewed By: Kevin A Lambert Date: 12-19-02

Volatile Organics

Site/Project: DSS Soil Sampling AR/COC #: 605785, 605805 Batch #s: 210994

Laboratory: _____ SDG #: _____ # 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
	Met				Met				
	Criteria					Criteria			

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

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

Comments:

Semivolatile Organics (SW 846 Method 8270)

Site/Project: DSS Soil Sampling AR/COC #: 605785, 605805 Laboratory Sample IDs: 68835-011 & -012

Laboratory: GEL SDG #: 68835, 68837

Methods: EPA 8270C

# of Samples: 2 Matrix: soil Batch #s: 208788/208790

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks		
							>.05	<20% / 0.99	20%												
2	BN	120-82-1	1,2,4-Trichlorobenzene	✓	0.20		✓	✓	✓	✓	✓			✓	✓	✓					
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		✓	✓	26/✓		✓			✓	✓	✓					
3	A	88-06-2	2,4,6-Trichlorophenol	✓	0.20		✓	✓	✓		✓			✓	✓	✓					
2	A	120-83-2	2,4-Dichlorophenol	✓	0.20		✓	✓													
2	A	105-67-9	2,4-Dimethylphenol	✓	0.20		✓	✓													
3	A	51-28-5	2,4-Dinitrophenol	✓	0.01	✓	✓	✓	✓/-22												
3	BN	121-14-2	2,4-Dinitrotoluene	✓	0.20		✓	✓	✓		✓	NA		✓	✓	✓					
3	BN	606-20-2	2,6-Dinitrotoluene	✓	0.20		✓	✓										N/A			
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		✓	✓	51/✓		✓			✓	✓	✓					
3	BN	88-74-4	2-Nitroaniline	✓	0.01		✓	✓	✓												
2	A	88-75-5	2-Nitrophenol	✓	0.10		✓	✓													
5	BN	91-94-1	3,3'-Dichlorobenzidine	✓	0.01		✓	✓													
3	BN	99-09-2	3-Nitroaniline	✓	0.01		✓	✓													
4	A	534-52-1	4,6-Dinitro-2-methylphenol	✓	0.01	✓	✓	✓													
4	BN	101-55-3	4-Bromophenyl-phenylether	✓	0.10		✓	✓													
3	BN	7005-72-3	4-Chlorophenyl-phenylether	✓	0.40		✓	✓													
2	A	59-50-7	4-Chloro-3-methylphenol	✓	0.20		✓	✓			✓			✓	✓	✓					
2	BN	106-47-8	4-Chloroaniline	✓	0.01		✓	✓													
1	A	106-44-5	4-Methylphenol (p-cresol)	✓	0.60		✓	✓			✓			✓	✓	✓					
3	BN	100-01-6	4-Nitroaniline	✓	0.01		✓	✓	✓	✓											

Comments:

Notes: Shaded rows are RCRA compounds.

Reviewed By: Kevin A Lambert Date: 12-19-02

Semivolatile Organics

Site/Project: DSS Soil Sampling AR/COC #: 605785, 605805 Batch #s: _____

Laboratory: _____ SDG #: _____ # of Samples: _____ Matrix: _____

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks		
							>.05	<20%/ 0.99	20%												
3	A	100-02-7	4-Nitrophenol	✓	0.01	✓	✓	0.985	27/-29	✓	✓			✓	✓	✓					
3	BN	83-32-9	Acenaphthene	✓	0.90		✓	✓	✓		✓			✓	✓	✓					
3	BN	208-96-8	Acenaphthylene	✓	0.90		✓	✓													
4	BN	120-12-7	Anthracene	✓	0.70		✓	✓													
5	BN	56-55-3	Benzo(a)anthracene	✓	0.80		✓	✓													
6	BN	50-32-8	Benzo(a)pyrene	✓	0.70		✓	✓													
6	BN	205-99-2	Benzo(b)fluoranthene	✓	0.70		✓	✓													
6	BN	191-24-2	Benzo(g,h,i)perylene	✓	0.50	✓	✓	✓													
6	BN	207-08-9	Benzo(k)fluoranthene	✓	0.70		✓	✓													
2	BN	111-91-1	bis(2-Chloroethoxy)methane	✓	0.30		✓	✓													
1	BN	111-44-4	bis(2-Chloroethyl)ether	✓	0.70		✓	✓													
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	✓	✓	✓													
3	BN	132-64-9	Dibenzofuran	✓	0.80		✓	✓													
3	BN	84-66-2	Diethylphthalate	✓	0.01		✓	✓													
3	BN	131-11-3	Dimethylphthalate	✓	0.01		✓	✓													
4	BN	84-74-2	Di-n-butylphthalate	✓	0.01		✓	✓													
6	BN	117-84-0	Di-n-octylphthalate	✓	0.01		✓	✓													
4	BN	206-44-0	Fluoranthene	✓	0.60		✓	✓													
3	BN	86-73-7	Fluorene	✓	0.90		✓	✓													
4	BN	118-74-1	Hexachlorobenzene	✓	0.10		✓	✓			✓			✓	✓	✓					
2	BN	87-68-3	Hexachlorobutadiene	✓	0.01		✓	✓	✓		✓			✓	✓	✓					
3	BN	77-47-4	Hexachlorocyclopentadiene	✓	0.01	✓	✓	✓	-32/✓												
1	BN	67-72-1	Hexachloroethane	✓	0.30		✓	✓	✓		✓			✓	✓	✓					
6	BN	193-39-5	Indeno(1,2,3-cd)pyrene	✓	0.50	✓	✓	✓	✓												

Comments:

Semivolatile Organics

Site/Project: DSS Soil Sampling AR/COC #: 605785, 605805 Batch #s:

Laboratory: SDG #: # of Samples: Matrix:

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks		
							>.05	<20% / 0.99	20%												
2	BN	78-59-1	Isophorone	✓	0.40		✓	✓	✓	✓											
2	BN	91-20-3	Naphthalene	✓	0.70		✓	✓													
2	BN	98-95-3	Nitrobenzene	✓	0.20		✓	✓			✓			✓	✓	✓					
4	BN	86-30-6	N-Nitrosodiphenylamine (1)	✓	0.01		✓	✓													
1	BN	621-64-7	N-Nitroso-di-propylamine	✓	0.50		✓	✓			✓		NA	✓	✓	✓		NA			
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		✓	✓	✓	✓	✓			✓	✓	✓					

(1) (2) 10-17/11-12

Surrogate Recovery Outliers

Sample	SMC 1	SMC 2	SMC 3	SMC 4	SMC 5	SMC 6	SMC 7	SMC 8
	Met Criteria							

SMC 1: Nitrobenzene-d5 (BN)
SMC 2: 2-Fluorobiphenyl (BN)
SMC 3: Terphenyl-d14 (BN)
SMC 4: Phenol-d5 (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
	Met Criteria											

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

Comments: (1) & (2) 4-Nitrophenol => R^2 > 0.90 but < 0.99; CCV %D > 20 but < 40; Sample results ND and based on professional judgment NDW2 are qualified. KAL ~~HJ~~

(2) 3 Compounds => CCV %D > 20 but < 40; associated sample results are ND and based on professional judgment ND data are qualified

(2) o-cresol => CCV %D > 40 but < 60 µg/ a high bias; associated sample result ND and based on professional judgment ND data are qualified

High Explosives (SW 846 Method 8330)

Site/Project: DSS Soil Sampling AR/COC #: 605785, 605805 Laboratory Sample IDs: 68835-001 to -008, -011, -012

Laboratory: GEL SDG #: 68835, 68837

Methods: EPA 8330

# of Samples: 10 Matrix: Soil Batch #s: 208681/208682

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

NA

Sample	SMC %REC	SMC RT	Sample	SMC %REC	SMC RT
Met Criteria					

Comments:

Confirmation

Sample	CAS #	RPD > 25%	Sample	CAS #	RPD > 25%
Not Required					
Results ND					

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

Reviewed By: Kevin A Lambert Date: 12-19-02

PCBs (SW 846 - Method 8082)

Site/Project: DSS Soil Sampling AR/COC #: 605785, 605805 Laboratory Sample IDs: 68835-011, -012

Laboratory: GEL SDG #: 68835, 68837

Methods: EPA8082 PCB

# of Samples: 2 Matrix: Soil Batch #s: 209079/209080

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

NA

NA

Sample	SMC % REC	SMC RT	Sample	SMC % REC	SMC RT
Met Criteria					

Comments:

Confirmation

Sample	CAS #	RPD > 25%	Sample	CAS #	RPD > 25%
	Not Required				
	Results		ND		

Reviewed By: Kevin A Lambert Date: 12-19-02

Inorganic Metals

Site/Project: DSS Soil Sampling AR/COC #: 605785, 605805 Laboratory Sample IDs: 68835-011, -012

Laboratory: GEL SDG #: ~~209839/209840~~ KAL 68835, 68837

Methods: EPA6010B ICP-AES, EPA7471A CVAA

# of Samples: 2 Matrix: soil Batch #s: 209839/209840, 211020/211021

ICP 5-6
CR 1-2
CVAA 1-2

CAS # / Analyte	TAL	ICV	CCV	ICB ug/l	CCB	Method Blanks mg/kg	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dilution	Field Dup. RPD	Equip. Blanks	Field Blanks	5x blk	
	QC Element												(2)		(3) KAL				(1)	
7429-90-5 Al																				
7440-39-3 Ba	✓	✓	✓	✓	✓		✓			N/A			22(20)	✓	✓					
7440-41-7 Be																				
7440-43-9 Cd	✓	✓	✓	✓	✓		✓			✓			✓	✓	✓					
7440-70-2 Ca																				
7440-47-3 Cr	✓	✓	✓	✓	✓	0.207J	✓			✓			✓	✓	✓ KAL (10)				1.035	
7440-48-4 Co																				
7440-50-8 Cu																				
7439-89-6 Fe																				
7439-95-4 Mg																				
7439-96-5 Mn																				
7440-02-0 Ni								NA												
7440-09-7 K												NA								
7440-22-4 Ag	✓	✓	✓	✓	✓		✓			✓			✓	✓	✓					
7440-23-5 Na																				
7440-62-2 V																				
7440-66-6 Zn																				
7439-92-1 Pb	✓	✓	✓	✓	✓		✓			✓			✓	✓	✓					
7782-49-2 Se	✓	✓	✓	2.24J	✓	0.199J	✓			✓			✓	✓	✓				11.2	
7440-38-2 As	✓	✓	✓	✓	✓		✓			✓			✓	✓	✓					
7440-36-0 Sb																				
7440-28-0 Tl																				
7439-97-6 Hg	✓	✓	✓	✓	✓	✓	✓			✓			✓	NA	NA					
Cyanide CN																				

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

Comments: N/A - MS %R limits do not apply, sample [c] > 4x spike [c]
(1) Cr results > 5x blk, no data are qualified. Se results < 5x blk and are qualified J, B, B3
(2) Ba RPD outside criteria, data are qualified J, P1
~~(3) Cr~~ KAL

Reviewed By: Kevin A Lambert Date: 12-19-02

General Chemistry

Site/Project: DSS Soil Sampling AR/COC #: 605785, 605805 Laboratory Sample IDs: 68835-011, -012

Laboratory: GEL SDG #: 68835, 68837

Methods: EPA 9012A TCN, EPA 7196A Cr+6

# of Samples: 2 Matrix: soil Batch #s: 209202/209203, 213486/213487

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	
5955-70-0	TCN	✓	✓	✓	✓	✓	✓	165 (138)	NA	NA	✓	NA	NA	✓	NA	NA	NA	NA	NA	
18540-29-9	Cr+6	✓	✓	✓	✓	✓	✓	✓	↓	↓	✓	↓	↓	✓	↓	↓	↓	↓	↓	

Comments:

Reviewed By: Kevin A Lambert Date: 12-19-02

Radiochemistry

Site/Project: DSS Soil Sampling AR/COC #: 605785, 605805 Laboratory Sample IDs: 68835-011, -012

Laboratory: GEL SDG #: 68835, 68837

Methods: EPA 900.0 GAB

# of Samples: 2 Matrix: Soil Batch #s: 210666

Analyte	QC Element												
	(1) Method Blanks	LCS	MS	Rep RER	Equip. Blanks	Field Dup. RER	Field Blanks	Sample ID	Isotope	IS/Trace	Sample ID	Isotope	IS/Trace
Criteria	U	20%	25%	<1.0	U	<1.0	U			50-105			50-105
H3													
U-238													
U-234													
U-235/-236													
Th-232													
Th-228													
Th-230													
Pu-239/-240													
Gross Alpha	✓	✓	✓	✓									
Nonvolatile Beta	0.239	✓	✓	✓									
Ra-226													
Ra-228													
Ni-63													
Gamma Spec. Am-241													
Gamma Spec. Cs-137													
Gamma Spec. Co-60													

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:

(1) Sample results > 5x blank, no data are qualified

Reviewed By: Kevin A Lambert Date: 12-19-02

Contract Verification Review (CVR)

Project Leader COLLINS | Project Name DSS SOIL SAMPLING | Case No. 7223_02.03.02

AR/COC No. 605785& 605805 | Analytical Lab GEL | SDG No. 68835A & 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				
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X				

Contract Verification Review (Continued)

3.0 Data Quality Evaluation

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

Contract Verification Review (Continued)

4.0 Calibration and Validation Documentation

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

Contract Verification Review (Concluded)

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions

Were deficiencies unresolved? ▶ Yes ▶ (No)

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

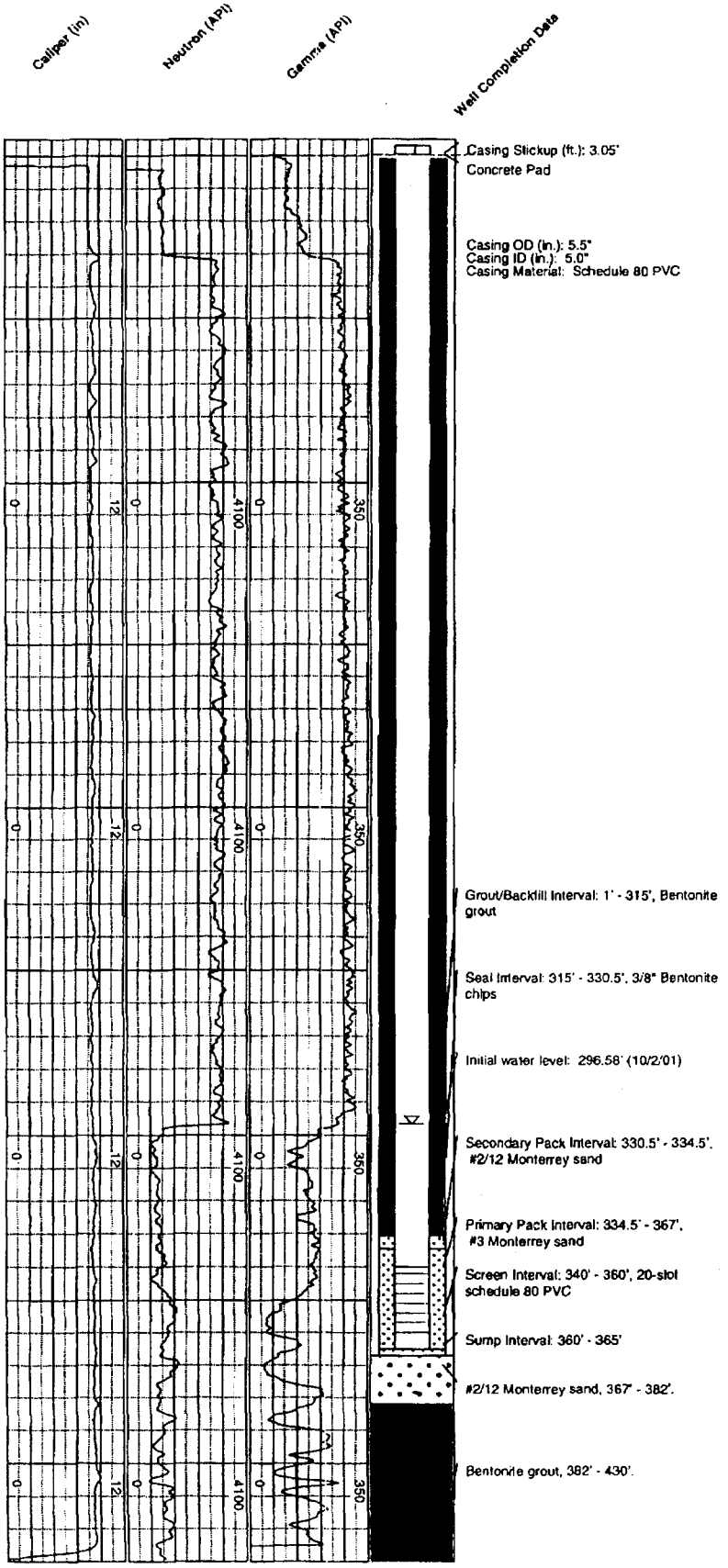
If no, provide: nonconformance report or correction request number _____ and date correction request was submitted:_____

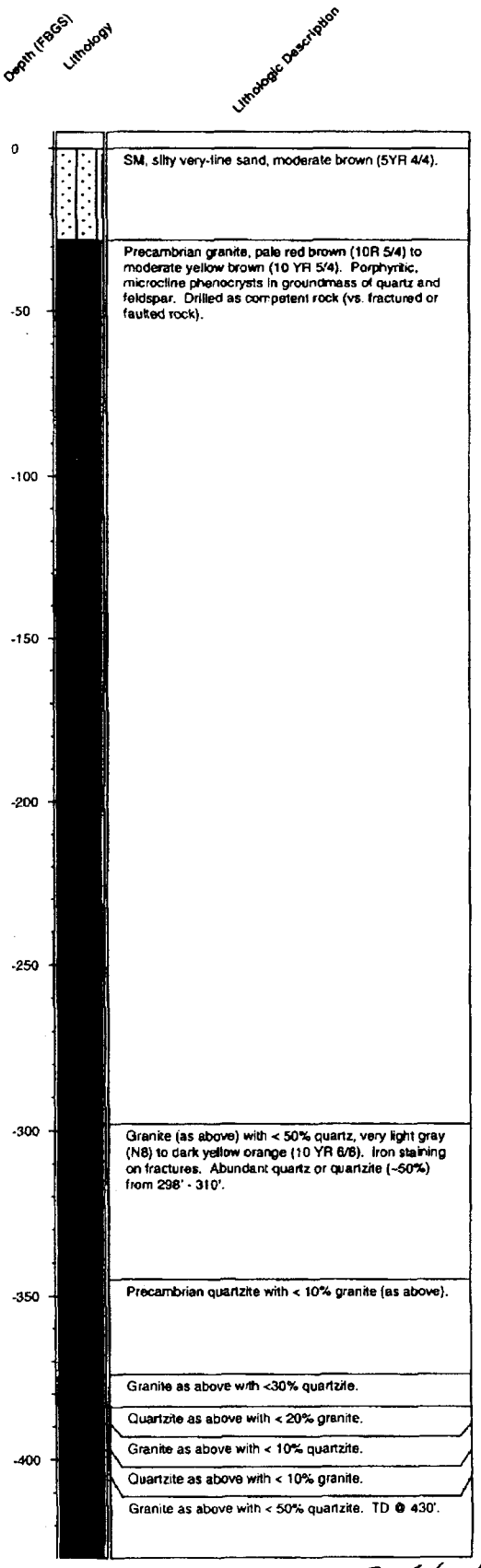
Reviewed by: W. Palencia Date: 12-6-2002 Closed by:_____ Date:_____

ANNEX B
DSS SWMU 149
Borehole Lithologic Log and Construction Diagram for Groundwater Monitoring Well CTF-MW3

Sandia National Laboratories/New Mexico
Environmental Restoration Project
CTF-MW3

Geologist: ***Mike Sanders***
Drilling Date: ***August 18, 2001***
Well Installation Date: ***August 20-21, 2001***





MRS 6/12/02

Attachment A

SNL/NM Groundwater Monitoring Well Data Sheet

PROJECT NAME: OU1295 MON. WELLS
ER ADS #: 1295
WELL NAME: CTF-MW3
OWNER: SNL/NM
DATE DRILLING BEGAN: 8/18/01
DRILLING CONTRACTOR: WDC INC.
DRILLING METHOD: ARCH. AIR ROTARY
BOREHOLE DEPTH: 430'
BOREHOLE DIAMETERS: 9 3/8" (CASED)
8 1/2" (UNCASED)

GEOGRAPHIC LOCATION: ~400' E. OF TA-III
WELL COMPLETION DATE: 8/21/01
COMPLETION ZONE: REGIONAL GROUNDWATER
FORMATION OF COMPLETION: PE GRANITE & QUARTZITE
REMARKS: 0'-29' DRILLED W/ ARCH.
29'-430' DRILLED W/
AIR ROTARY W/ DOWN
HOLE HAMMER (UNCASED)

Survey Data

Survey Date: 10/4/01
Surveyed by: ALBQ. SURVEYING CO. (ASC)

State Plane Coordinates
(X) Easting - 419463.46
(Y) Northing - 1,446,763.32

Surveyed Elevations
(feet above sea level)

Protective Casing: 5520.62
(Elev. D - FOP 94-71)

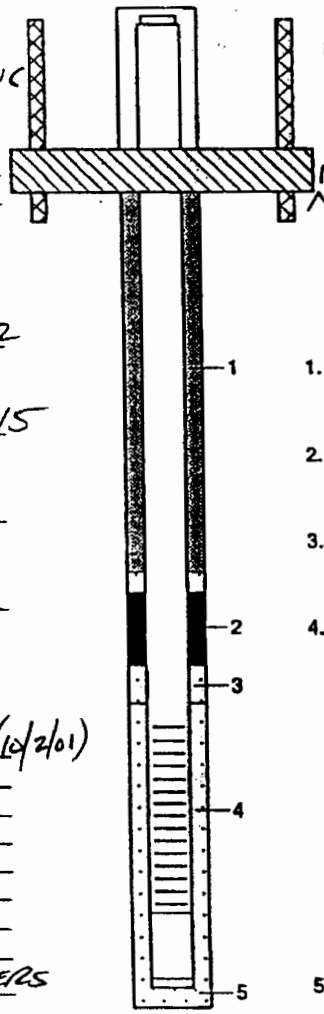
Top of Inner Well Casing: 5520.15
(Elev C - FOP 94-71)

Concrete Pad: 5517.48
(Elev B - FOP 94-71)

Ground Surface: 5517.10
(Elev A - FOP 94-71)

Calculated Elevations
(feet above sea level)
Initial Water Level: 5220.52' (10/2/01)
Other:
Comments:

Form Completed by: M. SANDERS
Verified by:



Completion Data

Measured Depths
(feet below ground surface)

Initial Water Level: 296.58' (10/2/01)
INNER
Casing Stickup: 3.05'
(above ground level)

Casing OD (in.): 5.5"
Casing ID (in.): 5.0"

1. Grout/Backfill Interval: 1'-315'
Material: BENTONITE GROUT
2. Seal Interval: 315'-330.5'
Material: 3/8" BENT. CHIPS
3. Secondary Pack Interval: 330.5'-334.5'
Secondary Pack Size: #2/12 MONTEREY SAND
4. Primary Pack Interval: 334.5'-367'
Primary Pack Size: #3 MONTEREY SAND
Screen Interval: 340'-360'
Slot Size: 0.02" (20-SLOT)
Material: SCH. 80 PVC
Sump Length: 5'
Casing Depth: 365'
Material: SCH. 80 PVC
5. Plug Back Interval (if used): 367'-430'
(Casing TD-Hole TD) 65'
Plug Material (if used): 367'-382': #2/12 MONT. SAND
382'-430': BENT. GROUT

301462.71.01/cw A1

ANNEX C
DSS SWMU 149
Groundwater Monitoring Well CTF-MW3
Data Validation Reports for Eight Quarters of Sampling
July 16, 2002–June 1, 2004

SMO ANALYTICAL DATA ROUTING FORM

Project Name: DSSs - GWM **Task No./Service Order:** 7223_01.05/CF022-02

SNL Task Leader: Collins **Org/Mail Stop:** 6133/1087

SMO Project Coordinator: Puissant **Sample Ship Date:** 07/17/02

ARCOC	Lab	Lab ID	Preliminary Received	Final Received	EDD Req'd YES	EDD Req'd NO	EDD ON Q YES	EDD ON Q NO
605578	GEL	63737		08/15/02	X		X	

	Date		
Correction Requested from Lab:	08.21.02	Correction Request Problem:	# 4786
Corrections Received:	08.21.02	Processed/resolved:	08.21.02 By: UH
Review Complete:	08.20.02	Signature:	UH
Priority Data Rec'd:		Notified:	
Preliminary Notification:		Customer Copy Picked Up	
Final Transmittal:	08.21.02	Transmitted To:	M. Sanders By: UH
Sent to validation:	08/26/02	Validation complete:	~~8/28/02~~ 9/16/02
Rush validation:	☐		
Returned from validation to:	ERDMS	On (date):	09/14/02
Filed in Records Center:		Filed By:	

Comments:

Received (Records Center) By:

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. N/A SAR/WR No

AR/COC 605578

Dept. No./Mail Stop	6133/MS-1087	Date Samples Shipped	7-17-02 SMO USE	Contract No	PO 21671 01.05
Project/Task Manager	Sue Collins/505-284-2546	Carrier/Waybill No.	11088	Project/Task No	7223 ~~01-04-01~~
Project Name	~~SWMUDSS~~ / DSSI - GWM	Lab Contact	Edie Kent/803-556-8171	SMO Authorization	
Record Center Code		Lab Destination	GEL		
Logbook Ref. No	ER 089	SMO Contact/Phone	Pam Russell/505-844-3185		
Service Order No	~~CF 023-02~~ CF022-02	Send Report to SMO	Wendy Palenoa/505-844-3132		

☐ Waste Characterization
-RCRA Date* ____
☐ Send:Preliminary/report to ____
☑ Validation Required
☐ Released by COC No.:

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

Location	Tech Area
Building NA	Room NA

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	Preserve All@4C	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
049494-001	CTF-MW3	350	149	07/16/02 1126	GW	G	3x40ml	HCL	G	SA	VOC (8260)	
049494-008	CTF-MW3	350	149	07/16/02 1127	GW	P	500ml	HNO3	G	SA	RCRA Metals (6020)	
049494-010	CTF-MW3	350	149	07/16/02 1132	FGW	P	500ml	HNO3	G	SA	Major Cations (6020)	
049494-012	CTF-MW3	350	149	07/16/02 1128	GW	P	500ml	NaOH	G	SA	Total Cyanide (9012A)	
049494-013	CTF-MW3	350	149	07/16/02 1129	GW	P	500ml	4C	G	SA	Major Anions (300.0)	
049494-015	CTF-MW3	350	149	07/16/02 1130	GW	AG	4x1L	4C	G	SA	High Explosives (8330)	
049494-016	CTF-MW3	350	149	07/16/02 1131	GW	P	250ml	H2SO4	G	SA	NPN (353.1)	
049499-001	SWMUD-TB3	NA	NA	07/16/02 1126	DIW	G	3x40ml	HCL	G	TB	VOC (8260)	

RMMA	☐ Yes ☑ No Ref. No	Sample Tracking	Smo Use
Sample Disposal	☐ Return to Client ☑ Disposal by lab	Date Entered(mm/dd/yy)	07/25/02
Turnaround Time	☐ 7 Day ☐ 15 Day ☑ 30 Day	Entered by	
Return Samples By:	☐ Negotiated TAT	QC inits	

Special Instructions/QC Requirements:
EDD ☑ Yes ☐ No
Raw Data Package ☑ Yes ☐ No

*Please send report to:
Tim Jackson/Org 6133/MS1087/505-284-2547

Major Anions/ Br CL FL SO4
FGW / Filtered in field w/ 45 micron filter

Please list as separate report

Abnormal Conditions on Receipt

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	Alfred Santillanes			Weston/6135/844-5130/228-0710
	John Boyd			Shaw/6135/284-3307/228-9231
	Robert Lynch			Weston/6135/844-4013/250-7090

1 Relinquished by		Org 6135	Date 7-17-02	Time 0815	4 Relinquished by	Org	Date	Time
1 Received by		Org 6133	Date 7/17/02	Time 0815	4 Received by	Org	Date	Time
2 Relinquished by		Org 6133	Date 7/17/02	Time 1000	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

*7 & 15 Day Turnaround Time: ERCL requires prior notification.

Sample Findings Summary

Site: DSSs GWM **AR/COC:** 605578 **Data Type:** Organic, Inorganic

Sample ID	Method/CAS Number (Analysis/Analyte)																					
	HEs:	1946-51-0 (4-amino-2,6-dinitrotoluene)	**VOCs:**	None	**Metals:**	None	**General Chemistry**	None														
049494-015 CTF-MW3		0.18J																				

Validated By: David Schwent **Date:** 09/06/02

Mr. David Schwent

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

MEMORANDUM

DATE: September 6, 2002

TO: File

FROM: David Schwent

SUBJECT: Inorganic Data Review and Validation - SNL
DSSs GWM, ARCOC #605578,
GEL SDG #63737, Project/Task No. 7223.01.05

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 methods EPA6020 ICP-MS, EPA7470A CVAA, EPA9012A total CN, EPA9056 ion chromatography (I.C.), and EPA353.1 nitrate/nitrite. No problems were identified with the data package that result in the qualification of data.

Data are acceptable. 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 initial and continuing calibrations met all QC acceptance criteria.

Blanks

ICP-MS Analysis: No target analytes were detected in the blanks, except for the following. In the initial calibration blank (ICB) and continuing calibration blanks (CCBs), Chromium (Cr) was detected at negative concentrations. The absolute values were > the detection limit (DL) but < the reporting limit (RL). However, the associated sample result was >5X the DL. Thus, no sample data were qualified.

Chloride (I.C.) Analysis: No target analytes were detected in the blanks, except for the following. Chloride was detected in the method blank (MB). However, the associated sample result was >5X the blank concentration. Thus, no sample data were qualified.

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

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

All Analyses: All MS and post spike (PS) QC acceptance criteria were met. It should be noted that the MS analyses for I.C. and nitrate/nitrite were performed on QC samples of similar matrix from other SNL SDGs (63387 and 63443, respectively). No sample data were qualified as a result. No MSD analyses were performed. The replicate analyses were used as measures of laboratory precision.

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

All Analyses: The LCS analyses met all QC acceptance criteria. No LCSD analyses were performed. The replicate analyses were used as measures of laboratory precision. No sample data were qualified as a result.

Laboratory Replicates

All Analyses: All laboratory replicate QC acceptance criteria were met. It should be noted that the laboratory replicate analyses for I.C. and nitrate/nitrite were performed on QC samples of similar matrix from other SNL SDGs (63387 and 63443, respectively). No sample data were qualified as a result.

ICP Interference Check Sample (ICS)

ICP-MS Analysis: All ICS QC acceptance criteria were met.

All Other Analyses: No ICS was required for these methods.

ICP Serial Dilution

ICP-MS Analysis: All serial dilution QC acceptance criteria were met.

All Other Analyses: No serial dilution was required for these methods.

Detection Limits/Dilutions

All Analyses: All detection limits were properly reported. Sample 63737-008 was diluted 5X for nitrate/nitrite and sample -006 was diluted 20X for chloride and sulfate in order to bring the raw values into the linear range of the instrument.

Other QC

All Analyses: No field duplicates, equipment blanks (EBs), or field blanks (FBs) were submitted on the ARCOC.

No other specific issues were identified which affect data quality.

Reviewed By: KAS **Level:** I **Date:** 9/13/02

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

MEMORANDUM

DATE: September 5, 2002

TO: File

FROM: David Schwent

SUBJECT: Organic Data Review and Validation - SNL
DSSs GWM; ARCOC #605578,
GEL SDG #63737, Project/Task No. 7223.01.05

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 methods EPA8260B VOCs and EPA8330 HEs. Problems were identified with the data package that result in the qualification of data.

1. HE Analysis: The confirmation relative percent difference (RPD) of 4-amino-2,6-dinitrotoluene was >25% but <75% for sample 63737-007. The highest detected sample result (0.18 ug/L) will be reported and qualified "J".

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

Holding Times/Preservation

VOC/HE Analyses: All samples were analyzed within the prescribed holding times and properly preserved.

Calibration

HE Analysis: All initial and continuing calibration QC acceptance criteria were met.

VOC Analysis: All initial and continuing calibration QC acceptance criteria were met, except for the following. For sample -007 the continuing calibration verification (CCV) %Ds of several compounds (see Data Validation Worksheets) were >20% but <40%. However, all associated sample results were non-detects (NDs). Thus, based on professional judgment, no sample data were qualified.

Blanks

VOC Analysis: No target analytes were detected in the method blanks (MBs), or trip blank (TB).

HE Analysis: No target analytes were detected in the MB.

Surrogates

VOC/HE Analyses: All surrogate percent recovery (%R) and retention time (RT) QC acceptance criteria were met.

Internal Standards (ISs)

VOC Analysis: All IS area and RT QC acceptance criteria were met.

HE Analysis: No ISs were required for this method.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

VOC Analysis: All MS/MSD QC acceptance criteria were met. No MS/MSD analyses were performed for the TB (VOC) since it was a QC sample. No sample data were qualified as a result. It should be noted that the MS/MSD analyses were performed on a QC sample from another SNL SDG (63387) of similar matrix. No sample data were qualified as a result.

HE Analysis: All MS/MSD QC acceptance criteria were met.

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

VOC Analysis: All LCS QC acceptance criteria were met. No LCSD analyses were performed. No sample data were qualified as a result.

HE Analysis: All LCS/LCSD QC acceptance criteria were met, except for the following. The LSC/LSCD RPD for tetryl was >20%. However, the RPD was only > the QC acceptance limit by 1%. Thus, based on professional judgment, no sample data were qualified.

Target Compound Identification/Confirmation

VOC Analysis: No confirmation analyses were required for this method.

HE Analysis: All confirmation QC acceptance criteria were met, except as noted above in the summary section.

Detection Limits/Dilutions

VOC/HE Analyses: All detection limits were reported correctly. No samples required dilution.

Other QC

VOC Analysis: A low level concentration (<10X DL) of acetone was detected in sample -001. The associated MB quantitative report was requested and is attached with the Data Validation Worksheets. The MB quantitative report shows no detection of acetone in the MB. Therefore, no sample data were qualified.

VOC/HE Analyses: No field duplicates, equipment blanks (EBs), or field blanks (FBs) were submitted on the ARCOC.

No other specific issues were identified which affect data quality.

Reviewed By: KAS **Level**: I **Date**: 9/13/02

Data Validation Summary

Site/Project: SNL / DSSs - GWM Project/Task #: 7223_01.05 # of Samples: 8 Matrix: Groundwater

AR/COC #: 605578 (SDG 63737) Laboratory Sample IDs: 63737001-008

Laboratory: GEL

Laboratory Report #: 63737

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

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

Reviewed By: David Schwent Date: 8-28-02

Volatile Organics (SW 846 Method 8260)

Site/Project: SNL/DSSS- GWM AR/COC #: 605578 # of Samples: 2 Matrix: Groundwater

Laboratory: GEL Laboratory Report #: 63737 Laboratory Sample IDs: 63737001-002

Methods: EPA 8260B Batch #s: 186455

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	N/A	✓	✓	✓	✓	✓	N/A	N/A	✓	✓	✓	N/A	N/A	✓		
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	N/A	✓	✓	✓	✓	✓	N/A	N/A	✓	✓	✓	N/A	N/A	✓		
2	108-10-1	4-methyl-2-pentanone (MIBK)		0.10				23.72[A]												
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				32.57[B]												
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				-28.98[A]												
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	N/A															
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																
1	75-01-4	**vinyl chloride**		0.10																
2	1330-20-7	xylenes(total)		0.30																

Comments:
* 2 Method Blanks were run and 2 LCSs were run (7-18-02; 7-22-02), with all QC criteria met.

Notes: Shaded rows are RCRA compounds.

A = Applies to sample -002 run 7-18-02
B = Applies to sample -001 run 7-22-02

Reviewed By: David Schwent Date: 8-28-02

Volatile Organics

Site/Project: SNL/DOSS-GWM AR/COC #: 605578 Batch #s: 186455

Laboratory: GEL Laboratory Report #: 63737 # of Samples: 2 Matrix: Groundwater

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
No Outliers									

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:

High Explosives (SW 846 Method 8330)

Site/Project: SNL/DSSs GWM AR/COC #: 605578 Laboratory Sample IDs: 63737007

Laboratory: GEL Laboratory Report #: 63737

Methods: EPA 8330 (HEs)

# of Samples: 1 Matrix: Groundwater Batch #s: 188136

CAS #	NAME	Initial	Intercept	Curve R^2 .99	CCV %D 20%	Method Blanks U	LCS	LCSD	LCS RPD 20%	MS	MSD	MS RPD 20%	Field. Dup. RPD	Equip. Blanks U	Field Blanks U		
2691-41-0	HMX	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	N/A	N/A	N/A		
121-82-4	RDX	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
99-35-4	1,3,5-Trinitrobenzene	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
99-65-0	1,3-dinitrobenzene	✓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
98-95-3	Nitrobenzene	✓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
479-45-8	Tetryl	↓	↓	↓	↓	↓	↓	DBr ✓	✓ 21	↓	↓	↓	↓	↓	↓		
118-96-7	2,4,6-trinitrotoluene	↓	↓	↓	↓	↓	↓	✓	✓	↓	↓	↓	↓	↓	↓		
35572-78-2	2-amino-4,6-dinitrotoluene	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
1946-51-0	4-amino-2,6-dinitrotoluene	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
121-14-2	2,4-dinitrotoluene	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
606-20-2	2,6-dinitrotoluene	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
88-72-2	2-nitrotoluene	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
99-99-0	4-nitrotoluene	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
99-08-1	3-nitrotoluene	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
78-11-5	PETN																

Sample	SMC %REC	SMC RT	Sample	SMC %REC	SMC RT
None					

Comments: Primary Column run 7-25-02
Confirmation Column run 7-26-02

Confirmation

Sample	CAS #	RPD > 25%	Sample	CAS #	RPD > 25%
63737007	1946-51-0	71.70			

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

Reviewed By: David Schwartz Date: 8-28-02

Inorganic Metals

Site/Project: SNL/DSSR GWM AR/COC #: 605578 Laboratory Sample IDs: 63737-003, -004

Laboratory: GEL Laboratory Report #: 63737

Methods: EPA 6020 (ICP-MS); 7470A (CVAA)

# of Samples: 2 Matrix: Groundwater Batch #s: 188867, 189924; 189399

CAS #/ Analyte	QC Element																			
	TAL	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dilu-tion	Field Dup. RPD	Equip. Blanks	Field Blanks		
7429-90-5 Al																				
7440-39-3 Ba	✓	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	N/A	N/A	✓	✓	✓	N/A	N/A	N/A		
7440-41-7 Be	~~✓~~	~~✓~~ DS																		
7440-43-9 Cd	✓	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	N/A	N/A	✓	✓	✓	N/A	N/A	N/A		
7440-70-2 Ca	✓			✓	✓															
7440-47-3 Cr	✓	↓	↓	-1.75	-1.73	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
7440-48-4 Co																				
7440-50-8 Cu																				
7439-89-6 Fe																				
7439-95-4 Mg	✓	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	N/A	N/A	✓	✓	✓	N/A	N/A	N/A		
7439-96-5 Mn																				
7440-02-0 Ni																				
7440-09-7 K	✓	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	N/A	N/A	✓	✓	✓	N/A	N/A	N/A		
7440-22-4 Ag	✓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
7440-23-5 Na	✓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
7440-62-2 V																				
7440-66-6 Zn																				
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	N/A	N/A	✓	✓	✓	N/A	N/A	N/A		
7782-49-2 Se	✓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
7440-38-2 As	✓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
7440-36-0 Sb																				
7440-28-0 Tl																				
7439-97-6 Hg	✓	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	N/A	N/A	✓	✓	N/A	N/A	N/A	N/A		
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:

Reviewed By: David Schwartz Date: 9-5-02

General Chemistry

Site/Project: SNL/DOE - GWM AR/COC #: 605578 Laboratory Sample IDs: 63737-005, -006, -008

Laboratory: GEL Laboratory Report #: 63737

Methods: EPA 9012A (total CN); 9056 (I.C.); 353.1 (NO_2/NO_3);

# of Samples: 3 Matrix: Groundwater Batch #s: 188092; 188344; 189029;

CAS #	Analyte	QC Element																	
		TAL	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS (PS)	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dilution	Field Dup. RPD	Equip. Blanks	Field Blanks
5955-70-0	total CN	✓	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	N/A	N/A	✓	N/A	N/A	N/A	N/A	N/A
24959-67-9, 16984-48-8, 16887-00-6,	I.C. (bromide, fluoride, chloride, sulfate)	✓	↓	↓	↓	↓	chloride = 0.082	↓	↓	↓	~~N/A~~ N	↓	↓	↓	↓	↓	↓	↓	↓
1N3N2	nitrate/nitrite	✓	↓	↓	↓	↓	✓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓

Comments:

Reviewed By: David Schwartz Date: 9-6-02

Contract Verification Review (CVR)

Project Leader Collins | Project Name DSS-GWM | Case No. 7223_01.05

AR/COC No. 605578 | Analytical Lab GEL | SDG No. 63737

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

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

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

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X				
2.4	Matrix spike/matrix spike duplicate data provided (if requested)	X				
2.5	Detection limits provided; PQL and MDL (or IDL), MDA and L_c	X				
2.6	QC batch numbers provided	X				
2.7	Dilution factors provided and all dilution levels reported	X				
2.8	Data reported in appropriate units and using correct significant figures	X				
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	N/A				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met	X				
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X				

Contract Verification Review (Continued)

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1 Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2 Quantitation limit met for all samples	X		
3.3 Accuracy a) Laboratory control samples accuracy reported and met for all samples	X		
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	X		
c) Matrix spike recovery data reported and met		X	cadmium not within acceptance limits
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	chloride detected in anion method blank
b) Sampling blank (e.g., field, trip, and equipment) data reported and met	X		
3.6 Contractual qualifiers provided: "J"- estimated quantity; "B"-analyte found in method blank above the MDL for organic or above the PQL for inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"-analysis done beyond the holding time	X		
3.7 Narrative addresses planchet flaming for gross alpha/beta	N/A		
3.8 Narrative included, correct, and complete	X		
3.9 Second column confirmation data provided for methods 8330 (high explosives) and 8082 (pesticides/PCBs)	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	N/A		

Contract Verification Review (Concluded)

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions
incomplete copy	HPLC	incomplete QC Summary on page 29

Were deficiencies unresolved? (Yes) No

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

If no, provide: nonconformance report or correction request number 4786 and date correction request was submitted: 08/21/02

Reviewed by: [illegible] Date: 08/20/02 Closed by: [illegible] Date: 08-21-02

RECORDS CENTER CODE: _____

SMO ANALYTICAL DATA ROUTING FORM

PROJECT NAME: DSS Assess GWM
PROJECT/TASK: 7222_01.09
SNL TASK LEADER: Collins
ORG/MS/CF0#: 6133/1089/CF022-03
SMO PROJECT LEAD: Herrera
SAMPLE SHIP DATE: 11/11/2002

ARCOC	LAB	LAB ID	PRELIM DATE	FINAL DATE	EDD	EDD ON Q	BY
605762	GEL	70428		12/3/2002	X	X	JAC

	NAME	DATE
REVIEW COMPLETED BY/DATE:	W. Palencia	12/9/02
CORRECTIONS REQUESTED/RECEIVED:		
PROBLEM #:		
FINAL TRANSMITTED TO/DATE:	Jackson	12/9/02
SENT TO VALIDATION BY/DATE:	Conn	12/11/02
RUSH VALIDATION REQUIRED EST. TAT:		
VALIDATION COMPLETED BY/DATE:	KAL 12-17-02	
COPY TO WM BY/DATE:		
TO ERDMS OR RECORDS CENTER BY/DATE:	Conn	12/24/02

COMMENTS: _____

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. N14

SMO Use

AR/COC 605762

Dept. No./Mail Stop:	6133/MS1089	Date Samples Shipped:	11-11-02	Project/Task No. 7222.01.09	☐ Waste Characterization -Send preliminary/copy report to:
Project/Task Manager:	Sue Collins	Carrier/Waybill No.	15847	SMO Authorization:	
Project Name:	DSS GW	Lab Contact:	Edie Kent/803-556-8171	Contract #: PO 21671	
Record Center Code:	ER	Lab Destination:	GEL	See attached Bottle Order	☐ Released by COC No.: ☑ Validation Required
Logbook Ref. No.:	ER 089	SMO Contact/Phone:	Pam Puissant/505-284-3185		
Service Order No.	CF 022-03	Send Report to SMO:	Wendy Palencia/505-844-3132		Bill To: Sandia National Labs (Accounts Payable) P.O. Box 5800 MS 0154 Albuquerque, NM 87185-0154 70428
Location	Tech Area				
Building	Room				

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
060022-001	CTF-MW3	350	149	11/7/02 1023	GW	G	3x40ml	HCL	G	SA	VOC (8260)	-001
060022-008	CTF-MW3	350	149	11/7/02 1024	GW	P	500ml	HNO3	G	SA	RCRA Metals (6020)	-003
060022-010	CTF-MW3	350	149	11/7/02 1025	FGW	P	500ml	HNO3	G	SA	Major Cations (6020) Filtered	-004
060022-012	CTF-MW3	350	149	11/7/02 1026	GW	P	500ml	NaOH	G	SA	Total Cyanide (9012A)	-005
060022-013	CTF-MW3	350	149	11/7/02 1027	GW	P	250ml	4C	G	SA	Major Anions (300.0)	-006
060022-015	CTF-MW3	350	149	11/7/02 1028	GW	AG	4x1L	4C	G	SA	High Explosives (8330)	-007
060022-016	CTF-MW3	350	149	11/7/02 1029	GW	P	250ml	H2SO4	G	SA	NPN (353.1)	-008
060030-001	CTF-TB5	NA	NA	11/7/02 1023	DIW	G	3x40ml	HCL	G	TB	VOC (8260)	-002

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day

Return Samples By: ☐ Negotiated TAT

Sample Tracking Smo Use

Date Entered(mm/dd/yy) 11/12/02

Entered by: RK

QC Inits. JAC

Special Instructions/QC Requirements

EDD ☑ Yes ☐ No

Level D Package ☑ Yes ☐ No

*Send report to:

Tim Jackson/Org 6133/MS 1087/505-284-2547

Major Anions/Br,Cl,Fl,SO4

Major Cations/Ca,Mg,K,Na

FGW/ Filtered in field w/.45 micron filter

*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	Alfred Santillanes		AS	Weston/6135/844-5130/228-0710
	John Boyd		JM	S&W/6135/284-3307/228-9231
	Robert Lynch		RL	Weston/6135/844-4013/250-7090

1.Relinquished by	Org 6135	Date 11/11/02	Time 0920	4.Relinquished by	Org.	Date	Time
1. Received by	Org 6134	Date 11/11/02	Time 0920	4. Received by	Org.	Date	Time
2.Relinquished by	Org 6132	Date 11/11/02	Time 0920	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

Sample Findings Summary

Site: DSS Assessment GWM. **AR/COC:** 605762 **Data Type:** Organic, Inorganic, and G. Chem

Sample ID	EPA8330: All results except nitrobenzene and 2,6-dinitrotoluene.	98-95-3 (nitrobenzene)	606-20-2 (2,6-dinitrotoluene)	19406-51-0 (4-amino-2,6-dinitrotoluene)	479-45-8 (tetryl)	7440-38-2 (Arsenic)	7439-97-6 (mercury)	24959-67-9 (bromide)	16887-00-6 (chloride)	16984-48-8 (fluoride)	14808-79-8 (sulfate)				
060022-015 / CTF-MW3				UJ, A	UJ, P1										
060022-R15 / CTF-MW3-RE	UJ, HT	UJ, HT, P	UJ, HT, A, P												
060022-008 / CTF-MW3						J, B, P1	UJ, B3								
060022-013 / CTF-MW3								J, P2	J, P2	J, P2	J, P2				

Validated By: Kevin A. Lambert **Date:** 12/17/02

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

MEMORANDUM

DATE: December 17, 2002

TO: File

FROM: Kevin Lambert

SUBJECT: Inorganic Data Review and Validation – SNL
DSS Assessment GWM, AR/COC No. 605762, SDG No. 70428 (GEL), and Project/Task No. 7222.01.09

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 accepted procedures using methods EPA6020 ICP-MS, EPA7470A CVAA, EPA9012A total cyanide, EPA353.1 nitrate/nitrite, and EPA9056 ion chromatography (IC). Problems were identified with the data package that result in the qualification of data.

1. ICP-MS: The following target analytes were detected (≥ DL) in one or more of the blanks (MB). The associated sample results are qualified as noted below.

   Sample 70428-003 — Arsenic was < 5x the blank concentration and is qualified "J, B."

   Selenium was non-detect (ND) or > 5x the blank concentrations; no data are qualified as a result.

   Sample 70428-004 — Calcium was ND or > 5x the blank concentrations; no data are qualified as a result.

2. ICP-MS: Sample 70428-003, the difference between the original and the replicate for arsenic is > the RL. The sample result is already qualified due the blank contamination; no further qualification is necessary. However the descriptive flag "P1" will be included to indicate poor precision.

3. CVAA: Mercury was detected in one or more of the blanks (CCB) at negative concentration with absolute value > the DL but < the RL. The associated sample results are qualified as noted below.

   Samples 70428-003 — Mercury was ND and is qualified "UJ, B3."

4. IC: The replicate was run on an unknown SDG. No measure of precision was provided on this SDG. Sample results were detect and are qualified "J, P2."

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

Holding Times/Preservation

All samples were analyzed within the prescribed holding times and properly preserved for the applicable analyses.

Calibration

The initial and continuing calibration data met QC acceptance criteria for the applicable analyses. The case narratives state the instruments used were properly calibrated.

Blanks

No target analytes were detected in the blanks for the applicable analyses except as follows.

> ICP-MS and CVAA: Several target analytes were detected in one or more of the blanks (see Data Validation Worksheet). Sample results are qualified as noted above in the summary section.

ICP Interference Check Sample (ICS)

ICP-MS: The ICS data met QC acceptance criteria.

Matrix Spike (MS)

The MS met QC acceptance criteria for the applicable analyses except as follows.

> ICP-MS: It should be noted the MS %R limits do not apply for calcium, magnesium, and sodium since the sample concentrations are > 4x the spike concentrations. No data are qualified as a result.
>
> IC: The MS was run on an unknown SDG. Accuracy was assessed using the LCS, which met QC acceptance criteria. No data are qualified as a result.

Replicate

The replicate met QC acceptance criteria for the applicable analyses except as follows.

> IC: The replicate was run on an unknown SDG. Sample results are qualified as noted above in the summary section.

Laboratory Control Sample (LCS)

The LCS met QC acceptance criteria for the applicable analyses. No LCSD was provided with the SDG. No data are qualified as a result. Laboratory precision was assessed using the replicate, which met QC acceptance criteria except as noted above in the summary section.

ICP Serial Dilution

ICP-MS: The serial dilution met QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported for the applicable analyses. No dilutions were required except as follows.

> ICP-MS: Calcium and sodium were diluted 5x due to high concentrations for this analysis.
>
> IC: Chloride and sulfate were diluted 20x due to high concentration and matrix interference for this analysis.
>
> Nitrate/Nitrite: Nitrate/nitrite was diluted 5x due to high concentration for this analysis.

Other QC

No equipment blank (EB), field blank (FB), or field duplicate pair was submitted on the ARCOC.

No other specific issues were identified which affect data quality.

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

MEMORANDUM

DATE: December 13, 2002

TO: File

FROM: Kevin Lambert

SUBJECT: Organic Data Review and Validation – SNL
DSS Assessment GWM, AR/COC No. 605762, SDG No. 70428 (GEL), and Project/Task No. 7222.01.09

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

Summary

All samples were prepared and analyzed with accepted procedures using method EPA8260B VOC and EPA8330 HE. All compounds were successfully analyzed. Problems were identified with the data package that result in the qualification of data.

1. HE: Sample 70428-007 (060022-015) was reextracted out of holding time and reanalyzed due to an LCS QC failure. Sample results for the reanalysis (70428-007RE / 060022-R15) were non-detect (ND) and are qualified "UJ, HT."

2. HE: For sample 70428-007RE (060022-R15), the LCS/LCSD RPD for nitrobenzene (29%) was outside QC acceptance criteria (20%). Qualification has already been recommended since the sample was reextracted out of holding time (see above). No further data qualification is necessary. However, the descriptive flag "P" will be included to indicate poor laboratory precision.

3. HE: For sample 70428-007RE (060022-R15), the LCSD %R for 2,6-dinitrotoluene (75%) was < the lower QC acceptance limit (79%) but > 10%. Also, the LCS/LCSD RPD for 2,6-dinitrotoluene (25%) was outside QC acceptance criteria (20%). Qualification has already been recommended since the sample was reextracted out of holding time (see above). No further data qualification is necessary. However, the descriptive flags "A" and "P" will be included to indicate poor laboratory accuracy and precision.

4. HE: For sample 70428-007 (060022-015), the LCS %R for 2-amino-4,6-dinitrotoluene (45%) was < the lower QC acceptance limit (59%) but > 10%. Sample result was ND and is qualified "UJ, A."

5. HE: For sample 70428-007 (060022-015), the MS/MSD RPD for tetryl (44%) was outside QC acceptance criteria (29%). Sample result was ND and is qualified "UJ, P1."

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

Holding Times

All samples were extracted and analyzed within the prescribed holding times and properly preserved for the applicable analyses except as noted above in the summary section.

Calibration

The initial calibration and continuing calibration data met QC acceptance criteria for the applicable analyses except as follows.

> VOC: The calibration RF for trichloroethene (0.24) was < the specified minimum RF (0.30). However, the calibration RSD and CCV %D for trichloroethene met QC acceptance criteria. Sample results were ND and as a result based on professional judgment no data are qualified. The CCV %D for bromomethane (35%), carbon tetrachloride (23%), and chloromethane (21%) were > 20% but ≤ 40%. Sample results were ND and as a result based on professional judgment no data are qualified.

Blanks

No target analytes were detected in the blanks for the applicable analyses.

Surrogates

The surrogate recoveries met QC acceptance criteria for the applicable analyses.

Internal Standards

Internal standards data met QC acceptance criteria for the applicable analyses.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS/MSD met QC acceptance criteria for the applicable analyses except as noted above in the summary section.

Laboratory Control Sample (LCS)

The LCS met QC acceptance criteria for the applicable analyses except as noted above in the summary section and as follows.

> VOC: No LCSD was provided with the SDG. Laboratory precision was assessed using the MS/MSD, which met QC acceptance criteria.

HE: For sample 70428-007RE (060022-R15), the LCSD %R for HMX (85%) and 1,3-dinitrobenzene (75%) was slightly < the lower QC acceptance limit (86% and 76% respectively). The LCS %R and LCS/LCSD RPD met QC acceptance criteria for HMX and1,3-dinitrobenzene. As a result based on professional judgment no data are qualified. Also, the LCS/LCSD RPD for tetryl (21%) was slightly outside QC acceptance criteria (20%). The LCS %R and /LCSD %R met QC acceptance criteria for tetryl. As a result based on professional judgment no data are qualified.

Detection Limits/Dilutions

All detection limits were properly reported for the applicable analyses. No dilutions were required.

Confirmation

HE: Not required; sample results were ND.

Other QC

A trip blank was submitted on the ARCOC. No field duplicate pair or field blank (FB) was submitted on the ARCOC.

No other specific issues were identified which affect data quality.

Data Validation Summary

Site/Project: DSS Assessment GW/M Project/Task #: 7222.01.09 # of Samples: 8 Matrix: Aqueous

AR/COC #: 605762 Laboratory Sample IDs: 70428-001 & -008

Laboratory: GEL

SDG #: 70428

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

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

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

Reviewed By: Kim A Lambert Date: 12-17-02

Holding Time and Preservation

Site/Project: DSS Assess GW/M AR/COC #: 605762 Laboratory Sample IDs: 70428-007 RE (HE)

Laboratory: GEL SDG #: 70428

# of Samples: 1 Matrix: Aqueous

Sample ID	Analytical Method	Holding Time Criteria	Days Holding Time was Exceeded	Preservation Criteria	Preservation Deficiency	Comments
70428-007 RE	EPA 8330	7dys-ext 40dys-ANAL	5 days-ext ✓	NA	NA	Reanalysis due to QC failure (LCS), reanalysis was out of holding time, results are ND and are qualified UJ, HT

Reviewed By: Kevin A Lambert Date: 12-17-02

Volatile Organics (SW 846 Method 8260)

Site/Project: DSS Assess GWM AR/COC #: 605762 # of Samples: 2 Matrix: Aqueous

Laboratory: GEL SDG #: 70428 Laboratory Sample IDs: 70428-001 & -002(TB)

Methods: EPA 8260B Batch #s: 215797

156-59-2 cis-1,2-dichloroethene

156-60-5 trans-1,2-dichloroethene

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 -002		
1	71-55-6	1,1,1-trichloroethane	✓	0.10		✓	✓	✓	✓									✓		
2	79-34-5	1,1,2,2-tetrachloroethane	✓	0.30		✓	✓													
2	79-00-5	1,1,2-trichloroethane	✓	0.10		✓	✓													
1	75-34-3	1,1-dichloroethane	✓	0.10		✓	✓													
1	75-35-4	1,1-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		✓	✓													
2	110-75-8	2-chloroethylvinylether	✓			✓	✓													
2	591-78-6	2-hexanone (MBK)	✓	0.01		✓	✓													
3	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		✓	✓	35												
1	75-15-0	carbon disulfide	✓	0.10		✓	✓	✓												
1	56-23-5	carbon tetrachloride	✓	0.10		✓	✓	23												
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		✓	✓	21												
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		0.29	✓			✓										
1	75-01-4	vinyl chloride	✓	0.10	✓	✓	✓													
2	1330-20-7	xylenes(total)	✓	0.30		✓	✓													
	108-05-4	vinyl acetate	✓			✓	✓													

NA

NA

Comments:

Notes: Shaded rows are RCRA compounds.

Reviewed By: Kevin A Lambert Date: 12-17-02

Volatile Organics

Site/Project: DSS Assess GWM AR/COC #: 605762 Batch #s: 215797

Laboratory: GEL SDG #: 70428 # of Samples: 2 Matrix: Aqueous

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

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

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

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

Comments:

High Explosives (SW 846 Method 8330)

Site/Project: DSS Assess GWM AR/COC #: 605762 Laboratory Sample IDs: ~~6~~ KAL 70428-007 (215659)

Laboratory: GEL SDG #: 70428 ↓ -007RE (216924)

Methods: EPA 8330

# of Samples: 1 Matrix: Aqueous Batch #s: 215656/215659, 216924/216922

CAS #	NAME	1/1	Intercept	Curve R^2 .99	CCV %D 20%	Method Blanks U	215659 LCS (1)	LCSD	LCS RPD 20%	MS	MSD	MS (2) RPD 20%	Field Dup. RPD	~~Equipment Blanks~~ MB U	~~Field Blanks~~ KAL ~~U~~ LCS	216924 LCSD (3)	LCS/LCSD RPD (4)
2691-41-0	HMX	✓	✓	✓	✓	✓	✓			✓	✓	✓	NA	✓	✓	85(86)	✓
121-82-4	RDX	✓	✓	✓			✓			✓	✓	✓			✓	✓	✓
99-35-49	1,3,5-Trinitrobenzene	✓	✓	✓			✓			✓	✓	✓			✓	✓	✓
99-65-0	1,3-dinitrobenzene	✓	✓	✓			✓			✓	✓	✓			✓	75(76)	✓
98-95-3	Nitrobenzene	✓	✓	✓			✓	NA		✓	✓	✓			✓	✓	29(20)
479-45-8	Tetryl	✓	✓	✓			✓			✓	✓	44(29)			✓	✓	21(20)
118-96-7	2,4,6-trinitrotoluene	✓	✓	✓			✓			✓	✓	✓			✓	✓	✓
35572-78-2	2-amino-4,6-dinitrotoluene	✓	✓	✓			✓			✓	✓	✓			✓	✓	✓
19406-51-0	4-amino-2,6-dinitrotoluene	✓	✓	✓			45(59)			✓	✓	✓			✓	✓	✓
121-14-2	2,4-dinitrotoluene	✓	✓	✓			✓			✓	✓	✓			✓	✓	✓
606-20-2	2,6-dinitrotoluene	✓	✓	✓			✓			✓	✓	✓			✓	75(79)	25(20)
88-72-2	2-nitrotoluene	✓	✓	✓			✓			✓	✓	✓			✓	✓	✓
99-99-0	4-nitrotoluene	✓	✓	✓			✓			✓	✓	✓			✓	✓	
99-08-1	3-nitrotoluene	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓
~~78-11-5~~	~~PETN~~																

~~ROI, RE~~ KAL

Sample	SMC %REC	SMC RT	Sample	SMC %REC	SMC RT
Met Criteria					

Confirmation

Nitrobenzene

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

KAL

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:

(1) 2A46DNT => LCS%R < lower limit but > 10%; result ~~qual~~ KAL ND and qualified UJ, A

(2) Tetryl => MS/MSD RPD was outside QC acceptance criteria, result ND and qualified UJ, P1

(3) HMX & 1,3-DNB => LCSD %R slightly < lower limit LCS & RPD met criteria, as a result based on professional judgment no data qualified

(4) ~~Tetryl~~ => LCS/LCSD RPD was outside QC acceptance criteria, result ND and qualified UJ, P

(4) Tetryl => LCS/LCSD RPD slightly outside criteria, recovery met criteria, result ND and as a result based on professional judgment no data qualified

(3) & (4) 2,6DNT => LCSD %R & LCS/LCSD RPD did not meet QC criteria; result ND and qualified UJ, A, P

Reviewed By: Kevin A Lambert Date: 12-17-02

Inorganic Metals

Site/Project: DSS Assess GWM AR/COC #: 605762 Laboratory Sample IDs: 70428-003 & -004

Laboratory: GEL SDG #: 70428

Methods: EPA 6020 ICP-MS, EPA 7470A CVAA

# of Samples: 2 Matrix: Aqueous Batch #s: 215817/215818, 216945/216946

CAS # / Analyte	QC Element																		
	TAL	ICV	CCV	ICB	CCB ug/l	Method Blanks ug/l	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep. RPD (2)	ICS AB	Serial Dilution	Field Dup. RPD	Equip. Blanks	Field Blanks	5x blk [5x DL] (1)
7429-90-5 Al								NA	NA		NA	NA							
7440-39-3 Ba	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓				
7440-41-7 Be																			
7440-43-9 Cd	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓				
7440-70-2 Ca	✓	✓	✓	✓	✓	0.0559 J	✓			N/A			✓	✓	✓				0.2795
7440-47-3 Cr	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓				
7440-48-4 Co																			
7440-50-8 Cu																			
7439-89-6 Fe																			
7439-95-4 Mg	✓	✓	✓	✓	✓	✓	✓			N/A			✓	✓	✓				
7439-96-5 Mn																			
7440-02-0 Ni																			
7440-09-7 K	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓				
7440-22-4 Ag	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓				
7440-23-5 Na	✓	✓	✓	✓	✓	✓	✓			N/A			✓	✓	✓				
7440-62-2 V																			
7440-66-6 Zn																			
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓				
7782-49-2 Se	✓	✓	✓	✓	✓	0.0007 J	✓			✓			✓	✓	✓				0.0035
7440-38-2 As	✓	✓	✓	✓	✓	0.00178 J	✓			✓			Δ > RL	✓	✓				0.0017
7440-36-0 Sb																			
7440-28-0 Tl																			
7439-97-6 Hg	✓	✓	✓	✓	-0.0857	✓	✓	NA	NA	✓	NA	NA	✓	NA	NA				[0.235]
Cyanide CN																			

KAL
~~ICP-MS~~
~~003~~ ~~7-8~~
~~004~~ ~~5-6~~
~~CVAA~~
~~003~~ ~~7-8~~
Cr, Hg 7-8
others 4-6

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: N/A - MS %R do not apply, sample [c] > 4x spike [c]
(1) Hg - Neg w/ absolute > DL but < RL, result ND and qualified UJ, B3
(1) Ca & Se > 5x blk, no data qualified
(1) As < 5x blk, data qualified J, B
(2) As Δ between original & Rep (0.0034) > RL (0.003) result qualified J, P1

Reviewed By: Kevin A Lambert Date: 12-17-02

General Chemistry

Site/Project: DSS Assessment GW/MR/COC #: 605762 Laboratory Sample IDs: 70428-008 (NpN)
Laboratory: GEL SDG #: 70428 ↓ -006 (IC)
Methods: EPA 353.1 NpN, EPA 9056 IC, EPA 9012A TCN 70428-005 (TCN)
# of Samples: 3 Matrix: Aqueous Batch #s: 215630, 215727, 217288/217289

CAS #	Analyte	QC Element																		
		TAL	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS (2)	MSD	MSD RPD	Rep. RPD (1)	ICS AB	Serial Dilution	Field Dup. RPD	Equip. Blanks	Field Blanks	
N599	NO_3/NO_2	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	✓	NA	NA	NA	NA	NA	
5955-70-0	Total Cyanide	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	✓	NA	NA	NA	NA	NA	
24959-67-9	Bromide	✓	✓	✓	✓	✓	✓	✓			NA			NA						
16887-00-6	Chloride	✓	✓	✓	✓	✓	✓	✓												
16984-48-8	Fluoride	✓	✓	✓	✓	✓	✓	✓												
14808-79-8	Sulfate	✓	✓	✓	✓	✓	✓	✓												

Comments:

(1) No measure of precision for bromide, chloride, fluoride & sulfate. Results were detect and are qualified "J, P2"

(2) No MS for bromide, chloride, fluoride, & sulfate; LCS used to assess accuracy; LCS met criteria. No data qualified as a result

Reviewed By: Kevin A Lambert Date: 12-17-02

Contract Verification Review (CVR)

Project Leader COLLINS | Project Name DSS ASSESSMENT GWM | Case No. 7222_01.09

AR/COC No. 605762 | Analytical Lab GEL | SDG No. 70428

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

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

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

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X				
2.4	Matrix spike/matrix spike duplicate data provided (if requested)	X				
2.5	Detection limits provided; PQL and MDL (or IDL), MDA and L_c	X				
2.6	QC batch numbers provided	X				
2.7	Dilution factors provided and all dilution levels reported	X				
2.8	Data reported in appropriate units and using correct significant figures	X				
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	N/A				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met	X		EXPLOSIVES SAMPLE RE-EXTRACTED PAST HOLDING TIME DUE TO LCS FAILURE	X	
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X				

Contract Verification Review (Continued)

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1 Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2 Quantitation limit met for all samples	X		
3.3 Accuracy a) Laboratory control samples accuracy reported and met for all samples		X	4-AMINO-2,6-DINTROTOLUENE FAILED RECOVERY LIMITS FOR LCS1 SEVERAL ANALYTES FAILED RECOVERY LIMITS FOR LCD2
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 MSD
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	RPD FOR TETRYL OUTSIDE ACCEPTANCE LIMITS
3.5 Blank data a) Method or reagent blank data reported and met for all samples		X	ARSENIC, SELENIUM & CALCIUM DETECTED IN BLANK
b) Sampling blank (e.g., field, trip, and equipment) data reported and met	X		
3.6 Contractual qualifiers provided: "J"- estimated quantity; "B"-analyte found in method blank above the MDL for organic or above the PQL for inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"-analysis done beyond the holding time	X		
3.7 Narrative addresses planchet flaming for gross alpha/beta	N/A		
3.8 Narrative included, correct, and complete	X		
3.9 Second column confirmation data provided for methods 8330 (high explosives) and 8082 (pesticides/PCBs)	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	N/A		

Contract Verification Review (Concluded)

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions

Were deficiencies unresolved? ► Yes ► (No)

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

If no, provide: nonconformance report or correction request number _____ and date correction request was submitted:-_____

Reviewed by: W. Palencia Date: 12-9-2002 Closed by:_____ Date:_____

RECORDS CENTER CODE: _____

SMO ANALYTICAL DATA ROUTING FORM

PROJECT NAME: DSS Assess GWM
PROJECT/TASK: 7222_01.09
SNL TASK LEADER: Collins
ORG/MS/CF0#: 6133/1089/CF022-03
SMO PROJECT LEAD: Herrera
SAMPLE SHIP DATE: 2/12/2003

ARCOC	LAB	LAB ID	PRELIM DATE	FINAL DATE	EDD	EDD ON Q	BY
606085	GEL	74913		3/6/2003	X	X	JAC

DATA PACKAGE TAT:		RUSH	X NORMAL
CORRECTIONS REQUESTED BY/DATE:			
PROBLEM #/DATE CORRECTION RECEIVED:			
CVR COMPLETED BY/DATE:	L. Herrera		03.07.03
FINAL TRANSMITTED TO/DATE:	T. Jackson		03.07.03
SENT TO VALIDATION BY/DATE:	J. Conn		03/07/03
VALIDATION COMPLETED BY/DATE:	NJ		3.20.03
COPY TO WM BY/DATE:			
TO ERDMS OR RECORDS CENTER BY/DATE:	Conn		3/25/03

COMMENTS:

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Page 1 of 1

Internal Lab

Batch No. N/A

SMO Use

AR/COC 606085

Dept. No./Mail Stop:	6133/MS1089	Date Samples Shipped:	2-12-03	Project/Task No. 7222.01.09	☐ Waste Characterization -Send preliminary/copy report to:
Project/Task Manager:	Sue Collins	Carrier/Waybill No.	18850	SMO Authorization:	
Project Name:	DSS GW	Lab Contact:	Edie Kent/803-556-8171	Contract #: PO 21671	
Record Center Code:	ER	Lab Destination:	GEL	SEE ATTACHED BOTTLE ORDER	☐ Released by COC No.: ☑ Validation Required
Logbook Ref. No.:	ER 089	SMO Contact/Phone:	Pam Puissant/505-284-3185		
Service Order No.	CF 022-03	Send Report to SMO:	Wendy Palencia/505-844-3132		Bill To: Sandia National Labs (Accounts Payable) P.O. Box 5800 MS 0154 Albuquerque, NM 87185-0154
Location	Tech Area	74913% Reference LOV(available at SMO)			
Building	Room				

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
061026-001	CTF-MW3	350	149	02/11/03 0925	GW	G	3x40ml	HCL	G	SA	VOC (8260)	001 .1
061026-008	CTF-MW3	350	149	02/11/03 0927	GW	P	500ml	HNO3	G	SA	RCRA Metals (6020)	003 .2
061026-010	CTF-MW3	350	149	02/11/03 0928	FGW	P	500ml	HNO3	G	SA	Major Cations (6020) Filtered	004 .3
061026-012	CTF-MW3	350	149	02/11/03 0929	GW	P	500ml	NaOH	G	SA	Total Cyanide (9012A)	008 .7
061026-013	CTF-MW3	350	149	02/11/03 0930	GW	P	250ml	4C	G	SA	Major Anions (300.0)	005 .4
061026-015	CTF-MW3	350	149	02/11/03 0932	GW	AG	4x1L	4C	G	SA	High Explosives (8330)	006 .5
061026-016	CTF-MW3	350	149	02/11/03 0934	GW	P	250ml	H2SO4	G	SA	NPN (353.1)	007 .6
061032-001	DSS-TB5	NA	NA	02/11/03 0925	DIW	G	3x40ml	HCL	G	TB	VOC (8260)	002 .1

RMMA	☐ Yes ☑ No Ref. No.	Sample Tracking Smo Use	Special Instructions/QC Requirements
Sample Disposal	☐ Return to Client ☑ Disposal by lab	Date Entered(mm/dd/yy)	EDD ☑ Yes ☐ No
Turnaround Time	☐ 7 Day ☐ 15 Day ☑ 30 Day	Entered by:	Level D Package ☑ Yes ☐ No
Return Samples By:	☐ Negotiated TAT	QC inits.	*Send report to:

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	Alfred Santillanes	[signature]		Weston/6135/844-5130/228-0710
	John Boyd	[signature]		S&W/6135/284-3307/228-9231
	Robert Lynch	[signature]		Weston/6135/844-4013/250-7090

*Send report to:
Tim Jackson/Org 6133/MS 1087/505-284-2547

Major Anions/Br,Cl,Fl,SO4
Major Cations/Ca,Mg,K,Na
FGW/ Filtered in field w/.45 micron filter
*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use
2°C

1.Relinquished by [signature]	Org. 6135	Date 2/12/03	Time 0945	4.Relinquished by	Org.	Date	Time
1. Received by [signature]	Org. 6133	Date 2/12/03	Time 0945	4. Received by	Org.	Date	Time
2.Relinquished by [signature]	Org. 6142	Date 2/12/03	Time 1030	5.Relinquished by	Org.	Date	Time
2. Received by [signature]	Org.	Date 2/13/03	Time 0715	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

Sample Findings Summary

Site: DSS Assess GWM | **ARCOC** 606085 | **Data:** Organic and Inorganic

Sample ID	VOC (8260B)	HE (8330)	Metals	7440-38-2 (arsenic)	7440-43-9 (cadmium)	General Chemistry								
061026-008 CTF-MW3	All QC acceptance criteria were met.No data will be qualified.	All QC acceptance criteria were met.No data will be qualified.		J, B	J, A2	All QC acceptance criteria were met.No data will be qualified.								

Validated By: K Mal

Date: 03/20/03

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

Memorandum

DATE: 03/19/03

TO: File

FROM: Linda Thal

SUBJECT: Organic Data Review and Validation - SNL
Site: DSS Assess GWM
ARCOC # 606085
GEL SDG # 74913
Project/Task No. 7222.01.09

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 method SW-846 8260B (VOC) and SW-846 8330 (HE's). 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: The samples were properly preserved and analyzed within the method prescribed holding time.

Calibration

All Analyses: All initial and continuing calibration acceptance criteria were met with the following exception:

VOC
The CCV had a %D >20% but < 40% with a negative bias for 2-butanone (20.3%) and acetone (22%). The associated sample results were non-detect and will not be qualified.

Blanks

All Analyses: All method blank (MB) and trip blank (TB) acceptance criteria were met.

Surrogates

All Analyses: All surrogate acceptance criteria were met.

Internal Standards (ISs)

VOC: All internal standard acceptance criteria were met.

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

All Analyses: All MS/MSD acceptance criteria were met. It should be noted that the sample used for the MS/MSD analysis was of similar matrix from another SNL SDG. No data will be qualified.

Laboratory Control Samples (LCS/LCSD) Analysis

All Analyses: All LCS acceptance criteria were met . No LCSD was analyzed. The MS/MSD is used to assess the precision for the batch. No data will be qualified as a result.

VOC
It should be noted that no compound was associated with internal standard 3 (1,4-dichlorobenzene-d4). No data will be qualified as a result.

Detection Limits/Dilutions

All detection limits were properly reported. No samples were diluted

Confirmation Analyses

VOC: No confirmation analyses required.

HE: The sample result was non-detect; therefore confirmation data was not required.

Other QC

VOC: A trip blank was submitted on the ARCOC included in this package.

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

No raw data was submitted with the package.

No other specific issues were identified which affect data quality.

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

Memorandum

DATE: 03/20/03

TO: File

FROM: Linda Thal

SUBJECT: Inorganic Data Review and Validation - SNL
DSS Assess GWM
ARCOC No. 606085
GEL SDG No. 74913
Project/Task No. 7222.01.09

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 accepted procedures and specified methods – SW-846 6020 (metals -ICP-MS), SW-846 9056 (anions), EPA 353.1 (NPN), SW-846 9012A (total cyanide) and SW-846 7470 (mercury-CVAA). Problems were identified with the data package that resulted in the qualification of data.

ICP-MS – metals
As was detected in the MB at a value > DL but < RL. Sample 74913-003 was detect, < 5X the MB value and will be qualified "J, B".
The MS %R for Cd was > QC acceptance criteria (75-125%). Sample 74913-003 was detect and will be qualified "J, A2".

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

Holding Times/Preservation

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

Calibration

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

Blanks

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

ICP-MS – metals

K, Na and Se were detected in the MB at values > DL but < RL.The associated sample results were detects > 5X the MB values and will not be qualified.

NPN
The MB had a value > DL but < RL. The associated sample result was > 5X MB value and will not be qualified.

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

All Analyses: The LCS met QC acceptance criteria.

Matrix Spike (MS) Analysis

All Analyses: The MS met all QC acceptance criteria except as mentioned above in the summary section.

NPN and Anions
It should be noted that the sample used for the MS analysis for anions and NPN was of similar matrix from another SNL SDG. No data will be qualified.

Replicate Analysis

All Analyses: The replicate analysis met QC acceptance criteria.

NPN and Anions
It should be noted that the sample used for the replicate analysis for anions and NPN was of similar matrix from another SNL SDG. No data will be qualified.

ICP Interference Check Sample (ICS)

ICP-MS: The ICS met QC acceptance criteria. It should be noted that the ICS-AB was not run at the end of the sequence. No data will be qualified as a result.

All other analyses: No ICS required.

ICP Serial Dilution

ICP-MS: The serial dilution met QC acceptance criteria.

All other analyses: No serial dilution required.

Detection Limits/Dilutions

All Analyses: All detection limits were properly reported. The samples were not diluted with the following exceptions:

ICP-MS
Sample 74913-004 was diluted 5X for Ca, Mg and Na analysis due to high concentrations of these analytes present in the sample.

NPN
Sample 74913-007 was diluted 3X due to high concentrations present in the sample.

Anions
Sample 74913-005 was diluted 20X for chloride and sulfate due to high concentrations of these analytes present in the sample.

Other QC

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

No raw data was submitted with the package.

No other specific issues were identified that affect data quality.

Data Validation Summary

Site/Project: OSJ Assess GWM Project/Task #: 7222.01.09 # of Samples: 8 Matrix: Aqueous

AR/COC #: 606085 Laboratory Sample IDs: 7H913-001 thru -008

Laboratory: GEL

Laboratory Report #: 7H913

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

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

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

Reviewed By: [signature] Date: 03.20.03

Volatile Organics (SW 846 Method 8260)

Site/Project: DSS GWM AR/COC #: 606085 # of Samples: 2 Matrix: Aqueous

Laboratory: GEL Laboratory Report #: 74913 Laboratory Sample IDs: 74913 - 001 & -002 (TB)

Methods: SW846 - 8260B Batch #s: 233630

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks		
						>.05	<20% / 0.99	20%												
1	71-55-6	1,1,1-trichloroethane	✓	0.10		✓	✓	✓	✓		NA					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				-20.3												
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				-22												
1	71-43-2	**benzene**		0.50				✓		✓			✓	✓	✓					
1	75-27-4	bromodichloromethane		0.20																
3	75-25-2	bromoform		0.10	✓	✓	✓													
1	74-83-9	bromomethane		0.10																
1	75-15-0	carbon disulfide		0.10																
1	56-23-5	**carbon tetrachloride**		0.10																
2	108-90-7	**chlorobenzene**		0.50						✓			✓	✓	✓					
1	75-00-3	chloroethane		0.01																
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						✓			✓	✓	✓					
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:

Notes: Shaded rows are RCRA compounds.

Reviewed By: [signature] Date: 07.19.03

RU/BO 74655 SMA's ✓

High Explosives (SW 846 Method 8330)

Site/Project: OJJ GWM AR/COC #: 606085 Laboratory Sample IDs: 7H913 - 006

Laboratory: GEL Laboratory Report #: 7H913

Methods: SW846 - 8330

# of Samples: 1 Matrix: Aqueous Batch #s: 233322

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

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

Comments: MS/MSD 7H838 SNL SOG

Confirmation

Sample	CAS #	RPD > 25%	Sample	CAS #	RPD > 25%
NA SAMPLE NO					

dlwl 03.19.03

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

Inorganic Metals

Site/Project: OSS GWM AR/COC #: 606085 Laboratory Sample IDs: 74913 - 003

Laboratory: GEL Laboratory Report #: 74913 - 00H (Carous)

Methods: SW846 - 7470 (Hg) 6020 (ICPMS)

# of Samples: 2 Matrix: Aqueous Batch #s: 234556 (Hg) 234377 (Metals)

CAS #/ Analyte	TA L 3 4	ICV	CCV	ICB	CCB	Method Blanks (mg/l)	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dilution	Field Dup. RPD	Equip. Blanks	Field Blanks	MBX 5 (ug/l)	
7429-90-5 Al								NA			NA					NA				
7440-39-3 Ba	✓	✓	✓	✓	✓	✓	✓			✓			✓		✓					
7440-41-7 Be																				
7440-43-9 Cd	✓									126			NA		NA					J, A2
7440-70-2 Ca		✓								NA			✓		✓					
7440-47-3 Cr	✓									✓			NA		NA					
7440-48-4 Co																				
7440-50-8 Cu																				
7439-89-6 Fe																				
7439-95-4 Mg		✓								NA			✓		✓					
7439-96-5 Mn																				
7440-02-0 Ni																				#4
7440-09-7 K		✓				.0176				NA			✓		✓			K	.088	>
7440-22-4 Ag	✓					✓				✓			NA		NA					
7440-23-5 Na		✓				.077				NA			✓		NA			Na	.385	>
7440-62-2 V						✓														
7440-66-6 Zn																				
7439-92-1 Pb	✓									✓			NA		NA					#3
7782-49-2 Se	✓					.00165				✓			✓		NA			Se	.00825	>
7440-38-2 As	✓					.00141 J				✓			NA		NA			As	.00705	< J, B
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:

00H - Ca Mg Na SX

No end ICV - AB

CCV 1 Mg 89.6 = 90 % ✓

Reviewed By: [signature] Date: 03.19.03

General Chemistry

Site/Project: DSS GWM AR/COC #: 606085 Laboratory Sample IDs: 74913 - 005 (Anions)
Laboratory: GEL Laboratory Report #: 74913 - 007 (NPN)
Methods: SW846 9056 (Anions) EPA 353.1 (NPN) SW846 9012A (TCN) - 008 (TCN)
# of Samples: 3 Matrix: Aqueous Batch #s: 234027 (Anions) 235227 (NPN) 233544 (TCN)

CAS #	Analyte	QC Element																		
		TAL	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dilu-tion	Field Dup. RPD	Equip. Blanks	Field Blanks	
	Bromide	✓	✓	✓	✓	✓	✓	✓	NA		✓	NA		✓	NA					
	Fluoride 1x	✓	✓	✓	✓	✓	✓	✓			✓			✓						
	Chloride 20X	✓	✓	✓	✓	✓	✓	✓			✓			✓						
	Sulfate 20X	✓	✓	✓	✓	✓	✓	✓			✓			✓						
	NPN 3X	✓	✓	✓	✓	✓	0.010 mg/L	✓			✓			✓						
	TCN 1X	✓	✓	✓	✓	✓	✓	✓			✓			NA						

Comments: Anions dup PS 74838 SNA SO4 ✓
NPN " " "

Reviewed By: [signature] Date: 03.20.03

Contract Verification Review (CVR)

Project Leader Irwin | Project Name DSS Assess GWM | Case No. 7222_01.09

AR/COC No. 606085 | Analytical Lab GEL | SDG No. 74913

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

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

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

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X				
2.4	Matrix spike/matrix spike duplicate data provided (if requested)	X				
2.5	Detection limits provided; PQL and MDL (or IDL), MDA and L_c	X				
2.6	QC batch numbers provided	X				
2.7	Dilution factors provided and all dilution levels reported	X				
2.8	Data reported in appropriate units and using correct significant figures	X				
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	N/A				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met	X				
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X				

Contract Verification Review (Continued)

3.0 Data Quality Evaluation

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

Contract Verification Review (Continued)

4.0 Calibration and Validation Documentation

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

Contract Verification Review (Concluded)

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions

Were deficiencies unresolved? Yes (No)

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

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

Reviewed by: [signature] Date: 03/07/03 Closed by:_____ Date:_____

RECORDS CENTER CODE: _____

SMO ANALYTICAL DATA ROUTING FORM

PROJECT NAME: DSS Assess GWM
PROJECT/TASK: 7222_01.09
SNL TASK LEADER: Collins
ORG/MS/CF0#: 6133/1089/CF022-03
SMO PROJECT LEAD: Herrera
SAMPLE SHIP DATE: 4/30/2003

ARCOC	LAB	LAB ID	PRELIM DATE	FINAL DATE	EDD	EDD ON Q	Cust CD	RC CD
606257	GEL	79275A		5/29/2003	X			
606259	GEL	79275B		5/29/2003	X			

DATA PACKAGE TAT:		RUSH	X	NORMAL
CORRECTIONS REQUESTED BY/DATE:				
PROBLEM #/DATE CORRECTION RECEIVED:				
CVR COMPLETED BY/DATE:		L. Herrera		06-03-03
FINAL TRANSMITTED TO/DATE:		T. Jackson		06-03-03
SENT TO VALIDATION BY/DATE:		J. Conn		06/03/03
REVISIONS REQUESTED/REVISIONS RECEIVED (DATE):				
VALIDATION COMPLETED BY/DATE:		NJ		06.06.03
COPY TO WM BY/DATE:				
CD REQUESTED BY/DATE		J. Conn		06/03/03
CD RECEIVED BY/DATE		J. Conn		06/06/03
TO ERDMS OR RECORDS CENTER BY/DATE:		J. Conn		06/12/03

COMMENTS: CD included ~~ef~~

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. N/A

SMO Use

Page 1 of 1

AR/COC 606257

Dept. No./Mail Stop:	6133/MS1089	Date Samples Shipped:	4-30-03	Project/Task No. 7222.01.09	☐ Waste Characterization
Project/Task Manager:	Sue Collins	Carrier/Waybill No.	21679	SMO Authorization:	-Send preliminary/copy report to:
Project Name:	DSS GWM	Lab Contact:	Edie Kent/803-556-8171	Contract #: PO 21671	
Record Center Code:	ER	Lab Destination:	GEL	SEE BOTTLE ORDER AT ATTACHED	☐ Released by COC No.:
Logbook Ref. No.:	ER 089	SMO Contact/Phone:	Pam Puissant/505-284-3185		☑ Validation Required
Service Order No.	CF 022-03	Send Report to SMO:	Wendy Palencia/505-844-3132		Bill To: Sandia National Labs (Accounts Payable) P.O. Box 5800 MS 0154 Albuquerque, NM 87185-0154
Location	Tech Area				
Building	Room				

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
061679-001	CTF-MW1	250	116	04/28/03 0916	GW	G	3x40ml	HCL	G	SA	VOC (8260)	
061679-008	CTF-MW1	250	116	04/28/03 0917	GW	P	500ml	HNO3	G	SA	RCRA Metals (6020)	
061679-010	CTF-MW1	250	116	04/28/03 0918	FGW	P	500ml	HNO3	G	SA	Major Cations (6020) Filtered	
061679-012	CTF-MW1	250	116	04/28/03 0919	GW	P	500ml	NaOH	G	SA	Total Cyanide (9012A)	
061679-013	CTF-MW1	250	116	04/28/03 0920	GW	P	~~250ml~~ 500ml	4C	G	SA	Major Anions (300.0)	
061679-015	CTF-MW1	250	116	04/28/03 0921	GW	AG	4x1L	4C	G	SA	High Explosives (8330)	
061679-016	CTF-MW1	250	116	04/28/03 0922	GW	P	250ml	H2SO4	G	SA	NPN (353.1)	
061683-001	DSS-TB1	NA	NA	04/28/03 0916	DIW	G	3x40ml	HCL	G	TB	VOC (8260)	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day

Return Samples By: ☐ Negotiated TAT

Sample Tracking Smo Use

Date Entered(mm/dd/yy) 05/01/03

Entered by: JAC

QC inits. R.K

Special Instructions/QC Requirements

EDD ☑ Yes ☐ No

Level D Package ☑ Yes ☐ No

*Send report to:

Tim Jackson/Org 6133/MS 1087/505-284-2547

Major Anions/Br,Cl,Fl,SO4

Major Cations/Ca,Mg,K,Na

FGW/ Filtered in field w/.45 micron filter

*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	Alfred Santillanes	[signature]	[illegible]	Weston/6135/844-5130/228-0710
	~~John Boyd~~			~~S&W/6133/284-3307/228-9231~~
	Robert Lynch	[signature]	[illegible]	Weston/6135/844-4013/250-7090

1.Relinquished by [signature]	Org. 6135	Date 4/29/03	Time 1120	4.Relinquished by	Org.	Date	Time
1. Received by [signature]	Org. 6133	Date 4/29/03	Time 1120	4. Received by	Org.	Date	Time
2.Relinquished by [signature]	Org. 6133	Date 4/30/03	Time 0900	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

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. N/A

SMO Use

AR/COC 606259

Dept. No./Mail Stop:	6133/MS1089	Date Samples Shipped:	4-30-03	Project/Task No. 7222.01.09	☐ Waste Characterization
Project/Task Manager:	Sue Collins	Carrier/Waybill No.	21619	SMO Authorization:	-Send preliminary/copy report to:
Project Name:	DSS SWMU	Lab Contact:	Edie Kent/803-556-8171	Contract #: PO 21671	
Record Center Code:	ER	Lab Destination:	GEL	See Bottle Order Attached	☐ Released by COC No.:
Logbook Ref. No.:	ER 089	SMO Contact/Phone:	Pam Puissant/505-284-3185		☑ Validation Required
Service Order No.	CF 022-03	Send Report to SMO:	Wendy Palencia/505-844-3132		Bill To: Sandia National Labs (Accounts Payable)
Location	Tech Area				P.O. Box 5800 MS 0154
Building	Room				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
061681-001	CTF-MW3	350	149	04/29/03 0920	GW	G	3x40ml	HCL	G	SA	VOC (8260)	
061681-008	CTF-MW3	350	149	04/29/03 0921	GW	P	500ml	HNO3	G	SA	RCRA Metals (6020)	
061681-010	CTF-MW3	350	149	04/29/03 0922	FGW	P	500ml	HNO3	G	SA	Major Cations (6020) Filtered	
061681-012	CTF-MW3	350	149	04/29/03 0923	GW	P	500ml	NaOH	G	SA	Total Cyanide (9012A)	
061681-013	CTF-MW3	350	149	04/29/03 0924	GW	P	~~250ml~~ 500ml	4C	G	SA	Major Anions (300.0)	
061681-015	CTF-MW3	350	149	04/29/03 0925	GW	AG	4x1L	4C	G	SA	High Explosives (8330)	
061681-016	CTF-MW3	350	149	04/29/03 0926	GW	P	250ml	H2SO4	G	SA	NPN (353.1)	
061684-001	DSS-TB2	NA	NA	04/29/03 0920	DIW	G	3x40ml	HCL	G	TB	VOC (8260)	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day

Return Samples By: ☐ Negotiated TAT

Sample Tracking Smo Use

Date Entered(mm/dd/yy) 05/01/03

Entered by: SPC

QC Inits. RK

Special Instructions/QC Requirements

EDD ☑ Yes ☐ No

Level D Package ☑ Yes ☐ No

***Send report to:**

Tim Jackson/Org 6133/MS 1087/505-284-2547

Major Anions/Br,Cl,Fl,SO4

Major Cations/Ca,Mg,K,Na

FGW/ Filtered in field w/.45 micron filter

Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members

Name	Signature	Init	Company/Organization/Phone/Cellular
Alfred Santillanes	[signature]		Weston/6135/844-5130/228-0710
~~John Boyd~~			~~G&W/6135/284-3307/228-9231~~
Robert Lynch	[signature]	RL	Weston/6135/844-4013/250-7090

1.Relinquished by [signature]	Org. 6135	Date 4/29/03	Time 1120	4.Relinquished by	Org.	Date	Time
1. Received by [signature] SMO	Org. 6133	Date 4/29/03	Time 1120	4. Received by	Org.	Date	Time
2.Relinquished by [signature] SMO	Org. 6133	Date 4/30/03	Time 0900	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

Sam Ings Summary

Site: DSS Assess GWM | **ARCOC** 606257 and 606259 | **Data:** Organic and Inorganic

Sample ID	VOC (8260B)	HE (8330)	Metals	7782-49-2 (selenium)	7440-47-3 (chromium)	7440-43-9 (cadmium)	General Chemistry	5955-70-0 (total cyanide)							
061679-008 CTF-MW1	All QC acceptance criteria were met.No data will be qualified.	All QC acceptance criteria were met.No data will be qualified.		J, B, B3	UJ, B3	J, A2									
061681-008 CTF-MW3					UJ, B3	J, A2									
061679-012 CTF-MW1								UJ, A2							
061681-012 CTF-MW3								UJ, A2							

Validated By: K Mal

Date: 06/05/03

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

Memorandum

DATE: 06/05/03

TO: File

FROM: Linda Thal

SUBJECT: Inorganic Data Review and Validation - SNL
DSS Assess GWM
ARCOC No. 606257 and 606259
GEL SDG No. 79275
Project/Task No. 7222.01.09

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 accepted procedures and specified methods – SW-846 6020 (metals -ICP-MS), SW-846 9056 (anions), EPA 353.1 (NPN), SW-846 9012A (total cyanide) and SW-846 7470 (mercury-CVAA). Problems were identified with the data package that resulted in the qualification of data.

ICP-MS – metals
Se was detected in the MB and CCB at a value > DL but < RL. Sample 79275-005 was detect, < 5X the blank values and will be qualified "J, B, B3". Cr was detected in the CCB at a negative value with an absolute value > DL but < RL. Sample 79275-005 and -006 were both non-detect and will be qualified "UJ, B3".
The MS %R (130%) for Cd was > QC acceptance criteria (75-125%). Sample 79275-005 and -006 were both detect and will be qualified "J, A2".

Total Cyanide
The MS performed with the batch had a %R < 30% (3%). The sample used for the MS was from another SNL SDG and according to the NCR included with the package, was known to exhibit matrix interference. Using professional judgment, the failing %R will not be used to qualify the samples from this SDG. Both associated sample results from this SDG were non-detect and will be qualified "UJ, A2" due to lack of MS information available for this SDG.

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

Holding Times/Preservation

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

Calibration

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

Blanks

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

ICP-MS – metals
Se was detected in the MB and CCB at a value > DL but < RL. Sample 79275-006 was detect with a value > 5X the blank values and will not be qualified.

NPN
The ICB had a value at the DL. The associated sample results were > 5X ICB value and will not be qualified.

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

All Analyses: The LCS met QC acceptance criteria.

Matrix Spike (MS) Analysis

All Analyses: The MS met all QC acceptance criteria except as mentioned above in the summary section.

Hg and NPN
It should be noted that the samples used for the MS analysis was of similar matrix from another SNL SDG. No data will be qualified.

Replicate Analysis

All Analyses: The replicate analysis met QC acceptance criteria.

Hg, NPN and Total Cyanide
It should be noted that the sample used for the replicate analysis was of similar matrix from another SNL SDG. No data will be qualified.

ICP Interference Check Sample (ICS)

ICP-MS: The ICS met QC acceptance criteria. It should be noted that the ICS-AB was not run at the end of the sequence. No data will be qualified as a result.

All other analyses: No ICS required.

ICP Serial Dilution

ICP-MS: The serial dilution met QC acceptance criteria except as follows:

The RPD for Mg (10.08%) was slightly > QC acceptance criteria (10%). Using professional judgment, no data will be qualified.

All other analyses: No serial dilution required.

Detection Limits/Dilutions

All Analyses: All detection limits were properly reported. The samples were not diluted with the following exceptions:

ICP-MS
Sample 79275-008 was diluted 5X for Ca, and 10X for Na analysis due to high concentrations of these analytes present in the sample.

NPN
Sample 79275-015 and -016 were diluted 5X due to high concentrations of analyte present in the samples.

Anions
Sample 79275-011 was diluted 5X and sample 79275-012 20X for chloride and sulfate due to high concentrations of these analytes present in the sample.

Other QC

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

No raw data was submitted with the package.

No other specific issues were identified that affect data quality.

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

Memorandum

DATE: 06/05/03

TO: File

FROM: Linda Thal

SUBJECT: Organic Data Review and Validation - SNL
Site: DSS Assess GWM
ARCOC # 606257 and 606259
GEL SDG # 79275
Project/Task No. 7222.01.09

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 method SW-846 8260B (VOC) and SW-846 8330 (HE's). 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: The samples were properly preserved and analyzed within the method prescribed holding time.

Calibration

All Analyses: All initial and continuing calibration acceptance criteria were met with the following exception:

VOC
The CCV had a %D >20% with a positive bias for several compounds. The associated sample results were non-detect and will not be qualified.

Blanks

All Analyses: All method blank (MB) and trip blank (TB) acceptance criteria were met.

Surrogates

All Analyses: All surrogate acceptance criteria were met.

Internal Standards (ISs)

VOC: All internal standard acceptance criteria were met.

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

All Analyses: All MS/MSD acceptance criteria were met.

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

Laboratory Control Samples (LCS/LCSD) Analysis

All Analyses: All LCS acceptance criteria were met. No LCSD was analyzed. The MS/MSD is used to assess the precision for the batch. No data will be qualified as a result.

VOC
It should be noted that no compound was associated with internal standard 3 (1,4-dichlorobenzene-d4). No data will be qualified as a result.

Detection Limits/Dilutions

All detection limits were properly reported. No samples were diluted

Confirmation Analyses

VOC: No confirmation analyses required.

HE: The sample result was non-detect; therefore confirmation data was not required.

Other QC

VOC: Two trip blanks were submitted on the ARCOC included in this package.

All Analyses: No field duplicates, field blanks or equipment blanks were submitted on the ARCOC.

No raw data was submitted with the package.

No other specific issues were identified which affect data quality.

Data Validation Summary

Site/Project: DSS Assess GWM Project/Task #: 7222.01.09 # of Samples: 16 Matrix: Aqueous

AR/COC #: 606257, 606259 Laboratory Sample IDs: 79275-001 thru -016

Laboratory: GEL

Laboratory Report #: 79275

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

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

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

Reviewed By: [signature] Date: 06.06.03

Volatile Organics (SW 846 Method 8260)

Site/Project: DSS Assess GWM AR/COC #: 606257, -59 # of Samples: 4 Matrix: Aqueous

Laboratory: GEL Laboratory Report #: 79275 Laboratory Sample IDs: 79275 - 001 thru -004

Methods: SW-846 8260B Batch #s: 249013

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks		
						>.05	<20% / 0.99	20%										-002, -004		
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																
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				+32												
1	75-15-0	carbon disulfide	✓	0.10				+30.5												
1	56-23-5	**carbon tetrachloride**	✓	0.10				✓												
2	108-90-7	**chlorobenzene**	✓	0.50				✓		✓			✓	✓	✓					
1	75-00-3	chloroethane	✓	0.01				+39.6												
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						✓			✓	✓	✓					
1	75-01-4	**vinyl chloride**	✓	0.10																
2	1330-20-7	xylenes(total)	✓	0.30																
	cis- 1,2- Dichloroethene		✓																	
	trans- 1,2- Dichloroethene							+24												
	Vinyl Acetate							+23												

Comments: Vinyl Acetate

Notes: Shaded rows are RCRA compounds.

Reviewed By: [signature] Date: 06.05.03

Volatile Organics

Site/Project: _____ AR/COC #: 606257 - 59 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 IS 1: Fluorobenzene
SMC 2: Dibromofluoromethane IS 2: Chorobenzene-d5
SMC 3: Toluene-d8 IS 3: 1,4-Dichlorobenzene-d4

Comments:

High Explosives (SW 846 Method 8330)

Site/Project: DSS GWM AR/COC #: 606257, -59 Laboratory Sample IDs: 79275 - 013, - 014

Laboratory: GEL Laboratory Report #:

Methods: SW846 8330

# of Samples: 2 Matrix: Aqueous Batch #s: 248847

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

Sample	SMC %REC	SMC RT	Sample	SMC %REC	SMC RT
NO CRITERIA					

Confirmation

Sample	CAS #	RPD > 25%	Sample	CAS #	RPD > 25%
NA SA	NO				

Comments: MS/MSD 79363 SNA SOG (run log)

I Cal included dated 03/13 12.26 → 05/06 4.57

CCV dates 03/13 12.26 → 03.13 18.49

(only Nitroglycerine updated on the 5/06 OK see email attached

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

Nhal 06.05.03

Inorganic Metals

Site/Project: DSS GWM AR/COC #: 606257, -59 Laboratory Sample IDs: 79275-005, -006, -007, -008 (Carous)

Laboratory: GEL Laboratory Report #: 79275

Methods: SW846 7470 (Hg) 6020 (ICP-MS)

# of Samples: 4 Matrix: Aqueous Batch #s: 248724 (Hg) 248595 (ICP-MS)

CAS #/ Analyte	QC Element																				
	TAL	ICV	CCV	ICB	CCB (ug/L)	Method Blanks (ug/L)	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dilu-tion	Field Dup. RPD	Equip. Blanks	Field Blanks	Blanks X5	Sa5	Sa6
7429-90-5 Al								NA			NA					NA					
7440-39-3 Ba	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓						
7440-41-7 Be																					
7440-43-9 Cd	✓	✓	✓	✓	✓	✓	✓			130			NA	✓	NA						
7440-70-2 Ca	X	✓	✓	✓	✓	✓	✓			NA			✓	✓	✓						
7440-47-3 Cr	✓	✓	✓	✓	[-.0007]	✓	✓			✓			NA	✓	NA				5XDL	UJ,B3	UJ,B3
7440-48-4 Co																					
7440-50-8 Cu																					
7439-89-6 Fe																					
7439-95-4 Mg	X	✓	✓	✓	✓	✓	✓			NA			✓	✓	% D 10.8/10.5 LSO						
7439-96-5 Mn																					
7440-02-0 Ni																					
7440-09-7 K	X	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓						
7440-22-4 Ag	✓	✓	✓	✓	✓	✓	✓			✓			NA	✓	NA						
7440-23-5 Na	X	✓	✓	✓	✓	✓	✓			NA			✓	✓	✓						
7440-62-2 V																					
7440-66-6 Zn																					
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	✓			✓			NA	✓	NA						
7782-49-2 Se	✓	✓	✓	✓	.00169	.00241	✓			✓			✓	✓	NA				.00845/.01205	J,B,B3	> NO Q
7440-38-2 As	✓	✓	✓	✓	✓	✓	✓			✓			NA	✓	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: -008 Ca 5X
Na 10X

Hg ~~MS/MSD~~ LT 79363 Dup/MS
SM4 SO4

No end ICS-AB

Reviewed By: [signature] Date: 06.05.03

General Chemistry

Site/Project: DSJ GWM AR/COC #: 606257, 606259 Laboratory Sample IDs: 79275 - 009, - 010 (TCN)
Laboratory: GEL Laboratory Report #: 79275 - 011, - 012 (Anions)
Methods: SW-846 9012A (TCN) ; 9056 (Anions) EPA 353.1 (Anions) - 015, - 016 (NPN)
# of Samples: 6 Matrix: Aqueous Batch #s: 249151 (TCN) 248585 (Anions) 249861 (NPN)

CAS #	Analyte	QC Element																		
		TAL	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dilu-tion	Field Dup. RPD	Equip. Blanks	Field Blanks	
	NPN		✓	✓	0.01	✓	✓	✓	NA		✓	NA		✓	NA					
	Bromide		✓	✓	✓	✓	✓	✓			✓			✓						
	Fluoride		✓	✓	✓	✓	✓	✓			✓			✓						
	Chloride		✓	✓	✓	✓	✓	✓			✓			✓						
	Sulfate		✓	✓	✓	✓	✓	✓			✓			✓						
	Total Cyanide		✓	✓	✓	✓	✓	✓			* 3 (75-125)			NA						

Comments: - 011 Cl & SO4 5X
- 012 20X
- 015, - 016 NPN 5X

NCR 32066
* Data not used.
VJ, A2

TCN. DUP/MS 79365 SNA SO4* ✓
NPN DUP/PS 78733 SNA SO4 ✓

Reviewed By: [signature] Date: 06.05.03

Contract Verification Review (CVR)

Project Leader Collins | Project Name DSS GWM | Case No. 7222_01.09

AR/COC No. 606257, 606259 | Analytical Lab GEL | SDG No. 79275A, 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	N/A				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met	X				
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X				

Contract Verification Review (Continued)

3.0 Data Quality Evaluation

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

Contract Verification Review (Concluded)

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions

Were deficiencies unresolved? Yes (No)

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

If no, provide: nonconformance report or correction request number _____ and date correction request was submitted_____

Reviewed by: [signature] Date: 06/03/02 Closed by:_____ Date:_____

RECORDS CENTER CODE: _____

SMO ANALYTICAL DATA ROUTING FORM

PROJECT NAME: DSS Assess GWM
PROJECT/TASK: 7222_01.09
SNL TASK LEADER: Collins
ORG/MS/CF0#: 6133/1089/CF022-03
SMO PROJECT LEAD: Palencia
SAMPLE SHIP DATE: 8/28/2003

ARCOC	LAB	LAB ID	PRELIM DATE	FINAL DATE	EDD	EDD ON Q	Cust CD	RC CD
606694	GEL	87087		9/22/2003	X	X	X	X

DATA PACKAGE TAT:		RUSH	X	NORMAL
CORRECTIONS REQUESTED BY/DATE:	L. Herrera		09-23-03	
PROBLEM #/DATE CORRECTION RECEIVED:		#6906	09-25-03	
CVR COMPLETED BY/DATE:	L. Herrera		09-23-03	
FINAL TRANSMITTED TO/DATE:	T. Jackson		09-23-03	
SENT TO VALIDATION BY/DATE:	J. Conn		09/25/03	
REVISIONS REQUESTED/REVISIONS RECEIVED (DATE):				
VALIDATION COMPLETED BY/DATE:	N		10 09 03	
COPY TO WM BY/DATE:				
CD REQUESTED BY/DATE	J. Conn		09/25/03	
CD RECEIVED BY/DATE	J. Conn		09/29/03	
TO ERDMS OR RECORDS CENTER BY/DATE:	J. Conn		10/15/03	

COMMENTS:

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. N/A

SMO Use

AR/COC 606694

Dept. No./Mail Stop:	6133/MS1089	Date Samples Shipped:	8-28-03	Project/Task No. 7222.01.09	☐ Waste Characterization
Project/Task Manager:	Sue Collins	Carrier/Waybill No.	26781	SMO Authorization:	-Send preliminary/copy report to:
Project Name:	DSS GW	Lab Contact:	Edie Kent/803-556-8171	Contract #: PO 21671	
Record Center Code:	ER	Lab Destination:	GEL	SUB BOTTLE ORDER	☐ Released by COC No.:
Logbook Ref. No.:	ER 089	SMO Contact/Phone:	Pam Puissant/505-284-3185		☑ Validation Required
Service Order No.	CF 022-03	Send Report to SMO:	Lorraine Herrera/505-284-3199		Bill To: Sandia National Labs (Accounts Payable)
Location	Tech Area				P.O. Box 5800 MS 0154
Building	Room				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
063016-001	CTF-MW3	350	149	08/28/03 0903	GW	G	3x40ml	HCL	G	SA	VOC (8260)	
063016-008	CTF-MW3	350	149	08/28/03 0905	GW	P	500ml	HNO3	G	SA	RCRA Metals (6020)	
063016-010	CTF-MW3	350	149	08/28/03 0906	FGW	P	500ml	HNO3	G	SA	Major Cations (6020) Filtered	
063016-012	CTF-MW3	350	149	08/28/03 0907	GW	P	500ml	NaOH	G	SA	Total Cyanide (9012A)	
063016-013	CTF-MW3	350	149	08/28/03 0908	GW	P	500ml	4C	G	SA	Major Anions (SW846/9056)	
063016-015	CTF-MW3	350	149	08/28/03 0911	GW	AG	4x1L	4C	G	SA	High Explosives (8330)	
063016-016	CTF-MW3	350	149	08/28/03 0912	GW	P	250ml	H2SO4	G	SA	NPN (SW846/9056)	
063017-001	DSS-TB4	NA	NA	08/28/03 0903	DIW	G	3x40ml	HCL	G	TB	VOC (8260)	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day

Sample Tracking Smp Use

Date Entered(mm/dd/yy) 09/02/03

Entered by: RIC

Special Instructions/QC Requirements

EDD ☑ Yes ☐ No

Level D Package ☑ Yes ☐ No

Abnormal Conditions on Receipt

Return Samples By: ☐ **Negotiated TAT** QC Inits. JAC

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	Alfred Santillanes			Weston/6134/844-5130/228-0710
	John Boyd			S&W/6134/284-3307/228-9231
	Robert Lynch			Weston/6134/844-4013/250-7090

*Send report to:

Tim Jackson/Org 6133/MS 1087/505-284-2547

Major Anions/Br,Cl,Fl,SO4

Major Cations/Ca,Mg,K,Na

FGW/ Filtered in field w/.45 micron filter

*Please list as separate report.

Lab Use

1.Relinquished by	Org. 6134	Date 8/28/03	Time 1105	4.Relinquished by	Org.	Date	Time
1. Received by	Org. 6133	Date 8/28/03	Time 1105	4. Received by	Org.	Date	Time
2.Relinquished by	Org. 6133	Date 8/28/03	Time 1130	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

Sample Fin Summary

Site: DSS Assess GWM

ARCOC 606694

Data: Organic and Inorganic

Sample ID	VOC (8260B)	All HE (8330) compounds	Metals	7439-92-1 (lead)	7440-47-3 (chromium)	7439-97-6 (mercury)	7440-23-5 (sodium)	General Chemistry				
063016-008 CTF-MW3	All QC acceptance criteria were met. No data will be qualified.			J, B	J, B	UJ, B3		All QC acceptance criteria were met. No data will be qualified.				
063016-010 CTF-MW3							J					
063016-015 CTF-MW3		UJ, HT										

Validated By: K Mal

Date: 10/09/03

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

Memorandum

DATE: 10/09/03

TO: File

FROM: Linda Thal

SUBJECT: Inorganic Data Review and Validation - SNL
DSS Assess GWM
ARCOC No. 606694
GEL SDG No. 87087
Project/Task No. 7222.01.09

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 accepted procedures and specified methods – SW-846 6020 (metals -ICP-MS), SW-846 9056 (anions), EPA 353.1 (NPN), SW-846 9012A (total cyanide) and SW-846 7470 (mercury-CVAA). Problems were identified with the data package that resulted in the qualification of data.

ICP-MS – metals
Cr and Pb were detected in the MB at a value > DL but < RL. Sample 87087-003 was detect, with values < 5X the blank values and will be qualified "J, B".
The serial dilution had a RPD > 10% for Na. Sample 87087-004 had a Na value > 50X RL and will be qualified "J".

Hg-CVAA
The CCB had a negative value with an absolute value > DL but < RL. Sample 87087-003 was non-detect and will be qualified "UJ, B3".

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

Holding Times/Preservation

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

Calibration

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

Blanks

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

ICP-MS – metals
Na and K were detected in the MB and ICB/CCB at values > DL but < RL. Sample 87087-004 was detect with values > 5X the blank values and will not be qualified.
Se was detected in the CCB at a value > DL but < RL. Sample 87087-003 was detect with a value > 5X the CCB value and will not be qualified.

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

All Analyses: The LCS met QC acceptance criteria.

Matrix Spike (MS) Analysis

All Analyses: The MS met all QC acceptance criteria except as mentioned above in the summary section.

ICP-MS, Anions and NPN
It should be noted that the samples used for the MS analysis was of similar matrix from another SNL SDG. No data will be qualified.

Replicate Analysis

All Analyses: The replicate analysis met QC acceptance criteria.

ICP-MS, Anions and NPN
It should be noted that the sample used for the replicate analysis was of similar matrix from another SNL SDG. No data will be qualified.

ICP Interference Check Sample (ICS)

ICP-MS: The ICS met QC acceptance criteria. It should be noted that the ICS-AB was not run at the end of the sequence. No data will be qualified as a result.

All other analyses: No ICS required.

ICP Serial Dilution

ICP-MS: The serial dilution met QC acceptance criteria except as mentioned above in the summary section and as follows:

The RPD for Se was > QC acceptance criteria (10%). Sample 87087-003 had a Se value < 50X RL and no data will be qualified.
It should be noted that the sample used for the serial dilution analysis was of similar matrix from another SNL SDG. No data will be qualified.

All other analyses: No serial dilution required.

Detection Limits/Dilutions

All Analyses: All detection limits were properly reported. The samples were not diluted with the following exceptions:

NPN: Sample 87087-008 was diluted 5X due to high concentrations of analyte present in the samples.
Anions: Sample 87087-006 was diluted 20X for chloride and sulfate due to high concentrations of these analytes present in the sample.

Other QC

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

No raw data was submitted with the package.

No other specific issues were identified that affect data quality.

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

Memorandum

DATE: 10/09/03

TO: File

FROM: Linda Thal

SUBJECT: Organic Data Review and Validation - SNL
Site: DSS Assess GWM
ARCOC # 606694
GEL SDG # 87087
Project/Task No. 7222.01.09

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 method SW-846 8260B (VOC) and SW-846 8330 (HE's). Problems were identified with the data package that resulted in the qualification of data.

HE
Due to a QC problem, the sample was re-extracted out of its hold time. Only the re-extracted sample results appear on the revised Certificate of Analysis and only the re-extracted sample will be validated. Sample 87087-007 was extracted after its hold time had expired, but within 2X its hold time. The sample results were non-detect and will be qualified "UJ, HT".

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

Holding Times/Preservation

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

VOC
It should be noted that sample 87087-002 was received with tiny bubbles in all 3 vials. Analysis of the sample was unaffected and no data will be qualified.

Calibration

All Analyses: All initial and continuing calibration acceptance criteria were met with the following exception:

VOC
The CCV had a %D >20% but < 40% with a positive bias for vinyl acetate. The associated sample results were non-detect and no data will be qualified.

Blanks

All Analyses: All method blank (MB) and trip blank (TB) acceptance criteria were met.

Surrogates

All Analyses: All surrogate acceptance criteria were met.

Internal Standards (ISs)

VOC: All internal standard acceptance criteria were met.

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

All Analyses: All MS/MSD acceptance criteria were met.

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

Laboratory Control Samples (LCS/LCSD) Analysis

All Analyses: The LCS acceptance criteria were met. No LCSD was analyzed. The MS/MSD is used to assess the precision for the batch. No data will be qualified as a result.

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

Detection Limits/Dilutions

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

Confirmation Analyses

VOC: No confirmation analyses required.

HE: The sample result was non-detect; therefore confirmation data was not required.

Other QC

VOC: A trip blank was submitted on the ARCOC included in this package.

All Analyses: No field duplicates, field blanks or equipment blanks 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 ASSESS GWM Project/Task #: 7222.01.09 # of Samples: 8 Matrix: AQUEOUS

AR/COC #: 606694 Laboratory Sample IDs: 87087 - 001 thru -008

Laboratory: GEL

SDG #: 87087

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

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

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

Reviewed By: [signature] Date: 10.09.03

Volatile Organics (SW 846 Method 8260)

Site/Project: OJJ GWM AR/COC #: 606694 # of Samples: 2 Matrix: Aqueous

Laboratory: GEL SDG #: 87087 Laboratory Sample IDs: 87087 - 001 & -002

Methods: SW 846 8260B Batch #s: 274515

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		✓	✓	✓	✓	✓			✓	✓	✓			✓		
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																
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																
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

Notes: Shaded rows are RCRA compounds. 722

Reviewed By: DWhal Date: 10.09.03

-002 (TB) All 3 vials have tiny bubbles

Full list LCS reported. CCV & LCS same lot
MS/MSD

Volatile Organics

Site/Project: _____ AR/COC #: 606694 Batch #s: _____

Laboratory: _____ SDG #: _____ # 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: Bromofluorobenzene
SMC 2: Dibromofluoromethane
SMC 3: Toluene-d8

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

Comments:

High Explosives (SW 846 Method 8330)

Site/Project: DSS GWM AR/COC #: 606694 Laboratory Sample IDs: 87087 - 007

Laboratory: 8 Laboratory Report #: 87087

Methods: SW846 8330

# of Samples: 1 Matrix: Aqueous Batch #s: 276502

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

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

Confirmation

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

Comments: sa date 8/28 9/11 XT date. 9/11 9.00
>HT slightly <2X HT " UJ, HT "

Client requested the Re analysis to be reported & the original results to be reranked.

Note: only the re-extracted data has been validated.

86973 MS/MSD SRL SOG ✓ (run 199)

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

A Khal 10.09.03

Inorganic Metals

Site/Project: DSJ GWM AR/COC #: 606694 Laboratory Sample IDs: 87087 - 003 (Rcra metals) & 004 (various only)

Laboratory: GEL SDG #: 87087

Methods: SW846 6020 ; SW846 7470A

# of Samples: 2 Matrix: Aqueous Batch #s: 274355 ; 274704

CAS #/ Analyte	TAL 3	TAL 4	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dilution	NA Field Dup. RPD	NA Equip. Blanks	NA Field Blanks		SA 3	SA 4
	QC Element (mg/L)																					
7429-90-5 Al									NA			NA					MBX5	ICB/CCB x 3				
7440-39-3 Ba	✓		✓	✓	✓	✓	✓	✓			✓			✓	✓	✓						
7440-41-7 Be																						
7440-43-9 Cd	✓		✓	✓	✓	✓	✓	✓			✓			NA	✓	NA						
7440-70-2 Ca		✓	✓	✓	✓	✓	✓	✓			NA			✓	✓	✓						
7440-47-3 Cr	✓		✓	✓	✓	✓	.000535J	✓			✓			NA	✓	✓	.002675	Cr		<5X	J,B	
7440-48-4 Co																						
7440-50-8 Cu																						
7439-89-6 Fe																						
7439-95-4 Mg		✓	✓	✓	✓	✓	✓	✓			NA			✓	✓	✓						
7439-96-5 Mn																						
7440-02-0 Ni																						
7440-09-7 K		✓	✓	✓	.0184	.0263	.0185 J	✓			✓			✓	✓	✓	.0925	K 0.1315		75X		No q
7440-22-4 Ag	✓		✓	✓	✓	✓	✓	✓			✓			NA	✓	NA						
7440-23-5 Na		✓	✓	✓	✓	.0131	.0259 J	✓			NA			✓	✓	13.2/12.2	0.1295	Na 0.0655		75X		No q
7440-62-2 V																						
7440-66-6 Zn																						
7439-92-1 Pb	✓		✓	✓	✓	✓	.0000865	✓			✓			NA	✓	NA	.00043	Pb		<5X	J,B	
7782-49-2 Se	✓		✓	✓	✓	.00116	✓	✓			✓			NA	✓	127/78		Se .0058		75X	No q.	
7440-38-2 As	✓		✓	✓	✓		✓	✓			✓			NA	✓	NA						
7440-36-0 Sb																						
7440-28-0 Tl																						
7439-97-6 Hg	✓		✓	✓	✓	[-.00007]	✓	✓			✓			NA				[ ]			ND	
																					"UJ,B3"	
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:

Reviewed By: [signature] Date: 10.09.03

Dup MS SD 87086 SMA SDG ✓

SD # 3 Se < 50x RA No q.
SD # 4 Na "J"

General Chemistry

Site/Project: DSS GWM AR/COC #: 606694 Laboratory Sample IDs: 87087-005 thru -007

Laboratory: GEL SDG #: 87087

Methods: SW846 9012A ; SW846 9056 ; EPA 353.1

# of Samples: 3 Matrix: Aqueous Batch #s: 274716 ; 274858 ; 274873

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	
	Total Cyanide	✓	✓	✓	✓	✓	✓	✓	NA		✓	NA		NA	NA					
	Bromide	✓	✓	✓	✓	✓	✓	✓			✓			✓						
	Fluoride	✓	✓	✓	✓	✓	✓	✓			✓			✓						
	Chloride	✓	✓	✓	✓	✓	✓	✓			✓			✓						
	Sulphate	✓	✓	✓	✓	✓	✓	✓			✓			✓						
	NPN	✓	✓	✓	✓	✓	✓	✓			✓✓			✓✓						

Comments: -006 2OX Cl. SO_4

-008 SX NPN

Anions 87086 Dup IPS SNA SO4 ✓

NPN 86890 Dup IPS SNA SO4 ✓ Reviewed By: [signature] Date: 10.09.03

Contract Verification Review (CVR)

Project Leader Collins | Project Name DSS Assess GWM | Case No. 7222_01.09

AR/COC No. 606694 | Analytical Lab GEL | SDG No. 87087

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

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

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

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X				
2.4	Matrix spike/matrix spike duplicate data provided (if requested)	X				
2.5	Detection limits provided; PQL and MDL (or IDL), MDA and L_c	X				
2.6	QC batch numbers provided	X				
2.7	Dilution factors provided and all dilution levels reported	X				
2.8	Data reported in appropriate units and using correct significant figures	X				
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	N/A				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met		X	HPLC re-extraction run out of holding time		
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X				

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1 Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2 Quantitation limit met for all samples	X		
3.3 Accuracy a) Laboratory control samples accuracy reported and met for all samples	X		
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	X		
c) Matrix spike recovery data reported and met	X		
3.4 Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	X		
b) Matrix spike duplicate RPD data reported and met for all organic samples		X	HPLC RPD failed for 4-Amino-2,6-Dintrotoluene in original extraction and passed in re-extraction
3.5 Blank data a) Method or reagent blank data reported and met for all samples		X	Chromium & Lead detected in Metals method blank; Potassium & Sodium detected in Major Cations method blank
b) Sampling blank (e.g., field, trip, and equipment) data reported and met	X		
3.6 Contractual qualifiers provided: "J"- estimated quantity; "B"-analyte found in method blank above the MDL for organic or above the PQL for inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"-analysis done beyond the holding time	X		
3.7 Narrative addresses planchet flaming for gross alpha/beta	N/A		
3.8 Narrative included, correct, and complete	X		
3.9 Second column confirmation data provided for methods 8330 (high explosives) and 8082 (pesticides/PCBs)		X	Missing for HPLC (LCS, MS, MSD)

Contract Verification Review (Continued)

4.0 Calibration and Validation Documentation

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

Contract Verification Review (Concluded)

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions
063016-015	HPLC	Reported two sets of data on COA (page 28); Missing second column confirmation for LCS, MS, MSD; Missing Sample IDs in Narrative Sample Analysis section for QC1200488298 & QC1200488299

Were deficiencies unresolved? (Yes) No

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

If no, provide: nonconformance report or correction request number 6906 and date correction request was submitted 09/23/03

Reviewed by: [illegible] Date: 09/23/03 Closed by: [illegible] Date: 09-25-03

ARCOC: 606694

RECORDS CENTER CODE: ER

SMO ANALYTICAL DATA ROUTING FORM

PROJECT NAME: DSS - GWM
PROJECT/TASK: 7222_01.09
SNL TASK LEADER: Collins
ORG/MS/CF0#: 6134/1089/CF022-04
SMO PROJECT LEAD: Herrera
SAMPLE SHIP DATE: 12/3/2003

ARCOC	LAB	LAB ID	PRELIM DATE	FINAL DATE	EDD	EDD ON Q	Cust CD	RC CD
606914	GEL	103007		1/6/2004	X	X		

DATA PACKAGE TAT:		RUSH		NORMAL
CORRECTIONS REQUESTED BY/DATE:		L Herrera		01-12-04
PROBLEM #/DATE CORRECTION RECEIVED:		#7108		01-14-04
CVR COMPLETED BY/DATE:		L Herrera		01-12-04
FINAL TRANSMITTED TO/DATE:		T. Jackson		01-12-04
SENT TO VALIDATION BY/DATE:		J. Conn		01/14/04
REVISIONS REQUESTED/REVISIONS RECEIVED (DATE):				
VALIDATION COMPLETED BY/DATE:		KAL 02-17-04		
COPY TO WM BY/DATE:				
CD REQUESTED BY/DATE		J. Conn		01/14/04
CD RECEIVED BY/DATE		J. Conn		01/21/04
TO ERDMS OR RECORDS CENTER BY/DATE:		J. Conn		02/17/04

COMMENTS:

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. N/A | SMO Use | 7208-01.09 | AR/COC **606914**

Dept. No./Mail Stop:	6133/MS1089	Date Samples Shipped:	12-3-03	Project/Task No.	~~72308.01.02~~
Project/Task Manager:	Sue Collins	Carrier/Waybill No.	29662	SMO Authorization:	[illegible]
Project Name:	DSS GW	Lab Contact:	Edie Kent/803-556-0171	Contract #:	PO 21871
Record Center Code:	ER	Lab Destination:	GEL		5070 40ml vials
Logbook Ref. No.:	ER 089	SMO Contact/Phone:	Pam Puissant/505-284-3185		
Service Order No.	CF 022-04	Send Report to SMO:	Lorraine Herrera/505-284-3199		

☐ 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 103007

Location	Tech Area
Building	Room

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	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
063529-001	CTF-MW3	350	149	12-03-03/0931	GW	G	3x40ml	HCL	G	SA	VOC (8260)	001
063529-008	CTF-MW3	350	149	12-03-03/0933	GW	P	500ml	HNO3	G	SA	RCRA Metals (6020)	003
063529-010	CTF-MW3	350	149	12-03-03/0935	FGW	P	500ml	HNO3	G	SA	Major Cations (6020) Filtered	103009-001
063529-012	CTF-MW3	350	149	12-03-03/0937	GW	P	500ml	NaOH	G	SA	Total Cyanide (9012A)	004
063529-013	CTF-MW3	350	149	12-03-03/0939	GW	P	500ml	4C	G	SA	Major Anions (SW846/9056)	005
063529-015	CTF-MW3	350	149	12-03-03/0941	GW	AG	4x1L	4C	G	SA	High Explosives (8330)	006
063529-016	CTF-MW3	350	149	12-03-03/0942	GW	P	250ml	H2SO4	G	SA	NPN (SW846/9056)	007
063530-001	DSS-TB5	NA	NA	12-03-03/0931	DIW	G	3x40ml	HCL	G	TB	VOC (8260)	002

RMMA	☐ Yes ☑ No Ref. No.	Sample Tracking	Smo Use
Sample Disposal	☐ Return to Client ☑ Disposal by lab	Date Entered(mm/dd/yy)	12/4/03
Turnaround Time	☐ 7 Day ☐ 15 Day ☑ 30 Day	Entered by:	JAC
Return Samples By:	☐ Negotiated TAT	QC inits.	KL

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level D Package ☑ Yes ☐ No

Abnormal Conditions on Receipt

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	Alfred Santillanes	[illegible]	[illegible]	Weston/6134/844-5130/228-0710
	John Boyd	[illegible]	[illegible]	S&W/6134/284-3307/228-9231
	William J Gibson	[illegible]	[illegible]	Weston/6134/284-5232

*Send report to:
Tim Jackson/Org 6133/MS 1087/505-284-2547

Major Anions/Br,Cl,Fl,SO4
Major Cations/Ca,Mg,K,Na
FGW/ Filtered in field w/.45 micron filter
*Please list as separate report.

Lab Use

1.Relinquished by [illegible]	Org. 6133	Date 12-3-03	Time 1030	4.Relinquished by	Org.	Date	Time
1. Received by [illegible]	Org. 6133	Date 12-3-03	Time 1030	4. Received by	Org.	Date	Time
2.Relinquished by [illegible]	Org. 6133	Date 12-3-03	Time 1300	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

Sample Findings Summary

Site: DSS-GWM **AR/COC:** 606914 **Data Type:** Organic, Inorganic, & G. Chem

	ICP-MS metals	7440-38-2 (Arsenic)	7440-43-9 (Cadmium)	7440-47-3 (Chromium)	7440-70-2 (Calcium)	General Chemistry	5955-70-0 (Total Cyanide)
063529-008 CTF-MW3		J, B	J, A2	J, B, B3			
063529-010 CTF-MW3					J		
063529-012 CTF-MW3							J, B3
VOC, HE analyses met QC acceptance criteria. No data will be qualified.							

Validated By: Kim A Lambert **Date:** 02/17/04

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

MEMORANDUM

DATE: February 17, 2004

TO: File

FROM: Kevin Lambert

SUBJECT: Inorganic Data Review and Validation – SNL
Site: DSS-GWM
AR/COC: 606914
SDG: 103007, 103009
Laboratory: GEL
Project/Task: 7222.01.09

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 Rev 1.

Summary

The samples were prepared and analyzed with accepted procedures using method EPA6020 (ICP-MS metals), EPA7470A (CVAA mercury), EPA9056 (Bromide, Fluoride, Chloride, and Sulfate by Ion Chromatography), EPA353.1 (Nitrate/Nitrite), and EPA9012A (Total Cyanide). Problems were identified with the data package that result in the qualification of data.

1. ICP-MS metals:
   The following target analytes were detected (≥ DL) in one or more of the blanks (ICB, CCB, and MB). The associated sample results are qualified as noted below.

103007-003	As was < 5x the MB and will be qualified "J, B." Cr was < 5x the CCB/MB and will be qualified "J, B, B3."

   The MS percent recovery (%R) for Cd (128%) was > the upper QC acceptance limit (125%). The associated sample result was a detect and will be qualified "J, A2."

   The serial dilution relative percent difference (RPD) for Ca (20%) was > 10%. The associated sample result was a detect > 50x the RL and will be qualified "J."

2. Total Cyanide:
   The target analyte was detected (≥ DL) in one or more of the blanks (ICB, CCB, and MB). The associated sample results are qualified as noted below. The associated sample result is qualified as noted below.

103007-004	Total cyanide was < 5x the ICB and will be qualified "J, B3."

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

Holding Times/Preservation

The samples were analyzed within the prescribed holding times and properly preserved for the applicable analyses.

Calibration

The initial and continuing calibration data met QC acceptance criteria for the applicable analyses.

Blanks

No target analytes were detected in the blanks for the applicable analyses except as noted above in the summary section and as follows.

ICP-MS metals:
K was detected (≥ DL) in one or more of the blanks (ICB, CCB, MB). However, the associated sample result was a detect > 5x the blank concentration; no data will be qualified as a result.

Laboratory Control Sample (LCS)

The LCS met QC acceptance criteria except as follows.

All analyses:
It should be noted that no laboratory control sample duplicate (LCSD) was provided with the SDG. No data will be qualified as a result. Laboratory precision was assessed using the replicate.

Matrix Spike (MS)

The MS met QC acceptance criteria except as noted above in the summary section and as follows.

ICP-MS metals:
It should be noted the MS was run on a sample of similar matrix from another SNL SDG and met QC acceptance criteria. No data will be qualified as a result. Also, it should be noted that the MS %R limits do not apply for target analytes with sample concentrations > 4x the spike concentrations (see Data Validation Worksheets). No data will be qualified as a result.

Ion Chromatography (IC), Nitrate/Nitrite, and Total Cyanide:
It should be noted the MS was run on a sample of similar matrix from another SNL SDG and met QC acceptance criteria. No data will be qualified as a result.

Replicate

The replicate met QC acceptance criteria except as follows.

Ion Chromatography (IC), Nitrate/Nitrite, and Total Cyanide:
It should be noted the replicate was run on a sample of similar matrix from another SNL SDG and met QC acceptance criteria. No data will be qualified as a result.

ICP Serial Dilution

The serial dilution met QC acceptance criteria except as noted above in the summary section.

ICP Interference Check Sample (ICS)

The ICS data met QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported for the applicable analyses. No dilutions were required except as follows.

ICP-MS metals:
Sample 103009-001 was diluted 5x for calcium and sodium in order to bring over range concentrations into the linear calibration range of the instrument.

IC:
Sample 103007-005 was diluted 50x for chloride and sulfate due to high concentration.

Other QC

No equipment blank (EB), field blank (FB), or field duplicate pair was submitted on the AR/COCs.

No other specific issues were identified which affect data quality.

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

MEMORANDUM

DATE: February 10, 2004

TO: File

FROM: Kevin Lambert

SUBJECT: Organic Data Review and Validation · SNL
Site: DSS-GWM
AR/COC: 606914
SDG: 103007, 103009
Laboratory: GEL
Project/Task: 7222.01.09

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 Rev 1.

Summary

All samples were prepared and analyzed with accepted procedures using method EPA8260A/B (VOC) and EPA8330 (HE). All compounds were successfully analyzed. No problems were identified with the data package that result in the qualification of data.

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

Holding Times

All samples were extracted and analyzed within the prescribed holding times and properly preserved for the applicable analyses.

Calibration

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

VOC:
The calibration response factor (RF) for trichloroethene (0.26) was < the specified minimum RF (0.30). The calibration relative standard deviation (RSD) and CCV %D for trichloroethene met QC acceptance criteria. The associated sample results were non-detects (NDs) and as a result based on professional judgment no data will be qualified.

The CCV %D for acetone (-26%) was > 20% but ≤ 40%. The associated sample results were NDs and as a result based on professional judgment no data will be qualified.

Blanks

No target analytes were detected in the blanks.

Internal Standards

Internal standards data met QC acceptance criteria for applicable analyses.

Surrogates

The surrogate recoveries met QC acceptance criteria.

Laboratory Control Sample (LCS)

The LCS met QC acceptance criteria except as follows.

VOC and HE:
It should be noted that no laboratory control sample duplicate (LCSD) was provided with the SDG. Laboratory precision was assessed using the MS/MSD, which met QC acceptance criteria. No data will be qualified as a result.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS/MSD met QC acceptance criteria except as follows.

HE:
The MS/MSD was run on a sample of similar matrix from another SNL SDG and met QC acceptance criteria. No data will be qualified as a result.

Confirmation

Confirmation analysis was not required for HE analysis; sample results were NDs.

Detection Limits/Dilutions

All detection limits were properly reported; no dilutions were required.

Other QC

A trip blank (TB) was submitted on the AR/COC. No equipment blank (EB) or field duplicate pair was submitted on the AR/COC.

No other specific issues were identified which affect data quality.

Data Validation Summary

Site/Project: DSS-GWM Project/Task #: 7222.01.09 # of Samples: 8 Matrix: aqueous

AR/COC #: 606914 Laboratory Sample IDs: 103007-001 to -007

Laboratory: GEL 103009-001

SDG #: 103007, 103009

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

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

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

Reviewed By: Kevin A Lambert Date: 02-17-04

Volatile Organics (SW 846 Method 8260)

Site/Project: DSS - GWM AR/COC #: 606914 # of Samples: 2 Matrix: aqueous

Laboratory: GEL SDG #: 103007, 103009 Laboratory Sample IDs: 103007-001, -002

Methods: EPA8260B (VOC) Batch #s: 297946

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	156-59-2	cis-1,2-dichloroethene	✓	0.01		✓	✓											
1	78-87-5	1,2-dichloropropane	✓	0.01		✓	✓											
1	78-93-3	2-butanone (MEK) (10xblk)	✓	0.01		✓	✓											
1	156-60-5	trans-1,2-dichloroethene	✓			✓	✓											
2	591-78-6	2-hexanone (MBK)	✓	0.01		✓	✓											
2	108-10-1	4-methyl-2-pentanone (MIBK)	✓	0.10		✓	✓											
1	67-64-1	acetone(10xblk)	✓	0.01		✓	✓	-26										
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	NA	✓	✓											
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	NA	✓	✓											
2	127-18-4	tetrachloroethene	✓	0.20		✓	✓											
2	108-88-3	toluene(10xblk)	✓	0.40		✓	✓											
2	10061-02-6	trans-1,3-dichloropropene	✓	0.10		✓	✓											
1	79-01-6	trichloroethene	✓	0.30		0.26	✓											
1	75-01-4	vinyl chloride	✓	0.10		✓	✓											
2	1330-20-7	xylenes(total)	✓	0.30		✓	✓											
	108-05-4	vinyl acetate	✓		✓	✓	✓	✓	✓	✓			✓	✓	✓			✓

Comments:

Notes: Shaded rows are RCRA compounds.

Reviewed By: Kevin A Lambert Date: 02-17-04

Volatile Organics

Site/Project: _____ AR/COC #: 606914 Batch #s: _____

Laboratory: _____ SDG #: _____ # 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
					Met				
	Met								
	Criteria				Criteria				

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

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

Comments:

① The Calib RF for TCE was < the specified min RF; RSD & CCV%D met QC acceptance criteria; ~~so~~ KH sample results ND and as a result based on professional no data will be qualified

② The CCV%D for acetone was > 20 but ≤ 40; sample results ND and as a result based on professional judgment no data will be qualified

High Explosives (SW 846 Method 8330)

Site/Project: DSS-GWM AR/COC #: 606914 Laboratory Sample IDs: 103007-006

Laboratory: GEL SDG #: 103007, 103009

Methods: EPA 8330 (HE)

# of Samples: 1 Matrix: aqueous Batch #s: 295804/295800

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

Comments: QC run on sample of similar matrix on another SNL SDG

Sample	SMC %REC	SMC RT	Sample	SMC %REC	SMC RT
Met Criteria					

Confirmation

Sample	CAS #	RPD > 25%	Sample	CAS #	RPD > 25%
Not Required					
Sample Results ND					

Solids-to-aqueous conversion:

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

Reviewed By: Kevin A Lambert Date: 02-17-04

Inorganic Metals

Site/Project: DSS GWM AR/COC #: 606914 Laboratory Sample IDs: 103007-003

Laboratory: GEL SDG #: 103007, 103009 103009-001

Methods: EPA6020 (ICP-MS metals), EPA 7470A (CVAA Hg)

# of Samples: 2 Matrix: aqueous Batch #s: 295461/295460, 295412/295410, 298802/288799

CAS #/ Analyte	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	5x Blk
	← (1) →									(2)					(3)				(1)
7429-90-5 Al																			
7440-39-3 Ba	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓				
7440-41-7 Be																			
7440-43-9 Cd	✓	✓	✓	✓	✓	✓	✓			1.25 (1.25)			✓	✓	✓				
7440-70-2 Ca	✓	✓	✓	✓	✓	✓	✓			N/A			✓	✓	20 (10)				
7440-47-3 Cr	✓	✓	✓	✓	0.000475	0.000774J	✓			✓			✓	✓	✓				0.00387
7440-48-4 Co																			
7440-50-8 Cu																			
7439-89-6 Fe																			
7439-95-4 Mg	✓	✓	✓	✓	✓		✓			N/A			✓	✓	✓				
7439-96-5 Mn																			
7440-02-0 Ni				✓ KK															
7440-09-7 K	✓	✓	✓	~~0.00267~~	0.00269J	0.03595	✓			✓			✓	✓	✓				0.1795
7440-22-4 Ag	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓				
7440-23-5 Na	✓	✓	✓	✓	✓	✓	✓			N/A			✓	✓	✓				
7440-62-2 V																			
7440-66-6 Zn																			
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓				
7782-49-2 Se	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓				
7440-38-2 As	✓	✓	✓	✓	✓	0.00165J	✓			✓			✓	✓	✓				0.00815
7440-36-0 Sb																			
7440-28-0 Tl																			
7439-97-6 Hg	✓	✓	✓	✓	✓	✓	✓			✓			✓	NA	N/A				
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: QC for ICP-MS metals run on sample of similar matrix from another SNL SDG

(1) K detected in blk, results > 5x blk, No data will be qualified

(1) Cr & As detected in blk, results ≤ 5x blk, results will be qualified J, B, B3 & J, B respectively

(2) The % R for Cd > the upper limit but it detect and will be qualified J, A2

(3) The Serial Dilution RPD for Ca is > 10%, results > 50x RL and will be qualified J

Reviewed By: Kevin A Lambert Date: 02-17-04

General Chemistry

Site/Project: DSS GWM AR/COC #: 606914 Laboratory Sample IDs: 103007-004, -005, -007

Laboratory: GEL SDG #: 103007, 103009

Methods: EPA9012A(TCN), EPA9056(Br, Cl, Fl, SO4 by IC), EPA353.1(NO3/NO2)

# of Samples: 3 Matrix: Aqueous Batch #s: 295301/295419, 295446, 297693

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	5 x Blk
5955-70-0	Total Cyanide	✓	✓	✓	0.0027J	✓	✓	✓			✓			✓						0.0135
24959-67-9	Bromide	✓	✓	✓	✓	✓	✓	✓			✓			✓						
16887-00-6	Chloride	✓	✓	✓	✓	✓	✓	✓			✓			✓						
16984-48-8	Fluoride	✓	✓	✓	✓	✓	✓	✓			✓			✓						
14808-79-8	Sulfate	✓	✓	✓	✓	✓	✓	✓			✓			✓						
N599	NO_3/NO_2	✓	✓	✓	✓	✓	✓	✓			✓			✓						

Comments: QC run on samples of similar matrix from other SNL SDGs
① TCN was detected in blank, result < 5 x blk and will be qualified "J, B5"

Reviewed By: Kevin A Lambert Date: 02-17-04

Contract Verification Review (CVR)

Project Leader Collins | Project Name DSS-GWM | Case No. 7222_01.09

AR/COC No. 606914 | Analytical Lab GEL | SDG No. 103007

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	Missing on Total Cyanide C of A		
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X				
2.4	Matrix spike/matrix spike duplicate data provided (if requested)	X				
2.5	Detection limits provided; PQL and MDL (or IDL), MDA and L_c	X				
2.6	QC batch numbers provided	X				
2.7	Dilution factors provided and all dilution levels reported	X				
2.8	Data reported in appropriate units and using correct significant figures	X				
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	N/A				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met	X				
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X				

Contract Verification Review (Continued)

3.0 Data Quality Evaluation

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

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	N/A		

Contract Verification Review (Concluded)

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions
063529-012	Total Cyanide	Missing Reviewed By signature (page 48)

Were deficiencies unresolved? (Yes) No

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

If no, provide: nonconformance report or correction request number 7108 and date correction request was submitted 01/12/04

Reviewed by: [illegible] Date: 01/12/04 Closed by: [illegible] Date: 01 14 04

Date: 01/12/04

To:	Edie Kent Jannie Shaw-Busby	From:	Lorraine Herrera
Company:	GEL	Org:	6133
Phone:	(843) 556-8171	Phone:	(505) 844-3199
Fax:	(843) 766-1178	Fax:	(505) 844-3128

Correction Request

COC: 606914 SDG: 103007 Tracking No: 7108

Jannie/Edie,

Please correct the following error(s):

- Total Cyanide C of A missing Reviewed By signature (page 48)

Thank you,
Lorraine

Sandia National Laboratories
Sample Management Office
P.O. Box 5800
Albuquerque, New Mexico 87185-1331

RECORDS CENTER CODE: ER

SMO ANALYTICAL DATA ROUTING FORM

PROJECT NAME: DSS GWM
PROJECT/TASK: 7222_01.09
SNL TASK LEADER: Collins
ORG/MS/CF0#: 6133/1089/CF023-04
SMO PROJECT LEAD: Herrera
SAMPLE SHIP DATE: 3/23/2004

ARCOC	LAB	LAB ID	PRELIM DATE	FINAL DATE	EDD	EDD ON Q	Cust CD	RC CD
607338	GEL	109590		4/23/2004	X	X		

DATA PACKAGE TAT:		RUSH	X	NORMAL
CORRECTIONS REQUESTED BY/DATE:				
PROBLEM #/DATE CORRECTION RECEIVED:				
CVR COMPLETED BY/DATE:	W. Palencia		4-27-04	
FINAL TRANSMITTED TO/DATE:	Jackson		4-27-04	
SENT TO VALIDATION BY/DATE:	J Conn		04/29/04	
REVISIONS REQUESTED/REVISIONS RECEIVED (DATE):				
VALIDATION COMPLETED BY/DATE:		KK	05/13/04	
COPY TO WM BY/DATE:			~~05/03/~~	
CD REQUESTED BY/DATE	J Conn		04/29/04	
CD RECEIVED BY/DATE	J. Conn		05/03/04	
TO ERDMS OR RECORDS CENTER BY/DATE:	J. Conn		05/19/04	

COMMENTS:

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. N/7

SMO Use

AR/COC **607338**

Dept. No./Mail Stop:	6133/MS1089	Date Samples Shipped:	3-23-04	Project/Task No. 7222.01.09	☐ Waste Characterization
Project/Task Manager:	Sue Collins	Carrier/Waybill No.	33654	SMO Authorization: [illegible] SMO	-Send preliminary/copy report to:
Project Name:	DSS GW	Lab Contact:	Edie Kent/803-556-8171	Contract #: PO 21671	
Record Center Code:	ER	Lab Destination:	GEL	See Bottle Order	☐ Released by COC No.:
Logbook Ref. No.:	ER 089	SMO Contact/Phone:	Pam Puissant/505-284-3185		☑ Validation Required
Service Order No.	CF 023-04	Send Report to SMO:	Lorraine Herrera/505-284-3199		Bill To: Sandia National Labs (Accounts Payable)
Location	Tech Area				P.O. Box 5800 MS 0154
Building	Room				Albuquerque, NM 87185-0154 109590-

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
064411-001	CTF-MW3	350	149	032304/0920	GW	G	3x40ml	HCL	G	SA	VOC (8260)	001
064411-010	CTF-MW3	350	149	032304/0922	GW	P	500ml	HNO3	G	SA	RCRA Metals (6020/7470)	003
064411-014	CTF-MW3	350	149	032304/0923	FGW	P	500ml	HNO3	G	SA	Major Cations (6020) Filtered	004
064411-023	CTF-MW3	350	149	032304/0925	GW	P	500ml	NaOH	G	SA	Total Cyanide (9012A)	005
064411-013	CTF-MW3	350	149	032304/0926	GW	P	250ml	4C	G	SA	Major Anions (SW846/9056)	006
064411-020	CTF-MW3	350	149	032304/0930	GW	AG	4x1L	4C	G	SA	High Explosives (8330)	007
064411-015	CTF-MW3	350	149	032304/0931	GW	P	250ml	H2SO4	G	SA	NPN (353.1)	008
064412-001	CTF-TB3	NA	149	032304/0920	DIW	G	3x40ml	HCL	G	TB	VOC (8260)	002

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

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

Return Samples By:

Sample Tracking — Smo Use
Date Entered(mm/dd/yy): 03/25/04
Entered by: JMC
QC inits:

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level D Package ☑ Yes ☐ No

*Send report to:
Tim Jackson/Org 6133/MS 1087/505-284-2547

Major Anions/Br,Cl,Fl,SO4
Major Cations/Ca,Mg,K,Na
FGW/ Filtered in field w/.45 micron filter
Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	Alfred Santillanes	[illegible]	[illegible]	Weston/6134/844-5130/228-0710
	Gilbert Quintana	[illegible]	[illegible]	S&W/6134/284-3309/238-9417
	William Gibson	[illegible]	[illegible]	Weston/6134/284-5232/239-7367

1.Relinquished by [illegible]	Org. 6134	Date 3/23/04	Time 1020	4.Relinquished by	Org.	Date	Time
1. Received by [illegible]	Org. 6133	Date 3/23/04	Time 1020	4. Received by	Org.	Date	Time
2.Relinquished by [illegible]	Org. 6133	Date 7/23/04	Time 1130	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

Sample Findings Summary

Site: DSS-GWM **AR/COC:** 607338 **Data Type:** Organic, Inorganic, & Gen Chem

	ICP-MS Metals	7440-47-3 (Chromium)	7439-95-4(Magnesium)	CVAA mercury	7439-97-6(Mercury)
064411-010 CTF-MW3		J,B			UJ,B3
064411-014 CTF-MW3			J		

VOC, HE, and General Chemistry analyses met QC acceptance criteria. No data will be qualified.

Validated By: Kevin A Lambert **Date:** 05/13/04

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

Memorandum

Date: May 13, 2004

To: File

From: Kevin Lambert

Subject: Inorganic Data Review and Validation – SNL
Site: DSS-GWM
AR/COC: 607338
SDG: 109590
Laboratory: GEL
Project/Task: 7222.01.09

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. Data are evaluated using SNL/NM SMO AOP 00-03 Rev 1.

Summary

The samples were prepared and analyzed with accepted procedures using methods EPA6020 (ICP-MS metals), EPA7470A (CVAA mercury), EPA9012A (Total Cyanide), EPA9056 (Bromide, Fluoride, Chloride, and Sulfate by Ion Chromatography), and EPA353.1 (Nitrate/Nitrite). Problems were identified with the data package that result in the qualification of data.

1. ICP-MS metals:
   The following target analytes were detected (≥ DL) in one or more of the blanks (ICB, CCB, and MB). The associated sample results are qualified as noted below.

   Samples 109590-003 Cr was a detect < 5x the MB and will be qualified "J, B."

   The serial dilution relative percent difference (RPD) for Mg (12%) was > 10%. The associated sample result was a detect > 50x the RL and will be qualified "J."

2. CVAA mercury:
   The target analyte was detected (≥ DL) in one or more of the blanks (ICB, CCB) at negative concentration with absolute value > the DL but < the RL. The associated sample results are qualified as noted below.

   Samples 109590-003 Hg was non-detect (ND) and will be qualified "UJ, B3."

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

Holding Times/Preservation

The samples were analyzed within the prescribed holding times and properly preserved.

Calibration

The initial and continuing calibration data met QC acceptance criteria.

Blanks

No target analytes were detected in the blanks except as noted above in the summary section and as follows.

ICP-MS metals:
Potassium, sodium, and selenium were detected (≥ DL) in one or more of the blanks (ICB, CCB, MB). However, associated sample results were NDs or > 5x the blank concentrations; no data will be qualified as a result. Also, selenium was detected in one or more of the blanks (ICB, CCB) at negative concentration with absolute value > the DL but < the RL. However, the associated sample result was a detect > 5x the DL; no data will be qualified as a result.

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

The LCS/LCSD met QC acceptance criteria except as follows.

All analyses:
It should be noted that no LCSD was provided with the SDG. No data will be qualified as a result. Laboratory precision was assessed using the replicate.

Matrix Spike (MS)

The MS met QC acceptance criteria except as follows.

ICP-MS metals:
It should be noted that the MS %R limits do not apply for target analytes with sample concentrations > 4x the spike concentrations (see Data Validation Worksheets). No data will be qualified as a result.

Total Cyanide (TCN) and Nitrate/Nitrite:
It should be noted the MS was run on a sample of similar matrix from another SNL SDG and met QC acceptance criteria. No data will be qualified as a result.

Ion Chromatography (IC):
It should be noted the MS was run on a sample of similar matrix from another SNL SDG and met QC acceptance criteria except for sulfate. The MS %R for sulfate (126%) was slightly > the upper QC acceptance limit (125%). The associated sample result was a detect. However, based on professional judgment no data will be qualified as a result.

Replicate

The replicate met QC acceptance criteria except as follows.

TCN, Nitrate/Nitrite, and IC:
It should be noted the replicate was run on a sample of similar matrix from another SNL SDG and met QC acceptance criteria. No data will be qualified as a result.

ICP Serial Dilution

The serial dilution met QC acceptance criteria except as noted above in the summary section.

ICP Interference Check Sample (ICS)

The ICS data met QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported. No dilutions were required except as follows.

ICP-MS metals:
Sample 109590-004 was diluted for calcium 10x to minimize matrix interferences and/or to bring over range target analytes into the linear calibration range of the instrument.

IC:
Sample 109590-006 was diluted for chloride and sulfate 20x due to high concentration.

Other QC

No equipment blank (EB), field blank (FB) or field duplicate pair was submitted on the AR/COC.

No other specific issues were identified which affect data quality.

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

Memorandum

Date: May 11, 2004

To: File

From: Kevin Lambert

Subject: Organic Data Review and Validation – SNL
Site: DSS-GWM
AR/COC: 607338
SDG: 109590
Laboratory: GEL
Project/Task: 7222.01.09

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. Data are evaluated using SNL/NM SMO AOP 00-03 Rev 1.

Summary

All samples were prepared and analyzed with accepted procedures using method EPA8260B (VOC) and EPA8330 (High Explosives). All compounds were successfully analyzed. No problems were identified with the data package that result in the qualification of data.

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

Holding Times

All samples were extracted and analyzed within the prescribed holding times and properly preserved.

Calibration

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

VOC:
The calibration RF for trichloroethene (0.28) was < the specified minimum RF (0.30). The calibration relative standard deviation (RSD) and continuing calibration verification percent difference (CCV %D) for trichloroethene met QC acceptance criteria. The associated sample results were non-detects (NDs) and as a result based on professional judgment no data will be qualified. The CCV %D for chloromethane (-28%) was > 20% but ≤ 40%. The associated sample results were NDs and as a result based on professional judgment no data will be qualified.

Blanks

No target analytes were detected in the blanks.

Internal Standards (ISs)

Internal standards data met QC acceptance criteria.

Surrogates

The surrogate recoveries met QC acceptance criteria.

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

The LCS/LCSD met QC acceptance criteria except as follows.

All analyses:
It should be noted that no LCSD was provided with the SDG. Laboratory precision was assessed using the MS/MSD, which met QC acceptance criteria. No data will be qualified as a result.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS/MSD met QC acceptance criteria except as follows.

All analyses:
It should be noted the MS/MSD was run on a sample of similar matrix from another SNL SDG and met QC acceptance criteria. No data will be qualified as a result.

Target Compound Identification/Confirmation

No target compound identification/confirmation analyses were required.

Detection Limits/Dilutions

All detection limits were properly reported. No dilutions were required except as follows.

High Explosives (HE):
All samples were diluted 2x according to laboratory procedure for this analysis.

Other QC

No equipment blank (EB), trip blank (TB), field blank (FB), or field duplicate pair was submitted on the AR/COC except as follows.

VOC:
A TB was submitted on the AR/COC.

No other specific issues were identified which affect data quality.

Data Val. .ion Summary

Site/Project: DSS-GWM Project/Task #: 7222.01.09 # of Samples: 8 Matrix: aqueous

AR/COC #: 607338 Laboratory Sample IDs: 109590-001 to -008

Laboratory: GEL

SDG #: 109590

QC Element	Analysis									
	Organics				IC Inorganics				NOs/NO2 RAD	Other
	VOC	SVOC	Pesticide/ PCB	HPLC (HE)	ICP/AES MS	~~GFAA/ AA~~	CVAA (Hg)	CN		
1. Holding Times/Preservation	✓			✓	✓	✓	✓	✓	✓	
2. Calibrations	✓			✓	✓	✓	UJ	✓	✓	
3. Method Blanks	✓			✓	J	✓	✓	✓	✓	
4. MS/MSD	✓			✓	✓	✓	✓	✓	✓	
5. Laboratory Control Samples	✓			✓	✓	✓	✓	✓	✓	
6. Replicates					✓	✓	✓	✓	✓	
7. Surrogates	✓			✓						
8. Internal Standards	✓									
9. TCL Compound Identification	✓									
10. ICP Interference Check Sample					✓					
11. ICP Serial Dilution					J					
12. Carrier/Chemical Tracer Recoveries									NA	
13. Other QC TB	✓			NA	NA	NA	NA	NA	✓	

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

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

Reviewed By: Kim A Lambert Date: 05-13-04

Volatile Organics (SW 846 Method 8260)

Site/Project: DSS-GWM AR/COC #: 607338 # of Samples: 2 Matrix: aqueous

Laboratory: GEL SDG #: 109590 Laboratory Sample IDs: 109590-001, -002

Methods: EPA8260B (VOC) Batch #s: 321085

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF (1)	Calib. RSD/ R^2	CCV %D (2)	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks		
						>.05	<20% / 0.99	20%												
1	71-55-6	1,1,1-trichloroethane	✓	0.10	NA	✓	✓	✓	✓	✓			✓	✓	✓			✓		
2	79-34-5	1,1,2,2-tetrachloroethane	✓	0.30		✓	✓													
2	79-00-5	1,1,2-trichloroethane	✓	0.10		✓	✓													
1	75-34-3	**1,1-dichloroethane**	✓	0.10		✓	✓													
1	75-35-4	**1,1-dichloroethene**	✓	0.20		✓	✓													
1	107-06-2	**1,2-dichloroethane**	✓	0.10		✓	✓													
1	156-59-2	**cis-1,2-dichloroethene**	✓	0.01		✓	✓													
1	78-87-5	**1,2-dichloropropane**	✓	0.01		✓	✓													
1	78-93-3	2-butanone (MEK) (10xblk)	✓	0.01		✓	✓													
1	156-60-5	**trans-1,2-dichloroethene**	✓			✓	✓													
2	591-78-6	2-hexanone (MBK)	✓	0.01		✓	✓													
2	108-10-1	4-methyl-2-pentanone (MIBK)	✓	0.10		✓	✓													
1	67-64-1	**acetone(10xblk)**	✓	0.01		✓	✓													
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	NA	✓	✓													
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		✓	✓	-23 ✓												
1	10061-01-5	cis-1,3-dichloropropene	✓	0.20		✓	✓													
2	124-48-1	dibromochloromethane	✓	0.10		✓	✓													
2	100-41-4	ethylbenzene	✓	0.10	✓	✓	✓													
1	75-09-2	methylene chloride (10xblk)	✓	0.01	✓	✓	✓													
2	100-42-5	styrene	✓	0.30	NA	✓	✓													
2	127-18-4	**tetrachloroethene**	✓	0.20		✓	✓													
2	108-88-3	toluene(10xblk)	✓	0.40		✓	✓													
2	10061-02-6	trans-1,3-dichloropropene	✓	0.10		✓	✓													
1	79-01-6	**trichloroethene**	✓	0.30		0.28	✓													
1	75-01-4	**vinyl chloride**	✓	0.10		✓	✓													
2	1330-20-7	xylenes(total)	✓	0.30		✓	✓													
	108-05-4	vinyl acetate	✓		✓	✓	✓	✓	✓	✓			✓	✓	✓			✓		

Comments: QC run on sample of similar matrix from another SNL SDG

Notes: Shaded rows are RCRA compounds.

Reviewed By: Kevin A Lambert Date: 05-13-04

Volatile Organics

Site/Project: _____ AR/COC #: 607338 Batch #s: _____

Laboratory: _____ SDG #: _____ # 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
	Met				Met				
	Criteria				Criteria				

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

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

Comments:

(1) The CalibRF for TCE was < the specified min RF; RSD & CCV %D met QC Criteria; Assoc sample results were NDs and as a result based on professional judgment no data will be qualified

(2) The CCV %D for chloromethane was > 20 but ≤ 40, Assoc sample results were NDs and as a result based on professional judgment no data will be qualified

High Explosives (SW 846 Method 8330)

Site/Project: DSS-GWM AR/COC #: 607338 Laboratory Sample IDs: 109540-007

Laboratory: GEL SDG #: 109540

Methods: EPA8330 (HE)

# of Samples: 1 Matrix: aqueous Batch #s: 320634/320633

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

Sample	SMC %REC	SMC RT	Sample	SMC %REC	SMC RT
	Met Criteria				

Comments: QC run on sample of similar matrix from another SWL

Confirmation

Sample	CAS #	RPD > 25%	Sample	CAS #	RPD > 25%
	Sample Results ND	Not Required			

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

Reviewed By: Kevin A Lambert Date: 05-13-04

Inorganic Metals

Site/Project: DSS-GWM AR/COC #: 607338 Laboratory Sample IDs: 109590-003, -004

Laboratory: GEL SDG #: 109590

Methods: EPA6020(ICP-MS metals), EPA7470A(CVAA Hg)

# of Samples: 2 Matrix: aqueous Batch #s: 319983/319987, 319887/319886

CAS #/ Analyte	QC Element ← (1) →																			← (1) →
	TAL	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dilu-tion	Field Dup. RPD	Equip. Blanks	Field Blanks	5x BLK	5x OC
7429-90-5 Al																				
7440-39-3 Ba	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓					
7440-41-7 Be																				
7440-43-9 Cd	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓					
7440-70-2 Ca	✓	✓	✓	✓	✓	✓	✓			N/A			✓	✓	✓					
7440-47-3 Cr	✓	✓	✓	✓	✓	0.00083	✓			✓			✓	✓	✓				0.0043	
7440-48-4 Co																				
7440-50-8 Cu																				
7439-89-6 Fe																				
7439-95-4 Mg	✓	✓	✓	✓	✓	✓	✓			N/A			✓	✓	12					
7439-96-5 Mn																				
7440-02-0 Ni																				
7440-09-7 K	✓	✓	✓	✓	0.02321	0.0269J	✓			N/A			✓	✓	✓				0.1345	
7440-22-4 Ag	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓					
7440-23-5 Na	✓	✓	✓	✓	✓	0.0125J	✓			N/A			✓	✓	✓				0.0625	
7440-62-2 V																				
7440-66-6 Zn																				
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓					
7782-49-2 Se	✓	✓	✓	✓	-0.00499	0.0015J	✓			✓			✓	✓	✓				0.005	0.0032
7440-38-2 As	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓					
7440-36-0 Sb																				
7440-28-0 Tl																				
					NC															
7439-97-6 Hg	✓	✓	✓	✓	~~0.0053~~	✓	✓			✓			✓	NA	NA					0.0002
				-0.00005J																
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: N/A - The MS %R limits don't apply; sample [c] > 4x spike [c]

SEE OTHER PAGE

Reviewed By: Kevin A Lambert Date: 05 13 04

COC# 607338 U33-GWM1 SDG# 109590 Metals 2/2

(1) Sample # 109590

Blank\Analyte	-003	-004						
MB Cr	<5xblk J,B	NA						
CCB MB K	NA	>5xblk NoQual						
MB Na	NA	>5xblk NoQual						
CCB -Se	>5x DL NO Qual	NA						
MB Se	>5xblk NoQual	NA						
CCB Hg	ND UJ,B3	NA						

(2) The serial dilution RPD for Mg was > 10; however sample result was a detect > 50 x RL and will be qualified "J"

Negative Blank>=DL	Negative Blank>RL	Positive Blank>=DL	Positive Blank>RL	Descriptive Flags (If applicable)
<5XDL=J, NDs=UJ, >5XDL = no qual	<5XRL=J, NDs=R	<5X Blank=J, ND or >5X = no qual	reported value = >10X blank	B=MB, B1=TB, B2=EB, B3=ICB/CCB

05-13-04
KKL

Gene. Chemistry

Site/Project: DSS-GWM AR/COC #: 607338 Laboratory Sample IDs: 109590-005, -006, -008

Laboratory: GEL SDG #: 109590

Methods: EPA9012A (TCN), EPA9056 (Br, Cl, F, SO4 by IC), EPA353.1 (NO3/NO2)

# of Samples: 3 Matrix: aqueous Batch #s: 320927/320926, 319444, 321642

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	
5955-70-0	Total Cyanide	✓	✓	✓	✓	✓	✓	✓			✓			✓						
24959-67-9	Bromide	✓	✓	✓	✓	✓	✓	✓			✓			✓						
16887-00-6	Chloride	✓	✓	✓	✓	✓	✓	✓			✓			✓						
16984-48-8	Fluoride	✓	✓	✓	✓	✓	✓	✓			✓			✓						
14808-79-8	Sulfate	✓	✓	✓	✓	✓	✓	✓			126 (125)			✓						
N 599	NO3/NO2	✓	✓	✓	✓	✓	✓	✓			✓			✓						

Comments: QC for TCN, IC, & NO3/NO2 were run on sample of similar matrix from other SNC SDG

(1) The MS %R for SO4 was slightly > the upper QC limit; however result was a detect however based on professional judgment no data will be qualified as a result

Reviewed By: Kevin A Lambert Date: 05 13 04

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Rec'd 05-12-04 KAL

QC Summary

Report Date: May 12, 2004
Page 1 of 3

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

Workorder: 109590

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
HPLC Explosives Federal										
Batch 320634										
QC1200595691 LCS										
1,3,5-Trinitrobenzene	6.49			5.84	ug/L		90	(50%-150%)	MAP	03/30/04 18:03
2,4,6-Trinitrotoluene	6.49			6.44	ug/L		99	(50%-150%)		
2,4-Dinitrotoluene	6.49			6.39	ug/L		98	(50%-150%)		
2,6-Dinitrotoluene	6.49			6.32	ug/L		97	(50%-150%)		
2-Amino-4,6-dinitrotoluene	6.49			6.42	ug/L		99	(50%-150%)		
4-Amino-2,6-dinitrotoluene	6.49			6.85	ug/L		106	(50%-150%)		
HMX	6.49			5.91	ug/L		91	(50%-150%)		
Nitrobenzene	6.49			5.73	ug/L		88	(50%-150%)		
RDX	6.49			6.34	ug/L		98	(50%-150%)		
Tetryl	6.49			4.57	ug/L		70	(50%-150%)		
m-Dinitrobenzene	6.49			5.85	ug/L		90	(50%-150%)		
m-Nitrotoluene	6.49			5.71	ug/L		88	(50%-150%)		
o-Nitrotoluene	6.49			5.93	ug/L		91	(50%-150%)		
p-Nitrotoluene	6.49			6.17	ug/L		95	(50%-150%)		
**3,4-Dinitrotoluene	3.25			3.80	ug/L		117	(50%-150%)		
QC1200595690 MB										
1,3,5-Trinitrobenzene			U	ND	ug/L					03/30/04 17:16
-Trinitrotoluene			U	ND	ug/L					
-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					
**3,4-Dinitrotoluene	3.25			3.12	ug/L		96	(50%-150%)		
QC1200595692 109752009 MS										
1,3,5-Trinitrobenzene	6.49	U	ND	5.74	ug/L		89	(50%-150%)		03/31/04 03:26
2,4,6-Trinitrotoluene	6.49	U	ND	6.78	ug/L		104	(50%-150%)		
2,4-Dinitrotoluene	6.49	U	ND	6.48	ug/L		100	(50%-150%)		
2,6-Dinitrotoluene	6.49	U	ND	6.16	ug/L		95	(50%-150%)		
2-Amino-4,6-dinitrotoluene	6.49	U	ND	6.19	ug/L		95	(50%-150%)		
4-Amino-2,6-dinitrotoluene	6.49	U	ND	6.79	ug/L		105	(50%-150%)		
HMX	6.49	U	ND	5.60	ug/L		86	(50%-150%)		
Nitrobenzene	6.49	U	ND	5.32	ug/L		82	(50%-150%)		
RDX	6.49	U	ND	6.09	ug/L		94	(50%-150%)		
Tetryl	6.49	U	ND	4.73	ug/L		73	(50%-150%)		

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Rec'd 05-12-04 KH

QC Summary

Workorder: 109590

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
HPLC Explosives Federal											
Batch 320634											
m-Dinitrobenzene	6.49	U	ND		5.73	ug/L		88	(50%-150%)		
m-Nitrotoluene	6.49	U	ND		5.46	ug/L		84	(50%-150%)		
o-Nitrotoluene	6.49	U	ND		5.84	ug/L		90	(50%-150%)		
p-Nitrotoluene	6.49	U	ND		5.85	ug/L		90	(50%-150%)		
**3,4-Dinitrotoluene	3.25		3.27		3.63	ug/L		112	(50%-150%)		
QC1200595693 109752009 MSD											
1,3,5-Trinitrobenzene	6.49	U	ND		5.92	ug/L	3	91	(0%-30%)		03/31/04 04:13
2,4,6-Trinitrotoluene	6.49	U	ND		6.60	ug/L	3	102	(0%-30%)		
2,4-Dinitrotoluene	6.49	U	ND		6.48	ug/L	0	100	(0%-30%)		
2,6-Dinitrotoluene	6.49	U	ND		6.26	ug/L	2	97	(0%-30%)		
2-Amino-4,6-dinitrotoluene	6.49	U	ND		6.36	ug/L	3	98	(0%-30%)		
4-Amino-2,6-dinitrotoluene	6.49	U	ND		7.03	ug/L	3	108	(0%-30%)		
HMX	6.49	U	ND		5.79	ug/L	3	89	(0%-30%)		
Nitrobenzene	6.49	U	ND		5.68	ug/L	6	87	(0%-30%)		
RDX	6.49	U	ND		6.54	ug/L	7	101	(0%-30%)		
Tetryl	6.49	U	ND		4.68	ug/L	1	72	(0%-30%)		
m-Dinitrobenzene	6.49	U	ND		5.94	ug/L	4	91	(0%-30%)		
m-Nitrotoluene	6.49	U	ND		5.79	ug/L	6	89	(0%-30%)		
o-Nitrotoluene	6.49	U	ND		6.05	ug/L	3	93	(0%-30%)		
p-Nitrotoluene	6.49	U	ND		6.22	ug/L	6	96	(0%-30%)		
**3,4-Dinitrotoluene	3.25		3.27		3.75	ug/L		115	(50%-150%)		

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.
- < For less than value for Flashpoint
- B The analyte was found in the blank above the effective MDL.
- H Holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
- P The response between the confirmation column and the primary column is >40%D
- U The analyte was analyzed for but not detected below this concentration. For Organic and Inorganic analytes the result is less than the effective MDL. 1
- X Presumptive evidence that the analyte is not present. Please see narrative for further information.
- X Presumptive evidence that the analyte is not present. Please see narrative for further infromation.
- Z The percent difference is greater than 70%.
- h Holding time exceeded

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Rec'd
05-12-04
KAL

QC Summary

Workorder: 109590

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

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

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

Contract Ver ion Review (CVR)

Project Leader COLLINS | Project Name DSS GWM | Case No. 7222_01.09

AR/COC No. 607338 | Analytical Lab GEL | SDG No. 109590

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

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

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

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X				
2.4	Matrix spike/matrix spike duplicate data provided (if requested)	X				
2.5	Detection limits provided; PQL and MDL (or IDL), MDA and L_c	X				
2.6	QC batch numbers provided	X				
2.7	Dilution factors provided and all dilution levels reported	X				
2.8	Data reported in appropriate units and using correct significant figures	X				
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	N/A				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met	X				
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X				

Contract Verification Review (Continued)

3.0 Data Quality Evaluation

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

Contract Verification Review (Concluded)

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions

Were deficiencies unresolved? Yes (No)

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

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

Reviewed by: W. Palencia Date: 4-27-04 Closed by:_____ Date:_____

RECORDS CENTER CODE: ER

SMO ANALYTICAL DATA ROUTING FORM

PROJECT NAME: DSS GWM
PROJECT/TASK: 7222_01.09
SNL TASK LEADER: Collins
ORG/MS/CF0#: 6133/1089/CF022-04
SMO PROJECT LEAD: Herrera
SAMPLE SHIP DATE: 6/1/2004

ARCOC	LAB	LAB ID	PRELIM DATE	FINAL DATE	EDD	EDD ON Q	Cust CD	RC CD
607545	GEL	113986		7/2/2004	X	X		

DATA PACKAGE TAT:		RUSH	X	NORMAL
CORRECTIONS REQUESTED BY/DATE:				
PROBLEM #/DATE CORRECTION RECEIVED:				
CVR COMPLETED BY/DATE:	W. Palencia		7-8-04	
FINAL TRANSMITTED TO/DATE:	Jackson		7-8-04	
SENT TO VALIDATION BY/DATE:	J. Conn		07/09/04	
REVISIONS REQUESTED/REVISIONS RECEIVED (DATE):				
VALIDATION COMPLETED BY/DATE:		KAL	07-23-04	
COPY TO WM BY/DATE:				
CD REQUESTED BY/DATE		JN H	7/30/-4	
CD RECEIVED BY/DATE				
TO (ERDMS) OR RECORDS CENTER BY/DATE:		R. Kavanaugh	7-30-04	

COMMENTS:

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. N/A

SMO Use

AR/COC 607545

Dept. No./Mail Stop:	6133/MS1089	Date Samples Shipped:	6/01/04	Project/Task No. 7222.01.09	☐ Waste Characterization
Project/Task Manager:	Sue Collins	Carrier/Waybill No.	36327	SMO Authorization: A Smo	-Send preliminary/copy report to:
Project Name:	DSS GW	Lab Contact:	Edie Kent/803-556-8171	Contract #: PO 21671	
Record Center Code:	ER	Lab Destination:	GEL		☐ Released by COC No.:
Logbook Ref. No.:	ER 089	SMO Contact/Phone:	Pam Puissant/505-284-3185	SEE Bottle Order	☑ Validation Required
Service Order No.	CF 028-04	Send Report to SMO:	Lorraine Herrera/505-284-3199		Bill To: Sandia National Labs (Accounts Payable)
Location	Tech Area				P.O. Box 5800 MS 0154
Building	Room				Albuquerque, NM 87185-0154 113986

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
065030-001	CTF-MW3	350	149	06/01/04 0914	GW	G	3x40ml	HCL	G	SA	VOC (8260)	001
065030-010	CTF-MW3	350	149	06/01/04 0916	GW	P	500ml	HNO3	G	SA	RCRA Metals (6020/7470)	003
065030-014	CTF-MW3	350	149	06/01/04 0917	FGW	P	500ml	HNO3	G	SA	Major Cations (6020) Filtered	004
065030-023	CTF-MW3	350	149	06/01/04 0919	GW	P	500ml	NaOH	G	SA	Total Cyanide (9012A)	005
065030-013	CTF-MW3	350	149	06/01/04 0920	GW	P	500ml	4C	G	SA	Major Anions (SW846/9056)	006
065030-020	CTF-MW3	350	149	06/01/04 0922	GW	AG	4x1L	4C	G	SA	High Explosives (8330)	007
065030-015	CTF-MW3	350	149	06/01/04 0923	GW	P	250ml	H2SO4	G	SA	NPN (353.1)	008
065031-001	CTF-TB3	NA	149	06/01/04 0914	DIW	G	3x40ml	HCL	G	TB	VOC (8260)	002

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day

Return Samples By: ☐ Negotiated TAT

Sample Tracking Smo Use

Date Entered(mm/dd/yy) 06/08/04

Entered by: TAC

QC inits.

Special Instructions/QC Requirements

EDD ☑ Yes ☐ No

Level D Package ☑ Yes ☐ No

***Send report to:**

Tim Jackson/Org 6133/MS 1087/505-284-2547

Major Anions/Br,Cl,Fl,SO4

Major Cations/Ca,Mg,K,Na

FGW/ Filtered in field w/.45 micron filter

Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	Alfred Santillanes			~~Weston~~/6134/844-5130/228-0710
	John Boyd			S&W/6134/284-3307/228-9231

1.Relinquished by	Org 6134	Date 6/1/04	Time 1045	4.Relinquished by	Org.	Date	Time
1. Received by Smo	Org. 6133	Date 6/1/04	Time 1045	4. Received by	Org.	Date	Time
2.Relinquished by Smo	Org. 6133	Date 6/1/04	Time 1350	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

Sample Findings Summary

Site: DSS-GWM **AR/COC:** 607545 **Data Type:** Organic, Inorganic, & Gen Chem

	VOC	108-88-3 (toluene)	67-64-1 (acetone)	108-05-4 (vinyl acetate)	ICP-MS Metals	7440-38-2 (Arsenic)	CVAA mercury	7439-97-6 (mercury)	General Chemistry	5955-70-0 (Total Cyanide)
065030-001 CTF-MW3		1 U,B,B1	UJ,P	UJ,P						
065031-001 CTF-TB3		1 U,B	UJ,P	UJ,P						
065030-010 CTF-MW3						J,B		J,B		
065030-023 CTF-MW3										UJ,A2

HE analyses met QC acceptance criteria. No data will be qualified.

Validated By: Kevin A Lambert **Date:** 07/23/04

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

Memorandum

Date: July 23, 2004

To: File

From: Kevin Lambert

Subject: Inorganic Data Review and Validation – SNL
Site: DSS-GWM
AR/COC: 607545
SDG: 113986
Laboratory: GEL
Project/Task: 7222.01.09

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. Data are evaluated using SNL/NM SMO AOP 00-03 Rev 1.

Summary

The samples were prepared and analyzed with accepted procedures using methods EPA6020 (ICP-MS metals), EPA7470A (CVAA mercury), EPA9012A (Total Cyanide), EPA9056 (Bromide, Fluoride, Chloride, and Sulfate by Ion Chromatography), and EPA353.1 (Nitrate/Nitrite). Problems were identified with the data package that result in the qualification of data.

1. ICP-MS metals:
   The following target analytes were detected (≥ DL) in one or more of the blanks (ICB, CCB, and MB). The associated sample results are qualified as noted below.

   Sample 113986-003 As was a detect < 5x the MB and will be qualified "J, B."

2. CVAA mercury:
   The following target analyte was detected (≥ DL) in one or more of the blanks (ICB, CCB, and MB). The associated sample results are qualified as noted below.

   Sample 113986-003 Hg was a detect < 5x the MB and will be qualified "J, B."

3. Total Cyanide:
   The MS percent recovery (%R) for total cyanide (72%) was < the lower QC acceptance limit (75%) but > 10%. The associated sample result was a non-detect (ND) and will be qualified "UJ, A2."

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

Holding Times/Preservation

The samples were analyzed within the prescribed holding times and properly preserved.

Calibration

The initial and continuing calibration data met QC acceptance criteria.

Blanks

No target analytes were detected in the blanks except as noted above in the summary section and as follows.

ICP-MS metals:
Potassium and sodium were detected (≥ DL) in one or more of the blanks (ICB, CCB, MB). However, the associated sample result were NDs or > 5x the blank concentrations, no data will be qualified as a result.

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

The LCS/LCSD met QC acceptance criteria except as follows.

All analyses:
It should be noted that no LCSD was provided with the SDG. No data will be qualified as a result. Laboratory precision was assessed using the replicate.

Matrix Spike (MS)

The MS met QC acceptance criteria except as noted above in the summary section and as follows.

ICP-MS metals:
It should be noted that the MS %R limits do not apply for target analytes with sample concentrations > 4x the spike concentrations (see Data Validation Worksheets). No data will be qualified as a result.

Nitrate/Nitrite:
It should be noted the MS was run on a sample of similar matrix from another SNL SDG and met QC acceptance criteria. No data will be qualified as a result.

Replicate

The replicate met QC acceptance criteria except as follows.

Nitrate/Nitrite:
It should be noted the replicate was run on a sample of similar matrix from another SNL SDG and met QC acceptance criteria. No data will be qualified as a result.

ICP Serial Dilution

The serial dilution met QC acceptance criteria.

ICP Interference Check Sample (ICS)

The ICS data met QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported. No dilutions were required except as follows.

ICP-MS metals:
Sample 113986-004 was diluted 5x for calcium and sodium to bring raw values within the linear range of the instrument.

IC:
The sample was diluted 25x for chloride and sulfate due to high concentration.

Other QC

No equipment blank (EB), field blank (FB) or field duplicate pair was submitted on the AR/COC(s).

No other specific issues were identified which affect data quality.

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

Memorandum

Date: July 23, 2004

To: File

From: Kevin Lambert

Subject: Organic Data Review and Validation – SNL
Site: DSS-GWM
AR/COC: 607545
SDG: 113986
Laboratory: GEL
Project/Task: 7222.01.09

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. Data are evaluated using SNL/NM SMO AOP 00-03 Rev 1.

Summary

All samples were prepared and analyzed with accepted procedures using method EPA8260B (VOC) and EPA8330 (High Explosives). All compounds were successfully analyzed. Problems were identified with the data package that result in the qualification of data.

1. VOC:
   Toluene was detected (≥ DL) in the method blank (MB) and trip blank (TB). The associated sample results were detects < 10x the blank concentration and < the RL will be qualified "U" at the RL (1.0 ug/L) with descriptive flag "B" and/or "B1."

   The LCS percent recovery (%R) for acetone (59%) and vinyl acetate (51%) were < the lower QC acceptance limit (71% and 67%. respectively) but > 10%. The associated sample results were non-detects (NDs) and will be qualified "UJ, P1."

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

Holding Times

All samples were extracted and analyzed within the prescribed holding times and properly preserved.

Calibration

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

VOC:

The calibration RF for trichloroethene (0.28) was < the specified minimum RF (0.30). The calibration relative standard deviation (RSD) and continuing calibration verification percent difference (CCV %D) for trichloroethene met QC acceptance criteria. The associated sample results were NDs and as a result based on professional judgment no data will be qualified. The CCV %D for five target analytes were > 20% but ≤ 40% or > 40% but ≤ 60% (see Data Validation Worksheets). The associated sample results were NDs and as a result based on professional judgment no data will be qualified.

Blanks

No target analytes were detected in the blanks except as noted above in the summary section.

Internal Standards (ISs)

Internal standards data met QC acceptance criteria.

Surrogates

The surrogate recoveries met QC acceptance criteria.

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

The LCS/LCSD met QC acceptance criteria except as noted above in the summary section and as follows.

All analyses:
It should be noted that no LCSD was provided with the SDG. Laboratory precision was assessed using the MS/MSD, which met QC acceptance criteria. No data will be qualified as a result.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS/MSD met QC acceptance criteria except as follows.

VOC:
It should be noted the MS/MSD was run on a sample of similar matrix from another SNL SDG and met QC acceptance criteria. No data will be qualified as a result.

Target Compound Identification/Confirmation

No target compound identification/confirmation analyses were required.

Detection Limits/Dilutions

All detection limits were properly reported. No dilutions were required except as follows.

High Explosives (HE):
All samples were diluted 2x according to laboratory procedure for this analysis.

Other QC

No TB, equipment blank (EB), field blank (FB), or field duplicate pair was submitted on the AR/COC(s) except as follows.

VOC:
A TB was submitted on an AR/COC(s).

No other specific issues were identified which affect data quality.

Data Validation Summary

Site/Project: DSS-GWM Project/Task #: 7222.01.09 # of Samples: 8 Matrix: aqueous

AR/COC #: 607545 Laboratory Sample IDs: 113986-001 to -008

Laboratory: GEL

SDG #: 113986

QC Element	Analysis									
	Organics				IC Inorganics				NO3/NO2 ~~RAD~~	Other
	VOC	SVOC	Pesticide/ PCB	HPLC (HE)	ICP/~~AES~~ MS	~~GFAA/ AA~~	CVAA (Hg)	CN		
1. Holding Times/Preservation	✓			✓	✓	✓	✓	✓	✓	
2. Calibrations	✓			✓	✓	✓	✓	✓	✓	
3. Method Blanks	U			✓	J	✓	J	✓	✓	
4. MS/MSD	✓			✓	✓	✓	✓	UJ	✓	
5. Laboratory Control Samples	UJ			✓	✓	✓	✓	✓	✓	
6. Replicates					✓	✓	✓	✓	✓	
7. Surrogates	✓			✓						
8. Internal Standards	✓									
9. TCL Compound Identification	✓									
10. ICP Interference Check Sample					✓					
11. ICP Serial Dilution					✓					
12. Carrier/Chemical Tracer Recoveries									NA	
13. Other QC Trip Blank	U			NA	NA	NA	NA	NA	✓	

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

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

Reviewed By: Kevin A Lambert Date: 07-23-04

Volatile Organics (SW 846 Method 8260)

Site/Project: DSS-GWM AR/COC #: 607545 # of Samples: 2 Matrix: aqueous

Laboratory: GEL SDG #: 113486 Laboratory Sample IDs: 113486-001

Methods: EPA8260B(VOC) Batch #s: 334417

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF (1)	Calib. RSD/ R^2 (1)	CCV %D (2)	Method Blks (3)	LCS (4)	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks	10x Blk (3)	
						>.05	<20% / 0.99	20%												
1	71-55-6	1,1,1-trichloroethane	✓	0.10	NA	✓	✓	✓	✓	✓			✓	✓	✓			✓		
2	79-34-5	1,1,2,2-tetrachloroethane	✓	0.30		✓	✓													
2	79-00-5	1,1,2-trichloroethane	✓	0.10		✓	✓													
1	75-34-3	1,1-dichloroethane	✓	0.10		✓	✓													
1	75-35-4	1,1-dichloroethene	✓	0.20		✓	✓													
1	107-06-2	1,2-dichloroethane	✓	0.10		✓	✓	-21												
1	156-59-2	cis-1,2-dichloroethene	✓	0.01		✓	✓	✓												
1	78-87-5	1,2-dichloropropane	✓	0.01		✓	✓	✓												
1	78-93-3	2-butanone (MEK) (10xblk)	✓	0.01		✓	✓	-32												
1	156-60-5	trans-1,2-dichloroethene	✓			✓	✓	✓												
2	591-78-6	2-hexanone (MBK)	✓	0.01		✓	✓	-24												
2	108-10-1	4-methyl-2-pentanone (MIBK)	✓	0.10		✓	✓	✓												
1	67-64-1	acetone(10xblk)	✓	0.01		✓	✓	41		59 (71)										
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	NA	✓	✓													
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	NA	✓	✓													
2	127-18-4	tetrachloroethene	✓	0.20		✓	✓													
2	108-88-3	toluene(10xblk)	✓	0.40		✓	✓		0.4425									0.7133	4.42, 7.13	
2	10061-02-6	trans-1,3-dichloropropene	✓	0.10		✓	✓		✓									✓		
1	79-01-6	trichloroethene	✓	0.30		0.28	✓													
1	75-01-4	vinyl chloride	✓	0.10		✓	✓													
2	1330-20-7	xylenes(total)	✓	0.30		✓	✓													
	108-05-4	vinyl acetate	✓			✓	✓	-49		51 (67)										

Comments: QC run on sample of similar matrix from another SNL SDG

Notes: Shaded rows are RCRA compounds.

Reviewed By: Kevin A Lambert Date: 07-23-04

Volatile Organics

Site/Project: _____ AR/COC #: 607545 Batch #s: _____

Laboratory: _____ SDG #: _____ # 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
	Met				Met				
	Criteria				Criteria				

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

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

Comments: ~~Acetone~~ KAG (3) Toluene was detected in MB & TB. Assoc results were detects < 10x the blank [<] and < the RL and will be qualified ND at the RL w/ descriptive flag "B" and/or "B1"

(1) The Calib RF for TCE was < the specified min RF; RSD & CCV %D met QC criteria. Assoc results were NDs and as a result based on professional judgment No data will be qualified

(2) The CCV %D for 5 target analytes were > 20 but ≤ 40 ~~and~~ KAG or > 40 but ≤ 60; Assoc results were NDs and as a result based on professional judgment No data will be qualified

(4) The LCS %R for acetone & vinyl acetate were < the lower QC limit; Assoc results were NDs and will be qualified "UJ, P"

High Explosives (SW 846 Method 8330)

Site/Project: DSS-GWM AR/COC #: 607545 Laboratory Sample IDs: 113986-007

Laboratory: GEL SDG #: 113986

Methods: EPA8330(HE)

# of Samples: 1 Matrix: aqueous Batch #s: 338144

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

Sample	SMC %REC	SMC RT	Sample	SMC %REC	SMC RT
Met Criteria					

Comments:

Confirmation

Sample	CAS #	RPD > 25%	Sample	CAS #	RPD > 25%
Not Required					
		Results	NDs		

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

Reviewed By: Kari A Lambert Date: 07-23-04

Inorganic Metals

Site/Project: DSS-GWM AR/COC #: 607545 Laboratory Sample IDs: 113986-003, -004

Laboratory: GEL SDG #: 113986

Methods: EPA6020 (ICP-MS metals), EPA7470A (CVAA Hg)

# of Samples: 2 Matrix: aqueous Batch #s: 338457, 337971

CAS #/ Analyte	QC Element																			
	TAL	ICV	CCV	ICB	CCB	Method Blanks (1)	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dilution	Field Dup. RPD	Equip. Blanks	~~Field~~ 5x Blanks (1)		
7429-90-5 Al																				
~~7440-39-3~~ Ba	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓					
7440-41-7 Be																				
~~7440-43-9~~ Cd	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓					
7440-70-2 Ca	✓	✓	✓	✓	✓	✓	✓			N/A			✓	✓	✓					
~~7440-47-3~~ Cr	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓					
7440-48-4 Co																				
7440-50-8 Cu																				
7439-89-6 Fe																				
7439-95-4 Mg	✓	✓	✓	✓	✓	✓	✓			N/A			✓	✓	✓					
7439-96-5 Mn																				
7440-02-0 Ni																				
7440-09-7 K	✓	✓	✓	✓	0.0159	0.0167 J	✓			N/A			✓	✓	✓			0.0795, 0.0835		
~~7440-22-4~~ Ag	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓					
7440-23-5 Na	✓	✓	✓	✓	✓ KM	~~0.050~~	✓			N/A			✓	✓	✓			0.25		
7440-62-2 V						0.050 J												~~0.25~~ KM		
7440-66-6 Zn																				
~~7439-92-1~~ Pb	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓					
~~7782-49-2~~ Se	✓	✓	✓	✓	✓		✓			✓			✓	✓	✓					
~~7440-38-2~~ As	✓	✓	✓	✓	✓	0.00155 J	✓			✓			✓	✓	✓			0.00775		
7440-36-0 Sb																				
7440-28-0 Tl																				
~~7439-97-6~~ Hg	✓	✓	✓	✓	✓	0.000071 J	✓			✓			✓	NA	NA			0.00036		
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: N/A - The MS % R limits don't apply; sample [c] > 4x spike [c]

(1) As & Hg were detected in MB; Assoc results were detects < 5x blk values and will be qualified "J, B"

(1) K & I were detected in blanks; Assoc results [illegible] detects > 5x blk value; no data will be qu[illegible]fied

Reviewed By: Kevin A Lambert Date: 07-23-04

General Chemistry

Site/Project: DSS-GWM AR/COC #: 607545 Laboratory Sample IDs: 113486-005, -006, -008

Laboratory: GEL SDG #: 113486

Methods: EPA9012A (TCN), EPA9056 (Br, Cl, Fl, SO4 by IC), EPA353.1 (NO3/NO2)

# of Samples: 3 Matrix: aqueous Batch #s: 338600/338599, 338070, 334876

CAS #	Analyte	TAL	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS (1)	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dilution	Field Dup. RPD	Equip. Blanks	Field Blanks	
5955-70-0	Total Cyanide	✓	✓	✓	✓	✓	✓	✓			72 (75)			✓						
24959-67-9	Bromide	✓	✓	✓	✓	✓	✓	✓			✓			✓						
16887-00-6	Chloride	✓	✓	✓	✓	✓	✓	✓			✓			✓						
16984-48-8	Fluoride	✓	✓	✓	✓	✓	✓	✓			✓			✓						
14808-79-8	Sulfate	✓	✓	✓	✓	✓	✓	✓			✓			✓						
N599	NO3/NO2	✓	✓	✓	✓	✓	✓	✓			✓			✓						

Comments: QC for NO3/NO2 was run on a sample of similar matrix from another SNL SDG

(1) The MS % R for TCN was < the lower QC limit but >10; Assoc result was ND and will be qualified "UJ, A2"

Reviewed By: Kevin A Lambert Date: 07-23-04

Contract Va ation Review (CVR)

Project Leader COLLINS | Project Name DSS – GWM | Case No. 7222_01.09

AR/COC No. 607545 | Analytical Lab GEL | SDG No. 113986

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

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

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

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X				
2.4	Matrix spike/matrix spike duplicate data provided (if requested)	X				
2.5	Detection limits provided; PQL and MDL (or IDL), MDA and L_c	X				
2.6	QC batch numbers provided	X				
2.7	Dilution factors provided and all dilution levels reported	X				
2.8	Data reported in appropriate units and using correct significant figures	X				
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	N/A				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met	X				
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X				

Contract Verification Review (Continued)

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1 Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2 Quantitation limit met for all samples	X		
3.3 Accuracy a) Laboratory control samples accuracy reported and met for all samples		X	ACETONE & VINYL ACETATE FAILED RECOVERY LIMITS FOR VOC LCS
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	CYANIDE FAIILED RECOVERY LIMITS FOR MATRIX SPIKE
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	TOLUENE DETECTED IN VOC METHOD BLANK ARSENIC, MERCURY, POTASSIUM & SODIUM DETECTED IN BLANK
b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	TOLUENE DETECTED IN TRIP 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	N/A		
3.8 Narrative included, correct, and complete	X		
3.9 Second column confirmation data provided for methods 8330 (high explosives) and 8082 (pesticides/PCBs)	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	N/A		

Contract Verification Review (Concluded)

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions

Were deficiencies unresolved? Yes (No)

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

If no, provide: nonconformance report or correction request number _____ and date correction request was submitted_____

Reviewed by: W Palencia Date: 7-8-04 Closed by:_____ Date:_____

ANNEX D
DSS SWMU 149
Exposure Pathway Discussion for Chemical and Radionuclide Contamination

ANNEX D
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)

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

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

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

Summary

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

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

Parameter	Industrial	Recreational	Residential
General Exposure Parameters			
Exposure Frequency (day/yr)	250[a,b]	8.7 (4 hr/wk for 52 wk/yr)[a,b]	350[a,b]
Exposure Duration (yr)	25[a,b,c]	30[a,b,c]	30[a,b,c]
Body Weight (kg)	70[a,b,c]	70 Adult[a,b,c] 15 Child[a,b,c]	70 Adult[a,b,c] 15 Child[a,b,c]
Averaging Time (days) for Carcinogenic Compounds (= 70 yr x 365 day/yr) for Noncarcinogenic Compounds (= ED x 365 day/yr)	25,550[a,b] 9,125 [a,b]	25,550[a,b] 10,950[a,b]	25,550 [a,b] 10,950 [a,b]
Soil Ingestion Pathway			
Ingestion Rate (mg/day)	100[a,b]	200 Child[a,b] 100 Adult[a,b]	200 Child [a,b] 100 Adult [a,b]
Inhalation Pathway			
Inhalation Rate (m^3/day)	20[a,b]	15 Child[a] 30 Adult[a]	10 Child[a] 20 Adult[a]
Volatilization Factor (m^3/kg)	Chemical Specific	Chemical Specific	Chemical Specific
Particulate Emission Factor (m^3/kg)	1.36E9[a]	1.36E9[a]	1.36E9[a]
Water Ingestion Pathway			
Ingestion Rate (liter/day)	2.4[a]	2.4[a]	2.4[a]
Dermal Pathway			
Skin Adherence Factor (mg/cm^2)	0.2[a]	0.2 Child[a] 0.07 Adult[a]	0.2 Child[a] 0.07 Adult[a]
Exposed Surface Area for Soil/Dust (cm^2/day)	3,300[a]	2,800 Child[a] 5,700 Adult[a]	2,800 Child[a] 5,700 Adult[a]
Skin Adsorption Factor	Chemical Specific	Chemical Specific	Chemical Specific

[a]Technical Background Document for Development of Soil Screening Levels (NMED 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).

References

ANL, see Argonne National Laboratory.

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

DOE, see U.S. Department of Energy.

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

EPA, see U.S. Environmental Protection Agency.

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

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

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

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

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

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

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Sandia National Laboratories/New Mexico
Environmental Restoration Project

REQUEST FOR SUPPLEMENTAL INFORMATION RESPONSE AND PROPOSAL FOR CORRECTIVE ACTION COMPLETE FOR DRAIN AND SEPTIC SYSTEMS SWMU 154, BUILDING 9960 SEPTIC SYSTEMS

June 2005

United States Department of Energy
Sandia Site Office

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ACRONYMS AND ABBREVIATIONS

AOC	Area(s) of Concern
AOP	Administrative Operating Procedure
bgs	below ground surface
CAC	Corrective Action Complete
COC	constituent of concern
COPEC	constituent of potential ecological concern
DCF	dose conversion factor
DOE	U.S. Department of Energy
DQO	data quality objective
DSS	Drain and Septic Systems
EB	equipment blank
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
GEL	General Engineering Laboratories, Inc.
HE	high explosive(s)
HEAST	Health Effects Assessment Summary Tables
HI	hazard index
HRMB	Hazardous and Radioactive Materials Bureau
IRIS	Integrated Risk Information System
KAFB	Kirtland Air Force Base
kg	kilogram(s)
LAS	Lockheed Analytical Services
MCL	maximum contaminant level
MDA	minimum detectable activity
MDL	method detection limit
mg	milligram(s)
mrem	millirem
NFA	no further action
NMED	New Mexico Environment Department
NPN	nitrate plus nitrite
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
QA	quality assurance
QC	quality control
QES	Quanterra Environmental Services
RAGS	Risk Assessment Guidance for Superfund
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RME	reasonable maximum exposure
RPSD	Radiation Protection Sample Diagnostics
RSI	Request for Supplemental Information
SAP	Sampling and Analysis Plan
SNL/NM	Sandia National Laboratories/New Mexico
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit

ACRONYMS AND ABBREVIATIONS (Concluded)

TB	trip blank
TEDE	total effective dose equivalent
TOP	Technical Operating Procedure
VOC	volatile organic compound
yr	year

1.0 INTRODUCTION

1.1 Investigation History

Solid Waste Management Unit (SWMU) 154 was originally one of 23 SWMUs designated as Operable Unit (OU) 1295 at Sandia National Laboratories/New Mexico (SNL/NM). This number was reduced to 22 when a petition for Administrative No Further Action (NFA) was approved by the New Mexico Environment Department (NMED) for SWMU 139 in 1995.

In August 1997, an NFA proposal was submitted to the NMED for SWMU 154 (SNL/NM August 1997). In January 1998, as part of a five-site sampling comparison study required by the NMED (Dinwiddie January 1998), additional samples were collected at Drain and Septic Systems (DSS) SWMU 154 from boreholes drilled through the center of, and beneath, the two HE seepage pits. The analytical results were submitted to the NMED, and were evaluated and summarized in an internal NMED report (McDonald November 1998). In June 1999, the NMED Hazardous and Radioactive Materials Bureau (HRMB) responded with a Request for Supplemental Information (RSI) on the NFA proposal (NMED June 1999) with the following specific requirements for SWMU 154:

- Provide complete analyte lists and method detection limits (MDLs) for volatile organic compound (VOC) and semivolatile organic compound (SVOC) analyses.
- Provide an estimate of the volume or mass of liquids disposed of in the septic systems.
- Provide details on the size (diameter) of the drain lines.
- Install a groundwater monitoring well.

The NMED also stated that no septic system NFA proposal would be approved without groundwater characterization unless the NMED gained confidence that such approvals would be protective of human health and the environment. The NMED stated that the only way to gain that confidence would be to conduct a sampling study of a sample population; the technical approach and decision-making details would be discussed later with SNL/NM.

SNL/NM addressed the general and site-specific comments in a response to the RSI in September 1999 (SNL/NM September 1999). The SNL/NM responses to the SWMU 154 site-specific comments were to:

- Provide analyte lists for VOC, SVOC, and high explosive (HE) compound analyses. Depending upon the laboratory, either MDLs or reporting limits were also included.
- Provide an estimate of the volume of effluent discharged to the septic and HE drain systems, based upon an assumed number of workers and volumes of water used for equipment cleaning.

- Provide drain line diameters as indicated on facility engineering drawings.

- Agree, as specified in the subsequently approved Sampling and Analysis Plan (SAP) (SNL/NM October 1999), to install a groundwater monitoring well at a location that is both downgradient and acceptable to the NMED sometime after the start of Fiscal Year 2003. Funding became available earlier than planned and the well was installed in August 2001.

On December 13, 1999, the NMED/HRMB confirmed in a response to SNL/NM (NMED December 1999) that, as discussed with SNL/NM technical staff, additional investigation would be conducted at SWMU 154.

Negotiations were conducted during the September 1999 RSI response submittal (SNL/NM September 1999) to define a technical and decision-making approach to complete environmental assessment and characterization work at the 22 SWMUs and 61 other DSS Area of Concern (AOC) sites at SNL/NM OU 1295. A SAP (SNL/NM October 1999) was written that documented investigations planned for completion at all OU 1295 SWMUs and AOC sites. The plan was approved by the NMED in January 2000 (Bearzi January 2000). Technical details for soil sampling procedures, soil sample locations, laboratory analytical methods, and passive soil-vapor sampling requirements at these sites were specified in a follow-up Field Implementation Plan (SNL/NM November 2001), which was also approved by the NMED (Moats February 2002).

As part of the groundwater monitoring well agreement for DSS sites, SNL/NM was required to collect groundwater samples for a minimum of eight quarters, and analyze the samples for VOCs, Resource Conservation and Recovery Act (RCRA) metals, and HE compounds (McDonald February 2002).

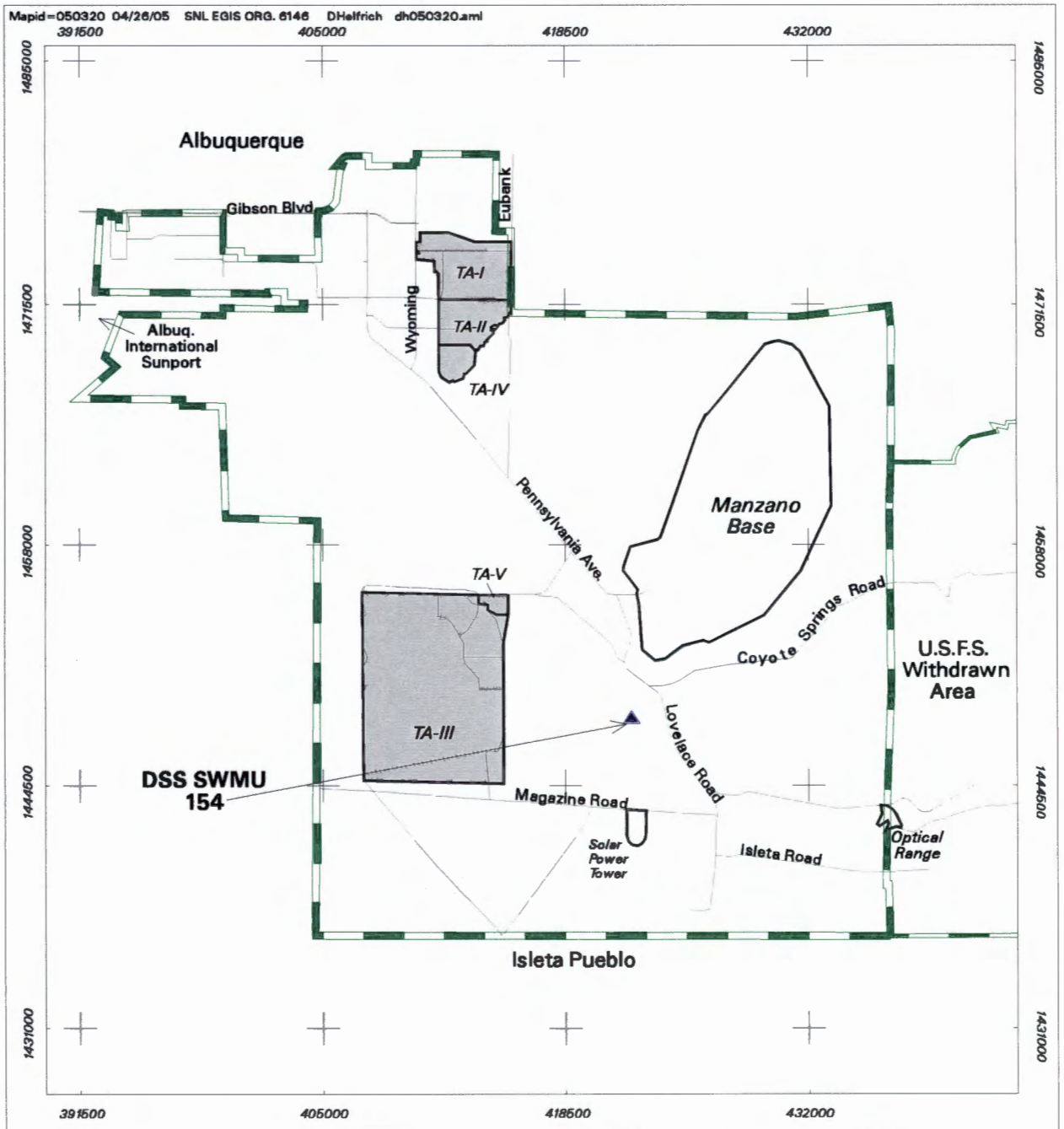
1.2 Remaining RSI Requirements

The remaining requirements to fulfill the June 1999 RSI for SWMU 154 that are addressed in this RSI response are to:

- Submit the analytical results for the eight quarters of groundwater monitoring, beginning in July 2002 and ending in June 2004, from monitoring well CTF-MW2 near SWMU 154.

- Submit a revised risk assessment using all available soil data.

An updated general location map (Figure 1.2-1), and an updated site location map showing the soil sampling locations at this site (Figure 1.2-2) are also provided. The location of groundwater monitoring well CTF-MW2 is shown in Figure 1.2-3. Because the site description and operational history were provided in the initial NFA proposal (SNL/NM August 1997), the information is only briefly summarized in the risk assessment report in Chapter 3.0.



Legend

- DSS SWMU 154
- Major Road
- KAFB Boundary
- USFS Withdrawn Area Boundary
- SNL Technical Area

Figure 1.2-1
Location Map of Drain and Septic Systems (DSS) SWMU 154, Bldg. 9960 Septic Systems 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 A361

Legend

- Soil Boring Location
- Road
- Septic Tank, Distribution Box, Seepage Pit
- Drainline, Sanitary Sewerline
- Building / Structure
- DSS SWMU 154

Figure 1.2-2
Site Map of Drain and Septic Systems (DSS) SWMU 154, Bldg. 9960 Septic System, Coyote Test Field

0 15 30
Scale in Feet

0 3.6 7.2
Scale in Meters

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Environmental Geographic Information System

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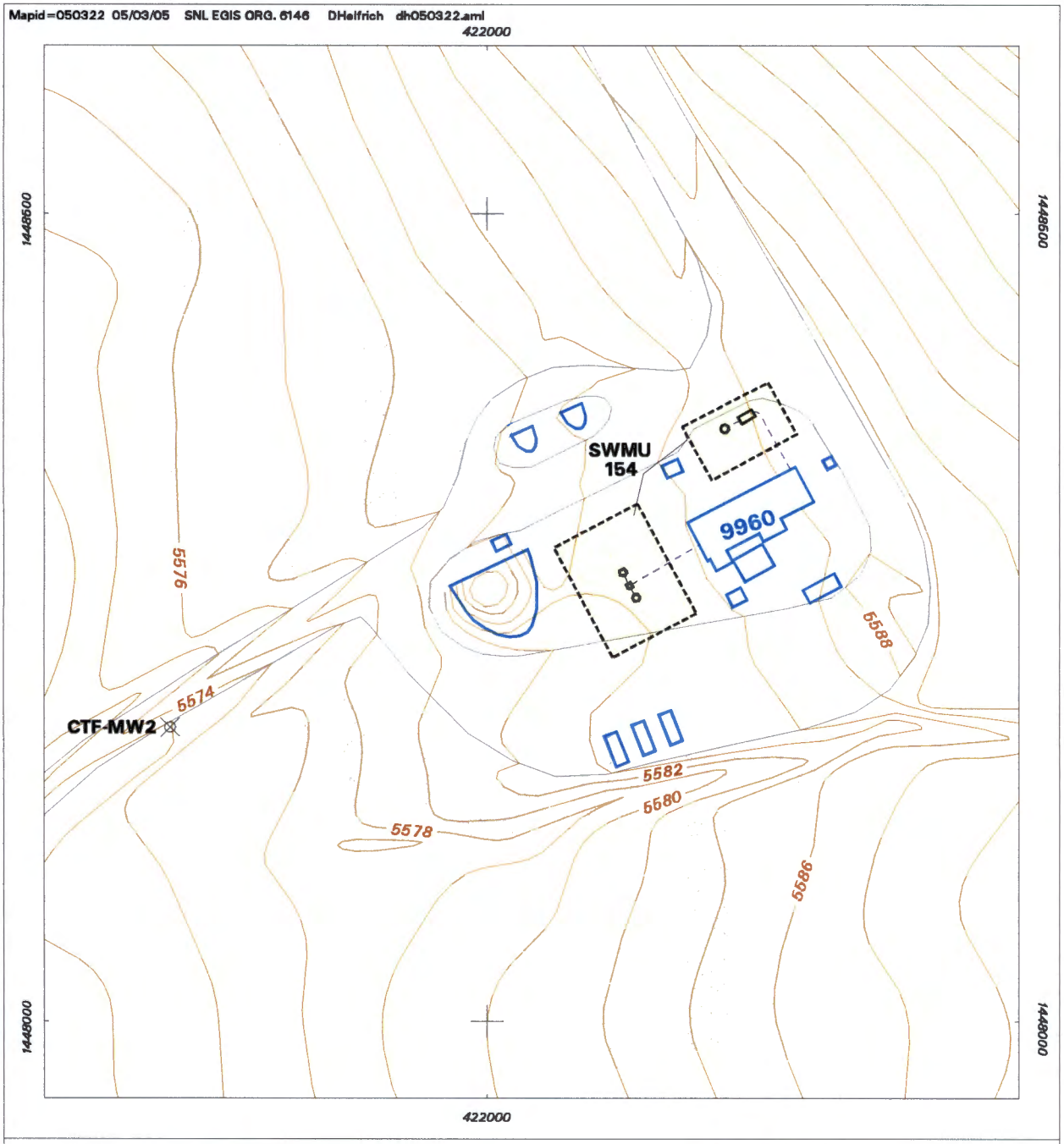

Legend

- Groundwater Monitoring Well
- Road
- 2-ft Contour
- Septic Tank, Seepage Pit, Distribution Box
- Sanitary Sewerline
- Building / Structure
- SWMU 154

Figure 1.2-3
Location Map of Groundwater Monitoring Well CTF-MW2 near Drain and Septic Systems (DSS) SWMU 154, Bldg. 9960 Septic Systems Coyote Test Field

0 50 100
Scale in Feet

0 12 24
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

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2.0 GROUNDWATER SAMPLING AT DSS SWMU 154

2.1 Groundwater Monitoring Well CTF-MW2 Installation and Sampling

Groundwater monitoring well CTF-MW2 was installed in August 2001. The monitoring well location is shown in Figure 1.2-3. Figure 2.1-1 shows the monitoring well borehole being drilled with the two HE seepage pits and an HE storage bunker in the foreground. Although the borehole for the well was drilled to 190 feet below ground surface (bgs), the borehole caved in up to 135 feet bgs when the drill string was removed. The monitoring well was subsequently installed with the screened interval from 110 to 130 feet bgs and a sump from 130 to 135 feet bgs. The borehole lithologic log and well construction diagram are provided in Annex A. The groundwater level rose significantly in the borehole after the well was installed, and depth to groundwater was 44 feet bgs on January 7, 2005.

Monitoring well CTF-MW2 was sampled on a quarterly basis from July 2002 to June 2004 to acquire the eight quarters of groundwater data required by the NMED as specified in the SAP (SNL/NM October 1999). Groundwater sample collection and handling were performed in accordance with SNL/NM Field Operating Procedure 94-48, "Sampling Groundwater Monitoring Wells" (SNL/NM July 1996a).

There are no current plans to continue sampling or to plug and abandon this well. At some point in the future the well may be incorporated into the SNL/NM Groundwater Protection Program or Long-Term Environmental Stewardship monitoring networks.

2.2 Groundwater Monitoring Well CTF-MW2 Sampling Results and Conclusions

Analytical results for the eight quarters of groundwater samples collected from monitoring well CTF-MW2 are presented and discussed in this section. As agreed upon by the NMED and SNL/NM, the eight quarters of groundwater samples were analyzed for VOCs, HE compounds, and RCRA metals (McDonald February 2002). Although not required by the NMED, additional samples were also collected and analyzed for nitrate plus nitrite (NPN) and anions and cations. These additional samples were collected to further characterize the general ion chemistry of groundwater in this well and for purge-water waste characterization purposes.

<u>VOCs</u>

VOC analytical results for the eight groundwater samples collected from monitoring well CTF-MW2 are summarized in Table 2.2-1. MDLs for the VOC groundwater analyses are presented in Table 2.2-2. Acetone was detected only in the first groundwater sample collected in July 2002 as well as in the August 2003 trip blank (TB) and equipment blank (EB) samples associated with this well. Bromoform was detected only in the December 2003 EB sample and dibromochloromethane was detected in the February and April 2003 EB samples. Methylene chloride and toluene were detected only in TB samples.

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Figure 2.1-1

Drilling the borehole for groundwater monitoring well CTF-MW2 northwest of DSS SWMU 154 with the two HE seepage pits and an HE storage bunker in the foreground. View to the northwest. August 17, 2001

Table 2.2-1
Summary of DSS SWMU 154, Building 9960 Septic Systems
Monitoring Well CTF-MW2 Groundwater Sampling, VOC Analytical Results
July 2002–June 2004
(Off-Site Laboratory)

Sample Attributes			VOCs (EPA Method 8260B[a]) (µg/L)				
Record Number[b]	Sample Number	Sample Date	Acetone	Bromoform	Dibromochloromethane	Methylene Chloride	Toluene
605577	049493-001	07-17-02	**7.72**	ND (0.5)	ND (0.29)	ND (5.0)	ND (0.39)
605761	060021-001	10-17-02	ND (4.5)	ND (0.5)	ND (0.29)	ND (3.3)	ND (0.39)
606084	061025-001	02-07-03	ND (4.5)	ND (0.5)	ND (0.29)	ND (3.3)	ND (0.39)
606084	061025-001 Duplicate	02-07-03	ND (4.5)	ND (0.5)	ND (0.29)	ND (3.3)	ND (0.39)
606258	061680-001	04-30-03	ND (4.5)	ND (0.5)	ND (0.29)	ND (3.3)	ND (0.39)
606693	063014-001	08-25-03	ND (8.69)	ND (0.5)	ND (0.29)	ND (3.3)	ND (0.39)
606912	063524-001	12-09-03	ND (4.5)	ND (0.5)	ND (0.29)	ND (3.3)	ND (0.39)
607337	064409-001	03-25-04	ND (4.5)	ND (0.5)	ND (0.29)	ND (3.3)	ND (0.39)
607544	065027-001	06-02-04	ND (4.5)	ND (0.5)	ND (0.29)	ND (3.3)	ND (0.39)
607544	065028-001 Duplicate	06-02-04	ND (4.5)	ND (0.5)	ND (0.29)	ND (3.3)	ND (0.39)
Quality Assurance/Quality Control Samples—Trip Blank Samples (µg/L)							
605577	049500-001	07-17-02	ND (4.5)	ND (0.5)	ND (0.29)	**4.03 J (5.0)**	**0.482 J (1.0)**
605761	060024-001	10-17-02	ND (4.5)	ND (0.5)	ND (0.29)	ND (3.3)	ND (0.39)
606084	061030-001	02-07-03	ND (4.5)	ND (0.5)	ND (0.29)	ND (3.3)	ND (0.39)
606258	061686-001	04-30-03	ND (4.5)	ND (0.5)	ND (0.29)	ND (3.3)	ND (0.39)
606693	063015-001	08-25-03	**8.24**	ND (0.5)	ND (0.29)	ND (3.3)	ND (0.39)
606912	063526-001	12-09-03	ND (4.5)	ND (0.5)	ND (0.29)	ND (3.3)	ND (0.39)
607337	064410-001	03-25-04	ND (4.5)	ND (0.5)	ND (0.29)	ND (3.3)	ND (0.39)
607544	065029-001	06-02-04	ND (4.5)	ND (0.5)	ND (0.29)	ND (3.3)	**0.438 J (1.0)**
Quality Assurance/Quality Control Samples—Equipment Blank Samples (µg/L)							
605763	060023-001	10-17-02	ND (4.5)	ND (0.5)	ND (0.29)	ND (3.3)	ND (0.39)
606086	061027-001	02-06-03	ND (4.5)	ND (0.5)	**0.291 J (1.0)**	ND (3.3)	ND (0.39)
606260	061682-001	04-29-03	ND (4.5)	ND (0.5)	**0.528 J (1.0)**	ND (3.3)	ND (0.39)
606695	063018-001	08-22-03	**7.45**	ND (0.5)	ND (0.29)	ND (3.3)	ND (0.39)
606915	063531-001	12-08-03	ND (4.5)	**2.03**	ND (0.29)	ND (3.3)	ND (0.39)
Regulatory Limits							
Maximum Contaminant Level[c]			NE	NE	NE	5	1,000
Maximum Allowable Concentration[d]			NE	NE	NE	100	750

Refer to footnotes at end of table.

Table 2.2-1 (Concluded)
Summary of DSS SWMU 154, Building 9960 Septic Systems
Monitoring Well CTF-MW2 Groundwater Sampling, VOC Analytical Results
July 2002–June 2004
(Off-Site Laboratory)

Note: Values in **bold** represent detected analytes.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
[c]Maximum contaminant level established by the EPA National Primary Drinking Water Regulations (40 CFR 141.11 [b]).
[d]Maximum allowable concentration in groundwater for the contaminants specified in 20 NMAC 6.2, Sec. 3103.

CFR	= Code of Federal Regulations.
DSS	= Drain and Septic Systems.
EPA	= U.S. Environmental Protection Agency.
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/L	= Microgram(s) per liter.
ND ( )	= Analyte not detected above the MDL, shown in parentheses.
NE	= Not established.
NMAC	= New Mexico Administrative Code.
SWMU	= Solid Waste Management Unit.
VOC	= Volatile organic compound.

Table 2.2-2
Summary of DSS SWMU 154, Building 9960 Septic Systems
Monitoring Well CTF-MW2 Groundwater Sampling, VOC Analytical MDLs
July 2002–June 2004
(Off-Site Laboratory)

Analyte	EPA Method 8260B[a] Detection Limit (µg/L)
Acetone	4.5
Benzene	0.33
Bromodichloromethane	0.38
Bromoform	0.5
Bromomethane	0.5
2-Butanone	2.31
Carbon disulfide	1.91
Carbon tetrachloride	0.29
Chlorobenzene	0.32
Chloroethane	0.5
Chloroform	0.36
Chloromethane	0.5
Dibromochloromethane	0.29
1,1-Dichloroethane	0.41
1,2-Dichloroethane	0.29
1,1-Dichloroethene	0.41
cis-1,2-Dichloroethene	0.3
trans-1,2-Dichloroethene	0.37
1,2-Dichloropropane	0.25
cis-1,3-Dichloropropene	0.3
trans-1,3-Dichloropropene	0.29
Ethylbenzene	0.21
2-Hexanone	1.45
Methylene chloride	3.3
4-Methyl-2-pentanone	1.78
Styrene	0.25
1,1,2,2-Tetrachloroethane	0.49
Tetrachloroethene	0.33
Toluene	0.39
1,1,1-Trichloroethane	0.34
1,1,2-Trichloroethane	0.44
Trichloroethene	0.36
Vinyl acetate	1.32
Vinyl chloride	0.55
Xylene	0.25–0.83

[a]EPA November 1986.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
MDL = Method detection limit.
µg/L = Microgram(s) per liter.
SWMU = Solid Waste Management Unit.
VOC = Volatile organic compound.

HE Compounds

HE compound analytical results for the eight groundwater samples collected from monitoring well CTF-MW2 are summarized in Table 2.2-3. MDLs for the HE compound groundwater analyses are presented in Table 2.2-4. The compound 1,3,5-trinitrobenzene was detected in the February 2003 groundwater sample. No other HE compounds were detected in the groundwater samples associated with this monitoring well. The result for RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine) was rejected during data validation for the October 2002 groundwater sample because the second column confirmation relative percent difference exceeded acceptance criteria. RDX was not detected during a reanalysis of this sample. A trace of tetryl (methyl-2,4,6-trinitrophenylnitramine) and 4-amino-2,6-dinitrotoluene were detected in separate EB samples associated with sampling of this well.

RCRA Metals

RCRA metals analytical results for the eight groundwater samples collected from monitoring well CTF-MW2 are summarized in Table 2.2-5. MDLs for the metals in groundwater analyses are presented in Table 2.2-6. The July 2002 sample was reanalyzed due to sample preservation problems. Arsenic exceeded both the NMED-approved background concentration (Dinwiddie September 1997) and the U.S. Environmental Protection Agency (EPA) maximum contaminant level (MCL) (Title 40 Code of Federal Regulations 141.11) in all the groundwater samples collected and analyzed. However, arsenic did not exceed the maximum allowable concentration in groundwater as specified in 20 New Mexico Administrative Code (NMAC) 6.2, Sec. 3103. Shortly after the first two rounds of sampling at monitoring well CTF-MW2, SNL/NM notified the U.S. Department of Energy (DOE) Office of Kirtland Site Operations of the arsenic concentration exceedences over background and promulgated limits and explained that these concentrations were likely due to natural origin and not caused by a release at DSS SWMU 154 (Lauffer September 2002).

No arsenic or arsenic-containing products were identified or associated with the types of activities that may have occurred at DSS SWMU 154 (SNL/NM August 1997). Arsenic concentrations in site soil samples were less than the NMED-approved background concentration of 4.4 milligrams (mg)/kilogram (kg) (Dinwiddie September 1997) in 21 of the 23 samples, and slightly exceeded background at 4.6 and 4.8 mg/kg in only 2 of the 23 samples collected.

Arsenic also occurs naturally in highly mineralized groundwater of deep origin that mixes with shallower groundwater along major Rio Grande valley rift-bounding faults. The relatively high arsenic concentrations are generally accompanied by highly elevated concentrations of chloride and sodium, and concentrations of these two ions are quite elevated in CTF-MW2 water relative to water in other groundwater monitoring wells in the area. The source of arsenic detected in well CTF-MW2, which was installed within the Tijeras Fault zone, is likely a mixture of shallower and deep groundwater that is upwelling along the high angle faults of the Tijeras Fault zone. Therefore, the anomalous arsenic concentrations detected in well CTF-MW2 groundwater are presumed to be of natural origin (Lauffer September 2002).

All other metal concentrations were below the NMED-approved background or other promulgated regulatory limits.

Table 2.2-3
Summary of DSS SWMU 154, Building 9960 Septic Systems
Monitoring Well CTF-MW2 Groundwater Sampling, HE Compound Analytical Results
July 2002–June 2004
(Off-Site Laboratory)

Sample Attributes			HE (EPA Method 8330B[a]) (µg/L)			
Record Number[b]	Sample Number	Sample Date	4-Amino-2,6-dinitrotoluene	1,3,5-Trinitrobenzene	RDX	Tetryl
605577	049493-015	07-17-02	ND (0.0409 J)	ND (0.0249 J)	ND (0.053)	ND (0.032 J)
605761	060021-015	10-17-02	ND (0.0409)	ND (0.0249)	R	ND (0.032 J)
605761	060021-R15 Reanalysis	10-17-02	ND (0.0409 JH)	ND (0.0249 JH)	ND (0.053 JH)	ND (0.104 JH)
606084	061024-015	02-07-03	ND (0.0409)	**0.0762 J**	ND (0.053)	ND (0.032)
606084	061025-015 Duplicate	02-07-03	ND (0.0409)	ND (0.0249)	ND (0.053)	ND (0.032)
606258	061680-015	04-30-03	ND (0.0409)	ND (0.0249 J)	ND (0.053)	ND (0.032)
606693	063014-015	08-25-03	ND (0.0409)	ND (0.0249)	ND (0.053)	ND (0.032)
606912	063525-015	12-09-03	ND (0.0409)	ND (0.0249)	ND (0.053)	ND (0.032)
607337	064409-020	03-25-04	ND (0.162)	ND (0.325)	ND (0.162)	ND (0.487)
607544	065027-020	06-02-04	ND (0.162)	ND (0.325)	ND (0.162)	ND (0.487)
607544	065028-020 Duplicate	06-02-04	ND (0.162)	ND (0.325)	ND (0.162)	ND (0.487)
Quality Assurance/Quality Control Samples—Equipment Blank Samples (µg/L)						
605763	060023-015	10-17-02	ND (0.0409)	ND (0.0249)	ND (0.053)	ND (0.032 J)
605763	060023-R15 Reanalysis	10-17-02	ND (0.0409)	ND (0.0249)	ND (0.053)	**0.1 J**
606086	061027-015	02-06-03	ND (0.0409)	ND (0.0249)	ND (0.053)	ND (0.032)
606260	061682-015	04-29-03	ND (0.0409)	ND (0.0249)	ND (0.053)	ND (0.032)
606695	063018-015	08-22-03	**0.185**	ND (0.0249)	ND (0.053)	ND (0.032)
606915	063531-015	12-08-03	ND (0.0409)	ND (0.0249)	ND (0.053)	ND (0.032)

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

DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
H = The holding time was exceeded for the associated sample analysis.
HE = High explosive(s).
J = Analytical result was qualified as an estimated value.
µg/L = Microgram(s) per liter.
ND ( ) = Not detected above the reporting limit, shown in parentheses.
R = Value rejected during data validation.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
SWMU = Solid Waste Management Unit.
Tetryl = Methyl-2,4,6-trinitrophenylnitramine.

Table 2.2-4
Summary of DSS SWMU 154, Building 9960 Septic Systems
Monitoring Well CTF-MW2 Groundwater Sampling, HE Compound Analytical MDLs
July 2002–June 2004
(Off-Site Laboratory)

Analyte	EPA Method 8330B[a] Detection Limit (µg/L)
2-Amino-4,6-dinitrotoluene	0.0779–0.325
4-Amino-2,6-dinitrotoluene	0.0409–0.162
1,3-Dinitrobenzene	0.033–0.325
2,4-Dinitrotoluene	0.0349–0.325
2,6-Dinitrotoluene	0.0501–0.182
HMX	0.0779–0.162
Nitrobenzene	0.0131–0.162
2-Nitrotoluene	0.064–0.162
3-Nitrotoluene	0.064–0.325
4-Nitrotoluene	0.064–0.325
RDX	0.053–0.162
Tetryl	0.032–0.487
1,3,5-Trinitrobenzene	0.0249–0.325
2,4,6-Trinitrotoluene	0.0779–0.162

[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/L = Microgram(s) per liter.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
SWMU = Solid Waste Management Unit.
Tetryl = Methyl-2,4,6-trinitrophenylnitramine.

Table 2.2-5
Summary of DSS SWMU 154, Building 9960 Septic Systems
Monitoring Well CTF-MW2 Groundwater Sampling, RCRA Metals Analytical Results
July 2002–June 2004
(Off-Site Laboratory)

Sample Attributes			Metals (EPA Methods 3005/7470[a]) (mg/L)							
Record Number[b]	Sample Number	Sample Date	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
605577	049493-008	07-17-02	**0.0705 J**	0.0788 J	0.000044 J	ND (0.00038 J)	0.000549 J	ND (0.000047 J)	0.00122 J	ND (0.00004 J)
605577	049493-R08 Reanalysis	07-17-02	**0.0643**	0.0741	ND (0.00004 J)	ND (0.00038 J)	0.000887	NA	0.0011 J (0.005)	ND (0.00004 J)
605761	060021-008	10-17-02	**0.0708 J**	0.0773 J	0.000152 J	ND (0.00038 J)	0.000241 J	0.000058 J	0.00103 J	ND (0.00004 J)
606084	061024-008	02-07-03	**0.0774 J**	0.0832 J	0.000129 J	0.00159 J	0.000228 J	ND (0.000047 J)	0.00252 J	ND (0.00004 J)
606084	061025-008 Duplicate	02-07-03	**0.0774 J**	0.0832 J	0.000127 J	0.00142 J	0.000224 J	ND (0.000047 J)	0.00271 J	ND (0.00004 J)
606258	061680-008	04-30-03	**0.0772**	0.0826	0.000101 J	0.00091 J	0.000259 J	ND (0.000047)	0.000691 J	ND (0.00004)
606693	063014-008	08-25-03	**0.0532**	0.0647	ND (0.00004)	0.000667 J	0.00007 J (0.002)	ND (0.000047)	0.00243 J	ND (0.00004)
606912	063525-008	12-09-03	**0.0738**	0.0922	0.00008 J	ND (0.00038)	0.000124 J	ND (0.000047)	ND (0.00064 J)	ND (0.00004)
607337	064409-010	03-25-04	**0.0626 J**	0.0836 J	ND (0.00004 J)	0.000628 J	0.000113 J	ND (0.000047 J)	ND (0.00064 J)	ND (0.00004 J)
607544	065027-010	06-02-04	**0.0674**	0.0882	0.000166 J (0.005)	0.000856 J (0.1)	0.000318 J (0.002)	ND (0.000047)	ND (0.00064 J)	ND (0.00004)
607544	065028-010 Duplicate	06-02-04	**0.0657**	0.0894	0.000189 J (0.001)	0.00043 J (0.003)	0.000306 J (0.002)	ND (0.000047)	ND (0.00064 J)	ND (0.00004)
Quality Assurance/Quality Control Samples—Equipment Blanks (mg/L)										
605763	060023-008	10-17-02	0.00147 J	0.000248 J	0.000135 J	ND (0.00038 J)	ND (0.00005 J)	ND (0.000047)	ND (0.00064 J)	ND (0.00004 J)
606086	061027-008	02-06-03	0.00194 J (0.003)	ND (0.00019)	ND (0.00004)	0.00104 J	ND (0.00005)	ND (0.000047)	0.000952 J	ND (0.00004)
606260	061682-008	04-29-03	ND (0.001)	ND (0.00019)	0.000127 J	0.00068 J (0.003)	0.000187 J (0.002)	ND (0.000047)	ND (0.00064)	ND (0.00004)
606695	063018-008	08-22-03	0.0017 J (0.003)	0.00019 J (0.002)	ND (0.00004)	ND (0.00038)	ND (0.00005)	ND (0.000047)	0.00115 J	ND (0.00004)
606915	063531-008	12-08-03	0.00154 J	0.00311	0.00112	0.00108 J (0.003)	0.000158 J (0.002)	ND (0.000047)	ND (0.00064 J)	ND (0.00004)
Regulatory Limits										
Maximum Contaminant Level[c]			0.010	2.0	0.005	0.1	NE	0.002	0.05	NE
Maximum Allowable Concentration[d]			0.1	1.0	0.01	0.05	0.05	0.002	0.05	0.05
Background Concentration[e]			0.014	0.12	0.00047	0.043	0.01	0.002	0.005	< 0.010

Note: Values in **bold** exceed background and maximum contaminant level concentrations.

[a]EPA November 1986.

[b]Analysis request/chain-of-custody record.

[c]Maximum contaminant level established by the EPA National Primary Drinking Water Regulations (40 CFR 141.11 [b]).

Table 2.2-5 (Concluded)
Summary of DSS SWMU 154, Building 9960 Septic Systems
Monitoring Well CTF-MW2 Groundwater Sampling, RCRA Metals Analytical Results
July 2002–June 2004
(Off-Site Laboratory)

[d]Maximum allowable concentration in groundwater for the contaminants specified in 20 NMAC 6.2, Sec 3103.
[e]Dinwiddie September 1997.

CFR	= Code of Federal Regulations.
DSS	= Drain and Septic Systems.
EPA	= U.S. Environmental Protection Agency.
J	= Analytical result was qualified as an estimated value.
J ( )	= The reported value is greater than or equal to the MDL, but is less than the practical quantitation limit, shown in parentheses.
MDL	= Method detection limit.
mg/L	= Milligram(s) per liter.
NA	= Not analyzed.
ND ( )	= Not detected above the MDL, shown parentheses.
NE	= Not established.
NMAC	= New Mexico Administrative Code.
RCRA	= Resource Conservation and Recovery Act.
SWMU	= Solid Waste Management Unit.

Table 2.2-6
Summary of DSS SWMU 154, Building 9960 Septic Systems
Monitoring Well CTF-MW2 Groundwater Sampling, RCRA Metals Analytical MDLs
July 2002–June 2004
(Off-Site Laboratory)

Analyte	EPA Methods 3005/7470[a] Detection Limits (mg/L)
Arsenic	0.001
Barium	0.00019
Cadmium	0.00004
Chromium	0.00038
Lead	0.00005
Mercury	0.000047
Selenium	0.00064
Silver	0.00004

[a]EPA November 1986.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
MDL = Method detection limit.
mg/L = Milligram(s) per liter.
RCRA = Resource Conservation and Recovery Act.
SWMU = Solid Waste Management Unit.

NPN, Anions and Cations

Analytical results for the NPN and anions and cations analyses for the eight sets of groundwater samples collected from monitoring well CTF-MW2 are summarized in Table 2.2-7. MDLs for the NPN and anions and cations analyses are presented in Table 2.2-8. NPN was not detected at concentrations above any promulgated regulatory limit. No regulatory or background limits have been established for bromide, calcium, chloride, magnesium, potassium, sodium, or sulfate in groundwater. With the exception of chloride and bromide in the August 2003 sample, the concentrations measured for these individual anions and cations were similar and generally consistent for the eight quarters of sampling.

Fluoride concentrations slightly exceeded the maximum allowable concentration (20 NMAC 6.2, Section 3101) in all eight primary and two duplicate samples collected, but were in all cases less than the MCL of 4.0 mg/liter. The fluoride detected in well CTF-MW2 is most likely naturally occurring. None of the known activities conducted at Building 9960 would have produced a discharge of fluoride contamination to the environment. Additionally, abandoned fluorite mines occur in the foothills of the Manzanita Mountains approximately 5 miles east of DSS SWMU 154. These mines were developed on deposits of fluorite (CaF_2) that were emplaced by fluoride-bearing groundwater circulating along deep seated, high-angle faults bounding the east side of the Rio Grande Rift.

Table 2.2-7
Summary of DSS SWMU 154, Building 9960 Septic Systems
Monitoring Well CTF-MW2 Groundwater Sampling, Nitrate plus Nitrite
Anions and Cations Analytical Results
July 2002–June 2004
(Off-Site Laboratory)

Sample Attributes			(EPA Method 353.1/3005/9012/9056)[a] (mg/L)								
Record Number[b]	Sample Number	Sample Date	Nitrate plus Nitrite	Bromide	Chloride	Fluoride	Sulfate	Calcium	Magnesium	Potassium	Sodium
605577	049493	07-17-02	0.03 J (0.05)	1.63	427	**2.16**	141	435 J	98.1 J	56.4 J	440 J
605761	060021	10-17-02	0.01 J	2.16	480	**2.31**	150	413 J	86.7 J	49.8 J	477 J
606084	061024	02-07-03	0.01 J	2.07	476	**2.02**	153	414 J	77.9 J	45.8 J	523 J
606084	061025 Duplicate	02-07-03	0.01 J	2.08	475	**1.94**	151	404 J	76.2 J	43.9 J	526 J
606258	061680	04-30-03	ND (0.01)	1.84	463	**2.36**	145	447	77.6	51.7	522
606693	063014	08-25-03	ND (0.01)	4.91	960	**2.04**	157	415	87.0 J	49.8	509
606912	063525	12-09-03	ND (0.01)	2.00	462	**2.28**	164	393	86.1 J	48.6	486
607337	064409	03-25-04	ND (0.10)	ND (4.89)	516	**1.90**	168	404 J	91.3 J	47.9 J	494 J
607544	065027	06-02-04	ND (0.01)	ND (4.89)	455	**1.77**	131	381	84.9	52.4	489
607544	065028 Duplicate	06-02-04	ND (0.01)	ND (4.89)	456	**1.79**	132	381	81.0	50.2	500
Regulatory Limits											
Maximum Contaminant Level[c]			10	NE	NE	4.0	NE	NE	NE	NE	NE
Maximum Allowable Concentration[d]			10	NE	NE	1.6	NE	NE	NE	NE	NE
Background Concentration[e]			4.0	NE	NE	NE	NE	NE	NE	NE	NE

Note: Values in **bold** exceed the maximum allowable concentration.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
[c]Maximum contaminant level established by the EPA National Primary Drinking Water Regulations (40 CFR 141.11 [b]).
[d]Maximum allowable concentration in groundwater for the contaminants specified in 20 NMAC 6.2, Sec. 3103.
[e]Dinwiddie September 1997.

CFR = Code of Federal Regulations.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
J = Analytical result was qualified as an estimated value.
J ( ) = The reported value is greater than or equal to the MDL but is less than the practical quantitation limit, shown in parentheses.
mg/L = Milligram(s) per liter.
ND ( ) = Not detected above the MDL, shown in parentheses.
NE = Not established.
NMAC = New Mexico Administrative Code.
SWMU = Solid Waste Management Unit.

Table 2.2-8
Summary of DSS SWMU 154, Building 9960 Septic Systems
Monitoring Well CTF-MW2 Groundwater Sampling, Nitrate plus Nitrite,
Anions and Cations Analytical MDLs
July 2002–June 2004
(Off-Site Laboratory)

Analyte	EPA Methods 353.1/3005/9012/9056[a] Detection Limits (mg/L)
Bromide	0.0978–0.489
Calcium	0.04
Chloride	0.161–0.322
Fluoride	0.0553
Magnesium	0.00633–0.0317
Nitrate plus Nitrite	0.05–0.1
Potassium	0.0151
Sodium	0.00968
Sulfate	0.965–1.93

[a]EPA November 1986.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
MDL = Method detection limit.
mg/L = Milligram(s) per liter.
SWMU = Solid Waste Management Unit.

2.3 Groundwater Sampling Quality Assurance/Quality Control Samples and Data Validation Results

The laboratory data for the eight sets of groundwater sample analyses were reviewed and verified/validated according to "Verification and Validation of Chemical and Radiochemical Data," Technical Operating Procedure (TOP) 94-03, Rev. 0 (SNL/NM July 1994), SNL/NM Environmental Restoration (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 B contains the data validation reports for the eight groundwater samples collected at this site.

Throughout the DSS monitoring well sampling project, quality assurance (QA)/quality control (QC) samples were collected. These included duplicate, EB, and TB samples. During the DSS well sampling project, aqueous EB samples were randomly collected to prove the efficacy of the equipment decontamination process. As part of the eight CTF-MW2 monitoring well sampling events, five EB samples were collected for VOCs, HE compounds, and metals. Low concentrations of three VOCs were found in the EB samples. One detection each of acetone and bromoform and two detections of dibromochloromethane were found in four of the five VOC EB samples (Table 2.2-1). One detection of 4-amino-2,6-dinitrotoluene and tetryl were found in two of the five HE compound EB samples (Table 2.2-3). Four detections of arsenic, three detections of barium, cadmium, and chromium, and two detections of lead and selenium were found in the five metals EB samples (Table 2.2-5).

Aqueous TB samples, for VOC analysis only, were included in every sample cooler containing VOC groundwater samples. Low concentrations of three VOCs were found in the TB samples. One detection each of acetone and methylene chloride and two detections of toluene were found in three of the eight TB samples (Table 2.2-1).

Two duplicate groundwater samples were collected during the eight rounds of sampling from monitoring well CTF-MW2 and analyzed for VOCs, HE compounds, RCRA metals, NPN, and anions and cations. Results were essentially similar for all analytes in the primary and duplicate samples with the following exceptions:

- 1,3,5-Trinitrobenzene was detected in the primary HE compound sample from February 7, 2003, and not in the duplicate (Table 2.2-3).
- The chromium concentration in the primary sample from June 4, 2002, was twice that measured in the duplicate (Table 2.2-5).

3.0 RISK ASSESSMENT REPORT FOR DSS SWMU 154

3.1 Site Description and History

DSS SWMU 154, the Building 9960 Septic Systems at SNL/NM, is located in the Coyote Test Field on federally owned land controlled by Kirtland Air Force Base (KAFB) and permitted to the DOE. SWMU 154 was composed of two adjacent but separate systems, shown in Figure 1.2-2. The east septic system consisted of a 900-gallon septic tank that discharged to a 5-foot-diameter, 10-foot-deep seepage pit. The west HE drain system consisted of two, 5-foot-diameter, approximately 23-foot-deep seepage pits. Available information indicates that Building 9960 was constructed in 1965 (SNL/NM March 2003), and it is assumed that the septic and HE drain systems were also constructed at that time. By 1993, the septic system discharges were routed to the City of Albuquerque sanitary sewer system (Jones July 1993). The old septic system line was disconnected and capped, and the system was abandoned in place concurrent with this change (Romero September 2003). Waste in the septic tank was removed and managed according to SNL/NM policy. The empty and decontaminated septic tank was inspected by the NMED on January 26, 1996, and a closure form was signed by the NMED (SNL/NM January 1996). The septic tank and associated seepage pit were then backfilled with clean, native soil from the area in early 1996. The HE drain system seepage pits are inactive, have not been backfilled, and rinse water from HE machining operations at the facility is currently directed to large, polypropylene tanks that are routinely tested and drained.

Environmental concern about DSS SWMU 154 is based upon the potential for the release of constituents of concern (COCs) in effluent discharged to the environment via the septic and HE drain system seepage pits 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 slopes to the west. The closest drainage lies immediately south of the site and terminates in the playa just west of KAFB. No springs or perennial surface-water bodies are located within 3.1 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 potentially rapid because the surface slopes to the west. Infiltration of precipitation is almost nonexistent as virtually all of the moisture subsequently undergoes evapotranspiration. The estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL/NM March 1996). Most of the area immediately surrounding DSS SWMU 154 is unpaved with some native vegetation, and no storm sewers are used to direct surface water away from the site.

DSS SWMU 154 lies at an average elevation of approximately 5,586 feet above mean sea level. The groundwater beneath the site occurs in confined conditions in highly fractured granite bedrock. As measured in the nearest groundwater monitoring well, CTF-MW2, approximately 340 feet to the southwest of Building 9960, groundwater is approximately 44 feet bgs. Groundwater flow is thought to be to the west in this area (SNL/NM April 2004). The nearest production wells are KAFB-4, and KAFB-11, approximately 4.7 and 4.3 miles to the northwest and north, respectively.

3.2 Data Quality Objectives

Soil sampling was conducted in October 1994, October 1995, June and July 1996, March 1997, and January 1998 in accordance with the rationale and procedures described in the approved "Septic Tanks and Drainfields ADS [Activity Data Sheet]-1295 RCRA Facility Investigation [RFI] Work Plan" (SNL/NM March 1993), the SAP for the RFI of the OU 1295 septic tanks and drainfields (IT March 1994), and subsequent site-specific addenda to the Work Plan and SAP based upon discussions with the NMED/HRMB.

Groundwater sampling was conducted at DSS SWMU 154 on a quarterly basis from July 2002 to June 2004. Groundwater is not evaluated in this risk assessment because, with the exception of arsenic and fluoride, concentrations of detected COCs were below promulgated regulatory limits. Although fluoride in groundwater slightly exceeds the New Mexico maximum allowable concentration for fluoride, the concentrations are below the EPA MCL. Arsenic concentrations exceed the EPA MCL. Both of these constituents are believed to be naturally occurring and not associated with a release. In addition, no groundwater exposure pathway exists at this site.

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 3.2-1 summarizes the rationale for determining the sampling locations at this site. The source of potential COCs at DSS SWMU 154 was effluent discharged to the environment from the three seepage pits at this site.

In October 1994, soil samples were collected from boreholes drilled adjacent to the septic tank and associated seepage pit, and adjacent to the two HE drain system seepage pits using a Geoprobe™. In October 1995, June and July 1996, and March 1997, additional soil samples were collected from boreholes drilled adjacent to, and at increasing distances outward from the two HE seepage pits. Finally, in January 1998 samples were collected from boreholes drilled through the center of, and beneath, the two HE seepage pits. Soil boring locations at DSS SWMU 154 are shown in Figure 1.2-2.

The October 1994 soil samples were collected from one borehole drilled on either side of both the east system septic tank and seepage pit, and on either side of the two HE drain system seepage pits. Samples were collected at one depth in the boreholes adjacent to the septic tank. The sampling interval started at 9.5 feet bgs, a depth equal to the base of the tank. Samples were collected at two depth intervals in the boreholes adjacent to the septic system seepage pit. The upper interval started at 10 feet bgs, a depth equal to the base of the seepage pit. The second interval started at 10 feet below the top of the upper interval, or 20 feet bgs. Because of shallow bedrock at the site, samples could be collected from only one depth interval in boreholes adjacent to the HE seepage pits, starting at 21.5 feet bgs in the northern HE seepage pit boreholes and 23 feet bgs in boreholes adjacent to the southern HE seepage pit.

Table 3.2-1
Summary of Sampling Performed to Meet Data Quality Objectives

DSS SWMU 154 Sampling Area(s)	Potential COC Source	Number of Sampling Locations	Sample Density (samples/acre)	Sampling Location Rationale
Soil adjacent to, and beneath, the septic tank	Effluent discharged to the environment from the septic tank	2	NA	Evaluate potential COC releases to the environment from effluent discharged from the septic tank
Soil adjacent to, and beneath, the septic system seepage pit	Effluent discharged to the environment from the seepage pit	2	NA	Evaluate potential COC releases to the environment from effluent discharged from the seepage pit
Soil adjacent to, and beneath, the northern HE drain system seepage pit	Effluent discharged to the environment from the seepage pit	8	NA	Evaluate potential COC releases to the environment from effluent discharged from the seepage pit
Soil adjacent to, and beneath, the southern HE drain system seepage pit	Effluent discharged to the environment from the seepage pit	8	NA	Evaluate potential COC releases to the environment from effluent discharged from the seepage pit

COC = Constituent of concern.
DSS = Drain and Septic Systems.
HE = High explosive(s).
NA = Not applicable.
SWMU = Solid Waste Management Unit.

In October 1995, shallow bedrock again frustrated attempts to collect additional samples from boreholes adjacent to the HE seepage pits. Only one composite sample from locations SP2-2 and SP1-1 (Figure 1.2-2) from 23 to 25 feet bgs was collected and analyzed for HE compounds.

In June and July 1996, samples were collected from boreholes adjacent to, and at step-out locations from the northern and southern HE seepage pits (locations SP2-1 through SP2-5, and SP1-1 through SP1-5 in Figure 1.2-2). Sample collection depths started from 21.5 to 27 feet bgs in boreholes around the northern HE seepage pit and 23 to 26.5 feet bgs in boreholes around the southern HE seepage pit.

In March 1997, samples were collected from two additional step-out locations around the northern and southern HE seepage pits (locations SP2-6 and SP2-7 and SP1-6 and SP1-7 in Figure 1.2-2). Sampling depths started from 24.3 to 26 feet bgs in these boreholes.

In January 1998, as part of a five-site sampling comparison study required by the NMED (Dinwiddie January 1998), additional samples were collected at DSS SWMU 154 from boreholes drilled through the center of, and beneath, the two HE seepage pits (locations SP1-8 and SP2-8 in Figure 1.2-2). Samples were collected starting at a depth of 24 feet bgs in borehole SP1-8 and starting at a depth of 23 feet bgs in borehole SP2-8. The analytical results were submitted to the NMED, and were evaluated and summarized in an internal NMED report (McDonald November 1998).

Soil samples were collected using procedures described in the RFI Work Plan (SNL/NM March 1993), the SAP for the RFI of septic tanks and drainfields (IT March 1994) and other DSS SWMU 154-specific documents. Table 3.2-2 summarizes the types of confirmatory and QA/QC samples collected at the site and the laboratories that performed the analyses.

The DSS SWMU 154 soil samples were analyzed for VOCs, SVOCs, HE compounds, RCRA metals, hexavalent chromium, nitrate/nitrite, isotopic uranium, tritium, and radionuclides by gamma spectroscopy. The samples were analyzed by off-site laboratories (Quanterra Environmental Services [QES], Lockheed Analytical Services [LAS], General Engineering Laboratories, Inc. [GEL], and the on-site SNL/NM Environmental Restoration Chemistry Laboratory, the Explosive Components Facility Laboratory, and Radiation Protection Sample Diagnostics (RPSD) Laboratory. Table 3.2-3 summarizes the analytical methods and the data quality requirements from the RFI Work Plan (SNL/NM March 1993) and the SAP for the RFI of septic tanks and drainfields (IT March 1994).

QA/QC samples were collected during the sampling effort according to the ER Project Quality Assurance Project Plan. The QA/QC samples consisted of two TBs (for VOCs only), one field duplicate for VOCs, SVOCs, and hexavalent chromium, and three duplicates for HE compounds and RCRA metals. One EB was collected for HE compounds, two EBs were collected for VOCs and SVOCs, and three EBs were collected for RCRA metals. No significant QA/QC problems were identified in the QA/QC samples.

All of the DSS SWMU 154 soil sample results were verified/validated by SNL/NM. The off-site laboratory results from QES, LAS, and GEL were reviewed according to "Verification and Validation of Chemical and Radiochemical Data," TOP 94-03, Rev. 0 (SNL/NM July 1994), SNL/NM ER Project "Data Validation Procedure for Chemical and Radiochemical Data," AOP 00-003 (SNL/NM December 1999), or earlier ER Project AOPs. 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 1996b) or an earlier procedure. The reviews confirmed that the analytical data are defensible and therefore acceptable for use in this RSI response. Therefore, the data quality objectives (DQOs) have been fulfilled.

3.3 Determination of Nature, Rate, and Extent of Contamination

3.3.1 Introduction

The determination of the nature, migration rate, and extent of contamination at DSS SWMU 154 is based upon an initial conceptual model validated with confirmatory sampling at the site. The initial conceptual model was developed from archival site research, site inspections, soil sampling, and passive soil-vapor sampling. The DQOs contained in the RFI Work Plan (SNL/NM March 1993), the SAP for the RFI of septic tanks and drainfields (IT March 1994), and subsequent negotiations with the NMED/HRMB 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 SWMU 154, which is presented in this risk assessment. The quality of the data specifically used to determine the nature, migration rate, and extent of contamination is described in the following sections.

Table 3.2-2
Number of Confirmatory Soil and QA/QC Samples Collected from DSS SWMU 154

Sample Type	VOCs	SVOCs	HE Compounds	RCRA Metals	Hexavalent Chromium	Nitrate/Nitrite	Isotopic Uranium	Tritium	Gamma Spectroscopy Radionuclides
Confirmatory	12	12	17	22	12	6	3	2	4
Duplicates	1	1	3	3	1	0	0	0	0
EBs and TBs[a]	4	2	1	3	0	0	0	0	0
Total Samples	17	15	21	28	13	6	3	2	4
Analytical Laboratory	GEL, QES	GEL, QES	ECF, ERCL, GEL, LAS	ERCL, GEL, LAS, QES	GEL, QES	ECF	GEL	LAS	RPSD

[a]TBs for VOCs only.
DSS = Drain and Septic Systems.
EB = Equipment blank.
ECF = Explosive Components Facility Laboratory.
ERCL = Environmental Restoration Chemistry Laboratory.
GEL = General Engineering Laboratories, Inc.
HE = High explosive(s).
LAS = Lockheed Analytical Services.
QA/QC = Quality assurance/quality control.
QES = Quanterra Environmental Services.
RCRA = Resource Conservation and Recovery Act.
RPSD = Radiation Protection Sample Diagnostics Laboratory.
SVOC = Semivolatile organic compound.
SWMU = Solid Waste Management Unit.
TB = Trip blank.
VOC = Volatile organic compound.

Table 3.2-3
Summary of Data Quality Requirements for DSS SWMU 154

Analytical Method[a]	Data Quality Level	QES	LAS	GEL	ECF	ERCL	RPSD
VOCs EPA Method 8260	Defensible	10	None	2	None	None	None
SVOCs EPA Method 8270	Defensible	10	None	2	None	None	None
HE Compounds EPA Method 8330 or equivalent	Defensible	None	None	2	11	4	None
RCRA Metals EPA Method 6000/7000	Defensible	10	None	2	None	10	None
Hexavalent Chromium EPA Method 7196A	Defensible	10	None	2	None	None	None
Nitrate/Nitrite EPA Method 300 Modified	Defensible	None	None	None	6	None	None
Isotopic Uranium HASL-300 or equivalent	Defensible	None	None	3	None	None	None
Tritium EPA Method 906.0 or equivalent	Defensible	None	2	None	None	None	None
Gamma Spectroscopy Radionuclides EPA Method 901.1	Defensible	None	None	None	None	None	4

Note: The number of samples does not include QA/QC samples such as duplicates, trip blanks, and equipment blanks.
[a]EPA methods from EPA (November 1986).

DSS = Drain and Septic Systems.
ECF = Explosive Components Facility Laboratory.
EPA = U.S. Environmental Protection Agency.
ERCL = Environmental Restoration Chemistry Laboratory.
GEL = General Engineering Laboratories, Inc.
HASL = Health and Safety Laboratory.
HE = High explosive(s).
LAS = Lockheed Analytical Services.
QA/QC = Quality assurance/quality control.
QES = Quanterra Environmental Services.
RCRA = Resource Conservation and Recovery Act.
RPSD = Radiation Protection Sample Diagnostics Laboratory.
SVOC = Semivolatile organic compound.
SWMU = Solid Waste Management Unit.
VOC = Volatile organic compound.

3.3.2 Nature of Contamination

Both the nature of contamination and the potential for the degradation of COCs at DSS SWMU 154 are evaluated using laboratory analyses of the soil samples. The analytical requirements included analyses for VOCs, SVOCs, HE compounds, RCRA metals, hexavalent chromium, isotopic uranium, tritium, and radionuclides by gamma spectroscopy. The analytes and methods listed in Tables 3.2-2 and 3.2-3 are appropriate to characterize the COCs and potential degradation products at SWMU 154.

3.3.3 Rate of Contaminant Migration

The septic system at DSS SWMU 154 was deactivated in the early 1990s when Building 9960 was connected to an extension of the City of Albuquerque sanitary sewer system. The HE seepage pits also became inactive about that time when rinsate water started to be collected in polyethylene tanks for proper disposal. The migration rate of COCs that may have been introduced into the subsurface via the seepage pits at this site was therefore dependent upon the volume of aqueous effluent discharged to the environment from these systems when they were operational. Any migration of COCs from this site after use of the seepage pits was discontinued has been predominantly dependent upon precipitation. However, it is highly unlikely that sufficient precipitation has fallen on the site to reach the depth at which COCs may have been discharged to the subsurface from this system. Analytical data generated from the soil sampling conducted at the site are adequate to characterize the rate of COC migration at SWMU 154.

3.3.4 Extent of Contamination

Subsurface soil samples were collected from boreholes drilled at 20 locations adjacent to the effluent release points (septic tank and seepage pits) at the site to assess whether releases of effluent from the systems caused any environmental contamination.

The soil samples were collected at sampling depths starting at 9.5 feet bgs adjacent to the septic tank and at 10 and 20 feet bgs adjacent to the septic system seepage pit. In boreholes drilled through the center of, and around, the two HE seepage pits, samples were collected starting at depths of approximately 21.5 to 25 feet bgs, the approximate depth of the seepage pits. Sampling intervals started at the depths at which effluent discharged from the septic tank and seepage pits would have entered the subsurface environment at the site. This sampling procedure was required by 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 of COCs.

3.4 Comparison of COCs to Background Levels

Site history and characterization activities are used to identify potential COCs. The DSS SWMU 154 NFA proposal (SNL/NM August 1997) 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 3.4-1 and 3.4-2.

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 3.4-1 lists the nonradiological COCs and Table 3.4-2 lists the radiological COCs for the human health risk assessment at DSS SWMU 154. 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 3.6.4 discusses the results presented in Tables 3.4-1 and 3.4-2.

3.5 Fate and Transport

The primary releases of COCs at DSS SWMU 154 were to the subsurface soil resulting from the discharge of effluents from the Building 9960 septic and HE drain systems. Wind, water, and biota are natural mechanisms of COC transport from the primary release point; however, because the discharge was to subsurface soil, none of these mechanisms are considered to be of potential significance as transport mechanisms at this site. Because the seepage pits are no longer active, additional infiltration of water is not expected. Infiltration of precipitation is essentially nonexistent at DSS SWMU 154, as virtually all of the moisture either drains away from the site or evaporates. When soil samples were collected around the two HE seepage pits, a hard layer was encountered at approximately 25 feet bgs. This hard layer could be either granitic bedrock or a heavily-cemented caliche layer, similar to that found from 18 to 32 feet bgs during the drilling for monitoring well CTF-MW2. Discharges from the seepage pits would tend to be trapped atop this layer and have a minimal potential to migrate into deeper groundwater. No HE compounds were detected in soil samples collected from the eight perimeter boreholes SP1-4 through SP1-7, and SP2-4 through SP-7 (Figure 1.2-2) that surround the two HE seepage pits. These samples indicate that the HE contamination is limited to the immediate area around the HE seepage pits.

Furthermore, the regional groundwater in this area appears to be present under confined conditions. When well CTF-MW2 was drilled, approximately 110 feet of low-permeability silty and clayey gravels, and a 14-foot-thick caliche layer, were penetrated before reaching highly-fractured granitic bedrock. Drilling records indicate that water was first encountered at approximately 95 feet bgs, near the contact between the granite and the overlying sediments. After the monitoring well was constructed, the water level stabilized at approximately 42 feet bgs, indicating confined groundwater conditions. It seems probable that the low-permeability sediments and the caliche layer act as a confining layer which would not only retard the upward rise of the regional groundwater, but also retard the downward migration of

Table 3.4-1
Nonradiological COCs for Human Health Risk Assessment at DSS SWMU 154 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	7.25	7	**No**	44[c]	--	**Yes**
Barium	1,740	214	**No**	170[d]	--	**Yes**
Cadmium	0.63 J	0.9	Yes	64[c]	--	**Yes**
Chromium, total	15.2	12.8	**No**	16[c]	--	No
Chromium VI	0.1[e]	NC	**Unknown**	16[c]	--	No
Lead	30.0	11.8	**No**	49[c]	--	**Yes**
Mercury	0.05[e]	<0.1	Yes	5,500[c]	--	**Yes**
Selenium	5.0[e]	<1	**No**	800[f]	--	**Yes**
Silver	6.2	<1	**No**	0.5[c]	--	No
Organic						
Acetone	0.0073 J	NA	**NA**	0.69[g]	-0.24[g]	No
2-Amino-4,6-dinitrotoluene[h]	1.9	NA	**NA**	5,225[i]	1.72[i]	**Yes**
4-Amino-2,6-dinitrotoluene[h]	1.2	NA	**NA**	5,225[i]	1.72[i]	**Yes**
2,4-Dinitrotoluene	0.75	NA	**NA**	204[i]	1.98[i]	**Yes**
HMX	81	NA	**NA**	0.49[j]	0.26[k]	No
Methylene Chloride	0.0038 J	NA	**NA**	5[g]	1.25[g]	No
3-Nitrotoluene	0.098	NA	**NA**	16[i]	2.45[i]	No
4-Nitrotoluene	0.190	NA	**NA**	<100[i]	2.3[i]	**Yes**
RDX	12.0	NA	**NA**	9[l]	0.97[i]	No
Toluene	0.0025[e]	NA	**NA**	10.7[c]	2.39[c]	No
1,3,5-Trinitrobenzene	5.2	NA	**NA**	23[i]	1.1[i]	No
2,4,6-Trinitrotoluene	1,430	NA	**NA**	453[m]	1.6[i]	**Yes**

Refer to footnotes at end of table.

Table 3.4-1 (Concluded)
Nonradiological COCs for Human Health Risk Assessment at DSS SWMU 154 with
Comparison to the Associated SNL/NM Background Screening Value, BCF, and Log K_{ow}

Note: **Bold** indicates the COCs that exceed the background screening values and/or are bioaccumulators.
[a]Dinwiddie September 1997, Coyote Test Field Area Supergroup. Lead background value is from the Southwest Area Supergroup.
[b]NMED March 1998a.
[c]Yanicak March 1997.
[d]Neumann 1976.
[e]Nondetected concentration (i.e., one-half the maximum detection limit if value is greater than the maximum detected concentration or analyte was not detected at all).
[f]Callahan et al. 1979.
[g]Howard 1990.
[h]2,6-Dinitrotoluene was used as a surrogate chemical.
[i]Micromedex, Inc. 1998.
[j]Rosenblatt et al. 1991.
[k]Maxwell and Opresko 1996.
[l]Talmage et al. 1996.
[m]Talmage and Opresko 1995.

BCF = Bioconcentration factor.
COC = Constituent of concern.
DSS = Drain and Septic Systems.
HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.
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.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
SNL/NM = Sandia National Laboratories/New Mexico.
SWMU = Solid Waste Management Unit.
-- = Information not available.

Table 3.4-2
Radiological COCs for Human Health Risk Assessment at DSS SWMU 154 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)
Cesium-137	ND (0.0421)	0.079	Yes	3,000[d]	**Yes**
Thorium-232	0.553	1.01	Yes	3,000[d]	**Yes**
Tritium	ND (0.006)	0.021[e]	Yes	NA	No
Uranium-235	**ND (0.287)**	0.18	**No**	900[d]	**Yes**
Uranium-238	**ND (1.55)**	1.4	**No**	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 Area Supergroup. Cesium-137, thorium-232, and uranium-235 values from Southwest Area Supergroup.
[c]NMED March 1998a.
[d]Baker and Soldat 1992.
[e]Tharp February 1999, 420 pCi/g = 0.021 pCi/g assuming a density of 1 gram/cubic centimeter and a 5 percent soil moisture.

BCF = Bioconcentration factor.
COC = Constituent of concern.
DSS = Drain and Septic Systems.
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.
NMED = New Mexico Environment Department.
pCi/g = Picocurie(s) per gram.
SNL/NM = Sandia National Laboratories/New Mexico.
SWMU = Solid Waste Management Unit.

COCs, and further reduce the possibility of any potential COCs to reach the regional groundwater through the unsaturated zone. This hypothesis is supported by the fact that no HE compounds have been detected in groundwater samples collected from well CTF-MW2.

The COCs at DSS SWMU 154 include both inorganic and organic constituents. The inorganic COCs include both radiological and nonradiological analytes. 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). Radiological COCs will undergo decay to stable isotopes or radioactive daughter elements. However, because of the long half-lives of the radiological COCs (uranium-235 and uranium-238), 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 SWMU 154 consist of VOCs and HE compounds. 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 3.5-1 summarizes the fate and transport processes that can occur at DSS SWMU 154. 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 regional groundwater at this site is not likely. The potential for transformation of COCs is low, and loss through decay of the radiological COCs is insignificant because of the long half-lives.

Table 3.5-1
Summary of Fate and Transport at DSS SWMU 154

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.
SWMU = Solid Waste Management Unit.

3.6 Human Health Risk Assessment

3.6.1 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 EPA, NMED, and DOE to determine whether further evaluation and potential site cleanup are required. Nonradiological COC risk values also are compared to background risk so that an incremental risk can be calculated.
Step 7.	Uncertainties of the above steps are addressed.

3.6.2 Step 1. Site Data

Section 3.1 of this risk assessment provides the site description and history for DSS SWMU 154. Section 3.2 presents a comparison of results to DQOs. Section 3.3 discusses the nature, rate, and extent of contamination.

3.6.3 Step 2. Pathway Identification

DSS SWMU 154 has been designated with a future land-use scenario of industrial (DOE et al. September 1995) (see Annex C 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 regional groundwater are considered. Depth to groundwater at

DSS SWMU 154 is approximately 44 feet bgs and low-permeability sediment and a caliche layer would retard the downward migration of COCs to the regional groundwater. No intake routes through plant, meat, or milk ingestion are considered appropriate for either the industrial or residential land-use scenarios. Figure 3.6.3-1 shows the conceptual site model flow diagram for SWMU 154.

Pathway Identification

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

3.6.4 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.

3.6.4.1 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 3.4-1 and used to calculate risk attributable to background in Section 3.6.6.2. 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.

3.6.4.2 Results

Tables 3.4-1 and 3.4-2 show the DSS SWMU 154 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, six constituents were measured at concentrations greater than their background screening values. One constituent (hexavalent chromium) does not have a quantified background screening concentration; therefore it is unknown whether this COC exceeds background. Twelve constituents are organic compounds that do not have corresponding background screening values.

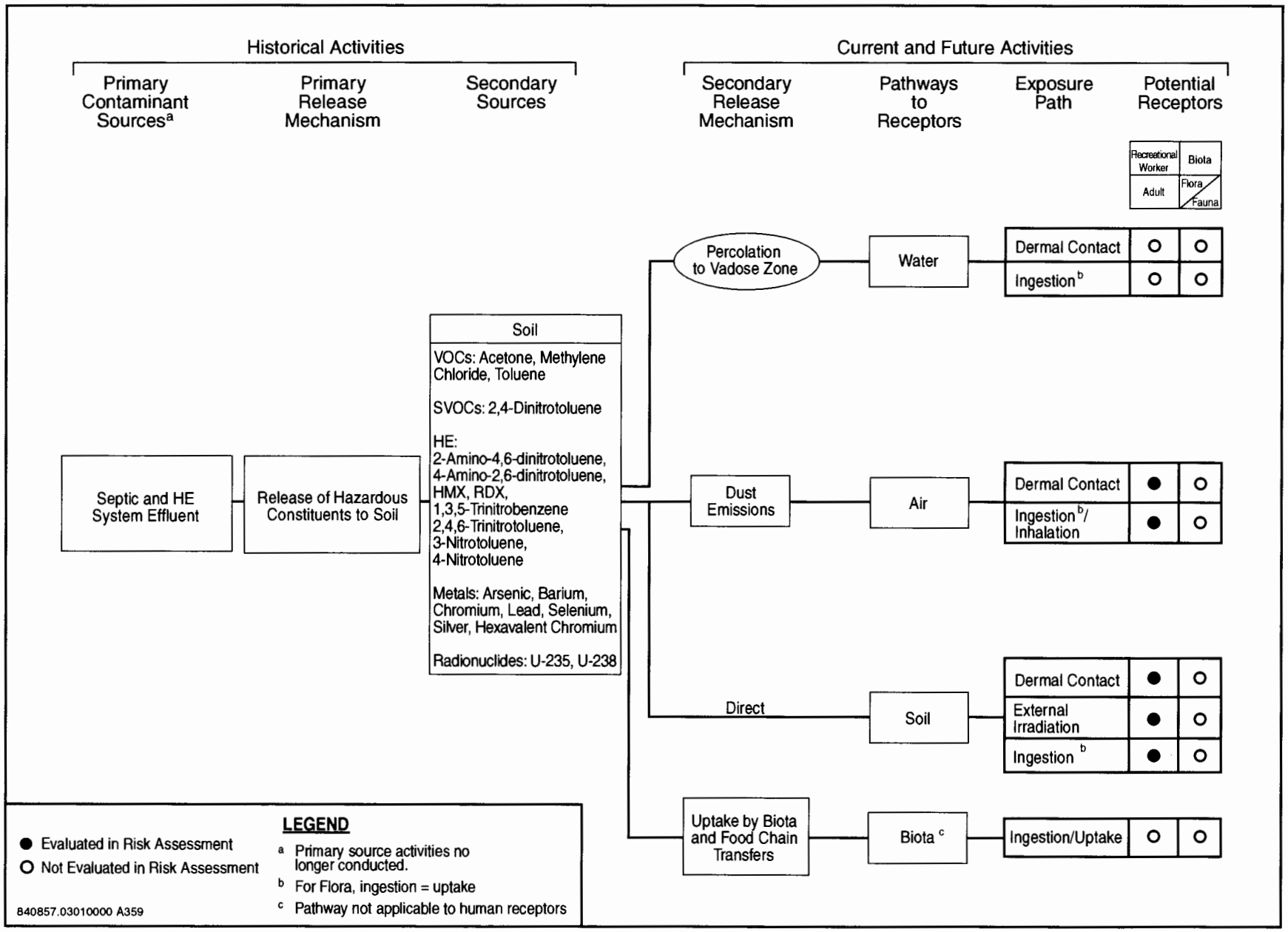

Figure 3.6.3-1

Conceptual Site Model Flow Diagram for DSS SWMU 154, Building 9960 Septic Systems

The maximum concentration value for lead is 30 mg/kg. The EPA intentionally does not provide any human health toxicological data on lead; therefore, no risk parameter values could be calculated. However, NMED guidance for lead screening concentrations for construction and industrial land-use scenarios are 750 and 1,500 mg/kg, respectively (Olson and Moats March 2000). The EPA screening guidance value for a residential land-use scenario is 400 mg/kg (Laws July 1994). The maximum concentration value for lead at this site is less than all the screening values; therefore, lead is eliminated from further consideration in the human health risk assessment.

For the radiological COCs, two constituents (uranium-235 and uranium-238) exhibited MDA values greater than the background screening levels.

3.6.5 Step 4. Identification of Toxicological Parameters

Tables 3.6.5-1 (nonradiological) and 3.6.5-2 (radiological) list the COCs retained in the risk assessment and the values for the available toxicological information. The toxicological values for the nonradiological COCs presented in Table 3.6.5-1 were obtained from the Integrated Risk Information System (IRIS) (EPA 2004a), the Health Effects Assessment Summary Tables (HEAST) (EPA 1997a), the Technical Background Document for Development of Soil Screening Levels (NMED February 2004), Risk Assessment Information System (ORNL 2003), and EPA Region 6 databases (EPA 2004b). Dose conversion factors (DCFs) used in determining the excess TEDE values for radiological COCs for the individual pathways are the default values provided in the RESRAD computer code (Yu et al. 1993a) as developed in the following documents:

- 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).

3.6.6 Step 5. Exposure Assessment and Risk Characterization

Section 3.6.6.1 describes the exposure assessment for this risk assessment. Section 3.6.6.2 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 COCs for both the industrial and residential land-use scenarios.

Table 3.6.5-1
Toxicological Parameter Values for DSS SWMU 154 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								
Arsenic	3E-4[c]	M	--	--	1.5E+0[c]	1.5E+1[c]	A	0.03[d]
Barium	7E-2[c]	M	1.4E-4[e]	--	--	--	D	0.01[d]
Chromium	1.5E+0[c]	L	--	--	--	--	D	0.01[d]
Chromium VI	3E-3[c]	L	2.3E-6[c]	L	--	4.2E+1[c]	A	0.01[d]
Selenium	5E-3[c]	H	--	--	--	--	D	0.01[d]
Silver	5E-3[c]	L	--	--	--	--	D	0.01[d]
Organic								
Acetone	1E-1[c]	L	1E-1[f]	--	--	--	D	0.01[g]
2-Amino-4,6-dinitrotoluene[h]	1E-3[e]	--	1E-3[f]	--	--	--	--	0.01[g]
4-Amino-2,6-dinitrotoluene[h]	1E-3[e]	--	1E-3[f]	--	--	--	--	0.01[g]
2,4-Dinitrotoluene	2E-3[c]	H	2E-3[f]	--	--	--	--	0.01[g]
HMX	5E-2[c]	L	5E-2[f]	--	--	--	D	0.1[d]
Methylene Chloride	6E-2[c]	M	8.6E-1[e]	--	7.5E-3[c]	1.6E-3[c]	B2	0.1[d]
3-Nitrotoluene	1E-2[f]	--	1E-2[e]	--	--	--	--	0.01[g]
4-Nitrotoluene	1E-2[f]	--	1E-2[e]	--	--	--	--	0.01[g]
RDX	3E-3[c]	H	3E-3[f]	--	1.1E-1[c]	1.1E-1[f]	C	0.1[d]
Toluene	2E-1[c]	M	1.1E-1[c]	M	--	--	D	0.1[d]
1,3,5-Trinitrobenzene	3E-2[c]	M	3E-2[f]	--	--	--	--	0.01[g]
2,4,6-Trinitrotoluene	5E-4[c]	M	5E-4[f]	--	3E-2[c]	3E-2[f]	C	0.1[d]

[a]Confidence associated with IRIS (EPA 2004a) database values. Confidence: L = low, M = medium, H = high.
[b]EPA weight-of-evidence classification system for carcinogenicity (EPA 1989) taken from IRIS (EPA 2004a):
A = Human carcinogen.
B2 = Probable human carcinogen. Sufficient evidence in animals and inadequate or no evidence in humans.
C = Possible human carcinogen.
D = Not classifiable as to human carcinogenicity.
[c]Toxicological parameter values from IRIS electronic database (EPA 2004a).
[d]Toxicological parameter values from NMED (February 2004).
[e]Toxicological parameter values from HEAST (EPA 1997a).
[f]Toxicological parameter values from EPA Region 6 (EPA 2004b).
[g]Toxicological parameter values from Risk Assessment Information System (ORNL 2003).
[h]2,6-Dinitrotoluene was used as a surrogate chemical.

Table 3.6.5-1 (Concluded)
Toxicological Parameter Values for DSS SWMU 154 Nonradiological COCs

ABS	= Gastrointestinal absorption coefficient.
COC	= Constituent of concern.
DSS	= Drain and Septic Systems.
EPA	= U.S. Environmental Protection Agency.
HEAST	= Health Effects Assessment Summary Tables.
HMX	= Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.
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.
RDX	= Hexahydro-1,3,5-trinitro-1,3,5-triazine.
RfD_{inh}	= Inhalation chronic reference dose.
RfD_o	= Oral chronic reference dose.
SF_{inh}	= Inhalation slope factor.
SF_o	= Oral slope factor.
SWMU	= Solid Waste Management Unit.
--	= Information not available.

Table 3.6.5-2
Radiological Toxicological Parameter Values for DSS SWMU 154 COCs
Obtained from RESRAD Risk Coefficients[a]

COC	SF_o (1/pCi)	SF_{inh} (1/pCi)	SF_{ev} (g/pCi-yr)	Cancer Class[b]
Uranium-235	4.70E-11	1.30E-08	2.70E-07	A
Uranium-238	6.20E-11	1.20E-08	6.60E-08	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.
SWMU = Solid Waste Management Unit.

3.6.6.1 Exposure Assessment

Annex C 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 annex 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 COCs, the coded equation provided in RESRAD computer code is used to estimate the incremental TEDE and cancer risk for individual exposure pathways. Further discussion of this process is provided in the "Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD" (Yu et al. 1993a). Although the designated land-use scenario for this site is industrial, risk and TEDE values for a residential land-use scenario are also presented.

3.6.6.2 Risk Characterization

Table 3.6.6-1 shows an HI of 4.72 for the DSS SWMU 154 nonradiological COCs and an estimated excess cancer risk of 3E-5 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 3.6.6-2 shows an HI of 0.03 and an estimated excess cancer risk of 4E-6 for the SWMU 154 associated background constituents under the designated industrial land-use scenario.

Table 3.6.6-1
Risk Assessment Values for DSS SWMU 154 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					
Arsenic	7.25	0.03	5E-6	0.33	2E-5
Barium	1,740	0.03	--	0.33	--
Chromium	15.2	0.00	--	0.00	--
Chromium VI	0.1[b]	0.00	2E-10	0.00	5E-10
Selenium	5.0[b]	0.00	--	0.01	--
Silver	6.2	0.00	--	0.02	--
Organic					
Acetone	0.0073 J	0.00	--	0.00	--
2-Amino-4,6-dinitrotoluene[c]	1.9	0.00	--	0.02	--
4-Amino-2,6-dinitrotoluene[c]	1.2	0.00	--	0.02	--
2,4-Dinitrotoluene	0.75	0.00	--	0.01	--
HMX	81	0.00	--	0.03	--
Methylene Chloride	0.0038 J	0.00	2E-8	0.00	5E-8
3-Nitrotoluene	0.098	0.00	--	0.00	--
4-Nitrotoluene	0.190	0.00	--	0.00	--
RDX	12.0	0.00	8E-7	0.07	3E-6
Toluene	0.0025[b]	0.00	--	0.00	--
1,3,5-Trinitrobenzene	5.2	0.00	--	0.00	--
2,4,6-Trinitrotoluene	1,430	4.65	3E-5	46.81	9E-5
Total		**4.72**	**3E-5**	**47.65**	**1E-4**

[a]EPA 1989.
[b]Nondetected concentration (i.e., one-half the maximum detected limit is greater than the maximum detected concentration).
[c]2,6-Dinitrotoluene was used as a surrogate chemical.
COC = Constituent of concern.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.
J = Estimated concentration.
mg/kg = Milligram(s) per kilogram.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
SWMU = Solid Waste Management Unit.
-- = Information not available.

Table 3.6.6-2
Risk Assessment Values for DSS SWMU 154 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
Arsenic	7.0	0.03	4E-6	0.32	2E-5
Barium	214	0.00	--	0.04	--
Chromium	12.8	0.00	--	0.00	--
Chromium VI	NC	--	--	--	--
Selenium	<1	--	--	--	--
Silver	<1	--	--	--	--
Total		**0.03**	**4E-6**	**0.36**	**2E-5**

[a]Dinwiddie September 1997, Coyote Test Field Area 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.
SWMU = Solid Waste Management Unit.
-- = Information not available.

For the radiological COCs, 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 1.5E-1 millirem (mrem)/year (yr). In accordance with EPA guidance found in Office of Solid Waste and Emergency Response (OSWER) Directive No. 9200.4-18 (EPA 1997b), an incremental TEDE of 15 mrem/yr is used for the probable land-use scenario (industrial in this case); the calculated dose value for DSS SWMU 154 for the industrial land-use scenario is well below this guideline. The estimated excess cancer risk is 1.3E-6.

For nonradiological COCs under the residential land-use scenario, the HI is 47.65 with an estimated excess cancer risk of 1E-4 (Table 3.6.6-1). The numbers in the table include exposure from soil ingestion, dermal contact, and dust and volatile inhalation. Although the EPA (1991) guidelines generally recommend that inhalation not be included in a residential land-use scenario, this pathway is included because of the potential for soil in Albuquerque, New Mexico, to be eroded and for dust to be present in predominantly residential areas. Because of the nature of the local soil, other exposure pathways are not considered (see Annex C). Table 3.6.6-2 shows an HI of 0.36 and an estimated excess cancer risk of 2E-5 for the DSS SWMU 154 associated background constituents under the residential land-use scenario.

For the radiological COCs, the incremental TEDE for the residential land-use scenario is 4.0E-1 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 SWMU 154 for the residential land-use scenario is well below this guideline. Consequently, SWMU 154 is eligible for unrestricted radiological release as the residential land-use scenario resulted in an incremental TEDE of less than 75 mrem/yr to the on-site receptor. The estimated excess cancer risk is 3.9E-6. The excess cancer risk from

the nonradiological and radiological COCs should be summed to provide risk estimates for persons exposed to both types of carcinogenic contaminants, as noted in OSWER Directive No. 9200.4-18 "Establishment of Cleanup Levels for CERCLA [Comprehensive Environmental Response, Compensation, and Liability Act] Sites with Radioactive Contamination" (EPA 1997b). This summation is tabulated in Section 3.6.9.

3.6.7 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 4.72 (greater than the numerical guideline of 1 suggested in the RAGS [EPA 1989]). The estimated excess cancer risk is 3E-5. NMED guidance states that cumulative excess lifetime cancer risk must be less than 1E-5 (Bearzi January 2001); thus the excess cancer risk for this site is above 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, the HI is 0.03 with an excess cancer risk of 4E-6 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 4.69 and the estimated incremental excess cancer risk is 2.58E-5 for the industrial land-use scenario.

Although both the HI and estimated excess cancer risk are above the NMED guidelines for the industrial land-use scenario, maximum concentrations were used in the risk calculation. The maximum concentration for 2,4,6-trinitrotoluene (the main contributor to the risk) was from a single composite sample collected from two borings next to the north and south HE seepage pits. In order to confirm the high 2,4,6-trinitrotoluene concentration and to define the size of the possible release, additional discrete (i.e., noncomposited) samples were collected from boreholes at the same two locations used for the composited HE compound sample (SP1-1 and SP2-2 in Figure 1.2-2), and from additional boreholes drilled directly beneath, and surrounding, the two seepage pits. The maximum 2,4,6-trinitrotoluene concentration measured in the additional discrete samples was 102 mg/kg in sample SP1-1-24-26. Using the maximum concentration in discrete samples from the additional sampling for the main contributor to excess cancer risk and hazards, 2,4,6-trinitrotoluene (102 mg/kg), reduces the total HI and estimated excess cancer risk to 0.40 and 7E-6, respectively. The incremental HI and excess cancer risk are reduced to 0.36 and 2.43E-6, respectively. Thus, by using the discrete sampling maximum concentration in the risk calculations, both the total and incremental HI and estimated excess cancer risks are below NMED guidelines.

For the radiological COCs under the industrial land-use scenario, the incremental TEDE is 1.5E-1 mrem/yr, which is significantly lower than the EPA's numerical guideline of 15 mrem/yr (EPA 1997b). The estimated incremental excess cancer risk is 1.3E-6.

Using the maximum 2,4,6-trinitrotoluene concentration (1,430 mg/kg), the calculated HI for the nonradiological COCs under the residential land-use scenario is 47.65, which is above

numerical guidance. The estimated excess cancer risk is 1E-4. 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 above the suggested acceptable risk value. The incremental HI is 47.28 and the estimated incremental excess cancer risk is 9.18E-5 for the residential land-use scenario.

Although both the HI and estimated excess cancer risk are above the NMED guidelines for the residential land-use scenario, maximum concentrations were used in the risk calculation. Using the maximum concentration from the additional discrete sampling for the main contributor to excess cancer risk and hazards, 2,4,6-trinitrotoluene (102 mg/kg), reduces the total HI and estimated incremental excess cancer risk to 4.15 and 3E-5, respectively. The incremental HI and excess cancer risk are reduced to 3.79 and 8.69E-6, respectively. Thus, by using the discrete sampling maximum concentration in the risk calculations, the estimated incremental excess cancer risks are below NMED guidelines. In addition, the total and incremental HI values only slightly exceed unity.

The incremental TEDE for a residential land-use scenario from the radiological components is 4.0E-1 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 3.9E-6.

3.6.8 Step 7. Uncertainty Discussion

The determination of the nature, rate, and extent of contamination at DSS SWMU 154 is based upon an initial conceptual model that was validated with sampling conducted at the site. The sampling was implemented in accordance with procedures and DQOs in the RFI Work Plan (SNL/NM March 1993), the SAP for the RFI of septic tanks and drainfields (IT March 1994), and subsequent negotiations with the NMED/HRMB. The data from soil samples collected at effluent release points are representative of potential COC releases to the site. The analytical requirements and results satisfy the DQOs, and data quality was verified/validated in accordance with SNL/NM procedures. Therefore, there is no uncertainty associated with the data quality used to perform the risk assessment at SWMU 154.

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

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

Table 3.6.5-1 shows the uncertainties (confidence levels) in nonradiological toxicological parameter values. There is a combination of estimated values and values from the IRIS (EPA 2004a), HEAST (EPA 1997a), EPA Region 6 (EPA 2004b), Risk Assessment Information System (ORNL 2003), and Technical Background Document for Development of Soil Screening Levels (NMED February 2004). Where values are not provided, information is not available from the HEAST (EPA 1997a), IRIS (EPA 2004a), Technical Background Document for Development of Soil Screening Levels (NMED February 2004), Risk Assessment Information

System (ORNL 2003), or EPA regions (EPA 2004b, EPA 2002a, EPA 2002b). Because of the conservative nature of the RME approach, uncertainties in toxicological values are not expected to change the conclusion from the risk assessment analysis.

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

For the radiological COCs, 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.

3.6.9 Summary

DSS SWMU 154 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 (4.72) is greater than the accepted numerical guidance from the EPA. The estimated incremental excess cancer risk is 3E-5; thus, excess cancer risk is also above the acceptable risk value provided by the NMED for an industrial land-use scenario (Bearzi January 2001). The incremental HI is 4.69, and the estimated incremental excess cancer risk is 2.58E-5 for the industrial land-use scenario.

Although both the HI and estimated excess cancer risk are above the NMED guidelines for the industrial land-use scenario, maximum concentrations were used in the risk calculation. The maximum concentration for 2,4,6-trinitrotoluene (the main contributor to the risk) at 1,430 mg/kg was from a composite sample collected at HE seepage pits 1 and 2. As a result, additional discrete sampling was performed from beneath, and around, these two seepage pits. Using the maximum concentration from the additional discrete sampling for the main contributor to excess cancer risk and hazards, 2,4,6-trinitrotoluene (102 mg/kg), reduces the total HI and estimated incremental excess cancer risk to 0.40 and 7E-6, respectively. The incremental HI and excess incremental cancer risk are reduced to 0.37 and 2.43E-6, respectively. In addition, the discrete sampling from boreholes drilled after the initial composite sample was collected demonstrated that the high 2,4,6-trinitrotoluene concentration found in the composite sample was very limited in extent and could not be replicated in follow-on samples (SNL/NM August 1997). Thus, by using the discrete sampling maximum concentration in the risk calculations, both the total and incremental HI and estimated incremental excess cancer risks are below NMED guidelines.

Using conservative assumptions and an RME approach to risk assessment, and using the 2,4,6-trinitrotoluene concentration of 1,430 mg/kg in the composite sample, calculations for the nonradiological COCs show that for the residential land-use scenario the HI (47.65) is above

the accepted numerical guidance from the EPA. The estimated excess cancer risk is 1E-4. Thus, excess cancer risk is above the acceptable risk value provided by the NMED for a residential land-use scenario (Bearzi January 2001). The incremental HI is 47.28 and the estimated incremental excess cancer risk is 9.18E-5 for the residential land-use scenario.

Although both the HI and estimated excess cancer risk are above the NMED guidelines for the residential land-use scenario, maximum concentrations were used in the risk calculation. Using the maximum concentration from the additional discrete sampling for the main contributor to excess cancer risk and hazards, 2,4,6-trinitrotoluene (102 mg/kg), reduces the total HI and estimated incremental excess cancer risk to 4.15 and 3E-5, respectively. The incremental HI and excess cancer risk are reduced to 3.79 and 8.69E-6, respectively. Thus, by using the discrete sampling maximum concentration in the risk calculations, the estimated incremental excess cancer risks are below NMED guidelines. In addition, the total and incremental HI values only slightly exceed unity.

The incremental TEDE and corresponding estimated cancer risk from the radiological COCs are much lower than EPA guidance values. The estimated TEDE is 1.5E-1 mrem/yr for the industrial land-use scenario, which is much lower than the EPA's numerical guidance of 15 mrem/yr (EPA 1997b). The corresponding estimated incremental cancer risk value is 1.3E-6 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 4.0E-1 mrem/yr with an associated risk of 3.9E-6. The guideline for this scenario is 75 mrem/yr (SNL/NM February 1998). Therefore, DSS SWMU 154 is eligible for unrestricted radiological release.

The excess cancer risk from the nonradiological and radiological COCs should be summed to provide risk estimates for persons exposed to both types of carcinogenic contaminants, as noted in OSWER Directive No. 9200.4-18 (EPA 1997b). The summation of the nonradiological and radiological carcinogenic risks is tabulated in Table 3.6.9-1.

Table 3.6.9-1
Summation of Incremental Nonradiological and Radiological Risks from
DSS SWMU 154, Building 9960 Septic Systems Carcinogens

Scenario	Nonradiological Risk	Radiological Risk	Total Risk
Industrial	2.43E-6[a]	1.3E-6	3.7E-6
Residential	8.69E-6[a]	3.9E-6	1.3E-5

[a]Based upon the maximum concentration from the discrete sampling locations.
DSS = Drain and Septic Systems.
SWMU = Solid Waste Management Unit.

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

3.7 Ecological Risk Assessment

3.7.1 Introduction

This section addresses the ecological risks associated with exposure to constituents of potential ecological concern (COPECs) in the soil at DSS SWMU 154. A component of the NMED Risk-Based Decision Tree (NMED March 1998a) is to conduct an ecological risk assessment that corresponds with that presented in the EPA's Ecological RAGS (EPA 1997c). The current methodology is tiered and contains an initial scoping assessment followed by a more detailed risk assessment if warranted by the results of the scoping assessment. Initial components of NMED's decision tree (a discussion of DQOs, data assessment, and evaluations of bioaccumulation as well as fate and transport potential) are addressed in previous sections of this report. At the end of the scoping assessment, a determination is made as to whether a more detailed examination of potential ecological risk is necessary.

3.7.2 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 3.7.2.4) summarizes the scoping results and assesses the need for further examination of potential ecological impacts.

3.7.2.1 Data Assessment

As indicated in Section 3.4, all COCs at DSS SWMU 154 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.

3.7.2.2 Bioaccumulation

Because no COPECs are associated with this site, bioaccumulation potential is not evaluated.

3.7.2.3 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 3.5. As noted in Table 3.5-1, 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.

3.7.2.4 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.

4.0 RECOMMENDATION FOR CORRECTIVE ACTION COMPLETE WITH CONTROLS DETERMINATION

4.1 Rationale

Based upon field investigation data and the human health and ecological risk assessment analyses, a determination of Corrective Action Complete (CAC) with controls (NMED April 2004) is recommended for DSS SWMU 154 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 the industrial land-use scenario when using the discrete confirmatory soil sample maximum concentration for HE compounds from boreholes adjacent to the two HE seepage pits.
- Groundwater is not evaluated in the risk assessment because, with the exception of arsenic and fluoride, concentrations of detected COCs were below promulgated regulatory limits, and because no groundwater exposure pathway exists at this site. Although fluoride and arsenic in groundwater exceed the New Mexico maximum allowable concentration and the EPA MCL, respectively, the concentrations are believed to be naturally occurring and not associated with a release.
- None of the COCs warrant ecological concern because no complete pathways exist at the site.

4.2 Criterion

Based upon the evidence provided in Section 4.1, a determination of CAC with controls (NMED April 2004) is recommended for DSS SWMU 154. This is consistent with the NMED's NFA Criterion 5, which states, "the SWMU/AOC 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 1998b).

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5.0 REFERENCES

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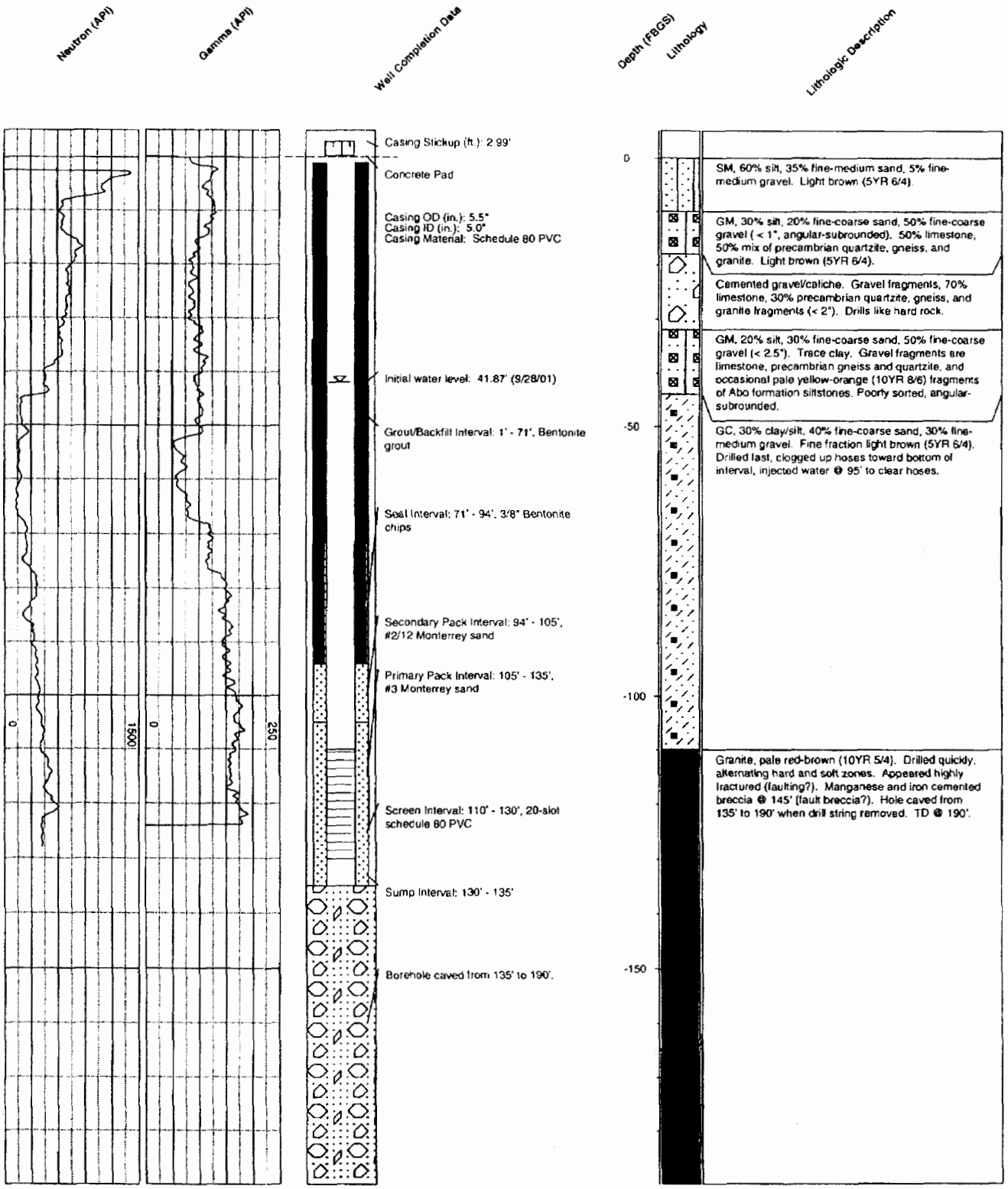
ANNEX A
DSS SWMU 154
Borehole Lithologic Log and Construction Diagram for Groundwater Monitoring Well CTF-MW2

Sandia National Laboratories/New Mexico
Environmental Restoration Project
CTF-MW2

Geologist: ***Mike Sanders***
Drilling Date: ***August 17, 2001***
Well Installation Date: ***August 17-18, 2001***



MRS 6/18/02

Attachment A

SNL/NM Groundwater Monitoring Well Data Sheet

PROJECT NAME: OU1295 MON. WELLS
ER ADS #: 1295
WELL NAME: CTF-MW2
OWNER: SNL/NM
DATE DRILLING BEGAN: 8/17/01
DRILLING CONTRACTOR: WDC INC.
DRILLING METHOD: ARCH, AIR ROTARY
BOREHOLE DEPTH: 190'
BOREHOLE DIAMETERS: 9 5/8" (CASED)
8 1/2" (UNCASED)

GEOGRAPHIC LOCATION: ~1.5 MILES E OF TA-III
WELL COMPLETION DATE: 8/18/01
COMPLETION ZONE: REGIONAL GROUNDWATER
FORMATION OF COMPLETION: PE GRANITE
REMARKS: 0'-110' DRILLED W/ ARCH, 110'-190' DRILLED W/ AIR ROTARY W/ DOWN HOLE HAMMER, HOLE UNCASED CAVED IN 190'-135'.

Survey Data

Survey Date: 10/4/01
Surveyed by: ADSA. SURVEYING CO. (ASC)

State Plane Coordinates
(X) Easting - 421 805.04'
(Y) Northing - 1,448,181.14'

Surveyed Elevations
(feet above sea level)

Protective Casing: 5576.25
(Elev. D - FOP 94-71)

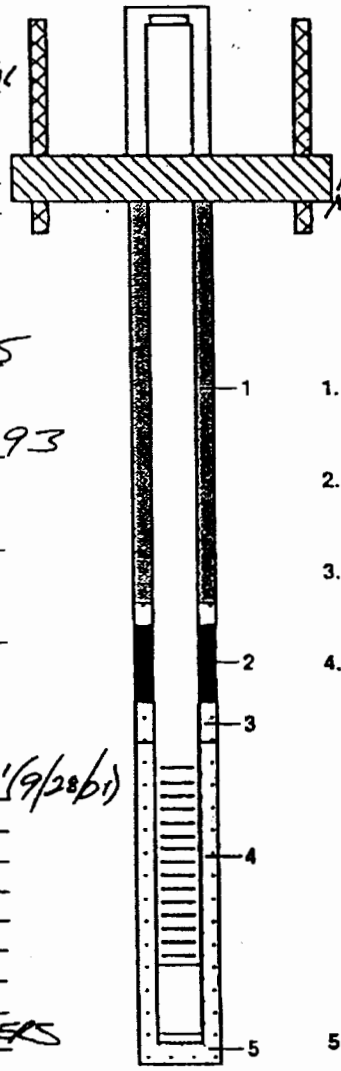
Top of Inner Well Casing: 5575.93
(Elev C - FOP 94-71)

Concrete Pad: 5573.23
(Elev B - FOP 94-71)

Ground Surface: 5572.94
(Elev A - FOP 94-71)

Calculated Elevations
(feet above sea level)
Initial Water Level: 5531.07' (9/28/01)
Other:
Comments:

Form Completed by: M. SANDERS
Verified by:



Completion Data

Measured Depths
(feet below ground surface)

Initial Water Level: 41.87' (9/28/01)
INNER
Casing Stickup: 2.99'
(above ground level)

Casing OD (in.): 5.5"
Casing ID (in.): 5.0"

1. Grout/Backfill Interval: 1'-71'
   Material: BENTONITE GROUT
2. Seal Interval: 71'-94'
   Material: 3/8" BENT. CHIPS
3. Secondary Pack Interval: 94'-105'
   Secondary Pack Size: #2/12 MONTEREY SAND
4. Primary Pack Interval: 105'-135'
   Primary Pack Size: #3 MONTEREY SAND

Screen Interval: 110'-130'
Slot Size: 0.02" (20-SLOT)
Material: SCH. 80 PVC

Sump Length: 5'

Casing Depth: 135'
Material: SCH. 80 PVC

5. Plug Back Interval (if used): NONE
   (Casing TD-Hole TD) 0'
   Plug Material (if used): NONE

301462.71.01/cw A1

ANNEX B
DSS SWMU 154
Groundwater Monitoring Well CTF-MW2
Data Validation Reports for Eight Quarters of Sampling
July 2002–June 2004

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. N/A SAR/WR No.

AR/COC 605577

Dept. No./Mail Stop:	6133/MS-1087	Date Samples Shipped:	7-22-02 SMO USE	Contract No:	PO 21671
Project/Task Manager:	Sue Collins/505-284-2546	Carrier/Waybill No.	1118	Project/Task No.:	7223 .01 .04 .01
Project Name:	SWMUDSS	Lab Contact:	Edie Kent/803-556-8171	SMO Authorization:	
Record Center Code:		Lab Destination:	GEL	SEE ATTACHED ORDER	BOTTLE
Logbook Ref. No.:	ER 089	SMO Contact/Phone:	Pam Puissant/505-844-3185		
Service Order No.	CF 023-02	Send Report to SMO:	Wendy Palencia/505-844-3132		

☐ Waste Characterization
RCRA Date=
☐ Send:Preliminary/report to
☑ Validation Required
☐ Released by COC No.:

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

Location Tech Area
Building NA Room NA

6 39 56 % 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	Preserve All@4C	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
049493-001	CTF-MW2	120	154	07/17/02 1134	GW	G	3x40ml	HCL	G	SA	VOC (8260) .1	001
049493-008	CTF-MW2	120	154	07/17/02 1135	GW	P	500ml	HNO3	G	SA	RCRA Metals (6020) .2	006
049493-010	CTF-MW2	120	154	07/17/02 1140	FGW	P	500ml	HNO3	G	SA	Major Cations (6020) .3	007
049493-012	CTF-MW2	120	154	07/17/02 1136	GW	P	500ml	NaOH	G	SA	Total Cyanide (9012A) .4	008
049493-013	CTF-MW2	120	154	07/17/02 1137	GW	P	250ml	4C	G	SA	Major Anions (300.0) .5	009
049493-015	CTF-MW2	120	154	07/17/02 1138	GW	AG	4x1L	4C	G	SA	High Explosives (8330) .6	010
049493-016	CTF-MW2	120	154	07/17/02 1139	GW	P	250ml	H2SO4	G	SA	NPN (353.1) .7	012
049500-001	SWMUD-TB4	NA	NA	07/17/02 1134	DIW	G	3x40ml	HCL	G	TB	VOC (8260) .1	002

RMMA	☐ Yes ☑ No	Ref. No.	
Sample Disposal	☐ Return to Client	☑ Disposal by lab	
Turnaround Time	☐ 7 Day	☐ 15 Day	☑ 30 Day
Return Samples By:		☐ Negotiated TAT	QC Inits.

Sample Tracking Smo Use
Date Entered(mm/dd/yy)
Entered by:

Special Instructions/QC Requirements:
EDD ☑ Yes ☐ No
Raw Data Package ☑ Yes ☐ No

*Please send report to:
Tim Jackson/Org.6133/MS1087/505-284-2547

Major Anions/ Br,CL,FL,SO4
FGW / Filtered in field w/.45 micron filter

Please list as separate report.

Abnormal Conditions on Receipt
3 C

	Name	Signature	Init	Company/Organization/Phone/Cellular
Sample Team Members	Alfred Santillanes			Weston/6135/844-5130/228-0710
	John Boyd			Shaw/6135/284-3307/228-9231
	Robert Lynch			Weston/6135/844-4013/250-7090

1.Relinquished by		Org. 6135	Date 7-22-02	Time 0800	4.Relinquished by	Org.	Date	Time
1. Received by		Org. 6133	Date 7/22/02	Time 0800	4. Received by	Org.	Date	Time
2.Relinquished by		Org. 6133	Date 7/22/02	Time 1115	5.Relinquished by	Org.	Date	Time
2. Received by		Org. GEL	Date 7/23/02	Time 0725	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

***7 & 15 Day Turnaround Time: ERCL requires prior notification.**

√'d

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. N/A SAR/WR No.

AR/COC 605579

Dept. No./Mail Stop:	6133/MS-1087	Date Samples Shipped:	7-22-02 SMO USE	Contract No:	PO 21671
Project/Task Manager:	Sue Collins/505-284-2546	Carrier/Waybill No.	1118	Project/Task No.:	7223 .01 .04 .01
Project Name:	SWMUDSS	Lab Contact:	Edie Kent/603-556-8171	SMO Authorization:	
Record Center Code:		Lab Destination:	GEL		
Logbook Ref. No.:	ER 089	SMO Contact/Phone:	Pam Pulssant/505-844-3185		
Service Order No.	CF 023-02	Send Report to SMO:	Wendy Palencia/505-844-3132		

See Attached Sheet on back

☐ Waste Characterization
-RCRA Date=
☐ Send:Preliminary/report to
☑ Validation Required
☐ Released by COC No.:

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

Location Tech Area
Building NA Room NA

639562B **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	Preserve All@4C	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
049495-001	SWMUD-EB1	NA	NA	07/18/02 1000	DIW	G	3x40ml	HCL	G	EB	VOC (8260) .1	003
049495-015	SWMUD-EB1	NA	NA	07/18/02 1001	DIW	AG	4x1L	4C	G	EB	High Explosives (8380) .6	011

RMMA ☐ Yes ☑ No Ref. No.
Sample Disposal ☐ Return to Client ☑ Disposal by lab
Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day
Return Samples By: ☐ Negotiated TAT

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

Special Instructions/QC Requirements:
EDD ☑ Yes ☐ No
Raw Data Package ☑ Yes ☐ No

Abnormal Conditions on Receipt: 5C

	Name	Signature	init	Company/Organization/Phone/Cellular
Sample Team Members	Alfred Santillanes			Weston/6135/844-5130/228-0710
	John Boyd			Shaw/6135/284-3307/228-9231
	Robert Lynch			Weston/6135/844-4013/250-7090

*Please send report to:
Tim Jackson/Org.6133/MS1087/505-284-2547

See COC #605580 for trip blank info.
Project complete:No more samples to follow this quarter

Please list as separate report.

1.Relinquished by	Org. 6135	Date 7-22-02	Time 0805	4.Relinquished by	Org.	Date	Time
1. Received by	Org. 6135	Date 7-22-02	Time 0805	4. Received by	Org.	Date	Time
2.Relinquished by	Org. 6135	Date 7-22-02	Time 1115	5.Relinquished by	Org.	Date	Time
2. Received by	Org. GCL	Date 7/23/02	Time 0725	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

***7 & 15 Day Turnaround Time: ERCL requires prior notification.**

V'd

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. N/A SAR/WR No.

AR/COC 605580

Dept. No./Mail Stop:	6133/MS-1087	Date Samples Shipped: 7-22-02 SMO USE	Contract No:	PO 21671	☑ Waste Characterization
Project/Task Manager:	Sue Collins/505-284-2546	Carrier/Waybill No. 11118	Project/Task No.:	7223.01.04.01	-RCRA Date=
Project Name:	SWMUDSS	Lab Contact: Edie Kent/803-558-8171	SMO Authorization:		☐ Send:Preliminary/report toErnest Visant 284-2507
Record Center Code:		Lab Destination: GEL	SEE ATTACHED BOTTLE ERROR		☑ Validation Required
Logbook Ref. No.:	ER 089	SMO Contact/Phone: Pam Puissant/505-844-3185			☐ Released by COC No.:
Service Order No.	CF 023-02	Send Report to SMO: Wendy Palencia/505-844-3132			Bill To: Sandia National Labs (Accounts Payable) P.O. Box 5800, MS-0154 Albuquerque, NM., 87185-0154
Location	Tech Area				
Building NA	Room NA	603956C	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	Preserve All@4C	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
049496-001	SWMUD-PW1	NA	NA	07/18/02 0900	PW	G	3x40ml	HCL	G	SA	VOC (8260) . /	004
049496-017	SWMUD-PW1	NA	NA	07/18/02 0901	PW	AG	2x1L	4C	G	SA	PCB (8082) . 8	013
049501-001	SWMUD-TB5	NA	NA	07/18/02 0900	DIW	G	3x40ml	HCL	G	TB	VOC (8260) . /	005

RMMA	☐ Yes ☑ No Ref. No.	Sample Tracking	Smo Use
Sample Disposal	☐ Return to Client ☑ Disposal by lab	Date Entered(mm/dd/yy)	
Turnaround Time	☐ 7 Day ☐ 15 Day ☑ 30 Day	Entered by:	
Return Samples By:	☐ Negotiated TAT	QC Inits.	

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	Alfred Santillanes			Weston/6135/844-5130/228-0710
	John Boyd			Shaw/6135/284-3307/228-9231
	Robert Lynch			Weston/6135/844-4013/250-7090

Special Instructions/QC Requirements:
EDD ☑ Yes ☐ No
Raw Data Package ☑ Yes ☐ No
*Please send report to:
Tim Jackson/Org.6133/MS1087/505-284-2587
Please list as separate report.

Abnormal Conditions on Receipt
SS

1.Relinquished by	Alfred Santillanes	Org. 6135	Date 7-22-02	Time 0805	4.Relinquished by	Org.	Date	Time
1. Received by	[illegible]	Org. 6133	Date 7/22/02	Time 0805	4. Received by	Org.	Date	Time
2.Relinquished by	[illegible]	Org. 6133	Date 7-22-02	Time 1115	5.Relinquished by	Org.	Date	Time
2. Received by	J M Hardy	Org.	Date 7/23/02	Time 0725	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

*7 & 15 Day Turnaround Time: ERCL requires prior notification.

Sample Findings Summary

Site: DSS - GWM | ARCOC: 605577, -579, -580 | Data: Organic and Inorganic

Sample ID	VOC (8260)	67-64-1 (acetone)	75-09-2 (methylene chloride)	PCBs (8082)	All HE (8330) TAL compounds except:	99-35-49 (1,3,5-trinitrobenzene)	479-45-8 (tetryl)	19406-51-0 (4-amino-2,6-dinitrotoluene)	Metals	7439-97-6 (mercury)	7440-38-2 (arsenic)	7440-39-3 (barium)	7440-43-9 (cadmium)	7440-47-3 (chromium)	7439-92-1 (lead)	7782-49-2 (selenium)	7440-22-4 (silver)	7440-70-2 (calcium)	7439-95-4 (magnesium)	7440-09-7 (potassium)	7440-23-5 (sodium)	General Chemistry	5955-70-0 (total cyanide)
049493-001 CTF-MW2		7.72U, B2	5.0U, B1, B2	All QC acceptance criteria were met. No data will be qualified.																			
049493-008 CTF-MW2										UJ, TP	J, TP	J, TP	J, TP	UJ, TP, B3	J, TP	J, TP	UJ, TP						
049493-010 CTF-MW2																		J, TP	J, TP	J, TP	J, TP		
049493-012 CTF-MW2																							UJ, TP
049493-015 CTF-MW2						UJ, A, P	UJ, A, P	UJ, P															
049493-015 CTF-MW2-RE					UJ, HT	UJ, HT, A, P	R, HT, A	UJ, HT															
049496-001 SWMUD-PW1		18.6U, B2																					
049495-015 SWMUD-EB1						UJ, A, P	UJ, A, P	UJ, P															
049495-015 SWMUD-EB1-RE					UJ, HT	UJ, HT, A, P	R, HT, A	UJ, HT															

Validated By: K. Mal

Date: 08/23/02

Sample Findings Summary

Site: DSS - GWM ARCOC: 605577 **Data:** Inorganic

Sample ID	All TAL Metals(6020) except:	7440-36-0 (antimony)	7440-43-9 (cadmium)	7440-22-4 (silver)	7440-62-2 (vanadium)	7440-47-3 (chromium)	7440-50-8 (copper)								
049493-R08	J, TP	UJ, TP	UJ, TP	UJ, TP	UJ, TP	UJ, TP, B3	J, TP, B								

Validated By: K Hal **Date:** 11/15/02

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

MEMORANDUM

DATE: November 15, 2002

TO: File

FROM: Linda Thal

SUBJECT: Inorganic Data Review and Validation – SNL
Site: DSS - GWM ARCOC No. 605577
GEL SDG No. 68334 Project/Task No. 7223.01.05

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 sample was prepared and analyzed with approved procedures using method SW-846 6020 (ICPMS metals). Problems were identified with the data package that resulted in the qualification of data.

The sample was originally analyzed as 63956-006 for RCRA metals. According to instructions from the client, GEL relogged and reanalyzed the sample as 68334-001 for TAL metals. According to the case narrative, the beryllium result is to be reported from the original sample (63956-006). The remaining results are to be reported from sample 68334-001. This validation report is for sample 68334-001 only.

The original ARCOC and the Sample Review and Receipt Form are not included with the re-analysis package. However, according to the original validation report, sample 63956-006 was received without the required chemical preservation, but was chemically preserved after receipt. Therefore, all detects for sample 68334-001 will be qualified "J, TP" and all non-detects "UJ, TP".

Chromium was detected in the CCB at a negative value, with an absolute value > DL. Sample 68334-001 was non-detect for chromium and is already qualified "UJ" due to preservation infringements; the descriptor flag "B3" will be added to the qualifier.

Copper was detected in the MB at a value >DL but < RL. The sample result is >DL, <RL and < 5X the MB value and is already qualified "J" due to preservation infringements; the descriptor flag "B" will be added to the qualifier.

The serial dilution had a RPD > QC acceptance criteria (10%) for magnesium (10.5%), potassium (15.7%) and sodium (50%). The Mg, K and Na results for sample 68334-001 are > 50X the RL and already qualified "J" due to preservation infringements. The results will not be further qualified.

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

Holding Times/Preservation

The sample was analyzed within the prescribed holding time but was not properly preserved as mentioned above in the summary section.

Calibration

The initial and continuing calibration data met QC acceptance criteria.

Blanks

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

Chromium, zinc and arsenic were detected in the MB, potassium in the MB and CCB and thallium in the ICB at values > DL but < RL. Barium was detected in the MB at a value > RL. Sample 68334-001 had values > 5X and > 10X (barium) the blank values and will not be qualified.

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

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

Matrix Spike (MS) Analysis

The MS met QC acceptance criteria except as follows:

The %R for barium (73%) and copper (74%) were slightly < QC acceptance criteria (75-125%). Using professional judgment, no data will be qualified.

Replicate Analysis

The replicate analysis met QC acceptance criteria.

ICP Interference Check Sample (ICS)

The ICS met QC acceptance criteria.

It should be noted that the ICS was not run at the end of the sequences for metals analysis (ICPMS). No data will be qualified as a result.

ICP Serial Dilution

The serial dilutions met QC acceptance criteria except as mentioned above in the summary section.

Detection Limits/Dilutions

All detection limits were properly reported.

Sample 68334-001 was diluted 10X for calcium, magnesium and sodium in order to bring these analytes within the linear range of the instrument.

Other QC

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

No other specific issues were identified which affect data quality.

Data Validation Summary

Site/Project: OJJ GWM Project/Task #: 7223.01.05 # of Samples: 1 Matrix: Aqueous

AR/COC #: 605577 Laboratory Sample IDs: 68334-001

Laboratory: GRL

Laboratory Report #: 68334

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

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

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

Reviewed By: [signature] Date: 11.5.02

WS 2 of 2 (Reanalysis)

Inorganic Metals

Site/Project: DJJ GWM AR/COC #: 605577 Laboratory Sample IDs: 68334-001

Laboratory: GEL Laboratory Report #: 68334

Methods: SW-846 6020 (ICP-MS)

# of Samples: 1 Matrix: Aqueous Batch #s: 206630

CAS #/ Analyte	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	BX5 mg/l	BX10	
			mg/l			mg/l				QC Element 75-125			%D/RSD								
7429-90-5 Al	✓	✓	110.1=110%	✓	✓	✓	✓	NA		✓	NA		✓	✓	NA	NA	NA	NA			
7440-39-3 Ba	✓	✓	✓	✓	✓	* .00286				73			✓	✓	✓				.0142	.0284	>10X
~~7440-41-7 Be~~																					No Q
7440-43-9 Cd	✓	✓	✓	✓	✓	✓				✓			NA	✓	NA						
7440-70-2 Ca					✓	✓				NA			✓		✓			mDLx5			No Q
7440-47-3 Cr					[.0049]	.00127				✓			NA		NA			[ ]	.00635		ND
7440-48-4 Co					✓	✓				✓			✓		✓						UJ, B3
7440-50-8 Cu						.00075				✓			✓		NA				.00375		<5X
7439-89-6 Fe						✓				74			✓		✓						J, B
7439-95-4 Mg			89.4 = 90%			✓				NA			✓		10.9/10.5						
7439-96-5 Mn			✓			✓				NA			✓		10.9/10.5 LT						
7440-02-0 Ni			✓			✓				✓			✓		N/A						
7440-09-7 K			89.8 = 90%		.0298	.0195				NA			✓		16.7/15.7				.1475/.0975		>5X
7440-22-4 Ag			✓		✓	✓				✓			NA		NA						No Q
7440-23-5 Na						✓				NA			✓		65.9/50						
7440-62-2 V						✓				✓			NA		NA						
7440-66-6 Zn						.00235				✓			✓		NA				.01175		>5X
																					No Q
7439-92-1 Pb						✓				✓			NA		NA						
7782-49-2 Se						✓				✓			NA		NA						
7440-38-2 As						.00276				✓			✓		NA				.0138		>5X
7440-36-0 Sb						✓				✓			NA		NA						
7440-28-0 Tl				.000025		✓				✓			✓		NA				.000125		>5X
7439-97-6 Hg																					
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: Sample was relogged - GEL's LOC incomplete.

Reviewed By: dlval Date:

Ca Mg Na 10X in order to bring raw values within linear range of instrument.

All non-detects UJ, NTP Sb Cd Ag V Cr

All detect J, NTP

* Ba > RL no end ICS-AB

WS lot 2 (Original)

Inorganic Metals

Site/Project: OJJ GWM AR/COC #: 605577 Laboratory Sample IDs: 63956-006

Laboratory: GEL Laboratory Report #: 63956

Methods: SW-846

# of Samples: 1 Matrix: Aqueous Batch #s: 188867 (Metals) ~~189399 (Hg)~~

CAS #/ Analyte	QC Element																			
	TAL	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dilu-tion	Field Dup. RPD	Equip. Blanks	Field Blanks		
7429-90-5 Al																				
7440-39-3 Ba																				
7440-41-7 Be	X	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓					
7440-43-9 Cd																				
7440-70-2 Ca																				
7440-47-3 Cr																				
7440-48-4 Co																				
7440-50-8 Cu																				
7439-89-6 Fe																				
7439-95-4 Mg																				
7439-96-5 Mn																				
7440-02-0 Ni																				
7440-09-7 K																				
7440-22-4 Ag																				
7440-23-5 Na																				
7440-62-2 V																				
7440-66-6 Zn																				
7439-92-1 Pb																				
7782-49-2 Se																				
7440-38-2 As																				
7440-36-0 Sb																				
7440-28-0 Tl																				
7439-97-6 Hg																				
Cyanide CN																				

NOT INCLUDED IN VALIDATION REPORT

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:

According to the case narr, only Be is to be reported from the original.

Reviewed By: [signature] Date: 11.15.02

Contract Verification Review (CVR)

Project Leader Collins | Project Name DSS-GWM (TAL Metals Re-Analysis) | Case No. 7223_01.05

AR/COC No. 605577 | Analytical Lab GEL | SDG No. 68334

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	N/A				
1.2	Container type(s) correct for analyses requested	N/A				
1.3	Sample volume adequate for # and types of analyses requested	N/A				
1.4	Preservative correct for analyses requested	N/A				
1.5	Custody records continuous and complete	N/A				
1.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X				
1.7	Date samples received	X				
1.8	Condition upon receipt information provided	X				

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X				
2.4	Matrix spike/matrix spike duplicate data provided (if requested)	X				
2.5	Detection limits provided; PQL and MDL (or IDL), MDA and L_c	X				
2.6	QC batch numbers provided	X				
2.7	Dilution factors provided and all dilution levels reported	X				
2.8	Data reported in appropriate units and using correct significant figures	X				
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	N/A				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met	X				
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X				

Contract Verification Review (Continued)

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1 Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2 Quantitation limit met for all samples	X		
3.3 Accuracy a) Laboratory control samples accuracy reported and met for all samples	X		
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	N/A		
c) Matrix spike recovery data reported and met		X	Barium and Iron outside acceptable TCLP Metal recovery limits; cadmium and calcium outside RCRA Metals acceptable limits
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	N/A		
3.5 Blank data a) Method or reagent blank data reported and met for all samples		X	Arsenic, Barium, Copper, Potassium, Sodium, Zinc, Chromium detected in re-analysis TAL Metals method blank; Selenium detected in RCRA Metals blank
b) Sampling blank (e.g., field, trip, and equipment) data reported and met	N/A		
3.6 Contractual qualifiers provided: "J"- estimated quantity; "B"-analyte found in method blank above the MDL for organic or above the PQL for inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"-analysis done beyond the holding time		X	"B" qualifier missing for sodium on the TAL Metals Certificate of Analysis and for selenium in the RCRA QC Summary method blank
3.7 Narrative addresses planchet flaming for gross alpha/beta	N/A		
3.8 Narrative included, correct, and complete	X		
3.9 Second column confirmation data provided for methods 8330 (high explosives) and 8082 (pesticides/PCBs)	N/A		

Contract Verification Review (Continued)

4.0 Calibration and Validation Documentation

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

Contract Verification Review (Concluded)

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions
049493-R06	TAL Metals	sodium "B" qualifier was not provided for sodium on the Certificate of Analysis
049493-006	RCRA Metals	selenium "B" qualifier provided on Certificate of Analysis and indicated in narrative but was not provided in the QC Summary for the method blank QC1200271143

Were deficiencies unresolved? (Yes) No

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

If no, provide: nonconformance report or correction request number 5186 and date correction request was submitted: 11/04/02

Reviewed by: [illegible] Date: 11/04/02 Closed by: [illegible] Date: 11-12-02

Page: _____ of _____
Project #: 7223.01.04.01
GEL Quote #:
COC Number [1]: 605577
LIMS Number:

GEL Chain of Custody and Analytical Request

General Engineering Laboratories, Inc.
2040 Savage Road
Charleston, SC 29407
Phone: (843) 556-8171
Fax: (843) 766-1178

Project Name / Site Name:

Client Name: Phone #: Fax #:

Address:

Collected by: Send Results To:

Sample Analysis Requested [5] (Fill in the number of containers for each test)

Field Sample ID	Should this sample be considered radioactive? (Yes or No)	Date Collected (dd-mm-yy)	Time Collected (Military) (hhmm)	Sample Depth (beginning - ending)	QC Code [2]	Field Filtered [3]	Sample Matrix [4]	Total Number of Containers	TAL METALS										Remarks
605541.																			
01 049493-R08 CTF-MW2		07/17/02	1135	-			GW	1											relog of 63956006
				-															
				-															
				-															
				-															
				-															
				-															
				-															
				-															
				-															
				-															

TAT Requested: _____ Normal: _____ Rush: _____ (Subject to Surcharge) | Fax Results: Yes / No | Deliverable: C of A / QC Summary / Level 1 / Level 2 / Level 3 / Level 4

Comments: (attach compound and/or element list requested)

Chain of Custody Signatures

Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1.			1.		
2.			2.		
3.			3.		

Sample Delivery Details / Laboratory Receipt

Delivered Directly to Lab: _____ Shipped: _____
Method of Shipment: _____ Airbill #: _____
Analytical Lab: _____ Location: _____
Lab Recipient: _____ Date: _____ Time: _____

1.) Chain of Custody Number = Client Determined
2.) QC Codes: N = Normal Sample, TB = Trip Blank, FD = Field Duplicate, EB = Equipment Blank, MS = Matrix Spike Sample, MSD = Matrix Spike Duplicate Sample, G = Grab, C = Composite
3.) Field Filtered: For liquid matrices, indicate with a - Y - for yes the sample was field filtered or - N - for sample was not field filtered.
4.) Matrix Codes: DW = Drinking Water, GW = Groundwater, SW = Surface Water, WW = Waste Water, SO = Soil, SD = Sediment, SL = Sludge, SS = Solid Waste
5.) Sample Analysis Requested: Analytical method requested (i.e. 8260B, 6010B/7470A) and number of containers provided for each (i.e. 8260B - 3, 6010B/7470A - 1).

For Lab Receiving Use Only
Custody Seal Intact? YES NO
Cooler Temp: _____ C

WHITE = LABORATORY **YELLOW = FILE** **PINK = CLIENT**

U1

Date: 11/04/02

To:	Edie Kent/Nicole McCleary	From:	Lorraine Herrera
Company:	GEL	Org:	6133
Phone:	(843) 556-8171	Phone:	(505) 844-3199
Fax:	(843) 766-1178	Fax:	(505) 844-3128

Correction Request

COC: 605577 SDG: 68334 Tracking No: 5186

NOTE: Nicole/Edie,

Please make the following correction(s):

- Sample 049493-R08 "B" qualifier not provided for sodium on the Certificate of Analysis (page 14)
- "B" qualifier provided for selenium on the Certificate of Analysis for sample 049493-008 and indicated in narrative but was not indicated on the QC Summary for the method blank QC1200271143 (page 22)

Thank you,
Lorraine

Sandia National Laboratories
Sample Management Office
P.O. Box 5800
Albuquerque, New Mexico 87185-1331

GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

RECORDS CENTER/
ORIGINAL COPY

RECEIVED
OCT 21 2002

October 17, 2002

Sandia National Laboratories
1515 Eubank SE
Albuquerque, New Mexico 87123
Attention: Pam Puissant, MS-0756, Org. 7578, Building 823/ Room 4276

Re: ARCOC-605577 SDG#68334

Project Coordinator: Pam Puissant

Dear Ms. Puissant:

Enclosed is the data package for the aqueous sample for ARCOC-605577 SDG#68334, which was re-analyzed for Metals parameters.

General Engineering Laboratories appreciates this opportunity to provide you with analytical results, and trusts that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 769-7385.

Yours very truly,

Edith M. Kent

Edith M. Kent
Project Manager

enclosure

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

Printed on Recycled Paper.

MEMORANDUM

DATE: 08/22/02

TO: File

FROM: Linda Thal

SUBJECT: Organic Data Review and Validation - SNL
Site: DSS - GWM
ARCOC # 605577, -579, -580 GEL SDG # 63956
Project/Task No. 7223.01.05

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 8260B (VOC), SW-846 8082 (PCBs) and SW-846 8330 (HE). Problems were identified with the data package that resulted in the qualification of data.

VOC: The equipment blank (EB) associated with sample 63956-001 and – 004 had an acetone and methylene chloride value > RL. The trip blank (TB) associated with sample 63956-001 had a methylene chloride value > DL.

11/26/02 see Blank section below

Sample 63956-001 had a methylene chloride value > DL, < RL and < 10X the EB and TB values, and will be qualified "U, B1," at the RL. 11/26/02 see Blank section below

HE: The samples were re-extracted out of method specified hold time but within 2X the hold time due to QC failures. Both sets of data are reported on the Certificate of Analysis and both sets of data will be validated. Both sets of QC, ICals and CCVs are supplied.

HE Batch # 188519: The LCS/LCSD %R for 1,3,5-trinitrobenzene (65/16%) failed QC acceptance criteria (84-110%). The RPD for 1,3,5-trinitrobenzene (122%) failed QC acceptance criteria (0-20%). The associated sample results are non-detect and will be qualified "UJ, A, P".

The LCS/LCSD %R for tetryl (44/6%) failed QC acceptance criteria (73-110%). The LCSD %R was <10%, however the MS/MSD %Rs for tetryl were in criteria. The RPD for tetryl (150%) failed QC acceptance criteria (0-20%). The associated sample results are non-detect and using professional judgment will be qualified "UJ, A, P".

The RPD for 4-amino-2,6-dinitrotoluene (31%) failed QC acceptance criteria (0-24%). The associated sample results are non-detect and using professional judgment will be qualified "UJ, P".

HE Batch # 189460: The associated sample results for the re-extractions are non-detect for all target analytes and will be qualified "UJ, HT".

The LCS/LCSD %R for 1,3,5-trinitrobenzene (15/11%) failed QC acceptance criteria (84-110%). The RPD for 1,3,5-trinitrobenzene (36%) failed QC acceptance criteria (0-20%). The associated sample results are non-detect and already qualified "UJ" due to hold time infringements. The descriptor flags " A, P" will be added to the qualifier.

The LCS/LCSD %R for tetryl (8/7%) failed QC acceptance criteria (73-110%) and were < 10%. The associated sample results are non-detect and using professional judgment will be qualified "R, A".

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

Holding Times/Preservation

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

Calibration

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

VOC: The CCV had a %D >20 but <40 for bromoform. The sample results were non-detect for bromoform, and using professional judgment no data will be qualified.

Blanks

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

VOC: The trip blank associated with sample 63956-001had a toluene value > DL but < RL. The sample result was non-detect for toluene and no data will be qualified as a result. The EB associated with samples 63956-001 and –004 had a dibromochloromethane value > DL. The sample results were non-detect and no data will be qualified as a result.

11/26/02 The EB appearing on the COC was not associated with these samples. Per Tim Jackson, all EB-associated qualifiers were removed from database – no revision required. MLH

Surrogates

All Analyses: All surrogate acceptance criteria were met.

Internal Standards (ISs)

VOC: All internal standard acceptance criteria were met.

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

All Analyses: All MS/MSD acceptance criteria were met except as follows:

> VOC: It should be noted that the sample used for the PS/PSD was of similar matrix from SNL SDG 64144. No data will be qualified as a result.
>
> HE Batch # 189460: No MS/MSD was extracted with this batch. The LCS/LCSD will be used to assess accuracy and precision for the batch. No data will be qualified as a result.

Laboratory Control Samples (LCS/LCSD) Analysis

VOC: The LCS acceptance criteria were met by the successful analysis of a second source CCV. It should be noted that no compound in the LCS was associated with internal standard toluene-d8. No LCSD was analyzed. No data will be qualified as a result.

HE: The LCS/LCSD acceptance criteria were met except as mentioned above in the summary section.

PCB: No LCSD was analyzed. No data will be qualified as a result.

Confirmation Analyses

VOC: No confirmation analysis required.

HE Batch # 188519: According to the case narrative, the target analytes observed in sample 63956-011 (EB) were not confirmed on the secondary column. No raw data is supplied. No data will be qualified as a result.

HE Batch # 189460: According to the case narrative, the target analytes observed in re-extracted samples 63956-011 and -011 were not confirmed on the secondary column. No raw data is supplied. No data will be qualified as a result.

PCB: The sample results were non-detect for all aroclors and therefore no confirmation analyses were performed.

Detection Limits/Dilutions

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

Other QC

VOC: Trip blanks and an equipment blank was submitted on the ARCOC. 11/26/02 See Blank section
No field dup was submitted on the ARCOC.

HE: An equipment blank was submitted on the ARCOC.
No field dup or field blank was submitted on the ARCOC.

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

No raw data was submitted with the package.

No other specific issues were identified which affect data quality.

Reviewed by: KAL 08/30/02, Level 1

MEMORANDUM

DATE: August 23, 2002

TO: File

FROM: Linda Thal

SUBJECT: Inorganic Data Review and Validation – SNL
Site: DSS - GWM ARCOC No. 605577
GEL SDG No. 63956 Project/Task No. 7223.01.05

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 6020 (ICPMS metals), SW-846 7470 (CVAA Hg), EPA 353.1 (NPN), SW-846 9056 (anions) and SW-846 9012 (total CN). Problems were identified with the data package that resulted in the qualification of data.

Metals:

Sample 63956-006 and – 007 were received without the required chemical preservation, but were chemically preserved after receipt. All detects will be qualified "J, TP" and all non-detects "UJ, TP".

Chromium was detected in the ICB and CCB at a negative value, with an absolute value > DL but < RL. Sample 63956-006 was non-detect for chromium and is already qualified "UJ" due to preservation infringements; the descriptor flag "B3" will be added to the qualifier.

The serial dilution had a RPD > QC acceptance criteria (10%) for magnesium (11%). The Mg result for sample 63956-007 was > 50X the RL and is already qualified "J" due to preservation infringements. No further qualification is necessary.

Total Cyanide:

Sample 63956-008 was received without the required chemical preservation, but was chemically preserved after receipt. The sample result was non-detect and will be qualified "UJ, TP".

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

Holding Times/Preservation

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

Calibration

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

Blanks

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

> Anions: The MB for chloride had a value > DL. The chloride value was > 5X the associated MB value and no data will be qualified as a result.

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/PS met QC acceptance criteria.

> Metals: It should be noted that the MS for Na and Hg analyses was run on a sample of similar matrix from a different SNL SDG (63737). No data will be qualified as a result.
>
> Anions: It should be noted that the PS for this analyses was run on a sample of similar matrix from a different SNL SDG (63387). No data will be qualified as a result.
>
> NPN: It should be noted that the PS for this analyses was run on a sample of similar matrix from a different SNL SDG (63443). No data will be qualified as a result.

Replicate Analysis

All Analyses: The replicate analysis met QC acceptance criteria.

> Metals: It should be noted that the replicate for Na and Hg analyses was run on a sample of similar matrix from a different SNL SDG (63737). No data will be qualified as a result.

Anions: It should be noted that the replicate for this analyses was run on a sample of similar matrix from a different SNL SDG (63387). No data will be qualified as a result.

NPN: It should be noted that the replicate for this analyses was run on a sample of similar matrix from a different SNL SDG (63443). No data will be qualified as a result.

ICP Interference Check Sample (ICS)

The ICS met QC acceptance criteria.

It should be noted that the ICS was not run at the end of the sequences for metals analysis (ICPMS). No data will be qualified as a result.

ICP Serial Dilution

The serial dilutions met QC acceptance criteria except as mentioned above in the summary section.

Detection Limits/Dilutions

All Analyses: All detection limits were properly reported.

Metals: Sample 63956-007 was diluted 10X for Ca, Mg and K, and 5X for Na analyses to bring these analytes within the linear range of the instrument.

Anions: The sample was diluted 50x for chloride and 10X for sulfate due to high levels of analyte present in the sample.

Other QC

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

No other specific issues were identified which affect data quality.

Reviewed by: KAL 08/30/02, Level 1

amend to
pkg
605577

AMENDED

QC Summary

Report Date: August 06, 2002

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

Workorder: 63956

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Metals Analysis - ICPMS Federal											
Batch 188867											
QC1200271144 63956006 DUP											
Arsenic			0.0705		0.0723	mg/L	3		(0%-20%)	BAJ	07/26/02 22:50
Barium			0.0788		0.0802	mg/L	2		(0%-20%)		
Cadmium		J	0.000044	U	ND	mg/L	N/A ^		(+/-0.001)		
Calcium					392	mg/L	N/A		(0%-20%)		
Chromium		U	ND	U	ND	mg/L	N/A		(+/-0.003)		
Lead		J	0.000549	J	0.000701	mg/L	N/A ^		(+/-0.002)		
Magnesium					94.5	mg/L	N/A		(0%-20%)		
Potassium					55.2	mg/L	N/A		(0%-20%)		
Selenium		J	0.00122	J	0.00179	mg/L	N/A ^		(+/-0.005)		
Silver		U	ND	U	ND	mg/L	N/A		(+/-0.001)		
QC1200271147 LCS											
Arsenic	0.050				0.0563	mg/L		113	(80%-120%)		07/26/02 22:27
Barium	0.050				0.0545	mg/L		109	(80%-120%)		
Cadmium	0.050				0.0543	mg/L		109	(80%-120%)		
Calcium	2.00				2.24	mg/L		112	(80%-120%)		
Chromium	0.050				0.0544	mg/L		109	(80%-120%)		
Lead	0.050				0.0562	mg/L		112	(80%-120%)		
Magnesium	2.00				2.27	mg/L		114	(80%-120%)	PRB	07/29/02 17:19
Potassium	2.00				2.29	mg/L		114	(80%-120%)	BAJ	07/26/02 22:27
Selenium	0.050				0.0549	mg/L		110	(80%-120%)		
Silver	0.050				0.055	mg/L		110	(80%-120%)		
QC1200271143 MB											
Arsenic				U	ND	mg/L					07/26/02 22:21
Barium				U	ND	mg/L					
Cadmium				U	ND	mg/L					
Calcium				U	ND	mg/L					
Chromium				U	ND	mg/L					
Lead				U	ND	mg/L					
Magnesium				U	ND	mg/L				PRB	07/29/02 17:14
Potassium				U	ND	mg/L				BAJ	07/26/02 22:21
Selenium				U	ND	mg/L					
Silver				U	ND	mg/L					
QC1200271146 63956006 MS											
Arsenic	0.040		0.0705		0.120	mg/L		125	(75%-125%)		07/26/02 22:55
Barium	0.050		0.0788		0.142	mg/L		125	(75%-125%)		
Cadmium	0.005	J	0.000044		0.0065	mg/L		129*	(75%-125%)		
Calcium	2.00				405	mg/L		907*	(75%-125%)		
Chromium	0.050	U	ND		0.0539	mg/L		108	(75%-125%)		
Lead	0.020	J	0.000549		0.0219	mg/L		107	(75%-125%)		
Magnesium	2.00				109	mg/L		1270*	(75%-125%)		
Potassium	2.00				58.3	mg/L		319*	(75%-125%)		
Selenium	0.010	J	0.00122		0.0133	mg/L		120	(75%-125%)		

AMENDED

QC Summary

Workorder: 63956

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Metals Analysis - ICPMS Federal											
Batch 188867											
Silver	0.050	U	ND		0.0538	mg/L		108	(75%-125%)		
QC1200271145 63956006 SDILT											
Arsenic			70.5		13.7	ug/L	2.94				07/26/02 23:01
Barium			78.8		15.5	ug/L	1.92				
Cadmium		J	0.044	U	ND	ug/L	N/A				
Calcium					75800	ug/L	N/A				
Chromium		U	ND	U	ND	ug/L	N/A				
Lead		J	0.549	J	0.119	ug/L	8.38				
Magnesium					18400	ug/L	N/A				
Potassium					11400	ug/L	N/A				
Selenium		J	1.22	J	0.973	ug/L	298				
Silver		U	ND	U	ND	ug/L	N/A				
Batch 189924											
QC1200273723 63737004 DUP											
Sodium			184		164	mg/L	11		(0%-20%)	JAB	08/01/02 16:36
QC1200273726 LCS											
Sodium	2.00				1.62	mg/L		81	(80%-120%)		08/01/02 16:14
QC1200273722 MB											
Sodium				U	ND	mg/L					08/01/02 16:08
QC1200273725 63737004 MS											
Sodium	2.00		184		170	mg/L		N/A	(75%-125%)		08/01/02 16:42
QC1200273724 63737004 SDILT											
Sodium			36700		7240	ug/L	1.33				08/01/02 16:47
Metals Analysis-Mercury Federal											
Batch 189399											
QC1200272292 63737003 DUP											
Mercury		U	ND	U	ND	mg/L	N/A		(+/-0.0002)	NOR1	08/02/02 16:13
QC1200272294 LCS											
Mercury	0.002				0.00195	mg/L		98	(80%-120%)		08/02/02 16:07
QC1200272291 MB											
Mercury				U	ND	mg/L					08/02/02 16:05
QC1200272293 63737003 MS											
Mercury	0.002	U	ND		0.00188	mg/L		94	(75%-125%)		08/02/02 16:15

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. 1
- X Presumptive evidence that the analyte is not present. Please see narrative for further information.
- X Presumptive evidence that the analyte is not present. Please see narrative for further infromation.

AMENDED

QC Summary

Workorder: 63956

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

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.

TOTAL METALS
- 5a -
MATRIX SPIKE SUMMARY

AMENDED

SDG No.: 63956

Contract: SNLS00401 **Lab Code:** GEL **Case No.:** GEL **SAS No.:**

Matrix: WATER **Level:** LOW **Client ID:** 049493-008S

Sample ID: 63956006 **Spiked ID:** 1200271146 **Percent Solids for Spike Sample:** 0.00

Analyte	Units	Acceptance Limit %R	Spiked Result	C	Sample Result	C	Spike Added	% Recovery	Qual	M
Arsenic	mg/L	75 - 125	0.120		0.071		0.040	123.7		MS
Barium	mg/L	75 - 125	0.142		0.079		0.050	126.4	N	MS
Cadmium	mg/L	75 - 125	0.007		0.000	B	0.005	129.1	N	MS
Calcium	mg/L		405		387		2.000	900.0		MS
Chromium	mg/L	75 - 125	0.054		0.000	U	0.050	107.8		MS
Lead	mg/L	75 - 125	0.022		0.001	B	0.020	106.8		MS
Magnesium	mg/L		109		83.1		2.000	1245.0		MS
Potassium	mg/L		58.3		52.0		2.000	315.0		MS
Selenium	mg/L	75 - 125	0.013		0.001	B	0.010	119.8		MS
Silver	mg/L	75 - 125	0.054		0.000	U	0.050	107.6		MS

TOTAL METALS
- 6 -
DUPLICATE SAMPLE SUMMARY

AMENDED

SDG No.: 63956

Contract: SNLS00401 **Lab Code:** GEL **Case No.:** GEL **SAS No.:**

Matrix: WATER **Level:** LOW **Client ID:** 049493-008D

Sample ID: 63956006 **Duplicate ID:** 1200271144 **Percent Solids for Duplicate:** 0.00

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M
Arsenic	mg/L	+/-20	0.071		0.072		2.5		MS
Barium	mg/L	+/-20	0.079		0.080		1.8		MS
Cadmium	mg/L	+/-20	0.000	B	0.000	U	200.0		MS
Calcium	mg/L	+/-20	387		392		1.3		MS
Chromium	mg/L	+/-20	0.000	U	0.000	U			MS
Lead	mg/L	+/-20	0.001	B	0.001	B	24.3		MS
Magnesium	mg/L	+/-20	83.1		94.5		12.7		MS
Potassium	mg/L	+/-20	52.0		55.2		6.0		MS
Selenium	mg/L	+/-20	0.001	B	0.002	B	37.9		MS
Silver	mg/L	+/-20	0.000	U	0.000	U			MS

TOTAL METALS

SERIAL DILUTION SAMPLE SUMMARY

AMENDED

SDG No.: 63956

Contract: SNLS00401 **Lab Code:** GEL **Case No.:** GEL **SAS No.:**

Matrix: WATER **Level:** LOW **Client ID:** 049493-008L

Sample ID: 63956006 **Serial Dilution ID:** 1200271145

Analyte	Initial µg/L	C	Serial µg/L	C	% Difference	Qual	Acceptance Limits	M
Arsenic	70.5		68.4		3.0		10 %	MS
Barium	78.8		77.3		1.9		10 %	MS
Cadmium	0.044	B	0.200	U	100.0		10 %	MS
Calcium	387000		379000		2.1		10 %	MS
Chromium	0.380	U	1.900	U			10 %	MS
Lead	0.549	B	0.595	B	8.4		10 %	MS
Magnesium	83100		92200		11.0	E	10 %	MS
Potassium	52000		57000		9.6		10 %	MS
Selenium	1.220	B	4.860	B	298.4		10 %	MS
Silver	0.040	U	0.200	U			10 %	MS

Rev. 8/8/97

AMENDED

GEL ORGANIC EXTRACTION TRACKER FORM

BATCH # 188[illegible]	
Test: PCB	
Matrix: Soil/Other	
Prep Method: 3510	

SOLVENT LOTS	CH2Cl2: X09E10
Hexane: CF187	Toluene:
Acetone:	Isooctane:
Ether:	Methanol:

Cleanup or Derivatization Technique	Sulfur Lot:
GPC bead Lot:	Florisil Lot:
Silica gel Lot:	Acid Lot:
Alumina Lot:	

GEL SOP Reference	R
GL-OA-E- 013	11
GL-OA-E- 037	2
GL-OA-E-	
GL-OA-E-	
GL-OA-E-	
GL-OA-E-	

Surrogate Std. Sol. ID:	UE020724-01	Conc.	200 µg	Vol. Added (ml):	0.5/1.0
MS/LCS Std. Sol. ID:	UE020712-01	Conc.	1 µg	Vol. Added (ml):	0.5/1.0

Client	GEL Sample ID#	Date Extracted	Sample Wt. (gm) or Vol. (ml)	Sample pH Ini.	Sample pH Ini. Ext.	Sample pH Sec. Ext.	Extract. Analyst	Spikes Verified By	Cleanup (cmup) Applied or Derivation	Volumes of Extract (ml.) Prior to Cleanup	Amt. Cleaned	After Cleanup	Final Ext. Vol.	Final Solv.	Date Cleaned (or Deriv.) & Initials	Re-ext. sample X	Comment (Include SDG# when
SMLS	63956013	7/25/02	1000	7			JAD	JMB	KMG/HSO4	1	1	8	1.0	Hex	JAD		
MS	1200270368		500	7						1	1	8	0.5		7/25/02		
MSD	1200270369		500	7						1	1	8	0.5				
→	64040006		1000	7						1	1	8	1.0				
[redacted]	64010002		1045	6						1	1	8	1.0				
MS	1200270370		500	6						1	1	8	1.0	JAD 7/25/02			
MSD	1200270371		500	6						1	1	8	1.0	JAD 7/25/02			
	64010001		1030	6						1	1	8	1.0				
	64010003		1025	6						1	1	8	1.0				
→	64010004 *		1025	7						1	1	8	1.0				* possibly contains double sample
Method Blank #1	1200270366		1000	6			JAD	JMB	KMG/HSO4	1	1	8	1.0	Hex			
LCS #1	1200270367		1000	6						1	1	8	1.0				
LCS #2																	

Contract Verification Review (CVR)

Project Leader Collins | Project Name DSS-GWM | Case No. 7223_01.05

AR/COC No. 605577, 605579, 605580 | Analytical Lab GEL | SDG No. 63956A, B, C

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	client identification incorrect for sample #049500-001		
1.7	Date samples received	X				
1.8	Condition upon receipt information provided	X				

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X				
2.4	Matrix spike/matrix spike duplicate data provided (if requested)	X				
2.5	Detection limits provided; PQL and MDL (or IDL), MDA and L_c	X				
2.6	QC batch numbers provided	X				
2.7	Dilution factors provided and all dilution levels reported	X				
2.8	Data reported in appropriate units and using correct significant figures	X				
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	N/A				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met		X	missed HPLC hold time due to re-extraction		
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X				

Contract Verification Review (Continued)

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1 Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2 Quantitation limit met for all samples	X		
3.3 Accuracy a) Laboratory control samples accuracy reported and met for all samples		X	HPLC LCS out of acceptance limits for 1,3,5-trinitroabenzene, tetryl, m-dinitrobenzene; re-extraction out for 1,3,5-trinitrobenzene, and m-ditrobenzene
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	MS recovery data out for cadmium, calcium. magnesium, potassium
3.4 Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	N/A		
b) Matrix spike duplicate RPD data reported and met for all organic samples		X	HPLC RPD% out of acceptance limits for 1, 3, 5-trinitrobenzene, 4-amino-2,6-dinitrotoluene, tetryl
3.5 Blank data a) Method or reagent blank data reported and met for all samples		X	chlorine detected in inorganic method blank
b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	VOC trip blank out of acceptance limits for trichloroethylene, methylene chloride and equipment blank out for acetone, dibromochloromethane, and methylene chloride
3.6 Contractual qualifiers provided: "J"- estimated quantity; "B"-analyte found in method blank above the MDL for organic or above the PQL for inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"-analysis done beyond the holding time	X		
3.7 Narrative addresses planchet flaming for gross alpha/beta	N/A		
3.8 Narrative included, correct, and complete	X		
3.9 Second column confirmation data provided for methods 8330 (high explosives) and 8082 (pesticides/PCBs)	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	N/A		

Contract Verification Review (Concluded)

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions
049500-001	VOC (8260)	client identification is incorrect

Were deficiencies unresolved? (Yes) No

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

If no, provide: nonconformance report or correction request number 4766 and date correction request was submitted: 08/16/02

Reviewed by: [signature] Date: 08/16/02 Closed by: [signature] Date: 08.19.02

Date: 08/16/02

To:	Edie Kent	From:	Lorraine Herrera
Company:	GEL	Org:	6133
Phone:	(843) 556-8171	Phone:	(505) 844-3199
Fax:	(843) 766-1178	Fax:	(505) 844-3128

Correction Request

COC: 605577 SDG: 63956A Tracking No: 4766

NOTE: Edie,

Please correct the following:

- incorrect client description for sample no. 049500-001 (63956002)

Thank you,
Lorraine

Sandia National Laboratories
Sample Management Office
P.O. Box 5800
Albuquerque, New Mexico 87185-1331

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. N/A SAR/WR No.

AR/COC 605577

Dept. No./Mail Stop:	6133/MS-1087	Date Samples Shipped: 7-22-02 SMO USE	Contract No:	PO 21671 .05	☐ Waste Characterization
Project/Task Manager:	Sue Collins/505-284-2546	Carrier/Waybill No. 11118	Project/Task No.:	7223 .01 .04 .01	-RCRA Date=
Project Name:	~~SWMUDSS~~ DSS's - GWM	Lab Contact: Edie Kent/803-556-8171	SMO Authorization:		☐ Send:Preliminary/report to
Record Center Code:		Lab Destination: GEL			☑ Validation Required
Logbook Ref. No.:	ER 089	SMO Contact/Phone: Pam Puissant/505-844-3185			☐ Released by COC No.:
Service Order No.	CF ~~023-02~~ 022-02	Send Report to SMO: Wendy Palencia/505-844-3132			Bill To: Sandia National Labs (Accounts Payable)
Location	Tech Area				P.O. Box 5800, MS-0154
Building NA	Room NA				Albuquerque, NM., 87185-0154

SEE ATTACHED BOTTLE ORDER

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	Preserve All@4C	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
049493-001	CTF-MW2	120	154	07/17/02 1134	GW	G	3x40ml	HCL	G	SA	VOC (8260)	
049493-008	CTF-MW2	120	154	07/17/02 1135	GW	P	500ml	HNO3	G	SA	RCRA Metals (6020)	
049493-010	CTF-MW2	120	154	07/17/02 1140	FGW	P	500ml	HNO3	G	SA	Major Cations (6020)	
049493-012	CTF-MW2	120	154	07/17/02 1136	GW	P	500ml	NaOH	G	SA	Total Cyanide (9012A)	
049493-013	CTF-MW2	120	154	07/17/02 1137	GW	P	250ml	4C	G	SA	Major Anions (300.0)	
049493-015	CTF-MW2	120	154	07/17/02 1138	GW	AG	4x1L	4C	G	SA	High Explosives (8330)	
049493-016	CTF-MW2	120	154	07/17/02 1139	GW	P	250ml	H2SO4	G	SA	NPN (353.1)	
049500-001	SWMUD-TB4	NA	NA	07/17/02 1134	DIW	G	3x40ml	HCL	G	TB	VOC (8260)	

RMMA	☐ Yes ☑ No Ref. No.	**Sample Tracking** Smo Use	**Special Instructions/QC Requirements:**
Sample Disposal	☐ Return to Client ☑ Disposal by lab	Date Entered(mm/dd/yy) 07/31/02	**EDD** ☑ Yes ☐ No
Turnaround Time	☐ 7 Day ☐ 15 Day ☑ 30 Day	Entered by: JAC	**Raw Data Package** ☑ Yes ☐ No
Return Samples By:	☐ **Negotiated TAT**	QC Inits.	***Please send report to:**

Abnormal Conditions on Receipt

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	Alfred Santillanes			Weston/6135/844-5130/228-0710
	John Boyd			Shaw/6135/284-3307/228-9231
	Robert Lynch			~~Weston/6135/844-4013/250-7090~~

Tim Jackson/Org.6133/MS1087/505-284-2547

Major Anions/ Br,CL,FL,SO4

FGW / Filtered in field w/.45 micron filter

Please list as separate report.

1.Relinquished by	Org. 6135	Date 7-22-02	Time 0800	4.Relinquished by	Org.	Date	Time
1. Received by	Org. 6133	Date 7/22/02	Time 0800	4. Received by	Org.	Date	Time
2.Relinquished by	Org. 6133	Date 7/22/02	Time 1115	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

***7 & 15 Day Turnaround Time: ERCL requires prior notification.**

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Page 1 of 1

Internal Lab: N/A

Batch No.

SMO Use

AR/COC 605761

Dept. No./Mail Stop:	6133/MS1089	Date Samples Shipped:	10-22-02	Project/Task No. 7222.01.09	☐ Waste Characterization
Project/Task Manager:	Sue Collins	Carrier/Waybill No.	15049	SMO Authorization:	-Send preliminary/copy report to:
Project Name:	DSS GW	Lab Contact:	Edie Kent/803-556-8171	Contract #: PO 21671	
Record Center Code:	ER	Lab Destination:	GEL	SEE ATTACHED BOTTLE ORDER	☐ Released by COC No.:
Logbook Ref. No.:	ER 089	SMO Contact/Phone:	Pam Puissant/505-284-3185		☑ Validation Required
Service Order No.	CFO 022-03	Send Report to SMO:	Wendy Palencia/505-844-3132		Bill To: Sandia National Labs (Accounts Payable)
Location	Tech Area				P.O. Box 5800 MS 0154
Building	Room				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
060021-001	CTF-MW2	120	154	10/17/02 1026	GW	G	3x40ml	HCL	G	SA	VOC (8260)	
060021-008	CTF-MW2	120	154	10/17/02 1027	GW	P	500ml	HNO3	G	SA	TAL Metals (6020)	
060021-010	CTF-MW2	120	154	10/17/02 1028	FGW	P	500ml	HNO3	G	SA	Major Cations (6020) Filtered	
060021-013	CTF-MW2	120	154	10/17/02 1029	GW	P	250ml	4C	G	SA	Major Anions (300.0)	
060021-015	CTF-MW2	120	154	10/17/02 1030	GW	AG	4x1L	4C	G	SA	High Explosives (8330)	
060021-016	CTF-MW2	120	154	10/17/02 1031	GW	P	250ml	H2SO4	G	SA	NPN (353.1)	
060024-001	CTF-TB1	NA	NA	10/17/02 1026	DIW	G	3x40ml	HCL	G	TB	VOC (8260)	

RMMA	☐ Yes ☑ No	Ref. No.	
Sample Disposal	☐ Return to Client	☑ Disposal by lab	
Turnaround Time	☐ 7 Day	☐ 15 Day	☑ 30 Day
Return Samples By:		☐ Negotiated TAT	

Sample Tracking — Smo Use
Date Entered(mm/dd/yy) 10/23/02
Entered by: RK
QC inits. JPC

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level D Package ☑ Yes ☐ No
*Send report to:
Tim Jackson/Org 6133/MS 1087/505-284-2547

Major Anions/Br,Cl,Fl,SO4
Major Cations/Ca,Mg,K,Na
FGW/ Filtered in field w/.45 micron filter
*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	Alfred Santillanes			Weston/6135/844-5130/228-0710
	John Boyd			S&W/6135/284-3307/228-9231
	Robert Lynch			Weston/6135/844-4013/250-7090

1.Relinquished by	Org. 6135	Date 10/22/02	Time 0930	4.Relinquished by	Org.	Date	Time
1. Received by	Org. 6132	Date 10/22/02	Time 0930	4. Received by	Org.	Date	Time
2.Relinquished by	Org. 6132	Date 10/23/02	Time 1130	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

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Page 1 of 1

Internal Lab N/A

Batch No.

SMO Use

AR/COC **605763**

Dept. No./Mail Stop:	6133/MS1089	Date Samples Shipped:	10-22-02	Project/Task No. 7222.01.09	☐ Waste Characterization -Send preliminary/copy report to:
Project/Task Manager:	Sue Collins	Carrier/Waybill No.	15099	SMO Authorization:	
Project Name:	DSS GW	Lab Contact:	Edie Kent/803-556-8171	Contract #: PO 21671	
Record Center Code:	ER	Lab Destination:	GEL		☐ Released by COC No.: ☑ Validation Required
Logbook Ref. No.:	ER 089	SMO Contact/Phone:	Pam Puissant/505-284-3185	See attention bottle order	
Service Order No.	CFO 023-03	Send Report to SMO:	Wendy Palencia/505-844-3132		Bill To: Sandia National Labs (Accounts Payable) P.O. Box 5800 MS 0154 Albuquerque, NM 87185-0154
Location	Tech Area				
Building	Room				

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	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
060023-001	DSS-EB1	NA	NA	10/17/02 0745	DIW	G	3x40ml	HCL	G	EB	VOC (8260)	
060023-008	DSS-EB1	NA	NA	10/17/02 0747	DIW	P	500ml	HNO3	G	EB	RCRA Metals (6020)	
060023-015	DSS-EB1	NA	NA	10/17/02 0748	DIW	AG	4x1L	4C	G	EB	High Explosives (8330)	
060025-001	DSS-TB2	NA	NA	10/17/02 0745	DIW	G	3x40ml	HCL	G	TB	VOC (8260)	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day

Return Samples By: ☐ Negotiated TAT

Sample Tracking Smo Use

Date Entered(mm/dd/yy) 10/23/02

Entered by: RL

QC Inits. JAC

Special Instructions/QC Requirements

EDD ☑ Yes ☐ No

Level D Package ☑ Yes ☐ No

*Send report to:

Tim Jackson/Org 6133/MS 1087/505-284-2547

*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	Alfred Santillanes			Weston/6135/844-5130/228-0710
	John Boyd			S&W/6135/284-3307/228-9231
	Robert Lynch			Weston/6135/844-4013/250-7090

1.Relinquished by	Org. 6135	Date 10/22/02	Time 0930	4.Relinquished by	Org.	Date	Time
1. Received by	Org. 6132	Date 10/22/02	Time 0930	4. Received by	Org.	Date	Time
2.Relinquished by	Org. 6132	Date 10/22/02	Time 1130	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

Sampl... ...ndings Summary

Site: DSS Assess GWM | **ARCOC** 605761 and 605763 | **Data:** Organic and Inorganic

Sample ID	VOC (8260B)	All HE (8330) compounds except:	479-45-8 (tetryl)	1,3,5-trinitrobenzene (99-35-4)	121-82-4 (RDX)	All TAL metals except:	7440-36-0 (antimony)	7440-47-3 (chromium)	7440-22-4 (silver)	7440-62-2 (vanadium)	7440-43-9 (cadmium)	7440-50-8 (copper)	7440-38-2 (arsenic)	General Chemistry	N599 (NPN)
060021-015 CTF-MW2	All QC acceptance criteria were met. No data will be qualified.		UJ, A	UJ, A	R										
060021-015 CTF-MW2-RE		UJ, HT	.104UJ, B2, HT	UJ, HT	UJ, HT										
060023-015 DSS-EB1			UJ, A	UJ, A											
060023-015 DSS-EB1-RE		UJ, HT	0.1J, HT	UJ, HT	UJ, HT										
060021-008 CTF-MW2						J, TP	UJ,TP	UJ,TP,B3	UJ,TP	UJ,TP	J,TP,B,B2,B3	J,TP,B			
060021-010 CTF-MW2						J, TP									
060023-008 DSS-EB1								UJ,B3			J,B,B3		J,B		
060021-016 CTF-MW2															J,B,B3

Validated By: K Mal

Date: 12/10/02

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

MEMORANDUM

DATE: 12/10/02

TO: File

FROM: Linda Thal

SUBJECT: Organic Data Review and Validation - SNL
Site: DSS Assess GWM
ARCOC # 605761 and 605763 GEL SDG # 69233
Project/Task No. 7222.01.09

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 8260B (VOC) and 8330 (HE). Problems were identified with the data package that resulted in the qualification of data.

HE Batch # 210211 (Samples 69233-008 and –009 (EB))

The LCS %R was < QC acceptance criteria but > 10% for 1,3,5-trinitrobenzene and tetryl. Associated sample results were non–detect and will be qualified "UJ, A". (It should be noted when assessing the data that the MS/MSD was in criteria for both compounds).

Sample 69233-008 had a value for RDX > RL. However, the confirmation RPD between columns was > 75% and the result will be qualified "R".

HE Batch # 211570 (Samples 69233-008-RE and –009-RE (EB))

The samples were extracted after the method specified holding time but within 2X the holding time. All non-detect results will be qualified "UJ, HT" and all detects "J, HT".

Tetryl was observed in sample 69233-008-RE at a value > DL but < RL. The confirmation RPD between columns was > QC acceptance criteria but < 75% and the sample result will be qualified "J". However, tetryl was also observed in sample 69233-009-RE (equipment blank) at a value > DL. The sample value was < 5X the EB value and will be further qualified "U, B2" at the RL.

Sample 69233-009-RE had a value for tetryl > DL but < RL. The confirmation RPD between columns was > 75%. However, since the sample result was < 5X the RL, the reported value is changed to the highest detected value and will be qualified "J", based on professional judgment.

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 properly preserved and analyzed within the method prescribed holding time except as mentioned above in the summary section.

Calibration

All Analyses: All initial and continuing calibration acceptance criteria were met with the following exception:

VOC

The initial calibration had a RF < minimum RF (0.30) but > 0.01. The associated sample results were all non-detect and using professional judgment will not be qualified.

Blanks

All Analyses: All method blank (MB), equipment blank (EB) and trip blank (TB) acceptance criteria were met except as mentioned above in the summary section.

Surrogates

All Analyses: All surrogate acceptance criteria were met.

Internal Standards (ISs)

All Analyses: All internal standard acceptance criteria were met.

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

All Analyses: All MS/MSD acceptance criteria were met except as follows:

VOC
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 as a result.

HE Batch # 211570 (Samples 69233-008-RE and –009-RE (EB))
No MS/MSD was extracted for the sample in this batch. As sample 69233-008 was already successfully extracted as a MS/MSD in Batch 210211,using professional judgment, no data will be qualified.

Laboratory Control Samples (LCS/LCSD) Analysis

All Analyses: The LCS acceptance criteria were met. No LCSD was analyzed. The MS/MSD is used to assess the precision for the batch. No data will be qualified as a result.

VOC
It should be noted that no compound was associated with internal standard 3 (1,4-dichlorobenzene-d4). No data will be qualified as a result.

Detection Limits/Dilutions

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

Other QC

VOC: A trip blank and an equipment blank were submitted on the ARCOC included in this package. No field duplicate was submitted on the ARCOC.

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

No raw data was submitted with the package.

No other specific issues were identified which affect data quality.

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

MEMORANDUM

DATE: December 10, 2002

TO: File

FROM: Linda Thal

SUBJECT: Inorganic Data Review and Validation – SNL
DSS Assess GWM ARCOC No. 605761 and 605763
GEL SDG No. 69233 and Project/Task No. 7222.01.09

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 accepted procedures and specified methods –SW-846 6020 (metals -ICP-MS), SW-846 7470 (mercury-CVAA), EPA 353.1 (NPN) and SW-846 9056 (anions). Problems were identified with the data package that resulted in the qualification of data.

ICP-MS – metals

According to the sample Review and Receipt form, sample 69233-005 and –006 were received unpreserved. The laboratory added preservative. All sample results that were detect will be qualified "J, TP" and all non-detects "UJ, TP".

Cadmium was detected in the MB and EB at a value > DL but < RL. Cadmium was also detected in the ICB/CCB at a negative value, with an absolute value > DL but < RL. Sample 69233-005 had a value > DL but < 5X DL and < 5X the blank values and will be qualified "J, B, B2, B3".
Sample 69233-011 (EB) had a value > DL but < 5X DL and < 5X the blank value and will be qualified "J, B, B3".

Chromium was detected in the ICB/CCB at a negative value, with an absolute value > DL but < RL. Sample 69233-005 and –011 were non-detect and will be qualified "UJ, B3".

Copper was detected in the MB at a value > DL but < RL. Sample 69233-005 had a value > DL but < 5X MB value and will be qualified "J, B"

Arsenic was detected in the MB at a value > DL but < RL. Sample 69233-011 (EB) had a value > DL but < 5X MB value and will be qualified "J, B."

The serial dilution had a RPD > QC acceptance criteria (10%) for iron, magnesium, manganese, potassium and sodium. All these compounds had results > 50X RL in sample 69233-005.The results for sodium, potassium and magnesium were > 50X RL in sample 69233-006. All sample results are already qualified "J" due to preservation infringements and will not be further qualified.

NPN

The MB and the CCB had a nitrate/nitrite value at the DL but < RL. Sample 69233-010 had a value at the DL but < 5X the blank value and will be qualified "J, B, B3".

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

Holding Times/Preservation

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

Calibration

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

Blanks

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

ICP-MS - metals

Nickel, zinc and arsenic were detected in the MB at a value > DL but < RL. Thallium was detected in the CCB at a value > DL but < RL. Barium and arsenic were detected in the EB at a value > DL but < RL. Sample 69233-005 had values for theses compounds > 5X the blank values and will not be qualified.

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

All Analyses: The LCS met QC acceptance criteria.

Matrix Spike (MS) Analysis

All Analyses: The MS met QC acceptance criteria.

CVAA – Hg, NPN and Anions
It should be noted that the sample used for the MS for these analyses 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.

CVAA – Hg, NPN and Anions
It should be noted that the sample used for the replicate for these analyses was of similar matrix from another SNL SDG. No data will be qualified as a result.

ICP Interference Check Sample (ICS)

ICP-MS: The ICS met QC acceptance criteria. It should be noted that the ICS-AB was not run at the end of the sequence. No data will be qualified as a result.

All other Analyses: No ICS required.

ICP Serial Dilution

ICP-MS: The serial dilution met QC acceptance criteria except as mentioned above in the summary section.

All other Analyses: No serial dilution required.

Detection Limits/Dilutions

All Analyses: All detection limits were properly reported. The samples were not diluted with the following exceptions:

ICP-MS-metals: Sample 69233-005 and -006 were diluted 10X for sodium and calcium. Sample 69233-005 was diluted 5X for beryllium analyses.

Anions: Sample 69233-007 was diluted 50X for chloride and sulfate analyses.

Other QC

Metals and Hg: An equipment blank was submitted on the ARCOC. No field duplicate pair or field blanks were submitted on the ARCOC.

NPN and Anions: No equipment blank, field duplicate pair or field blanks were submitted on the ARCOC.

No raw data was submitted with the package.

No other specific issues were identified which affect data quality.

Data Validation Summary

Site/Project: DSS GWM Project/Task #: 7222.01.09 # of Samples: 11 Matrix: Aqueous

AR/COC #: 605761, -63 Laboratory Sample IDs: 69233-001 thru -011

Laboratory: GEL

Laboratory Report #: 69233

QC Element	Analysis									
	Organics				Inorganics				RAD	NPN Other Anions
	VOC	SVOC	Pesticide/ PCB	HPLC (HE)	ICP/AES	GFAA/ AA	CVAA (Hg)	CN		
1. Holding Times/Preservation	✓	NA	NA	✓ / J, UJ, HT (RB)	J, UJ, TP	NA	U / UJ, TP	NA	NA	✓
2. Calibrations	✓			✓	✓		✓			✓
3. Method Blanks	✓			✓ / U, B2	J, UJ, B B2 B3		✓			J, B, B3 / ✓
4. MS/MSD	✓			✓	✓		✓			✓
5. Laboratory Control Samples	✓			UJ, A / ✓	✓		✓			✓
6. Replicates					✓		✓			✓
7. Surrogates	✓			✓						NA
8. Internal Standards	✓									
9. TCL Compound Identification	✓									
10. ICP Interference Check Sample					✓					
11. ICP Serial Dilution					J					
12. Carrier/Chemical Tracer Recoveries										
13. Other QC	FB, TB			FB	FB		FB			1

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

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

Reviewed By: [signature] Date: 12.11.02

Holding Time and Preservation

Site/Project: DSJ GWM AR/COC #: 605761, -63 Laboratory Sample IDs: 69233 ~~-008~~ LT, -0 -001 thru -011

Laboratory: GEL Laboratory Report #: 69233

# of Samples: LT & 11 Matrix: Aqueous

Sample ID	Analytical Method	Holding Time Criteria	Days Holding Time was Exceeded	Preservation Criteria	Preservation Deficiency	Comments
69233 - 008, -009	SW-846 8330	7 days	5 days	NA	NA	All NDs go "UJ, HT"
(Reextracted)			10/17 10:30 10/28 8:00			detects "J, HT"
69233 - 005 & -006	SW-846 6020 & 7470	NA	NA	HNO_3 pH <2	Samples received with no preservative Acidified by GEL	All NDs go "UJ, TP"
						All detects go "J, TP"

Reviewed By: [signature] Date: 12. 10. 02

Volatile Organics (SW 846 Method 8260)

Site/Project: DJJ GWM AR/COC #: 605761, -63 # of Samples: 3 Matrix: Aqueous

Laboratory: GEL Laboratory Report #: Laboratory Sample IDs: 69233 -001, -002, -003, -004

Methods: SW-846 8260B Batch #s: 210994

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	-003 Equip. Blanks	-002, -004 Trip Blanks		
						>.05	<20% / 0.99	20%												
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																
1	110-75-8	2-chloroethyl vinyl ether																		
2	591-78-6	2-hexanone (MBK)		0.01																
2	108-10-1	4-methyl-2-pentanone (MIBK)		0.10																
1	67-64-1	acetone(10xblk)		0.01																
1	71-43-2	benzene		0.50						✓			✓	✓	✓					
1	75-27-4	bromodichloromethane		0.20																
3	75-25-2	bromoform		0.10																
1	74-83-9	bromomethane		0.10																
1	75-15-0	carbon disulfide		0.10																
1	36-23-5	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		.1243				✓			✓	✓	✓					
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:

PS/PSD 69015 SMAS SDG

Notes: Shaded rows are RCRA compounds.

Reviewed By: [signature] Date: 12.10.02

Volatile Organics

Site/Project: _____ AR/COC #: 605761, -63 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:

High Explosives (SW 846 Method 8330)

Site/Project: DSS GWM AR/COC #: 605761, -63 Laboratory Sample IDs: 69233-008, -009 (EB)

Laboratory: GEL Laboratory Report #: 69233

Methods: SW-846 8330 ① ②

# of Samples: 2 Matrix: Aqueous Batch #s: 210211 reextracted 211570

CAS #	NAME	Tail	Intercept	Curve R^2 .99	CCV %D 20%	Method Blanks ① U ②	LCS ①	LCS②	LCS RPD 20%	MS ①	MSD ①	MS RPD ① 20%	Field. Dup. RPD	Equip. Blanks ① U ②	Field Blanks U		
2691-41-0	HMX	✓	NA	✓	✓	✓ ✓	✓	✓	NA	✓	✓	✓		✓	NA		
121-82-4	RDX						✓										
99-35-4	1,3,5-Trinitrobenzene						HH		(84-110)								
99-65-0	1,3-dinitrobenzene						✓										
98-95-3	Nitrobenzene						✓										
479-45-8	Tetryl						25		(73-110)					.0379	J.P.		
118-96-7	2,4,6-trinitrotoluene						✓										
35572-78-2	2-amino-4,6-dinitrotoluene						✓										
19406-51-0	4-amino-2,6-dinitrotoluene						✓										
121-14-2	2,4-dinitrotoluene						✓										
606-20-2	2,6-dinitrotoluene						✓										
88-72-2	2-nitrotoluene						✓										
99-99-0	4-nitrotoluene						✓										
99-08-1	3-nitrotoluene						✓										
78-11-5	PETN											✓					

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

Comments: 210211. >10% < QC LCS ① UJ, A but MS/MSD both in criteria RDX = R

211570 No MSD LCSD or rep. No qual. since sa run as ms/msd (MS/MSD performed on another client) Detects J, HT Non detects UJ, HT.

Confirmation

Sample	CAS #	RPD > 25%	Sample	CAS #	RPD > 25%
69233-008	RDX	115 %			
69233-009-RE	Tetryl	92 %	U, B	at RL. (.104)	
69233-008-RE	Tetryl	55 %	2		

(>25 <75 report highest J)

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

Reviewed By: [signature] Date: 12. 10. 02

Inorganic Metals

Site/Project: DSJ GWM AR/COC #: 605761, -63 Laboratory Sample IDs: 69233 - 005 (TAL Metals)
Laboratory: GEL Laboratory Report #: 69233 - 006 (Cyanide)
Methods: SW-846 6020 (ICP-MS) 7470 (Hg) - 011 (8 RCRA Metals)
# of Samples: 3 Matrix: Aqueous Batch #s: 211738 (Hg) 210935 (ICP-MS)

CAS #/ Analyte	← ug/l → TAL 5 & 11	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	<20% Rep. RPD	ICS AB	%D RPD Serial Dilution	Field Dup. RPD	ug/l -011 Equip. Blanks	Field Blanks	-ve.	ug/l SXB. SA 5	SA 4
7429-90-5 Al	✓	✓	✓	✓	✓	✓	✓	NA		✓	NA		✓	✓	✓	NA		NA			
7440-39-3 Ba	✓			✓	✓	✓							✓		✓		.248				
7440-41-7 Be				✓	✓	✓							✓		NA						
7440-43-9 Cd	✓			[-.047]	[-.042]	.116							NA		NA		.135		[ ]	0.58	
7440-70-2 Ca	X			✓	✓	✓				NA			✓		✓						
7440-47-3 Cr	✓			[-.382]	[-.554]	✓				✓			NA		NA		ND		[ ]		
7440-48-4 Co				✓	✓	✓							✓		NA						
7440-50-8 Cu						.81							✓		NA					4.05	
7439-89-6 Fe						✓							✓		206/19%						
7439-95-4 Mg	X					✓				NA			✓		14.7/15.5%						
7439-96-5 Mn						✓				NA			✓		11.3%						
7440-02-0 Ni						.079				✓			✓		NA					0.395	
7440-09-7 K	X					✓				NA			✓		44.3/13%						
7440-22-4 Ag	✓					✓				✓			NA		NA		ND				
7440-23-5 Na	X					✓				NA			✓		17/15.2%						
7440-62-2 V						✓				✓			NA		NA						
7440-66-6 Zn						1.77							✓		NA					8.85	
										✓											
7439-92-1 Pb	✓					✓							NA		NA		ND				
7782-49-2 Se	✓					✓							NA		NA		ND				
7440-38-2 As	✓					1.85							✓		✓		1.47			9.25	
7440-36-0 Sb						✓							NA		NA						
7440-28-0 Tl					.036	✓							✓		NA					0.18	
7439-97-6 Hg	✓			✓	✓	✓	✓			✓			NA				ND				
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: 5 & 6 received unpreserved. GEL added preservative
All detects 90 J, TP
non detects UJ, TP.

Reviewed By: [signature] Date: 12.10.02

Hg 69015 DUP/MS SNL SOG

D Ca Na 10X
Be 5X

(6) Ca Na 10X

General Chemistry

Site/Project: OSS GWM AR/COC #: 605761, -63 Laboratory Sample IDs: 69233-007 (Anions)
Laboratory: CEL Laboratory Report #: 69233 -010 (NPN)
Methods: SW-846 9056 (Anions) EPA 353.1 (NPN)
# of Samples: 2 Matrix: Aqueous Batch #s: 212590 (Anions) 212500 (NPN)

CAS #	Analyte	QC Element																		
		TAL	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	~~MSD~~ LCS RPD	Rep ~~RPD~~	ICS AB	Serial Dilution	Field Dup. RPD	Equip. Blanks	Field Blanks	
	Bromide		✓	✓	✓	✓	✓	✓			✓		* ✓ ~~32~~							
	Fluoride		✓	✓	✓	✓	✓	✓			✓		✓							
	Chloride 50X		✓	✓	✓	✓	✓	✓			✓		✓							
	Sulfate 50X		✓	✓	✓	✓	✓	✓			✓		✓							
	NPN		✓	✓	✓	0.01	0.01 J mg/L	✓			✓		✓						J, B, B3	

Comments: Anions 69015 DUP/PS SN25 SO4
NPN

* Value for sample <5X RL
Diff between sample & dup <RL.

Reviewed By: [signature] Date: 12.11.02

Contract Verification Review (CVR)

Project Leader COLLINS | Project Name DSS GWM | Case No. 7222_01.09

AR/COC No. 605761 & 605763 | Analytical Lab GEL | SDG No. 69233A & 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	EXPLOSIVES SAMPLES RERUN OUTSIDE HOLDING TIME DUE TO LCS FAILURE	X	
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X				

Contract Verification Review (Continued)

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1 Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2 Quantitation limit met for all samples .	X		
3.3 Accuracy a) Laboratory control samples accuracy reported and met for all samples		X	1,3,5-DINITROBENZENE & TETRYL FAILED RECOVERY LIMITS FOR EXPLOSIVES LCS
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	X		
c) Matrix spike recovery data reported and met	X		
3.4 Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	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	ARSENIC, CADMIUM, COPPER, NICKEL & ZINC DETECTED IN BLANK NITRATES/NITRITES DETECTED IN BLANK
b) Sampling blank (e.g., field, trip, and equipment) data reported and met	X		
3.6 Contractual qualifiers provided: "J"- estimated quantity; "B"-analyte found in method blank above the MDL for organic or above the PQL for inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"-analysis done beyond the holding time	X		
3.7 Narrative addresses planchet flaming for gross alpha/beta	N/A		
3.8 Narrative included, correct, and complete	X		
3.9 Second column confirmation data provided for methods 8330 (high explosives) and 8082 (pesticides/PCBs)	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	N/A		

Contract Verification Review (Concluded)

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions

Were deficiencies unresolved? ► Yes ► No

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

If no, provide: nonconformance report or correction request number _____ and date correction request was submitted:- _____

Reviewed by: W. Palencia Date: 11-21-2002 Closed by: _____ Date: _____

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. N/A

SMO Use

AR/COC **606084**

Dept. No./Mail Stop:	6133/MS1089	Date Samples Shipped:	2-11-03	Project/Task No. 7222.01.09	☐ Waste Characterization
Project/Task Manager:	Sue Collins	Carrier/Waybill No.	1879C	SMO Authorization:	-Send preliminary/copy report to:
Project Name:	DSS GW	Lab Contact:	Edie Kent/803-556-8171	Contract #: PO 21671	
Record Center Code:	ER	Lab Destination:	GEL	See attached SOTLO email	☐ Released by COC No.:
Logbook Ref. No.:	ER 089	SMO Contact/Phone:	Pam Puissant/505-284-3185		☑ Validation Required
Service Order No.	CF 022-03	Send Report to SMO:	Wendy Palencia/505-844-3132		Bill To: Sandia National Labs (Accounts Payable)
Location	Tech Area				P.O. Box 5800 MS 0154
Building	Room		Reference LOV(available at SMO)	74838C	Albuquerque, NM 87185-0154

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
061024-001	CTF-MW2	120	154	02/07/03 0924	GW	G	3x40ml	HCL	G	SA	VOC (8260)	005 .1
061024-008	CTF-MW2	120	154	02/07/03 0926	GW	P	500ml	HNO3	G	SA	RCRA Metals (6020)	013 .3
061024-010	CTF-MW2	120	154	02/07/03 0928	FGW	P	500ml	HNO3	G	SA	Major Cations (6020) Filtered	018 .4
061024-013	CTF-MW2	120	154	02/07/03 0929	GW	P	250ml	4C	G	SA	Major Anions (300.0)	022 .5
061024-015	CTF-MW2	120	154	02/07/03 0930	GW	AG	4x1L	4C	G	SA	High Explosives (8330)	030 .9
061024-016	CTF-MW2	120	154	02/07/03 0932	GW	P	250ml	H2SO4	G	SA	NPN (353.1)	027 .7
061025-001	CTF-MW2	120	154	02/07/03 0924	GW	G	3x40ml	HCL	G	DU	VOC (8260) Field QC	006 .1
061025-008	CTF-MW2	120	154	02/07/03 0926	FGW	P	500ml	HNO3	G	DU	RCRA Metals (6020) Field QC	014 .3
061025-010	CTF-MW2	120	154	02/07/03 0928	FGW	P	250ml	HNO3	G	DU	Major Cations (6020) Filtered Field QC	019 .4

RMMA	☐ Yes ☑ No	Ref. No.	Sample Tracking	Smo Use	Special Instructions/QC Requirements
Sample Disposal	☐ Return to Client	☑ Disposal by lab	Date Entered(mm/dd/yy)		EDD ☑ Yes ☐ No
Turnaround Time	☐ 7 Day ☐ 15 Day	☑ 30 Day	Entered by:		Level D Package ☑ Yes ☐ No
Return Samples By:		☐ Negotiated TAT	QC inits.		*Send report to:

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	Alfred Santillanes	[signature]	[illegible]	Weston/6135/844-5130/228-0710
	John Boyd	[signature]	[illegible]	S&W/6135/284-3307/228-9231
	Robert Lynch	[signature]	[illegible]	Weston/6135/844-4013/250-7090

*Send report to: Tim Jackson/Org 6133/MS 1087/505-284-2547

Please add additional preservation to sample(s) if needed, due to high buffering capacity

Major Cations/Ca,Mg,K,Na(filtered in field w/.45 micron filter)

Major Anions/Br,Cl,Fl,SO4

*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

2-C

1.Relinquished by [signature]	Org. 6135	Date 2-11-03	Time 0850	4.Relinquished by	Org.	Date	Time
1. Received by [signature]	Org. 6133	Date 2/11/03	Time 0850	4. Received by	Org.	Date	Time
2.Relinquished by [signature]	Org. 6133	Date 2-11-03	Time 1890	5.Relinquished by	Org.	Date	Time
2. Received by [signature]	Org.	Date 2-12-03	Time 0730	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)

Off

AR/COC- 606084

Project Name:	DSS GW	Project/Task Manager:	Sue Collins	Project/Task No:	7222.01.09
Location	Tech Area				
Building	Room				

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 use Lab Sample ID
061025-013	CTF-MW2	120	154	02/07/03 0929	GW	P	250ml	4C	G	DU	Major Anions (300.0) field QC	023 .5
061025-015	CTF-MW2	120	154	02/07/03 0930	GW	AG	4x1L	4C	G	DU	High Explosives (8330) field QC	027 .9
061025-016	CTF-MW2	120	154	02/07/03 0932	GW	P	250ml	H2SO4	G	DU	NPN (353.1) field QC	028 .7
061030-001	DSS-TB3	NA	NA	02/07/03 0924	DIW	G	3x40ml	HCL	G	TB	VOC (8260) field QC	007 .1

Abnormal Conditions on Receipt

LAB USE

Recipient Initials JR

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Page 1 of 1

Internal Lab

Batch No. N/A

SMO Use

AR/COC **606086**

Dept. No./Mail Stop:	6133/MS1089	Date Samples Shipped:	2-11-03	Project/Task No. 7222.01.09	☐ Waste Characterization
Project/Task Manager:	Sue Collins	Carrier/Waybill No.	18790	SMO Authorization	-Send preliminary/copy report to:
Project Name:	DSS GW	Lab Contact:	Edie Kent/803-556-8171	Contract #: PO 21671	
Record Center Code:	ER	Lab Destination:	GEL	SEE ATTACHED BOTTLE ORDER	☐ Released by COC No.:
Logbook Ref. No.:	ER 089	SMO Contact/Phone:	Pam Puissant/505-284-3185		☑ Validation Required
Service Order No.	CFO 023-03	Send Report to SMO:	Wendy Palencia/505-844-3132		Bill To: Sandia National Labs (Accounts Payable)
Location	Tech Area				P.O. Box 5800 MS 0154
Building	Room		Reference LOV(available at SMO) 74838D		Albuquerque, NM 87185-0154

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
061027-001	DSS-EB1	NA	NA	02/06/03 1330	DIW	G	3x40ml	HCL	G	EB	VOC (8260) field QC	008 .1
061027-008	DSS-EB1	NA	NA	02/06/03 1331	DIW	P	500ml	HNO3	G	EB	RCRA Metals (6020) field QC	015 .3
061027-015	DSS-EB1	NA	NA	02/06/03 1332	DIW	AG	4x1L	4C	G	EB	High Explosives (8330) field QC	032 .9
061029-001	DSS-TB2	NA	NA	02/06/03 1330	DIW	G	3x40ml	HCL	G	TB	VOC (8260) field QC	009 .1

RMMA	☐ Yes ☑ No Ref. No.	Sample Tracking	Smo Use
Sample Disposal	☐ Return to Client ☑ Disposal by lab	Date Entered(mm/dd/yy)	
Turnaround Time	☐ 7 Day ☐ 15 Day ☑ 30 Day	Entered by:	
Return Samples By:	☐ Negotiated TAT	QC inits.	

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	Alfred Santillanes	[illegible]	[illegible]	Weston/6135/844-5130/228-0710
	John Boyd	[illegible]	[illegible]	S&W/6135/284-3307/228-9231
	Robert Lynch	[illegible]	[illegible]	Weston/6135/844-4013/250-7090

Special Instructions/QC Requirements

EDD ☑ Yes ☐ No

Level D Package ☑ Yes ☐ No

*Send report to:

Tim Jackson/Org 6133/MS 1087/505-284-2547

NOTE: 1 BROKEN FRACTION—001 WHILE PACKAGING CHECK-IN.

*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

2°

1.Relinquished by [illegible]	Org. 6135	Date 2/11/03	Time 0845	4.Relinquished by	Org.	Date	Time
1. Received by [illegible]	Org. [illegible]	Date 2/11/03	Time 0845	4. Received by	Org.	Date	Time
2.Relinquished by [illegible]	Org. [illegible]	Date 2/11/03	Time 1030	5.Relinquished by	Org.	Date	Time
2. Received by [illegible]	Org. [illegible]	Date 2-11-03	Time 0730	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

Sample Findings Summary

Site: DSS Assess GWM | **ARCOC** 606081, 606083, 606084 and 606086 | **Data:** Organic and Inorganic

Sample ID	VOC (8260B)	SVOC (8270C)	HE (8330)	Metals	7439-97-6 (mercury)	7440-39-3 (barium)	7440-43-9 (cadmium)	7440-47-3 (chromium)	7439-92-1 (lead)	7782-49-2 (selenium)	7440-22-4 (silver)	7440-38-2 (arsenic)	7440-70-2 (calcium)	7439-95-4 (magnesium)	7440-19-7 (potassium)	7440-23-5 (sodium)	General Chemistry	18540-29-9 (hexavalent chromium)	N599 (NPN)
061022-008 CYN-MW5	All QC acceptance criteria were met.No data will be qualified.	All QC acceptance criteria were met.No data will be qualified.	All QC acceptance criteria were met.No data will be qualified.					J,B,B2,B3		J, B,B2		J,B2							
061023-008 CTF-MW1								J,B,B2,B3		J, B		J,B2							
061024-008 CTF-MW2					UJ, TP	J, TP	J, TP	J,B,B2,B3,TP	J, TP	J,B,B2,TP	UJ, TP	J, TP							
061025-008 CTF-MW2					UJ, TP	J, TP	J, TP	J,B,B2,B3,TP	J, TP	J,B,B2,TP	UJ, TP	J, TP							
061027-008 DSS-EB1								J,B,B3		J, B									
061024-010 CTF-MW2													J, TP	J, TP	J, TP	J, TP			
061025-010 CTF-MW2													J, TP	J, TP	J, TP	J, TP			
061022-015 CYN-MW5																		J, HT	
061024-016 CTF-MW2																			J,B,B3
061025-016 CTF-MW2																			J,B,B3

Validated By: K Mal

Date: 03/25/03

REVISED

HPLC Narrative
Sandia National Labs (SNLS)
SDG 74838

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:	233322
Prep Batch Number:	233266

Sample Analysis

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

Sample ID	Client ID
74838024	061022-015
74838030	061023-015
74838031	061024-015
74838032	061025-015
74838033	061027-015
1200379652	Method Blank (MB)
1200379653	Laboratory Control Sample (LCS)
1200379654	74838024(061022-015) Matrix Spike (MS)
1200379655	74838024(061022-015) Matrix Spike Duplicate (MSD)

Preparation/Analytical Method Verification

Procedures for preparation, analysis, and reporting of analytical data are documented by General Engineering Laboratories LLC (GEL) as Standard Operating Procedure (SOP) GL-OA-E-033, Rev. 7.

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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

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

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

Laboratory Control Sample (LCS) Recovery Statement
All the LCS spike recoveries for this SDG were within the established acceptance limits. 2,4,6-trinitrotoluene appears to fail recovery on the Form 3, while it passes recovery on the QC Summary. This is the result of differences in rounding and significant figures.

QC Sample Designation
Client sample 74838024 (061022-015) was selected for matrix spike analysis.

Matrix Spike (MS) Recovery Statement
All the matrix spike recoveries were within the established acceptance limits.

Matrix Spike Duplicate (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
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.

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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.

Electronic Package Comment

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

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

System Configuration

The laboratory utilizes 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:

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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.

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:_____ **Date:**_____

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

Memorandum

DATE: 03/21/03

TO: File

FROM: Linda Thal

SUBJECT: Organic Data Review and Validation - SNL
Site: DSS Assess GWM
ARCOC # 606081, -83, -84, -86
GEL SDG # 74838
Project/Task No. 7222.01.09

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 method SW-846 8260B (VOC), SW-846 8270C (SVOC) and SW-846 8330 (HE's). 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: The samples were properly preserved and analyzed within the method prescribed holding time.

Calibration

All Analyses: All initial and continuing calibration acceptance criteria were met with the following exception:

VOC
The CCV had a %D >20% but < 40% with a negative bias for 2-butanone (20.3%) and acetone (22%). The associated sample results were non-detect and will not be qualified.

SVOC
The initial calibration had a correlation coefficient <0.99 but > 0.90 for 2,4-dinitrophenol. The associated sample result was non-detect and no data will be qualified.
The CCV had a %D >20% but < 40% for several compounds (see Data Validation Worksheet). The associated sample results were non-detect and no data will be qualified.

Blanks

All Analyses: All method blank (MB), equipment blank (EB) and trip blank (TB) acceptance criteria were met with the following exception:

VOC
Sample 74838-008 (EB) had a dibromochloromethane value > DL but < RL. The associated sample result was non-detect and will not be qualified.

Surrogates

All Analyses: All surrogate acceptance criteria were met.

Internal Standards (ISs)

VOC and SVOC: All internal standard acceptance criteria were met.

HE: No internal standard required.

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

All Analyses: All MS/MSD acceptance criteria were met.

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

SVOC
Several compounds for which no laboratory acceptance criteria were available had %R <75% (see Data Validation Worksheet). Using professional judgment, no data will be qualified.
It should be noted that only 500ml (DF=2X) of sample was used for the MS/MSD. It is not known what affect this will have on the extraction procedure and no data will be qualified.

Laboratory Control Samples (LCS/LCSD) Analysis

All Analyses: All LCS acceptance criteria were met. No LCSD was analyzed. The MS/MSD is used to assess the precision for the batch. No data will be qualified as a result.

VOC
It should be noted that no compound was associated with internal standard 3 (1,4-dichlorobenzene-d4). No data will be qualified as a result.

SVOC
It should be noted that no compound was associated with internal standard 6 (perylene-d12). No data will be qualified as a result.

Detection Limits/Dilutions

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

Confirmation Analyses

VOC and SVOC: No confirmation analyses required.

HE: The sample results were non-detect; therefore confirmation data was not required.

Other QC

VOC: Four trip blanks, an equipment blank and a field duplicate were submitted on the ARCOC included in this package.

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

HE: An equipment blank and field duplicate was submitted on the ARCOC. No Field blank was submitted on the ARCOC.

No raw data was submitted with the package.

No other specific issues were identified which affect data quality.

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

Memorandum

DATE: 03/25/03

TO: File

FROM: Linda Thal

SUBJECT: Inorganic Data Review and Validation - SNL
DSS Assess GWM
ARCOC No. 606081,-83,-84,-86
GEL SDG No. 74838
Project/Task No. 7222.01.09

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 accepted procedures and specified methods – SW-846 6020 (metals -ICP-MS), SW-846 9056 (anions), EPA 353.1 (NPN), SW-846 9012A (total cyanide), SW-846 7196A (hexavalent chromium) and SW-846 7470A (mercury-CVAA). Problems were identified with the data package that resulted in the qualification of data.

ICP-MS – metals
Cr was detected in the MB, ICB/CCB and EB at a value > DL but < RL. All associated sample results were detect, < 5X the blank values and will be qualified "J, B, B2, B3".
Se was detected in the MB at a value > DL but < RL. All associated sample results were detect, < 5X the MB value and will be qualified "J, B".
Se was detected in the EB at a value > DL but < RL. All associated sample results (excluding sample 74838-012) were detect, < 5X the MB value and will be qualified "J, B2".
As was detected in the EB at a value > DL but < RL. Sample 74838-011 and -012 were detect, < 5X the EB value and will be qualified "J, B2".

Due to the high buffering capacity of samples 74838-013, -014, -018 and -019, additional HNO_3 had to be added by the laboratory to reduce the PH to < 2. All sample results that are detect will be qualified "J, TP" and all non-detects "UJ, TP".

Hexavalent Chromium
The sample was received and analyzed 2X after the hold-time had expired. The sample result was detect and will be qualified "J, HT".

NPN
The MB and/or ICB/CCB had a value at the DL. Sample 74838-027 and -028 were detect with values < 5X the blank values and will be qualified "J, B, B3". The remaining samples had values > 5X the blank value and will not be qualified.

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

Holding Times/Preservation

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

> It should be noted that the sample collected for hexavalent chromium analyses was received with a missing lid and insufficient sample available for analyses. One of the containers (amber glass) collected for explosives was used for the analysis. No data will be qualified.

Calibration

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

Blanks

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

> ICP-MS – metals
>
> Na was detected in the MB and CCB at values > DL but < RL. The associated sample results were detects > 5X the blank values and will not be qualified.
> Se and As were detected in the EB at values > DL but < RL. Sample 74838-012 had a Se value > 5X EB value and samples 74838-013 and -014 had As values > 5X EB values. These sample results will not be qualified.

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

All Analyses: The LCS met QC acceptance criteria.

Matrix Spike (MS) Analysis

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

> Hg and Total Cyanide
> It should be noted that the sample used for the MS analysis was of similar matrix from another SNL SDG. No data will be qualified.

Replicate Analysis

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

> Hg and Total Cyanide
> It should be noted that the sample used for the replicate analysis was of similar matrix from another SNL SDG. No data will be qualified.

ICP Interference Check Sample (ICS)

ICP-MS: The ICS met QC acceptance criteria. It should be noted that the ICS-AB was not run at the end of the sequence. No data will be qualified as a result.

All other analyses: No ICS required.

ICP Serial Dilution

ICP-MS: The serial dilution met QC acceptance criteria.

All other analyses: No serial dilution required.

Detection Limits/Dilutions

All Analyses: All detection limits were properly reported. The samples were not diluted with the following exceptions:

ICP-MS
Sample 74838-018 and -019 were diluted 10X for Ca and Na analysis due to high concentrations of these analytes present in the samples.

NPN
Sample 74838-025 was diluted 5X, and sample 74838-026 3X due to high concentrations present in the sample.

Anions
Sample 74838-021 was diluted 5X, and sample 74838-022 and -023 50X for chloride and sulfate, due to high concentrations of these analytes present in the sample.

Other QC

RCRA metals: An EB and field dup was submitted on the ARCOC. No field blank was submitted on the ARCOC.
Cations, Anions and NPN: A field duplicate was submitted on the ARCOC. No field blank or EB was submitted on the ARCOC.
Hexavalent Chromium and Total Cyanide: No field duplicate, field blank or EB were submitted on the ARCOC.

No raw data was submitted with the package.

No other specific issues were identified that affect data quality.

Data Validation Summary

Site/Project: DSS Assess GWM Project/Task #: 7222.01.09 # of Samples: 39 Matrix: Aqueous

AR/COC #: 606081, -83, -84, -86 Laboratory Sample IDs: 74838 - 001 thru -039

Laboratory: GEL

Laboratory Report #: 74838

QC Element	Analysis									
	Organics				Inorganics				RAD	Other
	VOC	SVOC	Pesticide/ PCB	HPLC (HE)	ICP/AES	GFAA/ AA	CVAA (Hg)	Hex Chromium		Anions NPH TOC
1. Holding Times/Preservation	✓	✓	NA	✓	J, UJ, TP ✓	NA	UJ, TP ✓	J, HT	NA	✓
2. Calibrations	✓	✓		✓	✓		✓	✓		✓
3. Method Blanks	✓	✓		✓	J, B, B2, B3		✓	✓		NPH J, B, B3 ✓
4. MS/MSD	✓	✓		✓	✓		✓	✓		✓
5. Laboratory Control Samples	✓	✓		✓	✓		✓	✓		✓
6. Replicates					✓		✓	✓		✓
7. Surrogates	✓	✓		✓						NA
8. Internal Standards	✓	✓								
9. TCL Compound Identification	✓	✓								
10. ICP Interference Check Sample					✓					
11. ICP Serial Dilution					✓					
12. Carrier/Chemical Tracer Recoveries										
13. Other QC	TBs EB Field Dup	NA		Field Dup EB	Field dup EB		Field dup EB	NA		Field dup (Anions/NPH)

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

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

Reviewed By: [signature] Date: 03.25.03

Holding Time and Preservation

Site/Project: DSS GWM AR/COC #: 606081, -83, -84, -86 Laboratory Sample IDs: 74838 - 001 thru - 039

Laboratory: GEL Laboratory Report #: 74838

# of Samples: 39 Matrix: Aqueous

Sample ID	Analytical Method	Holding Time Criteria	Days Holding Time was Exceeded	Preservation Criteria	Preservation Deficiency	Comments
74838 - 013	SW846 - 6020	NA	NA	HNO3 to a PH < 2	Due to buffering capacity of sample, additional HNO3 had to be added by the lab	NO's "UJ" Detects "J" TP
- 014	↓	↓	↓	↓	↓	↓
- 018	SW846 - 6020	↓	↓	↓	↓	↓
- 019	↓	↓	↓	↓	↓	↓
74838 - 024	SW846 - 7196A	24 hours	56.33 hours	NA	NA	>2X HT Detect "J HT"

Reviewed By: KMal Date: 03.24.03

Volatile Organics (SW 846 Method 8260)

Site/Project: DJJ Assess GWM AR/COC #: 606081, -83, -84, -86 # of Samples: 9 Matrix: Aqueous

Laboratory: CEL Laboratory Report #: 74838 Laboratory Sample IDs: 74838 - 001 thru - 009

Methods: SW846 - 8260B Batch #s: 233630

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	-006 Field Dup. RPD	-008 Equip. Blanks	-002, -004, 007, 009 Trip Blanks		
1	71-55-6	1,1,1-trichloroethane	✓	0.10		✓	✓	✓	✓							✓	✓	✓		
2	79-34-5	1,1,2,2-tetrachloroethane		0.30																
2	79-00-5	1,1,2-trichloroethane		0.10																
1	75-34-3	**1,1-dichloroethane**		0.10						✓			✓	✓	✓					
1	75-35-4	**1,1-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				-20.3												
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				-22												
1	71-43-2	**benzene**		0.50				✓		✓			✓	✓	✓					
1	75-27-4	bromodichloromethane		0.20																
3	75-25-2	bromoform		0.10	✓	✓	✓													
1	74-83-9	bromomethane		0.10																
1	75-15-0	carbon disulfide		0.10																
1	56-23-5	**carbon tetrachloride**		0.10																
2	108-90-7	**chlorobenzene**		0.50						✓			✓	✓	✓					
1	75-00-3	chloroethane		0.01																
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													0.291J			
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						✓			✓	✓	✓					
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:

PS/PSD 74655 SMS SDG ✓

Notes: Shaded rows are RCRA compounds.

Reviewed By: [signature] Date: 03.21.03

Volatile Organics

Site/Project: _____ AR/COC #: 606081-83, -84, -86 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: SA -006 had small headspace. Dup OK ✓

Semivolatile Organics (SW 846 Method 8270)

Site/Project: DSS Assess GWM AR/COC #: 606081, -83, -84, -86 Laboratory Sample IDs: 74838 - 010

Laboratory: GEL Laboratory Report #: 74838

Methods: SW846 8270C

# of Samples: 1 Matrix: Aqueous Batch #s: 233143

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks		
							>.05	<20%/ 0.99	20%												
2	BN	120-82-1	1,2,4-Trichlorobenzene	✓	0.20		✓	✓	✓	✓	✓	NA		✓	✓	✓	NA				
1	BN	95-50-1	1,2-Dichlorobenzene		0.40																
1	BN	541-73-1	1,3-Dichlorobenzene		0.60																
1	BN	106-46-7	1,4-Dichlorobenzene		0.50						✓			✓	✓	✓					
3	A	95-95-4	2,4,5-Trichlorophenol		0.20						✓			✓	✓	✓					
3	A	88-06-2	2,4,6-Trichlorophenol		0.20						✓			✓	70	✓					
2	A	120-83-2	2,4-Dichlorophenol		0.20																
2	A	105-67-9	2,4-Dimethylphenol		0.20																
3	A	51-28-5	2,4-dinitrophenol		0.01	✓	✓	0.982													
3	BN	121-14-2	2,4-Dinitrotoluene		0.20	✓	✓	✓	+70.6		✓			✓	✓	✓					
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						✓	-		63	59	✓					
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	✓	✓	✓	+27.9												
4	BN	101-55-3	4-Bromophenyl-phenylether		0.10				✓												
3	BN	7005-72-3	4-Chlorophenyl-phenylether		0.40																
2	A	59-50-7	4-Chloro-3-methylphenol		0.20						✓			✓	✓	✓					
2	BN	106-47-8	4-Chloroaniline		0.01																
1	A	106-44-5	4-Methylphenol (p-cresol)		0.60																

Comments: m,p cresol ✓ ✓ 60 57 ✓

Notes: Shaded rows are RCRA compounds.

Reviewed By: [signature] Date: 03-24-03 LT

Semivolatile Organics

Site/Project: _____ AR/COC #: 606081, -83, -84, -86 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		
							>.05	<20% / 0.99	20%												
3	BN	100-01-6	4-Nitroaniline	✓	0.01		✓	✓	✓	✓		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	✓	✓	.99 .987=													
6	BN	207-08-9	Benzo(k)fluoranthene		0.70			✓													
2	BN	111-91-1	bis(2-Chloroethoxy)methane		0.30																
1	BN	111-44-4	bis(2-Chloroethyl)ether		0.70																
1	BN	108-60-1	bis(2-chloroisopropyl)ether		0.01																
5	BN	117-81-7	bis(2-Ethylhexyl)phthalate		0.01																
5	BN	85-68-7	Butylbenzylphthalate		0.01																
4	BN	86-74-8	Carbazole		0.01																
5	BN	218-01-9	Chrysene		0.70																
6	BN	53-70-3	Dibenz(a,h)anthracene		0.40	✓	✓	✓													
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			.99 .986=													
4	BN	206-44-0	Fluoranthene		0.60			✓													
3	BN	86-73-7	Fluorene		0.90																
4	BN	118-74-1	Hexachlorobenzene		0.10						✓			✓	✓	✓					
2	BN	87-68-3	Hexachlorobutadiene		0.01						✓			67	65	✓					
3	BN	77-47-4	Hexachlorocyclopentadiene		0.01				-28.6												
1	BN	67-72-1	Hexachloroethane		0.30				✓		✓			60	60	✓					

Comments:

Semivolatile Organics

Site/Project: _____ AR/COC #: 606081, -83, -84, -86 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		
							>.05	<20%/ 0.99	20%												
6	BN	193-39-5	Indeno(1,2,3-cd)pyrene	✓	0.50	✓	✓	✓	✓	✓		NA					NA				
2	BN	78-59-1	Isophorone		0.40																
2	BN	91-20-3	Naphthalene		0.70																
2	BN	98-95-3	Nitrobenzene		0.20						✓			70	67	✓					
4	BN	86-30-6	N-Nitrosodiphenylamine (1)		0.01																
1	BN	621-64-7	N-Nitroso-di-propylamine	✓	0.50				-29.5		✓			✓	✓	✓					
4	A	87-86-5	Pentachlorophenol		0.05				✓		✓			✓	✓	✓					
4	BN	85-01-8	Phenanthrene		0.70																
1	A	108-95-2	Phenol		0.80						✓			✓	✓	✓					
5	BN	129-00-0	Pyrene		0.60						✓			✓	✓	✓					
			Diphenylamine																		

Surrogate Recovery Outliers

Sample	SMC 1	SMC 2	SMC 3	SMC 4	SMC 5	SMC 6	SMC 7	SMC 8
IN criteria								

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

Comments: MS/MSD 500ml

Internal Standard Outliers

Sample	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3-area	IS 3-RT	IS 4-area	IS 4-RT	IS 5-area	IS 5-RT	Is 6-area	IS 6-RT
IN criteria												

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

High Explosives (SW 846 Method 8330)

Site/Project: OSJ GWM AR/COC #: 606081, -83, -84, -86 Laboratory Sample IDs: 74838-024, -030 thru -033

Laboratory: GEL Laboratory Report #: 74838

Methods: SW 846 8330

# of Samples: 5 Matrix: AQUEOUS Batch #s: 233322

CAS #	NAME	1/1	Intercept	Curve R^2 .99	CCV %D 20%	Method Blanks U	LCS	LCSD	LCS RPD 20%	MS	MSD	MS RPD 20%	Field. Dup. RPD -032	Equip. Blanks U	Field Blanks -033 U		
2691-41-0	HMX	✓	NA	✓	✓	✓	✓			✓	✓	✓	✓	✓	NA		
121-82-4	RDX																
99-35-4	1,3,5-Trinitrobenzene																
99-65-0	1,3-dinitrobenzene																
98-95-3	Nitrobenzene																
479-45-8	Tetryl																
118-96-7	2,4,6-trinitrotoluene																
35572-78-2	2-amino-4,6-dinitrotoluene																
19406-51-0	4-amino-2,6-dinitrotoluene																
121-14-2	2,4-dinitrotoluene																
606-20-2	2,6-dinitrotoluene																
88-72-2	2-nitrotoluene																
99-99-0	4-nitrotoluene																
99-08-1	3-nitrotoluene																
78-11-5	PETN																

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

Comments: Form III into different to QC summary. Data contacted

Confirmation

Sample	CAS #	RPD > 25%	Sample	CAS #	RPD > 25%
NA SA NO.					

Solids-to-aqueous conversion:

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

Alal 03.24.

Inorganic Metals

Site/Project: DSS GWM AR/COC #: 606081, -83, -84, -86 Laboratory Sample IDs: 7H838 -011, -012, -013, -014, -015 Rcra metals
-016, -017, -018, -019 Carbons

Laboratory: GEL Laboratory Report #:

Methods: SW846 6020 (ICP-MS) 7470A (Hg)

# of Samples: 9 Matrix: Aqueous Batch #s: 233070 (Hg) 233051 (Metals)

-014 -019 -015 (Rcra metals only)

CAS #/ Analyte	QC Element																			
	TAL	ICV	CCV	ug/l ICB	CCB	ug/l Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dilution	Field Dup. RPD	Equip. Blanks mg/l	Field Blanks		
7429-90-5 Al																		NA		
7440-39-3 Ba	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓	✓	NA			
7440-41-7 Be																				
7440-43-9 Cd	✓									✓			NA		NA	✓	NO			
7440-70-2 Ca	✓									NA			✓		✓					
7440-47-3 Cr	✓			·000755	·00126	·000965				✓			NA		NA	✓	·00104			
7440-48-4 Co				✓	✓	✓														
7440-50-8 Cu																				
7439-89-6 Fe																				
7439-95-4 Mg	✓									NA			✓		✓					
7439-96-5 Mn																				
7440-02-0 Ni																				
7440-09-7 K	✓									✓			✓		NA					
7440-22-4 Ag	✓									✓			NA		NA	✓	NO			
7440-23-5 Na	✓				*.0763 ·0918	·0142				NA			✓		✓					
7440-62-2 V					✓	✓														
7440-66-6 Zn																				
7439-92-1 Pb	✓					✓				✓			NA		NA	✓	NO			
7782-49-2 Se	✓					·00156				✓			~~NA~~ J			✓	·000952			
7440-38-2 As.	✓					✓				✓			NA			✓	·001944			
7440-36-0 Sb																				
7440-28-0 Tl																				
7439-97-6 Hg	✓	✓	✓	✓	✓	NO	✓			✓			NA			✓	NO			
Cyanide CN																				

16817 *

** 18 & 19

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

Sa 013 & 018 received unpreserved } according to Sample Receipt & Review Form.
014 & 019 " " } According to chain additional preservation may be required due to high buffering capacity of sa.

Detects "J"
NDs "UJ"
TP.

Sa - 018 Ca & Na 10X
- 019

Hg Dup /MS 74655 SNA SOG ✓

General Chemistry

Site/Project: DSS GWM AR/COC #: 606081, -83, -84, -86 Laboratory Sample IDs: 74838-020 thru -023 (Anions)
-024 (Cr^{6+}) -025 thru -028 (NO_3/NO_2)
-029 (TCN)

Laboratory: GEL Laboratory Report #: 74838

Methods: SW846 - 9056 (Anions) SW846-7196A (Cr^{6+}) EPA 353.1 (NO_3/NO_2) SW846 9012B (TCN)

# of Samples: 10 Matrix: Aqueous Batch #s: 234027 (Anions) 233162 (Cr^{6+}) 235227 (NPN) 2335NH (TCN)

CAS #	Analyte	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	
	Bromide	✓	✓	✓	✓	✓	✓	✓	NA		✓	NA		✓	NA		✓	NA		
	Fluoride	✓	✓	✓	✓	✓	✓	✓			✓			✓			✓			
	Chloride	✓	✓	✓	✓	✓	✓	✓			✓			✓			✓			
	Sulfate	✓	✓	✓	✓	✓	✓	✓			✓			✓			✓			
No Field Dup.	Hexavalent Chromium	✓	✓	✓	✓	✓	✓	✓			✓			NA			NA			
	TCN	✓	✓	✓	✓ #25 ✓	✓ #25 ✓	✓	✓			✓			NA			NA			#25 > 5X B #26 > 5X B #27 #28 < 5X B * = J, B, B3
	NO_3/NO_2	✓	✓	✓	0.01 mg/L	0.01 mg/L	0.01 mg/L	✓			✓			✓			✓			

QC Element

Comments: (024) — Cr^{6+} 060122-030 container missing lid - not used - used Explosives sample OK ✓
"J HT" Received after HT exp.

Sa 21 - Cl SO4 5X TCN Dup/MS 74913 SNA SO4 ✓
22 - Cl SO4 50X
23

25 - NPN 5X
26 - 3X

Reviewed By: Mal Date: 03 25 03

Contract Verification Review (CVR)

Project Leader: Collins | Project Name: DSS GWM | Case No.: 7222.01.09

AR/COC No.: 606081, 606803, 606084, 606086 | Analytical Lab: GEL | SDG No.: 74838A, B, C, D

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

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

Line No.	Item	Complete? 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		Sample 061022-030 received w/o lid, used another container from same sample for Cr6 analysis		

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X				
2.4	Matrix spike/matrix spike duplicate data provided (if requested)	X				
2.5	Detection limits provided; PQL and MDL (or IDL), MDA and L_c	X				
2.6	QC batch numbers provided	X				
2.7	Dilution factors provided and all dilution levels reported	X				
2.8	Data reported in appropriate units and using correct significant figures	X				
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	N/A				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met		X	Cr6 analyzed out of holding time		
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X				

Contract Verification Review (Continued)

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1 Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2 Quantitation limit met for all samples	X		
3.3 Accuracy a) Laboratory control samples accuracy reported and met for all samples	X		
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	X		
c) Matrix spike recovery data reported and met	X		
3.4 Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	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 and Selenium detected in method blank; Sodium detected in Major Cation method blank; NPN detected in method blank
b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	Dibromochloromethane detected in VOC equipment blank; Chromium, Selenium, & Arsenic detected in metals 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	N/A		
3.8 Narrative included, correct, and complete	X		
3.9 Second column confirmation data provided for methods 8330 (high explosives) and 8082 (pesticides/PCBs)	N/A		

Contract Verification Review (Continued)

4.0 Calibration and Validation Documentation

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

Contract Verification Review (Concluded)

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions

Were deficiencies unresolved? Yes (No)

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

If no, provide: nonconformance report or correction request number _____ and date correction request was submitted:-_____

Reviewed by: [signature] Date: 03/06/03 Closed by:_____ Date:_____

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab N/A

Batch No.

SMO Use

AR/COC 606258

Dept. No./Mail Stop:	6133/MS1089	Date Samples Shipped:	5-1-03	Project/Task No. 7222.01.09	☐ Waste Characterization -Send preliminary/copy report to:
Project/Task Manager:	Sue Collins	Carrier/Waybill No.	21829	SMO Authorization:	
Project Name:	DSS GW	Lab Contact:	Edie Kent/803-556-8171	Contract #: PO 21671	
Record Center Code:	ER	Lab Destination:	GEL	SEE ATTACHED BOTTLE ORDER	☐ Released by COC No.:
Logbook Ref. No.:	ER 089	SMO Contact/Phone:	Pam Puissant/505-284-3185		☑ Validation Required
Service Order No.	CF 022-03	Send Report to SMO:	Wendy Palencia/505-844-3132		Bill To: Sandia National Labs (Accounts Payable) P.O. Box 5800 MS 0154 Albuquerque, NM 87185-0154
Location	Tech Area				
Building	Room				

Reference LOV(available at SMO) 79363

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
061680-001	CTF-MW2	120	154	04/30/03 0842	GW	G	3x40ml	HCL	G	SA	VOC (8260)	003 .1
061680-008	CTF-MW2	120	154	04/30/03 0843	GW	P	500ml	HNO3	G	SA	RCRA Metals (6020)	009 .3
061680-010	CTF-MW2	120	154	04/30/03 0844	FGW	P	500ml	HNO3	G	SA	Major Cations (6020) Filtered	012 .4
061680-013	CTF-MW2	120	154	04/30/03 0845	GW	P	250ml	4C	G	SA	Major Anions (300.0)	014 .5
061680-015	CTF-MW2	120	154	04/30/03 0846	GW	AG	4x1L	4C	G	SA	High Explosives (8330)	016 .6
061680-016	CTF-MW2	120	154	04/30/03 0847	GW	P	250ml	H2SO4	G	SA	NPN (353.1)	019 .7
061686-001	DSS-TB4	NA	NA	04/30/03 0842	DIW	G	3x40ml	HCL	G	TB	VOC (8260)	004 .1

RMMA	☐ Yes ☑ No Ref. No.	**Sample Tracking** Smo Use	**Special Instructions/QC Requirements**
Sample Disposal	☐ Return to Client ☑ Disposal by lab	Date Entered(mm/dd/yy)	**EDD** ☑ Yes ☐ No
Turnaround Time	☐ 7 Day ☐ 15 Day ☑ 30 Day	Entered by:	**Level D Package** ☑ Yes ☐ No
Return Samples By:	☐ Negotiated TAT QC inits.		*Send report to: Tim Jackson/Org 6133/MS 1087/505-284-2547

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	Alfred Santillanes			Weston/6135/844-5130/228-0710
	John Boyd			S&W/6135/284-3307/228-9231
	Robert Lynch			Weston/6135/844-4013/250-7090

Major Cations/Ca,Mg,K,Na(filtered in field w/.45 micron filter)
Major Anions/Br,Cl,Fl,SO4
Please list as separate report.

Abnormal Conditions on Receipt

Lab Use 3°C

1.Relinquished by	Org. 6135	Date 4/30/03	Time 1335	4.Relinquished by	Org.	Date	Time
1. Received by	Org. 6133	Date 4/30/03	Time 1335	4. Received by	Org.	Date	Time
2.Relinquished by	Org. 6133	Date 5-1-03	Time 1130	5.Relinquished by	Org.	Date	Time
2. Received by Patricia Power	Org. Kel	Date 5/2/03	Time 09:15	5. Received by	Org.	Date	Time
3.Relinquished by	Org.	Date	Time	6.Relinquished by	Org.	Date	Time
3. Received by	Org.	Date	Time	6. Received by	Org.	Date	Time

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. N/A

SMO Use

AR/COC 606260

Dept. No./Mail Stop:	6133/MS1089	Date Samples Shipped:	5-1-03	Project/Task No. 7222.01.09	☐ Waste Characterization
Project/Task Manager:	Sue Collins	Carrier/Waybill No.	21829	SMO Authorization:	-Send preliminary/copy report to:
Project Name:	DSS GW	Lab Contact:	Edie Kent/803-556-8171	Contract #: PO 21671	
Record Center Code:	ER	Lab Destination:	GEL	SEE ATTACHED BOTTLE ORDER	☐ Released by COC No.:_____
Logbook Ref. No.:	ER 089	SMO Contact/Phone.	Pam Puissant/505-284-3185		☑ Validation Required
Service Order No.	CFO 023-03	Send Report to SMO:	Wendy Palencia/505-844-3132		Bill To: Sandia National Labs (Accounts Payable)
Location	Tech Area				P.O. Box 5800 MS 0154
Building	Room				Albuquerque, NM 87185-0154

Reference LOV(available at SMO) 79363

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
061682-001	DSS-EB1	NA	NA	04/29/03 1210	DIW	G	3x40ml	HCL	G	EB	VOC (8260) field QC	005 .1
061682-008	DSS-EB1	NA	NA	04/29/03 1211	DIW	P	500ml	HNO3	G	EB	RCRA Metals (6020) field QC	010 .3
061682-015	DSS-EB1	NA	NA	04/29/03 1212	DIW	AG	4x1L	4C	G	EB	High Explosives (8330) field QC	017 .6
061685-001	DSS-TB3	NA	NA	04/29/03 1210	DIW	G	3x40ml	HCL	G	TB	VOC (8260) field QC	006 .1

RMMA ☐ Yes ☑ No Ref. No.	**Sample Tracking** Smo Use	**Special Instructions/QC Requirements**	Abnormal Conditions on Receipt
Sample Disposal ☐ Return to Client ☑ Disposal by lab	Date Entered(mm/dd/yy)	EDD ☑ Yes ☐ No	
Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day	Entered by:	Level D Package ☑ Yes ☐ No	
Return Samples By:	☐ **Negotiated TAT** QC inits.	*Send report to: Tim Jackson/Org 6133/MS 1087/505-284-2547	Lab Use
			2°C
		*Please list as separate report.	

	Name	Signature	Init	Company/Organization/Phone/Cellular
Sample Team Members	Alfred Santillanes	[signature]	AS	Weston/6135/844-5130/228-0710
	~~John Boyd~~			~~B&W/6135/284-3307/228-9231~~
	Robert Lynch	[signature]	RL	Weston/6135/844-4013/250-7090

1.Relinquished by [signature]	Org. 6135	Date 4/3/03	Time 1330	4.Relinquished by	Org.	Date	Time
1. Received by [signature]	Org. 6173	Date 4/30/03	Time 1330	4. Received by	Org.	Date	Time
2.Relinquished by [signature]	Org. 6173	Date 5-1-03	Time 1130	5.Relinquished by	Org.	Date	Time
2. Received by [signature]	Org.	Date 5-2-03	Time 0730	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

Sample F[illegible]gs Summary
[illegible]ed

Site: DSS Assess GWM | **ARCOC** 606256, 606258 and 606260 | **Data:** Organic and Inorganic

Sample ID	VOC (8260B)	SVOC (8270C)	HE (8330)	99-35-4 (1,3,5-trinitrobenzene)	Metals	7782-49-2 (selenium)	7440-47-3 (chromium)	7440-43-9 (cadmium)	7439-92-1 (lead)	General Chemistry	18540-29-9 (hexavalent chromium)			
061680-015 CTF-MW2	All QC acceptance criteria were met.No data will be qualified.	All QC acceptance criteria were met.No data will be qualified.		J										
061678-008 CYN-MW5								J, B						
061680-008 CTF-MW2						J, B3	J, B2	J, B, B2	J, B2					
061682-008 DSS-EB1								J, B						
061678-030 CYN-MW5											NJ, HT			

Validated By: [illegible]

Date: 07/15/03

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

Memorandum

DATE: 06/24/03

TO: File

FROM: Linda Thal

SUBJECT: Organic Data Review and Validation - SNL
Site: DSS Assess GWM
ARCOC # 606256, 606258 and 606260
GEL SDG # 79363
Project/Task No. 7222.01.09

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 method SW-846 8260B (VOC), SW-846 8270C (SVOC) and SW-846 8330 (HE's). Problems were identified with the data package that resulted in the qualification of data.

HE
The RPD between the primary and confirmation column was > 25% but < 75% for 1,3,5-trinitrobenzene in sample 79363-016. The sample result was > RL and will be qualified "J".

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

Holding Times/Preservation

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

VOC
It should be noted that 2 of the 3 vials for sample 79363-006 (EB) were received with headspace. No data will be qualified as a result.

VOC, SVOC and HE
Due to confusion over the sample ID #s for the TBs on COC 606256 and 606258, all the original C of A's issued for samples on these COC's had incorrect sample ID #s. Revised reports were issued with the correct sample ID #s and are included with the package.

Calibration

All Analyses: All initial and continuing calibration acceptance criteria were met with the following exception:

VOC
The CCV had a %D >20% with a positive bias for several compounds. The associated sample results were non-detect and will not be qualified.

SVOC
The initial calibration had a correlation coefficient > 0.90 but < 0.99 for 4,6-dinitro-2-methylphenol. The CCV had a %D >20% with a positive bias for 3,3'-dichlorobenzidine and a %D > 20% but < 40% with a negative bias for 2-nitroaniline. The associated sample results were non-detect and will not be qualified.

Blanks

All Analyses: All method blank (MB) and trip blank (TB) acceptance criteria were met with the following exceptions:

VOC
Trip blank (79363-006) had a 1,1-dichloroethene value > DL but < RL. Equipment blank (79363-005) had a dibromochloromethane value > DL but < RL. The associated sample results were non-detect and will not be qualified.

Surrogates

All Analyses: All surrogate acceptance criteria were met.

Internal Standards (ISs)

VOC and SVOC: All internal standard acceptance criteria were met.

HE: No internal standard required.

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

All Analyses: All MS/MSD acceptance criteria were met.

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

SVOC
It should be noted that only 500ml of sample (DF=2X) was used for the MS/MSD. No data will be qualified as a result.

Laboratory Control Samples (LCS/LCSD) Analysis

All Analyses: All LCS acceptance criteria were met. No LCSD was analyzed. The MS/MSD is used to assess the precision for the batch. No data will be qualified as a result.

VOC
It should be noted that no compound was associated with internal standard 3 (1,4-dichlorobenzene-d4). N data will be qualified as a result.

SVOC

It should be noted that no compound was associated with internal standard 6 (perylene-d12). No data will be qualified as a result.

Detection Limits/Dilutions

All detection limits were properly reported. No samples were diluted

Confirmation Analyses

VOC and SVOC: No confirmation analyses required.

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

Other QC

VOC: Two trip blanks and an equipment blank were submitted on the ARCOC included in this package. No field duplicate was included on the ARCOC.

SVOC: No field duplicates, field blanks or equipment blanks were submitted on the ARCOC.

HE: An equipment blank was submitted on the ARCOC included in this package. No field duplicate or field blank was included 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-Revised

DATE: 07/15/03

TO: File

FROM: Linda Thal

SUBJECT: Inorganic Data Review and Validation - SNL
DSS Assess GWM
ARCOC No. 606256, 606258 and 606260
GEL SDG No. 79363
Project/Task No. 7222.01.09

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 accepted procedures and specified methods – SW-846 6020 (metals -ICP-MS), SW-846 9056 (anions), EPA 353.1 (NPN), SW-846 7196A (hexavalent chromium) and SW-846 7470A (mercury-CVAA). Problems were identified with the data package that resulted in the qualification of data.

ICP-MS – metals
Cd was detected in the MB at a value > DL but < RL. Sample 79363-008, -009 and -010 were all detects with values < 5X the MB value and will be qualified "J, B".
Se was detected in the CCB at a value > DL but < RL. Sample 79363-009 was detect, with a value < 5X the blank value and will be qualified "J, B3".
Cd, Cr and Pb were detected in the EB at values > DL but < RL. Sample 79363-009 was detect, with values < 5X the EB values and will be qualified "J, B2".

Hexavalent Chromium
The sample was received and analyzed after its method specified hold time had expired but within 2X its method specified hold time. The sample result was detect and will be qualified "J, HT".
It should be noted that the ratio between the chromium and hexavalent chromium is incorrect. The hexavalent chromium value should be < chromium value. It is not possible to determine from the data presented in the package if interference was biasing the hexavalent chromium high. The hexavalent chromium result is already qualified "J" due to a hold time infringement and will be further qualified "N" (presumptive evidence of the presence of hexavalent chromium). The chromium result is already qualified "J, B2" due to chromium present in the EB. It will not be further qualified.

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

Holding Times/Preservation

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

All the original C of A's issued for samples on COC 606256 and 606258 have incorrect sample ID #'s. Revised C of A's have been issued and are included with the package.

Calibration

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

Blanks

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

ICP-MS – metals
Se was detected in the CCB at a value > DL but < RL. Sample 79363-008 and -010 were non-detect and will not be qualified.
Na was detected in MB at a value > DL but < RL and in the CCB's at negative values with absolute values > DL but < RL. Sample 79363-011 and -012 were detects with values > 5X the MB value and > 5X DL and will not be qualified.

NPN Batch # 249861
The ICB had a value at the DL. The associated sample result was > 5X ICB value and will not be qualified.

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

All Analyses: The LCS met QC acceptance criteria.

Matrix Spike (MS) Analysis

All Analyses: The MS met all QC acceptance criteria.

NPN (Batch # 249861) and Anions
It should be noted that the samples used for the MS analysis was of similar matrix from another SNL SDG. No data will be qualified.

Replicate Analysis

All Analyses: The replicate analysis met QC acceptance criteria.

NPN (Batch # 249861) and Anions
It should be noted that the sample used for the replicate analysis was of similar matrix from another SNL SDG. No data will be qualified.

ICP Interference Check Sample (ICS)

ICP-MS: The ICS met QC acceptance criteria. It should be noted that the ICS-AB was not run at the end of the sequence. No data will be qualified as a result.

All other analyses: No ICS required.

ICP Serial Dilution

ICP-MS: The serial dilution met QC acceptance criteria.

All other analyses: No serial dilution required.

Detection Limits/Dilutions

All Analyses: All detection limits were properly reported. The samples were not diluted with the following exceptions:

ICP-MS
Sample 79363-012 was diluted 10X for Ca and Na analysis due to high concentrations of these analytes present in the sample.

Anions
Sample 79363-014 was diluted 50X for chloride and sulfate due to high concentrations of these analytes present in the sample.

Other QC

All Metals: An equipment blank was submitted on the ARCOC. No field dup or field blank was submitted.

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

No raw data was submitted with the package.

No other specific issues were identified that affect data quality.

AQA Nonconformance Report

NCR No.07-15-03aLT

Pg 1 of 1

SECTION 1

Document Title: DV report SNL COC 605256, -58, -60	Project or Program: SNL Data Validation
Originator / Date: Linda Thal 07-15-03	Contract No.: 3719

DESCRIPTION OF NONCONFORMANCE

Requirement: The client requested that the equipment blank qualifier for Cr, Cd and Pb on sample 79363-008 be removed from the memorandum and sample finding summary.

Condition Found: Cr, Cd and Pb were qualified due to equipment blank contamination when in actual fact the equipment blank did not apply to this particular sample.

Assigned to: Linda Thal Response Due 07-15-03

SECTION 2

DISPOSITION: Accept-As-Is _____ Administrative Action ___X___

Justification: At the time of validation, no chart was supplied for this package and it was assumed that the EB on COC 606260 applied to both COC 606256 and 606258. When a chart was requested it was discovered that this package, which was for DSS Assess GWM, was on a chart for Canyons Assessment.

Instructions: A revised memorandum and Sample Finding Summary were issued with the Cr, Cd and Pb equipment blank qualification removed from sample 79363-008.

Responsible Employee L Thal Corrective Action Due Date 7-15-03

SECTION 3

VERIFICATION AND CLOSURE: Disposition Completed As Directed ___X___ Other (Specify)_____

Originator or QA Coordinator (Signature/Date)_____

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. N/A

SMO Use

AR/COC 606693

Dept. No./Mail Stop:	6133/MS1089	Date Samples Shipped:	8/26/03	Project/Task No. 7222 .01.09	☐ Waste Characterization
Project/Task Manager:	Sue Collins	Carrier/Waybill No.	25879	SMO Authorization:	-Send preliminary/copy report to:
Project Name:	DSS GW	Lab Contact:	Edie Kent/803-556-8171	Contract #: PO 21671	
Record Center Code:	ER	Lab Destination:	GEL	SEE Bottle order	☐ Released by COC No.:
Logbook Ref. No.:	ER 089	SMO Contact/Phone:	Pam Puissant/505-284-3185		☑ Validation Required
Service Order No.	CF 022-03	Send Report to SMO:	Lorraine Herrera/505-284-3199		Bill To: Sandia National Labs (Accounts Payable)
Location	Tech Area				P.O. Box 5800 MS 0154
Building	Room				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
063014-001	CTF-MW2	120	154	08/25/03 0847	GW	G	3x40ml	4C	G	SA	VOC (8260)	
063014-008	CTF-MW2	120	154	08/25/03 0849	GW	P	500ml	HNO3	G	SA	RCRA Metals (6020)	
063014-010	CTF-MW2	120	154	08/25/03 0850	FGW	P	500ml	HNO3	G	SA	Major Cations (6020) Filtered	
063014-013	CTF-MW2	120	154	08/25/03 0851	GW	P	~~250ml~~ 500 ml	4C	G	SA	Major Anions (SW846/9056)	
063014-015	CTF-MW2	120	154	08/25/03 0852	GW	AG	4x1L	4C	G	SA	High Explosives (8330)	
063014-016	CTF-MW2	120	154	08/25/03 0853	GW	P	250ml	H2SO4	G	SA	NPN (SW846/9056)	
063015-001	DSS-TB3	NA	NA	08/25/03 0847	DIW	G	3x40ml	HCL	G	TB	VOC (8260)	

RMMA	☐ Yes ☑ No	Ref. No.	
Sample Disposal	☐ Return to Client	☑ Disposal by lab	
Turnaround Time	☐ 7 Day	☐ 15 Day	☑ 30 Day
Return Samples By:		☐ Negotiated TAT	

Sample Tracking Smo Use
Date Entered(mm/dd/yy) 08/27/03
Entered by: RK
QC Inits. JAC

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level D Package ☑ Yes ☐ No
*Send report to:
Tim Jackson/Org 6133/MS 1087/505-284-2547

Major Cations/Ca,Mg,K,Na(filtered in field w/.45 micron filter)
Major Anions/Br,Cl,Fl,SO4
*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

	Name	Signature	Init	Company/Organization/Phone/Cellular
Sample Team Members	Alfred Santillanes			Weston/6134/844-5130/228-0710
	John Boyd			S&W/6134/284-3307/228-9231
	~~Robert Lynch~~			~~Weston/6134/844-4013/250-7090~~

1.Relinquished by		Org. 6134	Date 8/25/03	Time 1318	4.Relinquished by	Org.	Date	Time
1. Received by	SMO	Org. 6133	Date 8/25/03	Time 1318	4. Received by	Org.	Date	Time
2.Relinquished by	SMO	Org. 6133	Date 8/26/03	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

Sample Fin( )s Summary

Site: DSS Assess GWM **AR/COC:** 606693 **Data Type:** Organic, Inorganic

Sample ID	HEs/General Chemistry:	All QC acceptance criteria were met. No data will be qualified.	VOCs:	67-64-1 (acetone)	Metals:	7782-49-2 (Se)	7440-47-3 (Cr)	7439-95-4 (Mg)								
	Method/CAS Number (Analysis/Analyte)															
063014-001 CTF-MW2				8.69U,B,B2												
063014-008 CTF-MW2						J,B,B2,B3	J,B									
063014-010 CTF-MW2								J								

Validated By: David Schwent

Mr. David Schwent

Date: 10/08/03

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

Memorandum

DATE: October 8, 2003

TO: File

FROM: David Schwent

SUBJECT: Inorganic Data Review and Validation - SNL
DSS Assess GWM; ARCOC #606693
GEL SDG #86926; Project/Task No. 7222.01.09

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 methods EPA6020 ICP-MS, EPA7470A CVAA, EPA9056 anions, and EPA353.1 nitrate/nitrite. Problems were identified with the data package that result in the qualification of data.

1. ICP-MS Analysis: In the method blank (MB) and the equipment blank (EB) (Sample 86973-006 from COC 606695), selenium (Se) was detected at concentrations less than (<) the reporting limit (RL) and in the initial calibration blank (ICB) and continuing calibration blank (CCB), Se was detected at negative concentrations with absolute values greater than (>) the detection limit (DL) but < the RL. The associated Se result of Sample 86926-002 was a detect <5X the MB concentration, <5X the EB concentration, and <5X the DL and will be qualified "J,B,B2,B3".

2. ICP-MS Analysis: In the MB, chromium (Cr) was detected at a concentration < the RL. The associated Cr result of Sample 86926-002 was a detect <5X the MB concentration and will be qualified "J,B".

3. ICP-MS Analysis: For magnesium (Mg), the serial dilution (SD) relative percent difference (RPD) (20.3) was >10%. The associated Mg result of Sample 86926-003 was a detect >50X the RL and will be qualified "J".

Data are acceptable. 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: All initial and continuing calibration QC acceptance criteria were met.

Blanks

ICP-MS Analysis: No target analytes were detected in the blanks, except as noted above in the summary section and the following. In the EB, arsenic (As) and barium (Ba) were detected at a concentration < the RL. However, the associated As and Ba results of Sample 86926-002 were detects >5X the associated EB concentration and will not be qualified. In the MB, sodium (Na) was detected at a concentration < the RL and in the ICB and CCB, Na was detected at negative concentrations with absolute values > the DL but < the RL. However, the associated Na result of Sample -003 was a detect >5X the MB concentration and >5X the DL and will not be qualified.

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

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

All Analyses: All MS (PS) QC acceptance criteria were met. No MSD analyses were performed. The replicate analyses were used as measures of laboratory precision. No sample data will be qualified as a result. It should be noted that the MS (PS) analyses for the CVAA, anions, and nitrate/nitrite analyses were performed on QC samples from other SNL SDGs (86973, 86890 and 86890, respectively) of similar matrix. No sample data will be qualified as a result.

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

All Analyses: All LCS QC acceptance criteria were met. No LCSD analyses were performed. No sample data will be qualified as a result.

Replicates

All Analyses: All replicate QC acceptance criteria were met. It should be noted that the replicate analyses for the CVAA, anions, and nitrate/nitrite analyses were performed on QC samples from other SNL SDGs (86973, 86890 and 86890, respectively) of similar matrix. No sample data will be qualified as a result.

ICP Interference Check Sample (ICS)

ICP-MS Analysis: All ICS AB QC acceptance criteria were met.

All Other Analyses: No ICS was required for these methods.

ICP Serial Dilution

ICP-MS Analysis: All serial dilution QC acceptance criteria were met, except as noted above in the summary section.

All Other Analyses: No serial dilution was required for these methods.

Detection Limits/Dilutions

ICP-MS Analysis: All detection limits were properly reported. Sample 86926-003 was diluted 10X for calcium (Ca) and Mg due to high concentrations of the target analytes. No other samples required dilution.

I.C. (Anions) Analysis: All detection limits were properly reported. Sample 86926-004 was diluted 10X for sulfate and 100X for chloride due to high concentrations of the target analytes. No other samples required dilution.

All Other Analyses: All detection limits were properly reported. No samples required dilution.

Other QC

All Analyses: No field duplicates (FDs) or field blanks (FBs) were submitted on the ARCOC.

No other specific issues were identified which affect data quality.

Analytical Quality Associates, Inc.
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Memorandum

Date: October 7, 2003

To: File

From: David Schwent

Subject: Organic Data Review and Validation - SNL
DSS Assess GWM; ARCOC #606693
GEL SDG #86926; Project/Task No. 7222.01.09

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 methods EPA8260B VOCs and EPA8330 HEs. Problems were identified with the data package that result in the qualification of data.

1. VOC Analysis: In the trip blank (TB) (Sample 86926-007) and in the equipment blank (EB) (Sample 86973-003 from COC 606695), acetone was detected at concentrations greater than (>) the reporting limit (RL). The associated acetone result of Sample 86926-001 was a detect less than (<) 10X the TB concentration and <10X the EB concentration and will be qualified "8.69U,B,B2"at the reported value (8.69 µg/L).

Data are acceptable. 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

VOC Analysis: All initial and continuing calibration QC acceptance criteria were met, except the following. For vinyl acetate, the continuing calibration verification (CCV) percent difference (%D) (36.99%) was >20% but <40%. However, the associated vinyl acetate results of Samples 86926-001 and -007 were non-detects (NDs) and will not be qualified. For acetone, the CCV %D (22.36%) was >20% but <40%. However, the %D was above the QC acceptance limit by <3% and, based on professional judgment, no sample data will be qualified as a result.

HE Analysis: All initial and continuing calibration QC acceptance criteria were met.

Blanks

VOC Analysis: No target analytes were detected in the blanks, except as noted above in the summary section.

HE Analysis: No target analytes were detected in the blanks, except the following. In the EB (Sample 86973-011 from COC 606695), 4-amino-2,6-dinitrotoluene was detected at a concentration > the RL. However, the associated 4-amino-2,6-dinitrotoluene result of Sample 86926-005 was a ND and will not be qualified.

Surrogates

All Analyses: All surrogate recovery and retention time QC acceptance criteria were met.

Internal Standards (ISs)

VOC Analysis: All IS area and RT QC acceptance criteria were met.

HE Analysis: No IS analysis was required for this method.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

All Analyses: All MS/MSD (PS/PSD) QC acceptance criteria were met.

Laboratory Control Sample (LCS)

All Analyses: No LCSD analyses were performed. The MSD (PSD) analyses were used as measures of laboratory precision. No sample data will be qualified as a result.

VOC Analysis: All LCS QC acceptance criteria were met, except the following. For vinyl acetate, the LCS percent recovery (%R) (137%) was > QC acceptance criteria (67-136%). However, the associated vinyl acetate result of Sample 86926-001 and -007 were NDs and will not be qualified.

HE Analysis: All LCS QC acceptance criteria were met.

Detection Limits/Dilutions

All Analyses: All detection limits were reported correctly. No samples required dilution.

Target Compound Identification/Confirmation

VOC Analysis: No confirmation analysis was required for this method.

HE Analysis: All confirmation QC acceptance criteria were met.

Other QC

All Analyses: No field duplicates (FDs) or field blanks (FBs) were submitted on the ARCOC.

No other specific issues were identified which affect data quality.

Data Validation Summary

Site/Project: SWL / DSS Assess GWM Project/Task #: 7222-01.09 # of Samples: 7 Matrix: Water

AR/COC #: 606693 Laboratory Sample IDs: 86926-001 thru -007

Laboratory: GEL

SDG #: 86926

QC Element	Analysis									
	Organics				Inorganics				RAD	Other
	VOC	SVOC	Pesticide/ PCB	HPLC (HE)	ICP/AES	GFAA/ AA	CVAA (Hg)	CN		General Chemistry
1. Holding Times/Preservation	✓			✓	✓		✓			✓
2. Calibrations	J				✓					
3. Method Blanks	8.69 U, B, B2				J, B, B2, B3					
4. MS/MSD	✓				✓					
5. Laboratory Control Samples	✓	NA	NA		✓	NA		NA	NA	
6. Replicates					✓		✓			
7. Surrogates	✓			✓						
8. Internal Standards										
9. TCL Compound Identification	(NA)									
10. ICP Interference Check Sample					✓					
11. ICP Serial Dilution					J					
12. Carrier/Chemical Tracer Recoveries										
13. Other QC Confirmation RAD	NA			✓	NA		NA			NA

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

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

Reviewed By: David Schwent Date: 10-7-03

Volatile Organics (SW 846 Method 8260)

Site/Project: SNL / DSS Assess GWM AR/COC #: 606693 # of Samples: 2 Matrix: Water

Laboratory: GEL SDG #: 86926 Laboratory Sample IDs: 86926-001 and -007 (TB)

Methods: EPA 8260B Batch #s: 274036

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	ug/L Equip* Blanks 86926-003	ug/L Trip Blanks (-007)		
1	71-55-6	1,1,1-trichloroethane	✓	0.10	NA	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	NA	✓	✓		
2	79-34-5	1,1,2,2-tetrachloroethane	✓	0.30																
2	79-00-5	1,1,2-trichloroethane	✓	0.10																
1	75-34-3	**1,1-dichloroethane**	✓	0.10																
1	75-35-4	**1,1-dichloroethene**	✓	0.20																
1	107-06-2	**1,2-dichloroethane** trans	✓	0.10																
156-60-5 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	NA	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	NA	✓	✓		
2	108-10-1	4-methyl-2-pentanone (MIBK)	✓	0.10																
1	67-64-1	**acetone(10xblk)**	✓	0.01	✓			22.34									7.45	8.24		
1	71-43-2	**benzene**	✓	0.50	NA			✓									✓	✓		
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	NA															
2	127-18-4	**tetrachloroethene**	✓	0.20																
2	108-88-3	toluene(10xblk)	✓	0.40																
2	10061-02-6	trans-1,3-dichloropropene	✓	0.10																
1	79-01-6	**trichloroethene**	✓	0.30																
1	75-01-4	**vinyl chloride**	✓	0.10																
2	1330-20-7	xylenes(total)	✓	0.30	✓			✓		✓										
	108-05-4	Vinyl acetate	✓		✓			36.99		137										
	156-59-2	cis-1/2-dichloroethene	✓		NA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

Comments: * EB included in another package on a different COC (606695), but applies to these samples

Notes: Shaded rows are RCRA compounds.

Reviewed By: David Schwent Date: 10-7-03

Volatile Organics

Site/Project: _____ AR/COC #: 606693 Batch #s: 274036

Laboratory: _____ SDG #: _____ # 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

No Outliers

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

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

Comments:

High Explosives (SW 846 Method 8330)

Site/Project: SWL/DSS Assess Wwm AR/COC #: 606693 Laboratory Sample IDs: 86926-005

Laboratory: GEL SDG #: 86926

Methods: EPA 8330

# of Samples: 1 Matrix: Water Batch #s: 273955

CAS #	NAME		Intercept	Curve R^2 .99	CCV %D 20%	Method Blanks U	LCS	LCSD	LCS RPD 20%	MS	MSD	MS RPD 20%	Field. Dup. RPD	Equip. Blanks mg/L U	Field Blanks U		
2691-41-0	HMX	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	NA	✓	NA		
121-82-4	RDX	✓															
99-35-4	1,3,5-Trinitrobenzene	✓															
99-65-0	1,3-dinitrobenzene	✓															
98-95-3	Nitrobenzene	✓															
479-45-8	Tetryl	✓															
118-96-7	2,4,6-trinitrotoluene	✓															
35572-78-2	2-amino-4,6-dinitrotoluene	✓															
19406-51-0	4-amino-2,6-dinitrotoluene	✓												0.185*			
121-14-2	2,4-dinitrotoluene	✓												✓			
606-20-2	2,6-dinitrotoluene	✓															
88-72-2	2-nitrotoluene	✓															
99-99-0	4-nitrotoluene	✓															
99-08-1	3-nitrotoluene	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
78-11-5	PETN																

Sample	SMC %REC	SMC RT	Sample	SMC %REC	SMC RT
		No	Outliers		

Comments: * EB included in another package on a another COC (606695). Applies to this data.

Confirmation

Sample	CAS #	RPD > 25%	Sample	CAS #	RPD > 25%
		No	Outliers		

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

Reviewed By: David Schwent Date: 10-7-03

Inorganic Metals

Site/Project: SWL/DSS Assess GWM AR/COC #: 606693 Laboratory Sample IDs: 86926-002 and -003

Laboratory: GEL SDG #: 86926

Methods: EPA 6020 (ICP-MS); 7470A (CVAA)

# of Samples: 2 Matrix: Water Batch #s: 273877; 274082

CAS #/ Analyte	QC Element																			
	TAL	ICV	CCV	ICB mg/L	CCB mg/L	Method Blanks mg/L	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dilu-tion	Field Dup. RPD	Equip. Blanks mg/L	Field Blanks		
7429-90-5 Al																				
7440-39-3 Ba	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	✓	✓	✓	NA	0.00019	NA		
7440-41-7 Be																				
7440-43-9 Cd	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	✓	✓	✓	NA	✓	NA		
7440-70-2 Ca	✓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
7440-47-3 Cr	✓	↓	↓	↓	↓	0.000502	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
7440-48-4 Co																				
7440-50-8 Cu																				
7439-89-6 Fe																				
7439-95-4 Mg	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	✓	✓	20.3	NA	✓	NA		
7439-96-5 Mn																				
7440-02-0 Ni																				
7440-09-7 K	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	✓	✓	✓	NA	✓	NA		
7440-22-4 Ag	✓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
7440-23-5 Na	✓	↓	↓	-13.0	-28.7	0.0207	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
7440-62-2 V																				
7440-66-6 Zn																				
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	✓	✓	✓	NA	✓	NA		
7782-49-2 Se	✓	↓	↓	-0.947	-0.945	0.00108	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	0.00115	↓		
7440-38-2 As	✓	↓	↓	✓	✓	✓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	0.0047	↓		
7440-36-0 Sb																				
7440-28-0 Tl																				
7439-97-6 Hg	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	✓	NA	NA	NA	✓	NA		
Cyanide CN																				

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

Comments: QC sample for CVAA analysis from another SWL COC (86973) of similar matrix.

Reviewed By: David Schwent Date: 10-8-03

General Chemistry

Site/Project: SML/DSS Access Chem AR/COC #: 604693 Laboratory Sample IDs: 86926-004 and -006

Laboratory: GEL SDG #: 86926

Methods: EPA 9056 (anions); 353.1 (nitrate/nitrite);

# of Samples: 2 Matrix: Water Batch #s: 273695; 274[illegible]

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	
24959-67-9 16984-48-8 14808-79-8 16887-00-6	Anions Bromide Fluoride Sulfate Chloride	✓ ✓ ✓ ✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	✓	NA	NA	NA	NA	NA	
N599	nitrate/nitrite	✓	✓	✓	✓	✓	✓	✓			✓			✓						

Comments: QC Samples for anions and NO_3/NO_2 analyses from another SML SDG 86890 of similar matrix.

Reviewed By: David Schwent Date: 10-8-03

Contract Verification Review (CVR)

Project Leader Collins | Project Name DSS Assess GWM | Case No. 722_01.09

AR/COC No. 606693 | Analytical Lab GEL | SDG No. 86926

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	VOC sample 063014-001 received unpreserved but analyzed within 7 days		
1.5	Custody records continuous and complete	X				
1.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X				
1.7	Date samples received	X				
1.8	Condition upon receipt information provided	X				

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X				
2.4	Matrix spike/matrix spike duplicate data provided (if requested)	X				
2.5	Detection limits provided: PQL and MDL (or IDL), MDA and L_c	X				
2.6	QC batch numbers provided	X				
2.7	Dilution factors provided and all dilution levels reported	X				
2.8	Data reported in appropriate units and using correct significant figures	X				
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	N/A				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met	X				
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X				

Contract Verification Review (Continued)

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1 Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2 Quantitation limit met for all samples	X		
3.3 Accuracy a) Laboratory control samples accuracy reported and met for all samples		X	VOC LCS high for vinyl acetate
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	X		
c) Matrix spike recovery data reported and met	X		
3.4 Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	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 and Selenium detected in Metals method blank; Sodium detected in Major Cations method blank
b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	Acetone detected in VOC trip 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	N/A		
3.8 Narrative included, correct, and complete	X		
3.9 Second column confirmation data provided for methods 8330 (high explosives) and 8082 (pesticides/PCBs)	N/A		

Contract Verification Review (Continued)

4.0 Calibration and Validation Documentation

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

Contract Verification Review (Concluded)

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions

Were deficiencies unresolved? Yes (No)

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

If no, provide: nonconformance report or correction request number _____ and date correction request was submitted_____

Reviewed by: [signature] Date: 09/18/03 Closed by:_____ Date:_____

ARCOC: 606693

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. N/A

SMO Use

AR/COC 606695

Dept. No./Mail Stop:	6133/MS1089	Date Samples Shipped:	8/27/03	Project/Task No. 7222 .01.09	☐ Waste Characterization -Send preliminary/copy report to:
Project/Task Manager:	Sue Collins	Carrier/Waybill No.	24333	SMO Authorization: SMO	
Project Name:	DSS GW	Lab Contact:	Edie Kent/803-556-8171	Contract #: PO 21671	☐ Released by COC No.:
Record Center Code:	ER	Lab Destination:	GEL	SEE Battle order	☑ Validation Required
Logbook Ref. No.:	ER 089	SMO Contact/Phone:	Pam Puissant/505-284-3185		Bill To: Sandia National Labs (Accounts Payable)
Service Order No.	CFO 028-03	Send Report to SMO:	Lorraine Herrera/505-284-3199		P.O. Box 5800 MS 0154
Location	Tech Area				Albuquerque, NM 87185-0154
Building	Room				

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
063018-001	DSS-EB1	NA	NA	08/22/03 0800	DIW	G	3x40ml	HCL	G	EB	VOC (8260)	
063018-008	DSS-EB1	NA	NA	08/22/03 0801	DIW	P	500ml	HNO3	G	EB	RCRA Metals (6020)	
063018-015	DSS-EB1	NA	NA	08/22/03 0802	DIW	AG	4x1L	4C	G	EB	High Explosives (8330)	
063046-001	DSS-TB5	NA	NA	08/22/03 0800	DIW	G	3x40ml	HCL	G	TB	VOC (8260)	

RMMA	☐ Yes ☑ No Ref. No.	**Sample Tracking** Smo Use	**Special Instructions/QC Requirements**
Sample Disposal	☐ Return to Client ☑ Disposal by lab	Date Entered(mm/dd/yy) 08/28/03	**EDD** ☑ Yes ☐ No
Turnaround Time	☐ 7 Day ☐ 15 Day ☑ 30 Day	Entered by: RK	**Level D Package** ☑ Yes ☐ No
Return Samples By:	☐ Negotiated TAT	QC Inits. JAC	***Send report to:** Tim Jackson/Org 6133/MS 1087/505-284-2547

Abnormal Conditions on Receipt

Lab Use

	Name	Signature	Init	Company/Organization/Phone/Cellular
Sample Team Members	Alfred Santillanes	[signature]	[illegible]	Weston/6134/844-5130/228-0710
	John Boyd			S&W/6134/284-3307/228-9231
	Robert Lynch	[signature]	[illegible]	Weston/6134/844-4013/250-7090

***Please list as separate report.**

1.Relinquished by [signature]	Org. 6134	Date 8/27/03	Time 1050	4.Relinquished by	Org.	Date	Time
1. Received by [signature] SMO	Org. 6133	Date 8/27/03	Time 1050	4. Received by	Org.	Date	Time
2.Relinquished by [signature] SMO	Org. 6133	Date 8/27/03	Time 1130	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

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. N/A

SMO Use

AR/COC 606692

Dept. No./Mail Stop:	6133/MS1089	Date Samples Shipped:	8/27/03	Project/Task No. 7222.01.09	☐ Waste Characterization
Project/Task Manager:	Sue Collins	Carrier/Waybill No.	26333	SMO Authorization:	-Send preliminary/copy report to:
Project Name:	DSS GW	Lab Contact:	Edie Kent/803-556-8171	Contract #: PO 21671	
Record Center Code:	ER	Lab Destination:	GEL	SEE Bottle ORDER	☐ Released by COC No.:
Logbook Ref. No.:	ER 089	SMO Contact/Phone:	Pam Puissant/505-284-3185		☑ Validation Required
Service Order No.	CF 022-03	Send Report to SMO:	Lorraine Herrera/505-284-3199		Bill To: Sandia National Labs (Accounts Payable)
Location	Tech Area				P.O. Box 5800 MS 0154
Building	Room				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
063012-001	CTF-MW1	250	116	08/27/03 0902	GW	G	3x40ml	HCL	G	SA	VOC (8260)	
063012-008	CTF-MW1	250	116	08/27/03 0903	GW	P	500ml	HNO3	G	SA	RCRA Metals (6020)	
063012-010	CTF-MW1	250	116	08/27/03 0904	FGW	P	500ml	HNO3	G	SA	Major Cations (6020) Filtered	
063012-012	CTF-MW1	250	116	08/27/03 0905	GW	P	500ml	NaOH	G	SA	Total Cyanide (9012A)	
063012-013	CTF-MW1	250	116	08/27/03 0906	GW	P	250ml	4C	G	SA	Major Anions (SW846/9056)	
063012-015	CTF-MW1	250	116	08/27/03 0909	GW	AG	4x1L	4C	G	SA	High Explosives (8330)	
063012-016	CTF-MW1	250	116	08/27/03 0910	GW	P	250ml	H2SO4	G	SA	NPN (SW846/9056)	
063013-001	DSS-TB2	NA	NA	08/27/03 0902	DIW	G	3x40ml	HCL	G	TB	VOC (8260)	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day

Return Samples By: ☐ **Negotiated TAT**

Sample Tracking Smo Use

Date Entered(mm/dd/yy) 08/28/03

Entered by: RK

QC Inits. JAC

Special Instructions/QC Requirements

EDD ☑ Yes ☐ No

Level D Package ☑ Yes ☐ No

***Send report to:**

Tim Jackson/Org 6133/MS 1087/505-284-2547

Major Anions/Br,Cl,Fl,SO4

Major Cations/Ca,Mg,K,Na

FGW/ Filtered in field w/.45 micron filter

****Please list as separate report.***

Abnormal Conditions on Receipt

Lab Use

Sample Team Members

Name	Signature	Init	Company/Organization/Phone/Cellular
Alfred Santillanes	[signature]	[illegible]	Weston/6134/844-5130/228-0710
John Boyd	[signature]	[illegible]	S&W/6134/284-3307/228-9231
~~Robert Lynch~~			~~Weston/6134/844-4013/250-7090~~ [illegible]

1.Relinquished by	[signature]	Org. 6134	Date 8/27/03	Time 1053	4.Relinquished by	Org.	Date	Time
1. Received by	[signature] SMO	Org. 6133	Date 8/27/03	Time 1053	4. Received by	Org.	Date	Time
2.Relinquished by	[signature] SMO	Org. 6133	Date 8/27/03	Time 1130	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

Sample ı ...dings Summary

Site: DSS Assess GWM **AR/COC:** 606692,695 **Data Type:** Organic, Inorganic

Sample ID	Method/CAS Number (Analysis/Analyte)															
	VOCs/General Chemistry:	All QC acceptance criteria were met. No data will be qualified.	HEs:	All HE Sample Results	Metals:	7782-49-2 (Se)										
063012-008 CTF-MW1						J,B										
063018-008 DSS-EB1						J,B										
063018-015 DSS-EB1				P2												

Validated By: David Schwent

Mr. David Schwent

Date: 10/03/03

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

Memorandum

DATE: October 3, 2003

TO: File

FROM: David Schwent

SUBJECT: Inorganic Data Review and Validation - SNL
DSS Assess GWM; ARCOC #606692,695
GEL SDG #86973; Project/Task No. 7222.01.09

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 methods EPA6020 ICP-MS, EPA7470A CVAA, EPA9012A total CN, EPA9056 anions, and EPA353.1 nitrate/nitrite. Problems were identified with the data package that result in the qualification of data.

1. ICP-MS Analysis: In the method blank (MB), selenium (Se) was detected at a concentration less than (<) the reporting limit (RL). The associated Se results of Samples 86793-005 and -006 were detects <5X the MB concentration and will be qualified "J,B".

Data are acceptable. 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: All initial and continuing calibration QC acceptance criteria were met.

Blanks

ICP-MS Analysis: No target analytes were detected in the blanks, except as noted above in the summary section and the following. In the MB, chromium (Cr) was detected at a concentration < the RL. However, the associated Cr results of Samples 86973-005 and -006 were non-detects (NDs) and will not be qualified. In the MB and continuing calibration blank (CCB), sodium (Na) was detected at concentrations < the RL. However, the associated Na result of Sample -007 was a detect >5X the MB concentration and >5X the CCB concentration and will not be qualified.

In the equipment blank (EB) (Sample-006), barium (Ba), arsenic (As), and Se were detected at concentrations < the reporting limit (RL). However, the EB applies to samples of another COC (606693) in another data package. No sample data will be qualified as a result.

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

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

All Analyses: All MS (PS) QC acceptance criteria were met. No MSD analyses were performed. The replicate analyses were used as measures of laboratory precision. No sample data will be qualified as a result. It should be noted that the MS (PS) analyses for the total CN and nitrate/nitrite analyses were performed on QC samples from other SNL SDGs (87087 and 86890, respectively) of similar matrix. No sample data will be qualified as a result.

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

All Analyses: All LCS QC acceptance criteria were met. No LCSD analyses were performed. No sample data will be qualified as a result.

Replicates

All Analyses: All replicate QC acceptance criteria were met. It should be noted that the replicate analyses for the total CN and nitrate/nitrite analyses were performed on QC samples from other SNL SDGs (87087 and 86890, respectively) of similar matrix. No sample data will be qualified as a result.

ICP Interference Check Sample (ICS)

ICP-MS Analysis: All ICS AB QC acceptance criteria were met.

All Other Analyses: No ICS was required for these methods.

ICP Serial Dilution

ICP-MS Analysis: All serial dilution QC acceptance criteria were met.

All Other Analyses: No serial dilution was required for these methods.

Detection Limits/Dilutions

ICP-MS Analysis: All detection limits were properly reported. Sample 86973-007 was diluted 5X for magnesium (Mg) due to high concentration of the target analyte. No other samples required dilution.

I.C. (Anions) Analysis: All detection limits were properly reported. Sample 86973-009 was diluted 5X for chloride and sulfate due to high concentrations of the target analytes. No other samples required dilution.

All Other Analyses: All detection limits were properly reported. No samples required dilution.

Other QC

All Analyses: No field duplicates (FDs) or field blanks (FBs) were submitted on the ARCOC.

No other specific issues were identified which affect data quality.

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

Memorandum

Date: October 3, 2003

To: File

From: David Schwent

Subject: Organic Data Review and Validation - SNL
DSS Assess GWM; ARCOC #606692,695
GEL SDG #86973; Project/Task No. 7222.01.09

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 methods EPA8260B VOCs and EPA8330 HEs. Problems were identified with the data package that result in the qualification of data.

1. HE Analysis: For batch 274145, the Matrix Spike/Matrix Spike Duplicate (MS/MSD) analyses were performed on a sample from another client SDG (87033) and the MS/MSD analyses failed due to the formation of an emulsion during the extraction process. As a result, the MS/MSD were not applied to HE sample results and no measure of laboratory precision exists for HE sample results of batch 274145. Therefore, based on professional judgment, all associated HE results of Sample 86973-011 will be qualified "P2".

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

Holding Times/Preservation

VOC Analysis: All samples were analyzed within the prescribed holding times and properly preserved.

HE Analysis: All samples were analyzed within the prescribed holding times and properly preserved, except the following. Batch 276502 was re-extracted beyond of the method specified holding time, but within 2X the holding time. However, the results of this re-extraction batch were similar to the results of the initial extraction (batch 274713) and, based on professional judgment, no sample data will be qualified due to analysis beyond the holding time.

Calibration

VOC Analysis: All initial and continuing calibration QC acceptance criteria were met, except the following. For vinyl acetate, the continuing calibration verification (CCV) percent difference (%D) (36.12%) was greater than (>) 20% but less than (<) 40%. However the associated vinyl acetate results of Samples 86973-001 thru -004 were non-detects (NDs) and will not be qualified. For acetone, the CCV %D (21.89%) was >20% but <40%. However, the %D was above the QC acceptance limit by <2% and, based on professional judgment, no sample data will be qualified as a result.

HE Analysis: All initial and continuing calibration QC acceptance criteria were met.

Blanks

VOC Analysis: No target analytes were detected in the blanks, except the following. In the equipment blank (EB) (Sample 86973-003), acetone was detected at a concentration > the reporting limit (RL). However, the EB applies to samples of another COC (606693) in another data package. No sample data will be qualified as a result.

HE Analysis: No target analytes were detected in the blanks, except the following. In the EB (Sample 86973-011), 4-amino-2,6-dinitrotoluene was detected at a concentration > the RL. However, the EB applies to samples of another COC (606693) in another data package. No sample data will be qualified as a result.

Surrogates

All Analyses: All surrogate recovery and retention time QC acceptance criteria were met.

Internal Standards (ISs)

VOC Analysis: All IS area and RT QC acceptance criteria were met.

HE Analysis: No IS analysis was required for this method.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

VOC Analysis: All PS/PSD QC acceptance criteria were met.

HE Analysis: All MS/MSD QC acceptance criteria were met, except as noted above in the summary section and the following. For 4-amino-2,6-dinitrotoluene of batch 274713, the MS/MSD relative percent difference (RPD) (73%) was > QC acceptance criteria (33%). Due to the high RPD for 4-amino-2,6-dinitrotoluene, the samples were re-extracted and reanalyzed in batch 276502.

Laboratory Control Sample (LCS)

All Analyses: All LCS QC acceptance criteria were met. No LCSD analyses were performed. The MSD (PSD) analyses were used as measures of laboratory precision. No sample data will be qualified as a result.

Detection Limits/Dilutions

All Analyses: All detection limits were reported correctly. No samples required dilution.

Target Compound Identification/Confirmation

VOC Analysis: No confirmation analysis was required for this method.

HE Analysis: All confirmation QC acceptance criteria were met, except the following. For Sample 86973-011, the confirmation RPD of 4-amino-2,6-dinitrotoluene (28.6%) was > 25%. However, the RPD was above the QC acceptance limit by <3% and, based on professional judgment, no sample data will be qualified as a result.

Other QC

All Analyses: No field duplicates (FDs) or field blanks (FBs) were submitted on the ARCOC.

No other specific issues were identified which affect data quality.

Holding Time and Preservation

Site/Project: SNL / DSS Assess GWM AR/COC #: 606692, 695 Laboratory Sample IDs: 86973-001 thru -012

Laboratory: GEL SDG #: 86973

# of Samples: 12 Matrix: Water

Sample ID	Analytical Method	Holding Time Criteria	Days Holding Time was Exceeded	Preservation Criteria	Preservation Deficiency	Comments
86973-010	EPA8330 (HEs)	7 day ; 40 day	7 days	4°C, Amber Glass	None	Results similar to results w/in HT → No qualification due to missed HT.

Reviewed By: David Schwent Date: 10-3-03

Data Validation Summary

Site/Project: SWL / DSS Assess GWM Project/Task #: 7222-01.09 # of Samples: 12 Matrix: Water

AR/COC #: 606692, 695 Laboratory Sample IDs: 86973-001 thru -012

Laboratory: GEL

SDG #: 86973 795 MH
STE

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

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

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

Reviewed By: David Schwant Date: 10-2-03

Volatile Organics (SW 846 Method 8260)

Site/Project: SWL/~~OOB~~ ASSOSS GWM AR/COC #: 606692, 695 # of Samples: 4 Matrix: water

Laboratory: GEL Laboratory Report #: 86973 Laboratory Sample IDs: 86973-001 thru -004

Methods: EPA 8260B Batch #s: 274276

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	ug/L Equip. Blanks (-003)	Trip Blanks (-002 & -004)		
1	71-55-6	1,1,1-trichloroethane	✓	0.10	NA	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	NA	✓	✓		
2	79-34-5	1,1,2,2-tetrachloroethane	✓	0.30																
2	79-00-5	1,1,2-trichloroethane	✓	0.10																
1	75-34-3	**1,1-dichloroethane**	✓	0.10																
1	75-35-4	**1,1-dichloroethene**	✓	0.20																
1	107-06-2	**1,2-dichloroethane**	✓	0.10																
156-60S 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	NA	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	NA	✓	✓		
2	108-10-1	4-methyl-2-pentanone (MIBK)	✓	0.10																
1	67-64-1	**acetone(10xblk)**	✓	0.01	✓			21.99									7.45*			
1	71-43-2	**benzene**	✓	0.50	NA															
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	NA															
2	127-18-4	**tetrachloroethene**	✓	0.20																
2	108-88-3	toluene(10xblk)	✓	0.40																
2	10061-02-6	trans-1,3-dichloropropene	✓	0.10																
1	79-01-6	**trichloroethene**	✓	0.30																
1	75-01-4	**vinyl chloride**	✓	0.10																
2	1330-20-7	xylenes(total)	✓	0.30																
R 156-05-2	Vinyl acetate	✓					36.18													
156-60-4	Cis-1,2-dichloroethene	✓		NA																

Comments: * applies to another COC (606693) of a different package.

Notes: Shaded rows are RCRA compounds.

Reviewed By: David Schwent Date: 10-2-03

Volatile Organics

Site/Project: _____ AR/COC #: 606692, 695 Batch #s: 274276

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

No Outliers

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:

High Explosives (SW 846 Method 8330)

Site/Project: SNL / DSS Assess GWM AR/COC #: 606692, C95 Laboratory Sample IDs: 86973-010 and -011

Laboratory: GEL SDG #: 86973

Methods: EPA 8330

# of Samples: 2 Matrix: Water Batch #s: 274145; 274713; 276502

CAS #	NAME		Intercept	Curve R^2 .99	CCV %D 20%	Method Blanks U	LCS	LCSD	LCS RPD 20%	* MS	* MSD	MS RPD 20%	Field. Dup. RPD	Equip. Blanks U ug/L	Field Blanks U		
2691-41-0	HMX	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	NA	✓	NA		
121-82-4	RDX	✓															
99-35-4	1,3,5-Trinitrobenzene	✓															
99-65-0	1,3-dinitrobenzene	✓															
98-95-3	Nitrobenzene	✓															
479-45-8	Tetryl	✓															
118-96-7	2,4,6-trinitrotoluene	✓															
35572-78-2	2-amino-4,6-dinitrotoluene	✓															
19406-51-0	4-amino-2,6-dinitrotoluene	✓										73[2]		0.185*			
121-14-2	2,4-dinitrotoluene	✓										✓		✓			
606-20-2	2,6-dinitrotoluene	✓															
88-72-2	2-nitrotoluene	✓															
99-99-0	4-nitrotoluene	✓															
99-08-1	3-nitrotoluene	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
78-11-5	PETN																

Sample	SMC %REC	SMC RT	Sample	SMC %REC	SMC RT
		No	Outliers		

Confirmation

Sample	~~CAS #~~ Analyte	RPD > 25%	Sample	CAS #	RPD > 25%
		~~[illegible]~~ ✓	No Outliers		
86973-011	4-amino-2,6-dinitrotoluene	28.6			

Comments: * applies to sample date of another COC (606693) contained in another package.

- 3 extractions performed causing 3 sets of QC, indicated by superscripts 1, 2, and 3, where appropriate.
- QC sample for batch 274713 from another SNL SDG (87087) of similar matrix.
- * QC sample for batch 274145 non-SNL and MS/MSD failed → sample -011 will be qualified due to lack of precision info.

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

Reviewed By: David S Stuart Date: 10-3-03

Inorganic Metals

Site/Project: SNL/ DSS ASSESS GWMAR/COC #: 606692, 695 Laboratory Sample IDs: 86973-005 thru -007

Laboratory: GEL SDG #: 86973

Methods: EPA 6020 (ICP-MS); 7470A (CVAA)

# of Samples: 3 Matrix: Water Batch #s: 274100; 274092

CAS #/ Analyte	QC Element																			
	TAL	ICV	CCV	ICB	CCB mg/L	Method Blanks mg/L	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dilu-tion	Field Dup. RPD	* Equip. Blanks mg/L	Field Blanks		
7429-90-5 Al																				
7440-39-3 Ba	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	✓	✓	✓	NA	0.00019	NA		
7440-41-7 Be																				
7440-43-9 Cd	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	✓	✓	✓	NA	✓	NA		
7440-70-2 Ca	✓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
7440-47-3 Cr	✓	↓	↓	↓	↓	0.00134	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
7440-48-4 Co																				
7440-50-8 Cu																				
7439-89-6 Fe																				
7439-95-4 Mg	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	✓	✓	✓	NA	✓	NA		
7439-96-5 Mn																				
7440-02-0 Ni																				
7440-09-7 K	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	✓	✓	✓	NA	✓	NA		
7440-22-4 Ag	✓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
7440-23-5 Na	✓	↓	↓	↓	14.6	0.0252	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
7440-62-2 V																				
7440-66-6 Zn																				
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	✓	✓	✓	NA	✓	NA		
7782-49-2 Se	✓	↓	↓	↓	↓	0.0015	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	0.00115	↓		
7440-38-2 As	✓	↓	↓	↓	↓	✓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	0.0017	↓		
7440-36-0 Sb																				
7440-28-0 Tl																				
7439-97-6 Hg	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	✓	NA	NA	NA	✓	NA		
Cyanide CN																				

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

Comments: * Applies to Samples of LOC 606693 of another data package.

Reviewed By: David Schwant Date: 10-3-03

General Chemistry

Site/Project: SNL/DSS Assess GWM AR/COC #: 606692, 695 Laboratory Sample IDs: 86973-008, -009, -012

Laboratory: GEL SDG #: 86973

Methods: EPA 9056 (anions); 9012A (total CN); 353.1 (NO_2/NO_3)

# of Samples: 3 Matrix: Water Batch #s: 274162; 274716, 274873

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	
57-12-5	total CN ~~anions~~	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	✓	NA	NA	NA	NA	NA	
24959-67-9 16984-48-8 16887-00-6 14808-79-8	Anions bromide fluoride chloride sulfate	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	✓	NA	NA	NA	NA	NA	
N599	Nitrate/nitrite	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	✓	NA	NA	NA	NA	NA	

Comments: QC Samples for total CN and Nitrate/Nitrite from other SNL SDGs (87087 and 86890) of similar matrix.

Reviewed By: David Schwent Date: 10-3-03

Contract Verification Review (CVR)

Project Leader: Collins | Project Name: DSS Assess GWM | Case No. 7222_01.09

AR/COC No. 606692, 606695 | Analytical Lab: GEL | SDG No. 86793

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

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

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

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X				
2.4	Matrix spike/matrix spike duplicate data provided (if requested)	X				
2.5	Detection limits provided: PQL and MDL (or IDL), MDA and L_c	X				
2.6	QC batch numbers provided	X				
2.7	Dilution factors provided and all dilution levels reported	X				
2.8	Data reported in appropriate units and using correct significant figures	X				
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	N/A				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met		X	HPLC sample 063012-015 re-extracted out of holding time		
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X				

Contract Verification Review (Continued)

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1 Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2 Quantitation limit met for all samples	X		
3.3 Accuracy a) Laboratory control samples accuracy reported and met for all samples	X		
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	X		
c) Matrix spike recovery data reported and met		X	High Explosives MS REC% failed for sample 063018-015
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	High Explosives RPD failed for sample 063018-015 & RPD failed for 4-amino-2,5-dinitrotoluene in re-extraction
3.5 Blank data a) Method or reagent blank data reported and met for all samples		X	Chromium & Selenium detected in Metals method blank; Sodium detected in Major Cations method blank
b) Sampling blank (e.g., field, trip, and equipment) data reported and met	X		
3.6 Contractual qualifiers provided: "J"- estimated quantity; "B"-analyte found in method blank above the MDL for organic or above the PQL for inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"-analysis done beyond the holding time	X		
3.7 Narrative addresses planchet flaming for gross alpha/beta	N/A		
3.8 Narrative included, correct, and complete	X		
3.9 Second column confirmation data provided for methods 8330 (high explosives) and 8082 (pesticides/PCBs)		X	Missing for HPLC

ARCOC: 606692, 606695

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	N/A		

ARCOC: 606692, 606695

Contract Verification Review (Concluded)

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions
063012-015	HPLC	Reported to sets of data on the C of A
063018-015	HPLC	Missing Second Column confirmation

Were deficiencies unresolved? (Yes) No

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

If no, provide: nonconformance report or correction request number 6886 and date correction request was submitted 09/22/03

Reviewed by: [illegible] Date: 09/22/03 Closed by: [illegible] Date: 09-25-03

ARCOC: 606692, 606695

Date: 09/22/03

To:	Edie Kent Nicole McCleary	From:	Lorraine Herrera
Company:	GEL	Org:	6133
Phone:	(843) 556-8171	Phone:	(505) 844-3199
Fax:	(843) 766-1178	Fax:	(505) 844-3128

Correction Request

COC: 606692, 606695 SDG: 86793 Tracking No: 6886

Nicole/Edie,

Please correct the following error(s):

- 2 sets of HPLC data reported on C of A; Please report the re-analysis (batch 276502) and narrate the original results (batch 274713).
- Missing HPLC second column confirmation

Thank you,
Lorraine

Sandia National Laboratories
Sample Management Office
P.O. Box 5800
Albuquerque, New Mexico 87185-1331

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. N/A

SMO Use

AR/COC **606912**

Dept. No./Mail Stop:	6133/MS1089	Date Samples Shipped:	12-9-03	Project/Task No. 7222.01.09	☐ Waste Characterization -Send preliminary/copy report to:
Project/Task Manager:	Sue Collins	Carrier/Waybill No.	29924	SMO Authorization: for SMO	
Project Name:	DSS GW	Lab Contact:	Edie Kent/803-558-8171	Contract #: PO 21871	
Record Center Code:	ER	Lab Destination:	GEL	500 BOTTLE ORDER	☐ Released by COC No.: ____
Logbook Ref. No.:	ER 089	SMO Contact/Phone:	Pam Puissant/505-284-3185		☑ Validation Required
Service Order No.	CF 022-04	Send Report to SMO:	Lorraine Herrera/505-284-3199		Bill To: Sandia National Labs (Accounts Payable) P.O. Box 5800 MS 0154 Albuquerque, NM 87185-0154
Location	Tech Area				
Building	Room	Reference LOV(available at SMO)	1034097		

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	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
063525-001	CTF-MW2	120	154	12-09-03/0916	GW	G	3x40ml	4C	G	SA	VOC (8260)	001 .1
063525-008	CTF-MW2	120	154	12-09-03/0918	GW	P	500ml	HNO3	G	SA	RCRA Metals (6020)	005 .3
063525-010	CTF-MW2	120	154	12-09-03/0920	FGW	P	500ml	HNO3	G	SA	Major Cations (6020) Filtered	103416-01
063525-013	CTF-MW2	120	154	12-09-03/0922	GW	P	~~250ml~~ 500 ml	4C	G	SA	Major Anions (SW846/9056)	007 .4
063525-015	CTF-MW2	120	154	12-09-03/0924	GW	AG	4x1L	4C	G	SA	High Explosives (8330)	008 .5
063525-016	CTF-MW2	120	154	12-09-03/0926	GW	P	250ml	H2SO4	G	SA	NPN (SW846/9056)	009 .6
063526-001	DSS-TB3	NA	NA	12-09-03/0918	DIW	G	3x40ml	HCL	G	TB	VOC (8260) field QC	002 .2

RMMA	☐ Yes ☑ No	Ref. No.	Sample Tracking	Smo Use
Sample Disposal	☐ Return to Client	☑ Disposal by lab	Date Entered(mm/dd/yy)	
Turnaround Time	☐ 7 Day ☐ 15 Day	☑ 30 Day	Entered by:	
Return Samples By:		☐ Negotiated TAT	QC inits.	

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	Jeff Lee			Weston/6134/284-3309
	John Boyd			S&W/6134/284-3307/228-9231
	William J Gibson			Weston/6134/284-5232

Special Instructions/QC Requirements

EDD ☑ Yes ☐ No

Level D Package ☑ Yes ☐ No

*Send report to:

Tim Jackson/Org 6133/MS 1087/505-284-2547

Last DSS Well / CTF-MW2 Well very generated

Bennett Pump Purge

Major Cations/Ca,Mg,K,Na(filtered in field w/.45 micron filter)

Major Anions/Br,Cl,Fl,SO4

*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Temp 3°C

1.Relinquished by	Org.6134	Date 12-09-03	Time 10 00	4.Relinquished by	Org.	Date	Time
1. Received by	Org.6133	Date 12-09-03	Time 10 00	4. Received by	Org.	Date	Time
2.Relinquished by	Org. 6133	Date 12-9-03	Time 1135	5.Relinquished by	Org.	Date	Time
2. Received by	Org. GEL	Date 12-10-03	Time 0800	5. Received by	Org.	Date	Time
3.Relinquished by	Org.	Date	Time	6.Relinquished by	Org.	Date	Time
3. Received by	Org.	Date	Time	6. Received by	Org.	Date	Time

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. N/A

SMO Use

AR/COC **606915**

Dept. No./Mail Stop:	6133/MS1089	Date Samples Shipped:	12-8-03	Project/Task No. 7222.01.09	☐ Waste Characterization
Project/Task Manager:	Sue Collins	Carrier/Waybill No.	29845	SMO Authorization:	-Send preliminary/copy report to:
Project Name:	DSS GW	Lab Contact:	Edie Kent/803-556-8171	Contract #: PO 21671	
Record Center Code:	ER	Lab Destination:	GEL	SEE BOTTLE ORDER	☐ Released by COC No.:
Logbook Ref. No.:	ER 089	SMO Contact/Phone:	Pam Puissant/505-284-3185		☑ Validation Required
Service Order No.	CFO 023-04	Send Report to SMO:	Lorraine Herrera/505-284-3199		Bill To: Sandia National Labs (Accounts Payable)
Location	Tech Area				P.O. Box 5800 MS 0154
Building	Room	Reference LOV(available at SMO)	103409 1.		Albuquerque, NM 87185-0154

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
063531-001	DSS-EB1	NA	NA	12-08-03/0800	DIW	G	3x40ml	HCL	G	EB	VOC (8260) field QC	003 .2
063531-008	DSS-EB1	NA	NA	12-08-03/0802	DIW	P	500ml	HNO3	G	EB	RCRA Metals (6020) field QC	006 .3
063531-015	DSS-EB1	NA	NA	12-08-03/0804	DIW	AG	4x1L	4C	G	EB	High Explosives (8330) field QC	009 .5
063532-001	DSS-TB6	NA	NA	12-08-03/0800	DIW	G	3x40ml	HCL	G	TB	VOC (8260) field QC	004 .2

RMMA	☐ Yes ☑ No Ref. No.	Sample Tracking Smo Use:	Special Instructions/QC Requirements
Sample Disposal	☐ Return to Client ☑ Disposal by lab	Date Entered(mm/dd/yy)	EDD ☑ Yes ☐ No
Turnaround Time	☐ 7 Day ☐ 15 Day ☑ 30 Day	Entered by:	Level D Package ☑ Yes ☐ No
Return Samples By:	☐ Negotiated TAT	QC Inits.	*Send report to:

Tim Jackson/Org 6133/MS 1087/505-284-2547

*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Temp 4C

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	William J Gibson	William J Gibson	WJG	Weston/6134/284-5232
	John Boyd	[illegible]	[illegible]	S&W/6134/284-3307/228-9231

1.Relinquished by	William J Gibson	Org. 6134	Date 12-08-03	Time 0830	4.Relinquished by	Org.	Date	Time
1. Received by	[illegible]	Org. 6133	Date 12-08-03	Time 0830	4. Received by	Org.	Date	Time
2.Relinquished by	[illegible]	Org. 6133	Date 12/8/03	Time 1130	5.Relinquished by	Org.	Date	Time
2. Received by	[illegible]	Org. GEL	Date 12/8/03	Time 0820	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

Sample Findings S nary - Revised

Site: DSS GWM

AR/COC: 606912,915

Organic, Inorganic

Sample ID	VOCs (EPA8260):	56-23-5 (carbon tetrachloride)	High Explosives (EPA8330):	Metals (EPA6020):	7440-38-2 (As)	7782-49-2 (Se)	7440-43-9 (Cd)	7439-92-1 (Pb)	7439-95-4 (Mg)	Anions (EPA9056):	Nitrate/Nitrite (EPA353.1):					
	Method/CAS Number (Analysis/Analyte)															
063525-001 CFT-MW2		UJ	All Acceptance criteria met. No sample data will be qualified.							All Acceptance criteria met. No sample data will be qualified.	All Acceptance criteria met. No sample data will be qualified.					
063525-008 CFT-MW2						UJ,B3	J,B2	J,B2								
063531-008 DSS-EB1					J,B3	UJ,B3										
063525-010 CFT-MW2									J							

Validated By: David Schwent

Mr. David Schwent

Date: 03/01/04

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

Memorandum - Revised

DATE: March 1, 2004

TO: File

FROM: David Schwent

SUBJECT: Inorganic Data Review and Validation - SNL
Site: DSS GWM
AR/COC: 606912, 606915
SDG: 103409
Laboratory: GEL
Project/Task: 7222.01.09

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 Rev 1.

Summary

The samples were prepared and analyzed with accepted procedures using methods EPA6020 (ICP-MS), EPA7470A (CVAA mercury), EPA353.1 (nitrate/nitrite), and EPA9056 (anions). Problems were identified with the data package that result in the qualification of data.

ICP-MS Analyses:

Blanks; As and Se were detected in the initial calibration blank (ICB) and continuing calibration blank (CCB) at negative concentrations with absolute values > the detection limit (DL) but < the reporting limit (RL). The associated As result of Sample 103409-006 was a detect <5X the RL and will be qualified "J,B3"; the associated Se results of Samples -005 and -006 were non-detects (NDs) and will be qualified "UJ,B3." Cd and Pb were detected in the equipment blank (EB) (Sample -006) at concentrations < the RL. The associated Cd and Pb results of Sample -005 were detects <5X the equipment blank concentration and will be qualified "J,B2."

Serial Dilution: For Mg, the serial dilution relative percent difference (RPD) (13.4%) was >10%. The associated result of Sample 103416-001 was a detect >50X the RL and will be qualified "J."

Data are acceptable. 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: All initial and continuing calibration QC acceptance criteria were met.

Blanks

ICP-MS Analyses: No target analytes were detected in the blanks, except as noted above in the summary section and the following. As was detected in the ICB and CCB at negative concentrations with absolute values > the DL but < the RL. However, the associated result of Sample 103409-005 was a detect >5X the RL and will not be qualified. As, Ba, and Cr were detected in the EB (Sample -006) at concentrations < the RL. However, the associated results of Sample -005 were detects >5X the EB concentration and will not be qualified. Na was detected in the CCB and the method blank (MB) at concentrations < the RL. However, the associated result of Sample 103416-001 was a detect >5X the CCB concentration and >5X the MB concentration and will not be qualified.

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

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

All Analyses: All LCS QC acceptance criteria were met. No LCSD analyses were performed. No sample data will be qualified as a result.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

All Analyses: All MS (PS) QC acceptance criteria were met. No MSD analyses were performed. The replicate analyses were used as measures of laboratory precision. No sample data will be qualified as a result. It should be noted that the MS (PS) analyses for the anions and nitrate/nitrite analyses were performed on QC samples of similar matrix from other SNL SDGs. No sample data will be qualified as a result.

Replicates

All Analyses: All replicate QC acceptance criteria were met. It should be noted that the replicate analyses for the anions and nitrate/nitrite analyses were performed on QC samples of similar matrix from other SNL SDGs. No sample data will be qualified as a result.

ICP Serial Dilution

ICP-MS Analyses: All serial dilution QC acceptance criteria were met, except as noted above in the summary section.

All Other Analyses: No serial dilution was required for these methods.

ICP Interference Check Sample (ICS)

ICP-MS Analyses: All ICS AB QC acceptance criteria were met.

All Other Analyses: No ICS was required for these methods.

Detection Limits/Dilutions

ICP-MS Analyses: All detection limits were properly reported. Sample 103416-001 was diluted 5X for Na due to high concentration of target analyte.

Anions Analysis: All detection limits were properly reported. Sample 103409-007 was diluted 100X for chloride and sulfate due to high concentrations of the target analytes. No other samples required dilution.
Nitrate/nitrite Analysis: All detection limits were properly reported. No samples required dilution.

Other QC

All Analyses: No field duplicates (FDs) equipment blanks (EBs) or field blanks (FBs) were submitted on the ARCOC.

No other specific issues were identified which affect data quality.

AQA Nonconformance Report

NCR No. 03-01-04DJS

Pg 1 of 1

SECTION 1

Document Title: DV report SNL DSS GWM COCs 606912, 606915 Inorganics Memo and Sample Findings Summary	Project or Program: Data Validation
Originator / Date: David Schwent 03/01/04	Contract No.: 3719 Line 5 Validation

DESCRIPTION OF NONCONFORMANCE

Requirement: The arsenic result of Sample 103409-006 (063525-008 CFT-MW2) should not be qualified "J,B2" due to equipment blank (EB) contamination in the summary section of the Inorganics Memo or in the associated Sample Findings Summary. Instead, the arsenic result should be mentioned as not qualified because of being >5X the EB concentration in the blanks section of the Inorganics Memo.

Condition Found: The arsenic result of Sample 103409-006 (063525-008 CFT-MW2) was incorrectly qualified "J,B2" due to EB contamination in the summary section of the Inorganics Memo and in the associated Sample Findings Summary.

Assigned to: David Schwent Response Due 03/01/04

DISPOSITION: Accept-As-Is____ Reject____ Administrative Action X

Justification: Validation oversight.

Instructions: (Identify what Administrative Actions and/or Corrective Actions will occur.)
Correct error and re-issue Inorganic Memo and Sample Findings Summary.

Responsible Employee David Schwent Corrective Action Due Date 03/01/04

SECTION 3

VERIFICATION AND CLOSURE: Disposition Completed As Directed X Other (Specify)____

Originator or QA Coordinator (Signature/Date) David Schwent 03/01/04

Sample Finding Summary

Site: DSS GWM

AR/COC: 606912,915

Organic, Inorganic

Sample ID	Method/CAS Number (Analysis/Analyte)															
	VOCs (EPA8260):	56-23-5 (carbon tetrachloride)	High Explosives (EPA8330):	Metals (EPA6020):	7440-38-2 (As)	7782-49-2 (Se)	7440-43-9 (Cd)	7439-92-1 (Pb)	7439-95-4 (Mg)	Anions (EPA9056):	Nitrate/Nitrite (EPA353.1):					
063525-001 CFT-MW2		UJ	All Acceptance criteria met. No sample data will be qualified.							All Acceptance criteria met. No sample data will be qualified.	All Acceptance criteria met. No sample data will be qualified.					
063525-008 CFT-MW2					J,B2	UJ,B3	J,B2	J,B2								
063531-008 DSS-EB1					J,B3	UJ,B3										
063525-010 CFT-MW2									J							

Validated By: David Schwent

Mr. David Schwent

Date: 02/19/04

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

Memorandum

Date: February 19, 2004

To: File

From: David Schwent

Subject: Organic Data Review and Validation - SNL
Site: DSS GWM
AR/COC: 606912, 606915
SDG: 103409
Laboratory: GEL
Project/Task No. 7222.01.09

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 Rev 1.

Summary

All samples were prepared and analyzed with approved procedures using methods EPA8260B (VOCs) and EPA8330 (High Explosives). Problems were identified with the data package that result in the qualification of data.

VOC Analysis:

Calibration: For carbon tetrachloride of batch 297971, the continuing calibration verification (CCV) percent difference (%D) (43.93%) was >40% but <60%. The associated result of Sample 103409-001 was a non-detect (ND) and will be qualified "UJ."

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

Holding Times/Preservation

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

Calibration

VOC Analysis: All initial and continuing calibration QC acceptance criteria were met, except as noted above and the following. For batch 297946, the CCV %D of acetone was >20% but <40% and for batch 297971, the CCV %Ds of 4 other target analytes were >20% but <40% (see Data Validation Worksheets). However, all associated sample results of all these analytes were NDs and will not be qualified.

HE Analysis: All initial and continuing calibration QC acceptance criteria were met.

Blanks

VOC Analysis: No target analytes were detected in the method blank, equipment blank, or trip blanks, except the following. Bromoform and dibromochloromethane were detected in the equipment blank (Sample 103409-003). However, all associated sample results were NDs and will not be qualified.

HE Analysis: No target analytes were detected in the method blank or equipment blank.

Internal Standards (ISs)

VOC Analysis: All IS area and RT QC acceptance criteria were met.

HE Analysis: No IS analyses were required for this method.

Surrogates

All Analyses: All surrogate recovery and retention time QC acceptance criteria were met.

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

All Analyses: No LCSD analyses were performed. The MSD (PSD) analyses were used as measures of laboratory precision. No sample data will be qualified as a result.

VOC Analysis: All LCS QC acceptance criteria were met, except the following. For carbon tetrachloride and tetrachloroethylene, the LCS percent recoveries (%Rs) were > QC acceptance criteria. However, all associated sample results were NDs and will not be qualified.

HE Analysis: All LCS QC acceptance criteria were met.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

VOC Analysis: All MS/MSD (PS/PSD) QC acceptance criteria were met. It should be noted that the MS/MSD analyses for batch 297971 were performed on a QC sample of similar matrix from another SNL SDG. No sample data will be qualified as a result.

HE Analysis: All MS/MSD (PS/PSD) QC acceptance criteria were met, except the following. The MS/MSD relative percent differences (RPDs) of 3 target analytes were > QC acceptance criteria (see Data Validation Worksheets). However, the RPDs for all of these analytes were > the associated QC acceptance limit by only 6% or less and the MS and MSD %Rs were well within QC acceptance criteria. Therefore, based on professional judgment, no sample data should be qualified as a result.

Laboratory Replicates

All Analyses: No laboratory replicate analyses were required for these methods.

Target Compound Identification/Confirmation

VOC Analysis: No confirmation analysis was required for this method.

HE Analysis: All confirmation QC acceptance criteria were met.

Detection Limits/Dilutions

All Analyses: All detection limits were reported correctly. No samples required dilution.

Other QC

All Analyses: No field duplicates (FDs) or field blanks (FBs) were submitted on the AR/COC.

No other specific issues were identified which affect data quality.

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

Memorandum

DATE: February 18, 2004

TO: File

FROM: David Schwent

SUBJECT: Inorganic Data Review and Validation - SNL
Site: DSS GWM
AR/COC: 606912, 606915
SDG: 103409
Laboratory: GEL
Project/Task: 7222.01.09

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 Rev 1.

Summary

The samples were prepared and analyzed with accepted procedures using methods EPA6020 (ICP-MS), EPA7470A (CVAA mercury), EPA353.1 (nitrate/nitrite), and EPA9056 (anions). Problems were identified with the data package that result in the qualification of data.

ICP-MS Analyses:

Blanks: As and Se were detected in the initial calibration blank (ICB) and continuing calibration blank (CCB) at negative concentrations with absolute values > the detection limit (DL) but < the reporting limit (RL). The associated As result of Sample 103409-006 was a detect <5X the RL and will be qualified "J,B3"; the associated Se results of Samples -005 and -006 were non-detects (NDs) and will be qualified "UJ,B3." As, Cd, and Pb were detected in the equipment blank (EB) (Sample -006) at concentrations < the RL. The associated As, Cd, and Pb results of Sample -005 were detects <5X the equipment blank concentration and will be qualified "J,B2."

Serial Dilution: For Mg, the serial dilution relative percent difference (RPD) (13.4%) was >10%. The associated result of Sample 103416-001 was a detect >50X the RL and will be qualified "J."

Data are acceptable. 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: All initial and continuing calibration QC acceptance criteria were met.

Blanks

ICP-MS Analyses: No target analytes were detected in the blanks, except as noted above in the summary section and the following. As was detected in the ICB and CCB at negative concentrations with absolute values > the DL but < the RL. However, the associated result of Sample 103409-005 was a detect >5X the RL and will not be qualified. Ba and Cr were detected in the EB (Sample -006) at concentrations < the RL. However, the associated results of Sample -005 were detects >5X the EB concentration and will not be qualified. Na was detected in the CCB and the method blank (MB) at concentrations < the RL. However, the associated result of Sample 103416-001 was a detect >5X the CCB concentration and >5X the MB concentration and will not be qualified.

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

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

All Analyses: All LCS QC acceptance criteria were met. No LCSD analyses were performed. No sample data will be qualified as a result.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

All Analyses: All MS (PS) QC acceptance criteria were met. No MSD analyses were performed. The replicate analyses were used as measures of laboratory precision. No sample data will be qualified as a result. It should be noted that the MS (PS) analyses for the anions and nitrate/nitrite analyses were performed on QC samples of similar matrix from other SNL SDGs. No sample data will be qualified as a result.

Replicates

All Analyses: All replicate QC acceptance criteria were met. It should be noted that the replicate analyses for the anions and nitrate/nitrite analyses were performed on QC samples of similar matrix from other SNL SDGs. No sample data will be qualified as a result.

ICP Serial Dilution

ICP-MS Analyses: All serial dilution QC acceptance criteria were met, except as noted above in the summary section.

All Other Analyses: No serial dilution was required for these methods.

ICP Interference Check Sample (ICS)

ICP-MS Analyses: All ICS AB QC acceptance criteria were met.

All Other Analyses: No ICS was required for these methods.

Detection Limits/Dilutions

ICP-MS Analyses: All detection limits were properly reported. Sample 103416-001 was diluted 5X for Na due to high concentration of target analyte.

Anions Analysis: All detection limits were properly reported. Sample 103409-007 was diluted 100X for chloride and sulfate due to high concentrations of the target analytes. No other samples required dilution.

Nitrate/nitrite Analysis: All detection limits were properly reported. No samples required dilution.

Other QC

All Analyses: No field duplicates (FDs) equipment blanks (EBs) or field blanks (FBs) were submitted on the ARCOC.

No other specific issues were identified which affect data quality.

Data Validation Summary

Site/Project: SWL/ OSS GWM Project/Task #: 7222.01.09 # of Samples: 11 Matrix: Groundwater

AR/COC #: 606912, 915 Laboratory Sample IDs: 103409-001 thru -010

Laboratory: GEL 103416-001

SDG #: 103409

QC Element	Analysis									
	Organics				Inorganics				RAD	Other (General Chemistry)
	VOC	SVOC	Pesticide/ PCB	HPLC (HE)	ICP/AES	GFAA/ AA	CVAA (Hg)	CN		
1. Holding Times/Preservation	✓			✓	✓		✓			✓
2. Calibrations	UJ									
3. Method Blanks, EB	✓				J, UJ, B2, B3					
4. MS/MSD					✓					
5. Laboratory Control Samples										
6. Replicates										
7. Surrogates	✓			✓						
8. Internal Standards										
9. TCL Compound Identification	(NA)									
10. ICP Interference Check Sample					✓					
11. ICP Serial Dilution					J					
12. Carrier/Chemical Tracer Recoveries										
13. Other QC	NA			NA	NA		NA			NA

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

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

Reviewed By: David Schwent Date: 2-19-04

Holding Time and Preservation

Site/Project: SNL / DSS GWM AR/COC #: 606912, 915 Laboratory Sample IDs: 103409 - 001 thru -010
Laboratory: GEL SDG #: 103409 103416-001
# of Samples: 11 Matrix: Groundwater

Sample ID	Analytical Method	Holding Time Criteria	Days Holding Time was Exceeded	Preservation Criteria	Preservation Deficiency	Comments

No Outliers

Reviewed By: David Schwartz Date: 2-14-04

Volatile Organics (SW 846 Method 8260)

Site/Project: SNL / DSS GWM AR/COC #: 606912, 915 # of Samples: 4 Matrix: Groundwater

Laboratory: GEL SDG #: 103409 Laboratory Sample IDs: 103409-001 thru -004

Methods: EPA 8260B (VOCs) Batch #s: 297946 / 297971

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	µg/L Equip. Blanks (-003)	Trip Blanks (-004) (-004)
1	71-55-6	1,1,1-trichloroethane	✓	0.10	NA	✓	✓	23.01*	✓	✓	NA	NA	✓	✓	✓	NA	✓	✓
2	79-34-5	1,1,2,2-tetrachloroethane	✓	0.30				✓										
2	79-00-5	1,1,2-trichloroethane	✓	0.10														
1	75-34-3	**1,1-dichloroethane**	✓	0.10														
1	75-35-4	**1,1-dichloroethene**	✓	0.20														
1	107-06-2	**1,2-dichloroethane**	✓	0.10														
1	~~540-59-0 thru~~	**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	NA	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	NA	✓	✓
2	108-10-1	4-methyl-2-pentanone (MIBK)	✓	0.10														
1	67-64-1	**acetone(10xblk)**	✓	0.01				26.27/23.97*										
1	71-43-2	**benzene**	✓	0.50				✓										
1	75-27-4	bromodichloromethane	✓	0.20														
3	75-25-2	bromoform	✓	0.10													2.03	
1	74-83-9	bromomethane	✓	0.10													✓	
1	75-15-0	carbon disulfide	✓	0.10														
1	56-23-5	***carbon tetrachloride***	✓	0.10				43.93*		144*								
2	108-90-7	**chlorobenzene**	✓	0.50				✓		✓								
1	75-00-3	chloroethane	✓	0.01														
1	67-66-3	**chloroform**	✓	0.20														
1	74-87-3	chloromethane	✓	0.10				22.98*										
1	10061-01-5	cis-1,3-dichloropropene	✓	0.20	✓			✓										
2	124-48-1	dibromochloromethane	✓	0.10	✓												0.521	
2	100-41-4	ethylbenzene	✓	0.10	NA												✓	
1	75-09-2	methylene chloride (10xblk)	✓	0.01	✓													
2	100-42-5	styrene	✓	0.30	NA													
2	127-18-4	**tetrachloroethene**	✓	0.20				29.03*		129*								
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														
1	75-01-4	**vinyl chloride**	✓	0.10														
2	1330-20-7	xylenes(total)	✓	0.30														
		cis-1,2-dichloroethylene	✓															
		vinyl acetate	✓															

Comments: Each batch has its own set of QC. The QC sample for batch 297946 was from another SNL SDG of similar matrix.

Notes: Shaded rows are RCRA compounds.

Reviewed By: David Schwent Date: 2-19-04

*Apply to sample -001 only (batch 297971)

Volatile Organics

Site/Project: _____ AR/COC #: 606912, 915 Batch #s: 297946 / 297971

Laboratory: _____ SDG #: _____ # 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

No Outliers

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

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

Comments:

High Explosives (SW 846 Method 8330)

Site/Project: SWL / DSS GWM AR/COC #: 606912, 915 Laboratory Sample IDs: 103409008 and -009

Laboratory: CEL SDG #: 103409

Methods: EPA 8330 (HEs)

# of Samples: 2 Matrix: groundwater Batch #s: 296878

CAS #	NAME		Intercept	Curve R^2 .99	CCV %D 20%	Method Blanks U	LCS	LCSD	LCS RPD 20%	MS	MSD	MS RPD 20%	Field. Dup. RPD	Equip. Blanks U	Field Blanks U		
2691-41-0	HMX	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	NA	✓	NA		
121-82-4	RDX	✓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
99-35-4	1,3,5-Trinitrobenzene	✓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
99-65-0	1,3-dinitrobenzene																
98-95-3	Nitrobenzene	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	NA	✓	NA		
479-45-8	Tetryl	✓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
118-96-7	2,4,6-trinitrotoluene	✓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
35572-78-2	2-amino-4,6-dinitrotoluene	✓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
19406-51-0	4-amino-2,6-dinitrotoluene	✓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
121-14-2	2,4-dinitrotoluene	✓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
606-20-2	2,6-dinitrotoluene	✓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
88-72-2	2-nitrotoluene	✓	↓	↓	↓	↓	↓	↓	↓	↓	~~22~~	22	↓	↓	↓		
99-99-0	4-nitrotoluene	✓	↓	↓	↓	↓	↓	↓	↓	↓	~~27~~	27	↓	↓	↓		
99-08-1	3-nitrotoluene	✓	↓	↓	↓	↓	↓	↓	↓	↓	~~23~~	23	↓	↓	↓		
78-11-5	PETN																

Sample	SMC %REC	SMC RT	Sample	SMC %REC	SMC RT
		No	Out	liers	

Comments:

Confirmation

Sample	CAS #	RPD > 25%	Sample	CAS #	RPD > 25%
		No	Out	liers	

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

Reviewed By: David Schwent Date: 2-19-04

Inorganic Metals

Site/Project: SNL / DSS-C-WM AR/COC #: 606912, 915 Laboratory Sample IDs: 103409-005 and -006

Laboratory: G-EL SDG #: 103409

Methods: EPA 6020 (ICP-MS); 7470A (CVAA)

# of Samples: 2 Matrix: Groundwater Batch #s: 206943; 296778

CAS #/ Analyte	QC Element																			
	TAL	ICV	CCV	ICB mg/L	CCB mg/L	Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dilu-tion	Field Dup. RPD	Equip. Blanks mg/L	Field Blanks		
7429-90-5 Al																				
7440-39-3 Ba	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	✓	✓	✓	NA	0.00311	NA		
7440-41-7 Be																				
7440-43-9 Cd	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	✓	✓	✓	NA	0.00112	NA		
7440-70-2 Ca																				
7440-47-3 Cr	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	✓	✓	✓	NA	0.00108	NA		
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	✓	NA	NA	✓	✓	✓	NA	✓	NA		
7440-23-5 Na																				
7440-62-2 V																				
7440-66-6 Zn																				
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	✓	✓	✓	NA	0.003158	NA		
7782-49-2 Se	✓	✓	✓	-0.499	-1.83	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	✓	↓		
7440-38-2 As	✓	✓	✓	-1.30	-0.04	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	0.00154	↓		
7440-36-0 Sb																				
7440-28-0 Tl																				
7439-97-6 Hg	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	✓	NA	NA	NA	NA	NA		
Cyanide CN																				

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

Comments: QC Sample for ICP-MS is 103416-001.

Reviewed By: David Schwent Date: 2-19-04

Inorganic Metals

Site/Project: SNL / DSS - GWM AR/COC #: 606912, 915 Laboratory Sample IDs: 103416 ~~001 and other~~ 005

Laboratory: GEL SDG #: 103409

Methods: ~~EPA~~ 6020 (ICP-ms);

# of Samples: 1 Matrix: Groundwater Batch #s: 296943

CAS #/ Analyte	QC Element																			
	TAL	ICV	CCV	ICB	CCB mg/l	Method Blanks mg/l	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dilu-tion	Field Dup. RPD	Equip. Blanks	Field Blanks		
7429-90-5 Al																				
7440-39-3 Ba																				
7440-41-7 Be																				
7440-43-9 Cd																				
7440-70-2 Ca	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	✓	✓	✓	NA	NA	NA		
7440-47-3 Cr																				
7440-48-4 Co																				
7440-50-8 Cu																				
7439-89-6 Fe																				
7439-95-4 Mg	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	✓	✓	134	NA	NA	NA		
7439-96-5 Mn																				
7440-02-0 Ni																				
7440-09-7 K	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	✓	✓	~~119~~ 95	NA	NA	NA		
7440-22-4 Ag																				
7440-23-5 Na	✓	✓	✓	✓	29.8	0.0143	✓	NA	NA	✓	NA	NA	✓	✓	✓	NA	NA	NA		
7440-62-2 V																				
7440-66-6 Zn																				
7439-92-1 Pb																				
7782-49-2 Se																				
7440-38-2 As																				
7440-36-0 Sb																				
7440-28-0 Tl																				
7439-97-6 Hg																				
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:

Reviewed By: David Schwent Date: 2-19-04

General Chemistry

Site/Project: SNL / PSS GWM AR/COC #: 606912, 915 Laboratory Sample IDs: 103409-007 and -010

Laboratory: B-EL SDG #: 103409

Methods: EPA 9056 (anions); 353.1 (nitrate / nitrite);

# of Samples: Matrix: Groundwater Batch #s: 296842; 297693

CAS #	Analyte	QC Element																		
		TAL	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	(PS) MS	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dilution	Field Dup. RPD	Equip. Blanks	Field Blanks	
N599	Nitrate/ ~~Nitrite~~	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	NA	NA	✓	NA	NA	NA	NA	NA	
	Anions																			
24959-67-9	Bromide	✓	✓	✓	✓	✓	✓	✓	↓	↓	✓	↓	↓	✓	↓	↓	↓	↓	↓	
16887-00-6	Chloride	✓	✓	✓	✓	✓	✓	✓			✓			✓						
16984-48-8	Fluoride	✓	✓	✓	✓	✓	✓	✓			✓			✓						
14808-79-8	Sulfate	✓	✓	✓	✓	✓	✓	✓			✓			✓						

Comments: QC Samples for nitrate/nitrite and anions analyses from other SNL sites of similar matrix.

Reviewed By: David Schwent Date: 2-1-04

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. N/A

SMO Use

AR/COC 606912

Dept. No./Mail Stop:	6133/MS1089	Date Samples Shipped:	12-9-03	Project/Task No. 7222.01.09	☐ Waste Characterization
Project/Task Manager:	Sue Collins	Carrier/Waybill No.	29924	SMO Authorization: [signature] for SMO	-Send preliminary/copy report to:
Project Name:	DSS GW	Lab Contact:	Edie Kent/803-556-8171	Contract #: PO 21671	
Record Center Code:	ER	Lab Destination:	GEL	500 BOTTLE ORDER	☐ Released by COC No.:
Logbook Ref. No.:	ER 089	SMO Contact/Phone:	Pam Puissant/505-284-3185		☑ Validation Required
Service Order No.	CF 022-04	Send Report to SMO:	Lorraine Herrera/505-284-3199		Bill To: Sandia National Labs (Accounts Payable) P.O. Box 5800 MS 0154 Albuquerque, NM 87185-0154
Location	Tech Area				
Building	Room				

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
063525-001	CTF-MW2	120	154	12-09-03/0916	GW	G	3x40ml	4C	G	SA	VOC (8260)	
063525-008	CTF-MW2	120	154	12-09-03/0918	GW	P	500ml	HNO3	G	SA	RCRA Metals (6020)	
063525-010	CTF-MW2	120	154	12-09-03/0920	FGW	P	500ml	HNO3	G	SA	Major Cations (6020) Filtered	
063525-013	CTF-MW2	120	154	12-09-03/0922	GW	P	~~250ml~~ 500 ml	4C	G	SA	Major Anions (SW846/9056)	
063525-015	CTF-MW2	120	154	12-09-03/0924	GW	AG	4x1L	4C	G	SA	High Explosives (8330)	
063525-016	CTF-MW2	120	154	12-09-03/0926	GW	P	250ml	H2SO4	G	SA	NPN (SW846/9056)	
063526-001	DSS-TB3	NA	NA	12-09-03/0916	DIW	G	3x40ml	HCL	G	TB	VOC (8260)	

RMMA	☐ Yes ☑ No	Ref. No.	**Sample Tracking**	Smo Use	**Special Instructions/QC Requirements**
Sample Disposal	☐ Return to Client	☑ Disposal by lab	Date Entered(mm/dd/yy)	12/11/03	EDD ☑ Yes ☐ No
Turnaround Time	☐ 7 Day ☐ 15 Day	☑ 30 Day	Entered by:	JBC	Level D Package ☑ Yes ☐ No
Return Samples By:		☐ Negotiated TAT	QC inits.	RK	*Send report to:

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	Jeff Lee	[signature]	[initials]	Weston/6134/284-3309
	John Boyd	[signature]	[initials]	S&W/6134/284-3307/228-9231
	William J Gibson	[signature]	[initials]	Weston/6134/284-5232

Tim Jackson/Org 6133/MS 1087/505-284-2547

Last DSS Well / CTF-MW2 Well very aerated

Bennett Pump Purge

Major Cations/Ca,Mg,K,Na(filtered in field w/.45 micron filter)

Major Anions/Br,Cl,Fl,SO4

*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

1.Relinquished by [signature]	Org. 6134	Date 12-09-03	Time 10 00	4.Relinquished by	Org.	Date	Time
1. Received by [signature]	Org. 6133	Date 12-09-03	Time 10 00	4. Received by	Org.	Date	Time
2.Relinquished by [signature]	Org. 6133	Date 12-9-03	Time 1135	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

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. N/A

SMO Use

AR/COC 606915

Dept. No./Mail Stop:	6133/MS1089	Date Samples Shipped:	12-8-03	Project/Task No. 7222.01.09	☐ Waste Characterization
Project/Task Manager:	Sue Collins	Carrier/Waybill No.	29845	SMO Authorization:	-Send preliminary/copy report to:
Project Name:	DSS GW	Lab Contact:	Edie Kent/803-556-8171	Contract #: PO 21671	
Record Center Code:	ER	Lab Destination:	GEL	See Bottle order	☐ Released by COC No.:
Logbook Ref. No.:	ER 089	SMO Contact/Phone:	Pam Puissant/505-284-3185		☑ Validation Required
Service Order No.	CFO 022204	Send Report to SMO:	Lorraine Herrera/505-284-3199		Bill To: Sandia National Labs (Accounts Payable)
Location	Tech Area				P.O. Box 5800 MS 0154
Building	Room				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
063531-001	DSS-EB1	NA	NA	12-08-03/0800	DIW	G	3x40ml	HCL	G	EB	VOC (8260)	
063531-008	DSS-EB1	NA	NA	12-08-03/0802	DIW	P	500ml	HNO3	G	EB	RCRA Metals (6020)	
063531-015	DSS-EB1	NA	NA	12-08-03/0804	DIW	AG	4x1L	4C	G	EB	High Explosives (8330)	
063532-001	DSS-TB6	NA	NA	12-08-03/0800	DIW	G	3x40ml	HCL	G	TB	VOC (8260)	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day

Return Samples By: ☐ **Negotiated TAT** QC inits. RL

Sample Tracking Smo Use

Date Entered(mm/dd/yy) 12/11/03

Entered by: JAC

Special Instructions/QC Requirements

EDD ☑ Yes ☐ No

Level D Package ☑ Yes ☐ No

***Send report to:**

Tim Jackson/Org 6133/MS 1087/505-284-2547

Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members

Name	Signature	Init	Company/Organization/Phone/Cellular
William J Gibson	William J Gibson	WJG	Weston/6134/284-5232
John Boyd	[illegible]	[illegible]	S&W/6134/284-3307/228-9231

1.Relinquished by William J Gibson	Org. 6134	Date 12-08-03	Time 0830	4.Relinquished by	Org.	Date	Time
1. Received by [illegible]	Org. 6133	Date 12-08-03	Time 0830	4. Received by	Org.	Date	Time
2.Relinquished by [illegible]	Org. 6133	Date 12/8/03	Time 1130	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

Contract Verification Review (CVR)

Project Leader Collins | Project Name DSS-GWM | Case No. 7222_01.09

AR/COC No. 606912, 606915 | Analytical Lab GEL | SDG No. 103409

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	063525-008, -010 received out of spec for pH; pH adjusted for analysis		
1.5	Custody records continuous and complete	X				
1.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X				
1.7	Date samples received	X				
1.8	Condition upon receipt information provided	X				

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X				
2.4	Matrix spike/matrix spike duplicate data provided (if requested)	X				
2.5	Detection limits provided; PQL and MDL (or IDL), MDA and L_c	X				
2.6	QC batch numbers provided	X				
2.7	Dilution factors provided and all dilution levels reported	X				
2.8	Data reported in appropriate units and using correct significant figures	X				
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	N/A				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met	X				
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X				

Contract Verification Review (Continued)

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1 Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2 Quantitation limit met for all samples	X		
3.3 Accuracy a) Laboratory control samples accuracy reported and met for all samples		X	LCS failed high for carbon tetrachloride & tetrachloroethylene
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	X		
c) Matrix spike recovery data reported and met	X		
3.4 Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	X		
b) Matrix spike duplicate RPD data reported and met for all organic samples		X	High Explosives RPD failed for several analytes
3.5 Blank data a) Method or reagent blank data reported and met for all samples		X	Sodium detected in Major Anions Method Blank
b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	Bormoform & dibromochloromethane detected in VOC Equipment Blank; several metals detected in Metals 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	N/A		
3.8 Narrative included, correct, and complete	X		
3.9 Second column confirmation data provided for methods 8330 (high explosives) and 8082 (pesticides/PCBs)		X	All results are "ND"

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	N/A		

ARCOC: 606912, 606915

Contract Verification Review (Concluded)

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions

Were deficiencies unresolved? Yes (No)

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

If no, provide: nonconformance report or correction request number _____ and date correction request was submitted_____

Reviewed by: [signature] Date: 01/14/04 Closed by:_____ Date:_____

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. N/A

SMO Use

AR/COC **607337**

Dept. No./Mail Stop:	6133/MS1089	Date Samples Shipped:	3-25-04	Project/Task No. 7222.01.09	☐ Waste Characterization
Project/Task Manager:	Sue Collins	Carrier/Waybill No.	3383	SMO Authorization:	-Send preliminary/copy report to:
Project Name:	DSS GW	Lab Contact:	Edie Kent/803-556-8171	Contract #: PO 21671	
Record Center Code:	ER	Lab Destination:	GEL	See below order	☐ Released by COC No.:
Logbook Ref. No.:	ER 089	SMO Contact/Phone:	Pam Puissant/505-284-3185		☑ Validation Required
Service Order No.	CF 023-04	Send Report to SMO:	Lorraine Herrera/505-284-3199		Bill To: Sandia National Labs (Accounts Payable)
Location	Tech Area				P.O. Box 5600 MS 0154
Building	Room				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
064409-001	CTF-MW2	120	154	032504/0842	GW	G	3x40ml	HCL	G	SA	VOC (8260)	
064409-010	CTF-MW2	120	154	032504/0844	GW	P	500ml	HNO3	G	SA	RCRA Metals (6020)	
064409-014	CTF-MW2	120	154	032504/0846	FGW	P	500ml	HNO3	G	SA	Major Cations (6020) Filtered	
064409-013	CTF-MW2	120	154	032504/0848	GW	P	250ml	4C	G	SA	Major Anions (SW846/9056)	
064409-020	CTF-MW2	120	154	032504/0851	GW	AG	4x1L	4C	G	SA	High Explosives (8330)	
064409-015	CTF-MW2	120	154	032504/0853	GW	P	250ml	H2SO4	G	SA	NPN (353.1)	
064410-001	CTF-TB2	NA	154	032504/0842	DIW	G	3x40ml	HCL	G	TB	VOC (8260)	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day

Return Samples By: ☐ Negotiated TAT

Sample Tracking — SMO Use
Date Entered(mm/dd/yy): 03/30/04
Entered by: TAC
QC Initials: JX

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level D Package ☑ Yes ☐ No

Abnormal Conditions on Receipt — Lab Use

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	Alfred Santillanes			Weston/6134/844-5130/228-0710
	John Boyd			S&W/6134/284-3307/228-9231
	William Gibson			Weston/6134/284-5232/239-7367

*Send report to:
Tim Jackson/Org 6133/MS 1087/505-284-2547
High Buffering Capacity
Major Anions/Br,Cl,Fl,SO4
Major Cations/Ca,Mg,K,Na
FGW/ Filtered in field w/.45 micron filter
*Please list as separate report.

1.Relinquished by	Org. 6134	Date 3/25/04	Time 1050	4.Relinquished by	Org.	Date	Time
1. Received by	Org. 6133	Date 3/25/04	Time 1050	4. Received by	Org.	Date	Time
2.Relinquished by	Org. 6133	Date 3/25/04	Time 1130	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

Sample Findings Summary

DSS GWM

AR/COC: 607337

Data Type: Inorganic

	Metals (6020)	7440-39-3 (Ba)	7440-43-9 (Cd)	7440-47-3 (Cr)	7440-22-4 (Ag)	7439-92-1 (Pb)	7782-49-2 (Se)	7440-38-2 (As)	7439-97-6 (Hg)	7440-70-2 (Ca)	7439-95-4 (Mg)	7440-9-7 (K)	7440-23-5 (Na)
064409-010 CTF-MW2		J, TP	UJ, TP	J, TP, B	UJ, TP	J, TP	UJ, TP, B3	J, TP	UJ, TP, B3				
064409-014 CTF-MW2										J, TP	J, TP	J, TP	J, TP

Validated By: K Mal

Date: 05/14/04

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

Memorandum

Date: 05/13/04

To: File

From: Linda Thal

Subject: Inorganic Data Review and Validation - SNL
Site: TA III/V Assessment GWM
ARCOC #: 607337
SDG #: 109752
Project/Task No. 7222.01.09

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 accepted procedures and specified methods – EPA6020 (ICP-MS), EPA7470 (Hg), EPA9056 (anions) and EPA553.1 (NPN). Problems were identified with the data package that resulted in the qualification of data.

1. ICP-MS
   Sample 109752-005 and -007 were received by the laboratory at the incorrect pH possibly due to the buffering capacity of the sample. The laboratory was instructed to acidify the sample. All sample results that were detect will be qualified "J, TP" and all non-detect sample results "UJ, TP".

   The continuing calibration verification standard (CCV) bracketing sample 109752-005 had a Ba value greater than (>) 110%. The sample result was detect for Ba and will be qualified "J".

   The method blank (MB) had a chromium value > the detection limit (DL) but less than (<) the reporting limit (RL). Sample 109752-005 had a chromium value > DL but < 5X MB value and will be qualified "J, B".

   The initial calibration blank (ICB) had a Se value >DL with a negative bias. Sample 109752-005 was ND for Se and will be qualified "UJ, B3".

2. Hg
   The continuing calibration blank (CCB) had a value > DL with a negative bias. Sample 109752-005 was ND for Hg and will be qualified "UJ, B3".

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

Holding Times/Preservation

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

Calibration

All Analyses: The initial and continuing calibration data met QC acceptance criteria except as noted above in the summary section.

Blanks

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

ICP-MS
The MB had a Se value > DL but < RL. Sample 109752-005 was ND for Se and will not be qualified.

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

All Analyses: The LCS met QC acceptance criteria. No LCSD was performed. The replicate is used to access precision for the batch.

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

All Analyses: The MS met all QC acceptance criteria. No MSD was performed. The replicate is used to access precision for the batch.

ICP/MS and Anions
It should be noted that 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 all QC acceptance criteria.

ICP/MS and Anions
It should be noted that 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-MS: The ICS met QC acceptance criteria. It should be noted that the ICS-AB was not run at the end of the sequence. No data will be qualified as a result.

All other Analyses: No ICS required.

ICP Serial Dilution

ICP-MS: The serial dilution met QC acceptance criteria except as follows:

According to the QC summary the RPD for K (10.2%) was slightly > 10%. Using professional judgment, no data will be qualified.

All other Analyses: No serial dilution required.

Detection Limits/Dilutions

All Analyses: All detection limits were properly reported. The samples were not diluted with the following exceptions:

> ICP-MS: Sample 109752-007 was diluted 5X for cation analysis.
> NPN: Sample 109752-011 was diluted 10X due to matrix interference.
> Anions: Sample 109752-008 was diluted 50X for Br due to matrix interference and 50X for Fl and Cl due to large amounts of analyte present in the sample.

Other QC

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

No raw data was submitted with the package.

No other specific issues were identified that affect data quality.

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

Memorandum

Date: 05/13/04

To: File

From: Linda Thal

Subject: Organic Data Review and Validation - SNL
Site: DSS GWM
ARCOC: 607337
SDG: 109752
Project/Task No.: 7222.01.09

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 sample were prepared and analyzed with approved procedures using methods EPA8260B (VOC) and EPA8330 (High Explosives). 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: The samples were properly preserved and analyzed within the method prescribed holding time.

Calibration

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

VOC
Chloromethane had a percent difference (%D) greater than (>) 20% but less than (<) 40% with a negative bias in the continuing calibration (CCV) preceding the samples. The associated sample results were non-detect for chloromethane and will not be qualified.

Blanks

All Analyses: All method blank (MB) and trip blank (TB) acceptance criteria were met.

Internal Standards (ISs)

VOC: All internal standard acceptance criteria were met.

HE: No internal standard required.

Surrogates

All Analyses: All surrogate acceptance criteria were met.

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

All Analyses: The LCS acceptance criteria were met. No LCSD was analyzed. The MS/MSD is used to assess the precision for the batch. No data will be qualified as a result.

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

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

All Analyses: All MS/MSD acceptance criteria were met.

VOC
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 as a result.

Confirmation

VOC: No confirmation required.

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

Detection Limits/Dilutions

All Analyses: All detection limits were properly reported. The sample was not diluted.

Other QC

VOC: A trip blank (TB) was submitted on the ARCOC. No field duplicates or equipment blank was submitted.

HE: No equipment blank, field blank or field duplicate were submitted on the ARCOC

No raw data was submitted with the original package.

No other specific issues were identified which affect data quality.

Data Validation Summary

Site/Project: DSS GWM Project/Task #: 7222.01.09 # of Samples: 7 Matrix: Aqueous

AR/COC #: 607337 (607342 - Not Validated) Laboratory Sample IDs: 109752

Laboratory: GEL

SDG #: 109752

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

AS PER INSTRUCTIONS SA ON WC 607342 HAVE NOT BEEN VALIDATED

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: Nhal Date: 05.14.04

Volatile Organics (SW 846 Method 8260)

Site/Project: DSS GWM AR/COC #: 607337 # of Samples: 2 Matrix: Aqueous

Laboratory: GEL SDG #: 109752 Laboratory Sample IDs: 109752 - 001 & - 002 (TB)

Methods: 8260B Batch #s: 321085

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 -002		
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																
1	110-75-8	2-chloroethyl vinyl ether																		
2	591-78-6	2-hexanone (MBK)	✓	0.01																
2	108-10-1	4-methyl-2-pentanone (MIBK)		0.10																
1	67-64-1	acetone(10xblk)		0.01																
1	71-43-2	benzene		0.50																
1	75-27-4	bromodichloromethane		0.20																
3	75-25-2	bromoform		0.10	✓	✓	✓													
1	74-83-9	bromomethane		0.10																
1	75-15-0	carbon disulfide		0.10																
1	56-23-5	carbon tetrachloride		0.10																
2	108-90-7	chlorobenzene		0.50																
1	75-00-3	chloroethane		0.01																
1	67-66-3	chloroform		0.20																
1	74-87-3	chloromethane		0.10				-28												
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		127-.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

Notes: Shaded rows are RCRA compounds.

Reviewed By: [illegible] Date: 05.13.04

High Explosives (SW 846 Method 8330)

Site/Project: DSS GWM AR/COC #: 607337 Laboratory Sample IDs: 109752 - 009

Laboratory: GEL SDG #: 109752

Methods: 8330

# of Samples: 1 Matrix: Aqueous Batch #s: 320634

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

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

Confirmation

Sample	CAS #	RPD > 25%	Sample	CAS #	RPD > 25%
NA -	SAMPLE	ND			

Comments:

The CV incorrectly states that no MS was performed.

The MS/MSD was performed on this sample.

Revised CV requested.

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

Reviewed By: [signature] Date: 05.13.04

Inorganic Metals

Site/Project: DSS GWM AR/COC #: 607337 Laboratory Sample IDs: 109752-005 Rcra metals
Laboratory: CET SDG #: 109752 -007 Carous
Methods: 6020 (ICP-MS) 7470 (Hg)
# of Samples: 2 Matrix: Aqueous Batch #s: 320544 (Hg) 321028 (ICP/MS)

CAS #/ Analyte	QC Element																			
	STAL	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		
	ug/L					mg/L														
7429-90-5 Al								NA			NA					NA				
7440-39-3 Ba	✓	✓	110.5	✓	✓	✓	✓			✓			✓	✓	✓					
7440-41-7 Be																				
7440-43-9 Cd	✓	✓	✓	✓	✓	✓	✓			✓			NA	✓	NA					
7440-70-2 Ca	✓	✓	✓	✓	✓	✓	✓			NA			✓	✓	✓					
7440-47-3 Cr	✓	✓	✓	✓	✓	.000993	✓			✓			✓	✓	NA			Cr		
7440-48-4 Co																		Sa 5 < 5XMB		J, B
7440-50-8 Cu																				
7439-89-6 Fe																				
7439-95-4 Mg	✓	✓	✓	✓	✓	✓	✓			NA			✓	✓	✓					
7439-96-5 Mn																				
7440-02-0 Ni																				
7440-09-7 K	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	9.7 9.3	— QC from	10.2			
7440-22-4 Ag	✓	✓	✓	✓	✓	✓	✓			✓			NA	✓	NA	(from	raw data)			
7440-23-5 Na	✓	✓	✓	✓	✓	✓	✓			NA			✓	✓	✓					
7440-62-2 V																				
7440-66-6 Zn																				
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	✓			✓			NA	✓	NA			Se		
7782-49-2 Se	✓	✓	✓	-.00071	✓	.00209	✓			✓			NA	✓	NA			Sa 5 ND		UJ, B3
7440-38-2 As	✓	✓	✓	✓	✓	✓	✓			✓			NA	✓	NA					
7440-36-0 Sb																				
7440-28-0 Tl																				
																		Hg.		
7439-97-6 Hg	✓	✓	✓	✓	-.00005	✓	✓			✓			✓		✓			Sa ND		UJ, B3
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: -005 & -007 received "unpreserved" lab instructed to add more acid. All detects J, TP All NDs UJ, TP.

-007 5X

Reviewed By: [signature] Date: 05.13.04

ICP MS Dup 109829-004 CCV Ba = 110.5
MS SNA SO4. -005 detect "J"

General Chemistry

Site/Project: DSS GWM AR/COC #: 607337 Laboratory Sample IDs: 109752 – 008 (Anions)
Laboratory: GEL SDG #: 109752 – 011 (NPN)
Methods: 9056 (Anions) 353.1 (NPN)
# of Samples: 2 Matrix: Aqueous Batch #s: 320246 (Anions) 323199 (NPN)

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	
	Fluoride	✓	✓	✓	✓	✓	✓	✓	NA		✓	NA		✓	NA					
	Bromide 50X	✓	✓	✓	✓	✓	✓	✓			✓			NA						
	Chloride 50X	✓	✓	✓	✓	✓	✓	✓			✓			✓						
	Sulphate 50X	✓	✓	✓	✓	✓	✓	✓			✓			✓						
	NPN 10X	✓	✓	✓	✓	✓	✓	✓			✓			NA						

Comments:

Anions Dup/MS 109672 SNA 504 ✓

Br out due to matrix interference
NPN " " " " "

Reviewed By: [signature] Date: 05.14.04 LT

Inorganic Metals

Site/Project: DSS GWM AR/COC #: 607337 Laboratory Sample IDs: 109752-005 Rcra metals
Laboratory: GEL SDG #: 109752 -007 Carous
Methods: 6020 (ICP-ms) 7470 (Hg)
# of Samples: 2 Matrix: Aqueous Batch #s: 320544 (Hg) 321028 (ICP/ms)

CAS #/ Analyte	QC Element																			
	5TAL ug/L 7	ICV	CCV	ICB	CCB	Method Blanks mg/L	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dilution (RPD)	Field Dup. RPD	Equip. Blanks	Field Blanks		
7429-90-5 Al								NA			NA					NA				
7440-39-3 Ba	✓	✓	110.5	✓	✓	✓	✓			✓			✓	✓	✓					
7440-41-7 Be																				
7440-43-9 Cd	✓	✓	✓	✓	✓	✓	✓			✓			NA	✓	NA					
7440-70-2 Ca	✓	✓	✓	✓	✓	✓	✓			NA			✓	✓	✓					
7440-47-3 Cr	✓	✓	✓	✓	✓	.000993	✓			✓			✓	✓	NA				Cr Sa 5 <5xmB	" J,B "
7440-48-4 Co																				
7440-50-8 Cu																				
7439-89-6 Fe																				
7439-95-4 Mg	✓	✓	✓	✓	✓	✓	✓			NA			✓	✓	✓					
7439-96-5 Mn																				
7440-02-0 Ni																				
7440-09-7 K	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	9.7 a.3	— QC form (from raw data)		10.2 "		
7440-22-4 Ag	✓	✓	✓	✓	✓	✓	✓			✓			NA	✓	NA					
7440-23-5 Na	✓	✓	✓	✓	✓	✓	✓			NA			✓	✓	✓					
7440-62-2 V																				
7440-66-6 Zn																				
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	✓			✓			NA	✓	NA				Se	"
7782-49-2 Se	✓	✓	✓	-.00071	✓	.00209	✓			✓			NA	✓	NA				Sa 5 ND	UJ, B3 "
7440-38-2 As	✓	✓	✓	✓	✓	✓	✓			✓			NA	✓	NA					
7440-36-0 Sb																				
7440-28-0 Tl																				
																			Hg.	"
7439-97-6 Hg	✓	✓	✓	✓	-.00005	✓	✓			✓			✓		✓				Sa ND	UJ, B3 "
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: -005 & -007 received "unpreserved" lab instructed to add more acid. All detects J, TP All NDs UJ, TP.

-007 5X

Reviewed By: [signature] Date: 05.13.04

ICP ms Dup 109829-004 ms SNA SO4.

CCV Ba = 110.5 -005 detect "J"

Contract Verification Review (CVR)

Project Leader Collins | Project Name DSS GWM | Case No. 7222_01.09

AR/COC No. 607337, 342 | Analytical Lab GEL | SDG No. 109752

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	Sample Id 064409-010 and -014 received out of pH spec		
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	Missing for VOCs		
2.5	Detection limits provided: PQL and MDL (or IDL), MDA and L_c	X				
2.6	QC batch numbers provided	X				
2.7	Dilution factors provided and all dilution levels reported	X				
2.8	Data reported in appropriate units and using correct significant figures	X				
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	N/A				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met	X				
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X				

Contract Verification Review (Continued)

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1 Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2 Quantitation limit met for all samples	X		
3.3 Accuracy a) Laboratory control samples accuracy reported and met for all samples	X		
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	X		
c) Matrix spike recovery data reported and met	X		
3.4 Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	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	Selenium & chromium detected in Metals Method Blank
b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	Bromodichloromethane, bromoform, dibromochloromethane detected in VOC Equipment Blank; barium, selenium, chromium detected in Metals Method 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	N/A		
3.8 Narrative included, correct, and complete	X		
3.9 Second column confirmation data provided for methods 8330 (high explosives) and 8082 (pesticides/PCBs)		X	Missing for high explosives - all sample results are ND

Contract Verification Review (Continued)

4.0 Calibration and Validation Documentation

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

Contract Verification Review (Concluded)

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions
Narrative	VOC	Incorrect PS and PSD listed (page 59) / Correct PS is 1200596834/109829001 and correct PSD is 1200596835/109829001
Narrative	Nitrate/Nitrate	Incorrect Sample Spike Recovery statement (page 172) - results reported in QC summary do not confirm statement in narrative

Were deficiencies unresolved? (Yes) No

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

If no, provide: nonconformance report or correction request number 7608 and date correction request was submitted 04/28/04

Reviewed by: [illegible] Date: 04/28/04 Closed by: [illegible] Date: 05-04-04

Date: 04/28/04

To:	Edie Kent Denni Grunstra	From:	Lorraine Herrera
Company:	GEL	Org:	6133
Phone:	(843) 556-8171	Phone:	(505) 844-3199
Fax:	(843) 766-1178	Fax:	(505) 844-3128

Correction Request

COC: 607337, 607342 SDG: 109752 Tracking No: 7608

Denni/Edie,

Please correct the following error(s):

- Incorrect PS and PSD listed (page 59) / Correct PS is 1200596834/109829001 and correct PSD is 1200596835/109829001
- Incorrect Sample Spike Recovery statement (page 172) – results reported in QC summary do not confirm statement in narrative

Thank you,
Lorraine

Sandia National Laboratories
Sample Management Office
P.O. Box 5800
Albuquerque, New Mexico 87185-1331

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. N/A

SMO Use

Page 1 of 1 (2)

AR/COC 607544

Dept. No./Mail Stop:	6133/MS1069	Date Samples Shipped:	6/02/04	Project/Task No. 7222.01.09	☐ Waste Characterization
Project/Task Manager:	Sue Collins	Carrier/Waybill No.	36393	SMO Authorization:	-Send preliminary/copy report to:
Project Name:	DSS GW	Lab Contact:	Edie Kent/803-556-8171	Contract #: PO 21671	
Record Center Code:	ER	Lab Destination:	GEL		☐ Released by COC No.:
Logbook Ref. No.:	ER 089 2	SMO Contact/Phone:	Pam Puissant/505-284-3185	SEE Bottle order	☑ Validation Required
Service Order No.	CF 028-04	Send Report to SMO:	Lorraine Herrera/505-284-3199		Bill To: Sandia National Labs (Accounts Payable)
Location	Tech Area				P.O. Box 5800 MS 0154
Building	Room				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
065027-001	CTF-MW2	120	154	060204/0944	GW	G	3x40ml	None	G	SA	VOC (8260)	[illegible]
065028-001	CTF-MW2	120	154	060204/0944	GW	G	3x40ml	None	G	DU	VOC (8260)	[illegible]
065027-010	CTF-MW2	120	154	060204/0946	GW	P	500ml	HNO3	G	SA	RCRA Metals (6020)	[illegible]
065028-010	CTF-MW2	120	154	060204/0946	GW	P	500ml	HNO3	G	DU	RCRA Metals (6020)	[illegible]
065027-014	CTF-MW2	120	154	060204/0948	FGW	P	500ml	HNO3	G	SA	Major Cations (6020) Filtered	[illegible]
065028-014	CTF-MW2	120	154	060204/0948	FGW	P	500ml	HNO3	G	DU	Major Cations (6020) Filtered	[illegible]
065027-013	CTF-MW2	120	154	060204/0950	GW	P	500ml	4C	G	SA	Major Anions (SW846/9056)	[illegible]
065028-013	CTF-MW2	120	154	060204/0950	GW	P	500ml	4C	G	DU	Major Anions (SW846/9056)	[illegible]
065027-020	CTF-MW2	120	154	060204/0952	GW	AG	4x1L	4C	G	SA	High Explosives (8330)	009
065028-020	CTF-MW2	120	154	060204/0952	GW	AG	4x1L	4C	G	DU	High Explosives (8330)	[illegible]

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day

Return Samples By: ☐ Negotiated TAT

Sample Tracking Smo Use

Date Entered(mm/dd/yy) 06/08/04

Entered by: JAC

QC inits. LH

Special Instructions/QC Requirements

EDD ☑ Yes ☐ No

Level D Package ☑ Yes ☐ No

*Send report to:

Tim Jackson/Org 6133/MS 1087/505-284-2547

High Buffering Capacity (Add Preservative at Lab if needed)

Major Anions/Br,Cl,Fl,SO4

Major Cations/Ca,Mg,K,Na

FGW/ Filtered in field w/.45 micron filter

Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members

Name	Signature	Init	Company/Organization/Phone/Cellular
Alfred Santillanes	[signature]		Weston/6134/844-5130/228-0710
John Boyd	[signature]		S&W/6134/284-3307/228-9231
William Gibson	[signature]		Weston/6134/284-5232/239-7367

1.Relinquished by [signature]	Org. 6134	Date 6-2-04	Time 1030	4.Relinquished by	Org.	Date	Time
1. Received by [signature]	Org. 6133	Date 6-2-04	Time 1030	4. Received by	Org.	Date	Time
2.Relinquished by [signature]	Org. 6133	Date 6/02/04	Time 1300	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- 607544

Project Name:	DSS GW	Project/Task Manger:	Sue Collins	Project/Task No.:	7222 .01.09
Location	Tech Area				
Building	Room				

Reference LOV (available at SMO)

1141 12
Lab use

Sample No-Fraction	ER Sample ID or Sample Location detail	Pump Depth (ft)	ER Site No.	Date/Time (hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
065027-015	CTF-MW2	120	154	060204/0954	GW	P	250ml	H2SO4	G	SA	NPN (353.1)	011
065028-015	CTF-MW2	120	154	060204/0954	GW	P	250ml	H2SO4	G	DU	NPN (353.1)	012
065029-001	CTF-TB2	NA	154	060204/0944	DIW	G	3x40ml	HCL	G	TB	VOC (8260)	013

Abnormal Conditions on Receipt

LAB USE

Recipient Initials_____

Sample Fin s Summary

Site: DSS-GWM **AR/COC:** 607544 **Data Type:** Organic, Inorganic, & Gen Chem

	VOC	74-87-3 (Chloromethane)	ICP-MS Metals	7782-49-2 (Selenium)
065027-001 CTF-MW2		UJ,A		
065028-001 CTF-MW2		UJ,A		
065029-001 CTF-TB2		UJ,A		
065027-010 CTF-MW2				UJ,B3
065028-010 CTF-MW2				UJ,B3

HE and General Chemistry analyses met QC acceptance criteria. No data will be qualified.

Validated By: Kevin A Lambert **Date:** 07/20/04

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

Memorandum

Date: July 20, 2004

To: File

From: Kevin Lambert

Subject: Organic Data Review and Validation – SNL
Site: DSS-GWM
AR/COC: 607544
SDG: 114072
Laboratory: GEL
Project/Task: 7222.01.09

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. Data are evaluated using SNL/NM SMO AOP 00-03 Rev 1.

Summary

All samples were prepared and analyzed with accepted procedures using method EPA8260B (VOC) and EPA8330 (High Explosives). All compounds were successfully analyzed. Problems were identified with the data package that result in the qualification of data.

1. VOC:
   The LCS percent recovery (%R) for chloromethane (66%) was < the lower QC acceptance limit (72%). The associated sample results were non-detects (NDs) and will be qualified "UJ, A."

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

Holding Times

All samples were extracted and analyzed within the prescribed holding times and properly preserved.

Calibration

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

VOC:
The calibration RF for trichloroethene (0.27) was < the specified minimum RF (0.30). The calibration relative standard deviation (RSD) and continuing calibration verification percent difference (CCV %D) for trichloroethene met QC acceptance criteria. The associated sample results were NDs and as a result based on professional judgment no data will be qualified. The CCV %D for six target analytes were >

20% but ≤ 40%(see Data Validation Worksheets). The associated sample results were NDs and as a result based on professional judgment no data will be qualified.

Blanks

No target analytes were detected in the blanks except as follows.

VOC:
Toluene was detected (≥ DL) in the trip blank (TB). However, associated sample results were NDs; no data will be qualified as a result.

Internal Standards (ISs)

Internal standards data met QC acceptance criteria.

Surrogates

The surrogate recoveries met QC acceptance criteria.

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

The LCS/LCSD met QC acceptance criteria except as follows.

All analyses:
The LCS %R for bromoform (78%) was slightly < the lower QC acceptance limit (79%). The associated sample results were NDs and as a result based on professional judgment no data will be qualified. It should be noted that no LCSD was provided with the SDG. Laboratory precision was assessed using the MS/MSD, which met QC acceptance criteria. No data will be qualified as a result.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS/MSD met QC acceptance criteria except as follows.

High Explosives (HE):
It should be noted the MS/MSD was run on a sample of similar matrix from another SNL SDG and met QC acceptance criteria. No data will be qualified as a result.

Target Compound Identification/Confirmation

No target compound identification/confirmation analyses were required.

Detection Limits/Dilutions

All detection limits were properly reported. No dilutions were required except as follows.

HE:
All samples were diluted 2x according to laboratory procedure for this analysis.

Other QC

No equipment blank (EB), TB, field blank (FB), or field duplicate pair was submitted on the AR/COC(s) except as follows.

VOC:

A TB was submitted on an AR/COC(s). A field duplicate pair was submitted on the AR/COC(s). There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result.

HE:
A field duplicate pair was submitted on the AR/COC(s). There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues were identified which affect data quality.

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

Memorandum

Date: July 20, 2004

To: File

From: Kevin Lambert

Subject: Inorganic Data Review and Validation – SNL
Site: DSS-GWM
AR/COC: 607544
SDG: 114072
Laboratory: GEL
Project/Task: 7222.01.09

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. Data are evaluated using SNL/NM SMO AOP 00-03 Rev 1.

Summary

The samples were prepared and analyzed with accepted procedures using methods EPA6020 (ICP-MS metals), EPA7470A (CVAA mercury), EPA9012A (Total Cyanide), EPA9056 (Bromide, Fluoride, Chloride, and Sulfate by Ion Chromatography), and EPA353.1 (Nitrate/Nitrite). Problems were identified with the data package that result in the qualification of data.

1. ICP-MS metals:
   The following target analytes were detected (≥ DL) in one or more of the blanks (ICB, CCB) at negative concentration with absolute value > the DL but < the RL. The associated sample results are qualified as noted below.

Sample 114072-003 and -004	Se was non-detect (ND) and will be qualified "UJ, B3."

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

Holding Times/Preservation

The samples were analyzed within the prescribed holding times and properly preserved.

Calibration

The initial and continuing calibration data met QC acceptance criteria.

Blanks

No target analytes were detected in the blanks except as noted above in the summary section and as follows.

ICP-MS metals:
Arsenic, potassium, and sodium were detected (≥ DL) in one or more of the blanks (ICB, CCB, MB). However, the associated sample results were NDs or > 5x the blank concentrations; no data will be qualified as a result. Lead was detected (≥ DL) in one or more of the blanks (ICB, CCB) at negative concentration with absolute value > the DL but < the RL. However, the associated sample results were > 5x the DL; no data will be qualified as a result.

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

The LCS/LCSD met QC acceptance criteria except as follows.

All analyses:
It should be noted that no LCSD was provided with the SDG. No data will be qualified as a result. Laboratory precision was assessed using the replicate.

Matrix Spike (MS)

The MS met QC acceptance criteria except as follows.

ICP-MS metals:
It should be noted the MS was run on a sample of similar matrix from another SNL SDG and met QC acceptance criteria. No data will be qualified as a result. Also, it should be noted that the MS %R limits do not apply for target analytes with sample concentrations > 4x the spike concentrations (see Data Validation Worksheets). No data will be qualified as a result.

Replicate

The replicate met QC acceptance criteria except as follows.

ICP-MS metals:
It should be noted the replicate was run on a sample of similar matrix from another SNL SDG and met QC acceptance criteria. No data will be qualified as a result.

ICP Serial Dilution

The serial dilution met QC acceptance criteria except as follows.

ICP-MS metals:
It should be noted the serial dilution was run on a sample of similar matrix from another SNL SDG and met QC acceptance criteria.

ICP Interference Check Sample (ICS)

The ICS data met QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported. No dilutions were required except as follows.

ICP-MS metals:
The samples were diluted 5x for calcium and sodium due to instrument QC failures.

Ion Chromatography (IC):
The samples were diluted 50x for bromide, chloride, and sulfate due to high concentration and matrix interference.

Other QC

No equipment blank (EB), field blank (FB) or field duplicate pair was submitted on the AR/COC(s) except as follows.

All analyses:
A field duplicate pair was submitted on the AR/COC(s). The relative percent difference (RPD) for several target analytes in the field duplicate pair are presented on the Data Validation Worksheets. There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues were identified which affect data quality.

Data Validation Summary

Site/Project: DSS-GWM Project/Task #: 7222.01.09 # of Samples: 13 Matrix: aqueous

AR/COC #: 607544 Laboratory Sample IDs: 114072-001 to -013

Laboratory: GEL

SDG #: 114072

QC Element	Analysis									
	Organics				IC Inorganics				RAD	Other
	VOC	SVOC	Pesticide/ PCB	HPLC (HE)	ICP/AES	~~GFAA/ AA~~	CVAA (Hg)	~~CN~~ NO_3/NO_2		
1. Holding Times/Preservation	✓			✓	✓	✓	✓	✓		
2. Calibrations	✓			✓	UJ	✓	✓	✓		
3. Method Blanks	✓			✓	✓	✓	✓	✓		
4. MS/MSD	✓			✓	✓	✓	✓	✓		
5. Laboratory Control Samples	UJ			✓	✓	✓	✓	✓		
6. Replicates					✓	✓	✓	✓		
7. Surrogates	✓			✓						
8. Internal Standards	✓									
9. TCL Compound Identification	✓									
10. ICP Interference Check Sample					✓					
11. ICP Serial Dilution					✓					
12. Carrier/Chemical Tracer Recoveries										
13. Other QC Trip Blank, Dup	✓			✓	✓	✓	✓	✓		

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: Kevin A Lambert Date: 07-20-04

Volatile Organics (SW 846 Method 8260)

Site/Project: DSS-GWM AR/COC #: 607544 # of Samples: 3 Matrix: aqueous

Laboratory: GEL SDG #: 114072 Laboratory Sample IDs: 114072-001 to -002, -013

Methods: EPA 8260B (VOC) Batch #s: 339409

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF (1) >.05	Calib. RSD/ R^2 <20%/ 0.99	CCV %D (2) 20%	Method Blks	LCS (3)	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks (4)		
1	71-55-6	1,1,1-trichloroethane	✓	0.10	NA	✓	✓	✓	✓	✓			✓	✓	✓	✓		✓		
2	79-34-5	1,1,2,2-tetrachloroethane	✓	0.30		✓	✓													
2	79-00-5	1,1,2-trichloroethane	✓	0.10		✓	✓													
1	75-34-3	1,1-dichloroethane	✓	0.10		✓	✓													
1	75-35-4	1,1-dichloroethene	✓	0.20		✓	✓													
1	107-06-2	1,2-dichloroethane	✓	0.10		✓	✓													
1	156-59-2	cis-1,2-dichloroethene	✓	0.01		✓	✓													
1	78-87-5	1,2-dichloropropane	✓	0.01		✓	✓	✓												
1	78-93-3	2-butanone (MEK) (10xblk)	✓	0.01		✓	✓	-24												
1	156-60-5	trans-1,2-dichloroethene	✓			✓	✓	✓												
2	591-78-6	2-hexanone (MBK)	✓	0.01		✓	✓	✓												
2	108-10-1	4-methyl-2-pentanone (MIBK)	✓	0.10		✓	✓	-23												
1	67-64-1	acetone(10xblk)	✓	0.01		✓	✓	-25												
1	71-43-2	benzene	✓	0.50		✓	✓	✓												
1	75-27-4	bromodichloromethane	✓	0.20	✓	✓	✓	✓		✓										
3	75-25-2	bromoform	✓	0.10	✓	✓	✓	-22		78(79)										
1	74-83-9	bromomethane	✓	0.10	NA	✓	✓	✓		✓										
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		✓	✓	-24		66(72)										
1	10061-01-5	cis-1,3-dichloropropene	✓	0.20		✓	✓	✓		✓										
2	124-48-1	dibromochloromethane	✓	0.10		✓	✓													
2	100-41-4	ethylbenzene	✓	0.10	✓	✓	✓													
1	75-09-2	methylene chloride (10xblk)	✓	0.01	✓	✓	✓													
2	100-42-5	styrene	✓	0.30	NA	✓	✓													
2	127-18-4	tetrachloroethene	✓	0.20		✓	✓											✓		
2	108-88-3	toluene(10xblk)	✓	0.40		✓	✓											0.45J		
2	10061-02-6	trans-1,3-dichloropropene	✓	0.10		✓	✓											✓		
1	79-01-6	trichloroethene	✓	0.30		0.27	✓													
1	75-01-4	vinyl chloride	✓	0.10		✓	✓	✓												
2	1330-20-7	xylenes(total)	✓	0.30		✓	✓	✓												
	108-05-4	vinyl acetate	✓		✓	✓	✓	-23	✓	✓			✓	✓	✓	✓		✓		

Comments:

Notes: Shaded rows are RCRA compounds.

Reviewed By: Kevin A Lambert Date: 07-20-04

Volatile Organics

Site/Project: _____ AR/COC #: 607544 Batch #s: _____

Laboratory: _____ SDG #: _____ # 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
					Met				
	Met				Criteria				
	Criteria								

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

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

Comments:

(1) The calibration RF for TCE was < the specified min RF; The RSD and CCV%D met QC criteria; Assoc results were NDs and as a result based on professional judgment no data will be qualified

(2) The CCV%D for 6 target analytes were > 20 but ≤40, Assoc results were NDs and as a result based on professional judgment no data will be qualified

(3) ~~Bromoform & chloro~~ KKG The LCS %R for bromoform & chloromethane were < the lower QC limit; Assoc results were NDs; Bromoform will not be qualified since LCS %R was slightly < lower limit; Chloromethane will be qualified "UJ, A"

(4) Toluene was detected in TB; Assoc results were NDs; no data will be qualified as result

High Explosives (SW 846 Method 8330)

Site/Project: DSS-GWM AR/COC #: 607544 Laboratory Sample IDs: 114072-009,-010

Laboratory: GEL SDG #: 114072

Methods: EPA8330 (HE)

# of Samples: 2 Matrix: aqueous Batch #s: 338144/338143

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

Sample	SMC %REC	SMC RT	Sample	SMC %REC	SMC RT
Met	Criteria				

Comments: QC run on sample of similar matrix from another ~~SDG~~ SNL SDG KK

Confirmation

Sample	CAS #	RPD > 25%	Sample	CAS #	RPD > 25%
Not	Required				
		Results ND's			

Solids-to-aqueous conversion:

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

Reviewed By: Kevin A Lambert Date: 07-20-04

Inorganic Metals

Site/Project: DSS-GWM AR/COC #: 607544 Laboratory Sample IDs: 114072-003 to -006

Laboratory: GEL SDG #: 114072

Methods: EPA6020 (ICP-MS metals), EPA7470A (CVAA Hg)

# of Samples: 4 Matrix: aqueous Batch #s: 338457/338456, 338497/338496

CAS #/ Analyte	QC Element																			
	TAL	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dilu-tion	Field Dup. RPD	5x ~~Equip.~~ Blanks	5x DL ~~Field Blanks~~		
7429-90-5 Al																				
7440-39-3 Ba	✓	✓	✓	✓	✓	✓	✓						✓	✓	✓	1				
7440-41-7 Be																				
7440-43-9 Cd	✓	✓	✓	✓	✓	✓	✓						✓	✓	✓	13				
7440-70-2 Ca	✓	✓	✓	✓	✓	✓	✓			N/A			✓	✓	✓	8				
7440-47-3 Cr	✓	✓	✓	✓	✓	✓	✓						✓	✓	✓	66				
7440-48-4 Co																				
7440-50-8 Cu																				
7439-89-6 Fe																				
7439-95-4 Mg	✓	✓	✓	✓	✓	✓	✓			N/A			✓	✓	✓	5				
7439-96-5 Mn																				
7440-02-0 Ni																				
7440-09-7 K	✓	✓	✓	✓	✓	0.0167 J	✓			N/A			✓	✓	✓	4	0.0835			
7440-22-4 Ag	✓	✓	✓	✓	✓	✓	✓						✓	✓	✓	✓				
7440-23-5 Na	✓	✓	✓	✓	0.0434	0.050 J	✓			N/A			✓	✓	✓	2	0.217			
7440-62-2 V																				
7440-66-6 Zn																				
7439-92-1 Pb	✓	✓	✓	✓	-0.00058	✓	✓						✓	✓	✓	4		0.00025		
7782-49-2 Se	✓	✓	✓	-0.0018 J	✓	✓	✓						✓	✓	✓	✓		0.052		
7440-38-2 As	✓	✓	✓	✓	0.00164	0.0015 J	✓						✓	✓	✓	3	0.0052			
7440-36-0 Sb																				
7440-28-0 Tl																				
7439-97-6 Hg	✓	✓	✓	✓	✓	✓	✓			✓			✓	NA	NA	✓				
Cyanide CN																				

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

Comments: QC for ICP-MS metals was run on sample of similar matrix from another SNL SDG
N/A - The MS % R limits don't apply; sample [c] > 4x spike [c]

Reviewed By: Kevin A Lambert Date: 07-20-04

SEE OTHER PAGE

Metals

DSS-GWM
COC # 607544
SDG # 114072

2/2

(1)

Sample # 114072-

BlankAnalyte	-003	-004	-005	-006				
MB K			>5xblk No Qual →					
CCB MB Na			>5xblk No Qual →					
CCB - Pb	>5xDL No Qual →							
ICB - Se	ND UJ, B3 →							
CCB MB As	>5xblk No Qual →							

Negative Blank>=DL	Negative Blank>RL	Positive Blank>=DL	Positive Blank>RL	Descriptive Flags (if applicable)
<5XDL=J, NDs=UJ, >5XDL = no qual	<5XRL=J, NDs=R	<5X Blank=J, ND or >5X = no qual	reported value = >10X blank	B=MB, B1=TB, B2=EB, B3=ICB/CCB

KAL
07-20-04

General Chemistry

Site/Project: DSS-GWM AR/COC #: 607544 Laboratory Sample IDs: 114072-007, -008, -011, -012

Laboratory: GEL SDG #: 114072

Methods: EPA 9056 (Br, Cl, F, SO_4 by IC), EPA 353.1 (NO_3/NO_2)

# of Samples: 4 Matrix: aqueous Batch #s: 338384, 339876

CAS #	Analyte	QC Element																		
		TAL	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dilu-tion	Field Dup. RPD	Equip. Blanks	Field Blanks	
24959-67-9	Bromide	✓	✓	✓	✓	✓	✓	✓			✓			✓			✓			
16887-00-6	Chloride	✓	✓	✓	✓	✓	✓	✓			✓			✓			0			
16984-48-8	Fluoride	✓	✓	✓	✓	✓	✓	✓			✓			✓			1			
14808-79-8	Sulfate	✓	✓	✓	✓	✓	✓	✓			✓			✓			0			
N599	NO_3/NO_2	✓	✓	✓	✓	✓	✓	✓			✓			✓			✓			

Comments:

Reviewed By: Kevin A Lambert Date: 07-20-04

Contract Verification Review (CVR)

Project Leader COLLINS | Project Name DSS – GWM | Case No. 7222_01.09

AR/COC No. 607544 | Analytical Lab GEL | SDG No. 114072

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

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

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

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X				
2.4	Matrix spike/matrix spike duplicate data provided (if requested)	X				
2.5	Detection limits provided; PQL and MDL (or IDL), MDA and L_c	X				
2.6	QC batch numbers provided	X				
2.7	Dilution factors provided and all dilution levels reported	X				
2.8	Data reported in appropriate units and using correct significant figures	X				
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	N/A				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met	X				
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X				

Contract Verification Review (Continued)

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1 Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2 Quantitation limit met for all samples	X		
3.3 Accuracy a) Laboratory control samples accuracy reported and met for all samples		X	CHLOROMETHANE & BROMOFORM FAILED RECOVERY LIMITS FOR VOC LCS
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	X		
c) Matrix spike recovery data reported and met	X		
3.4 Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	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	ARSENIC, POTASSIUM & SODIUM DETECTED IN BLANK
b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	TOLUENE DETECTED IN TRIP 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	N/A		
3.8 Narrative included, correct, and complete	X		
3.9 Second column confirmation data provided for methods 8330 (high explosives) and 8082 (pesticides/PCBs)	X		

Contract Verification Review (Concluded)

5.0 Problem Resolution

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

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions
065029-001	8260B	TOLUENE INCORRECTLY QUALIFIED WITH A "B"

Were deficiencies unresolved? (Yes) No

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

If no, provide: nonconformance report or correction request number 8026 and date correction request was submitted: 6-30-04

Reviewed by: W. Palencia Date: 6-30-04 Closed by: W. Palencia Date: 7-9-04

Date: 6-30-04

To:	Denni Grunstra	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: 607544 SDG: 114072 Tracking No: 8026

NOTE: Denni,
Voc sample #065029-001 was qualified with a "B" on toluene, but there was no toluene in the method blank. Please forward a corrected COA.

Thank you,
Wendy

Sandia National Laboratories
Sample Management Office
P.O. Box 5800
Albuquerque, New Mexico 87185-1331

ANNEX C
DSS SWMU 154
Exposure Pathway Discussion for Chemical and Radionuclide Contamination

ANNEX C
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)

$$= C \times (CR \times EFD/BW/AT) \times \text{Toxicity Effect} \qquad (1)$$

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

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

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

Summary

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

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

Parameter	Industrial	Recreational	Residential
General Exposure Parameters			
Exposure Frequency (day/yr)	250[a,b]	8.7 (4 hr/wk for 52 wk/yr)[a,b]	350[a,b]
Exposure Duration (yr)	25[a,b,c]	30[a,b,c]	30[a,b,c]
Body Weight (kg)	70[a,b,c]	70 Adult[a,b,c] 15 Child[a,b,c]	70 Adult[a,b,c] 15 Child[a,b,c]
Averaging Time (days) for Carcinogenic Compounds (= 70 yr x 365 day/yr) for Noncarcinogenic Compounds (= ED x 365 day/yr)	25,550[a,b] 9,125[a,b]	25,550[a,b] 10,950[a,b]	25,550[a,b] 10,950[a,b]
Soil Ingestion Pathway			
Ingestion Rate (mg/day)	100[a,b]	200 Child[a,b] 100 Adult[a,b]	200 Child[a,b] 100 Adult[a,b]
Inhalation Pathway			
Inhalation Rate (m^3/day)	20[a,b]	15 Child[a] 30 Adult[a]	10 Child[a] 20 Adult[a]
Volatilization Factor (m^3/kg)	Chemical Specific	Chemical Specific	Chemical Specific
Particulate Emission Factor (m^3/kg)	1.36E9[a]	1.36E9[a]	1.36E9[a]
Water Ingestion Pathway			
Ingestion Rate (liter/day)	2.4[a]	2.4[a]	2.4[a]
Dermal Pathway			
Skin Adherence Factor (mg/cm^2)	0.2[a]	0.2 Child[a] 0.07 Adult[a]	0.2 Child[a] 0.07 Adult[a]
Exposed Surface Area for Soil/Dust (cm^2/day)	3,300[a]	2,800 Child[a] 5,700 Adult[a]	2,800 Child[a] 5,700 Adult[a]
Skin Adsorption Factor	Chemical Specific	Chemical Specific	Chemical Specific

[a]Technical Background Document for Development of Soil Screening Levels (NMED December 2000).
[b]Risk Assessment Guidance for Superfund, Vol. 1, Part B (EPA 1991).
[c]Exposure Factors Handbook (EPA August 1997).
ED = Exposure duration.
EPA = U.S. Environmental Protection Agency.
hr = Hour(s).
kg = Kilogram(s).
m = Meter(s).
mg = Milligram(s).
NA = Not available.
wk = Week(s).
yr = Year(s).

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

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

[a]Risk Assessment Guidance for Superfund, Vol. 1, Part B (EPA 1991).
[b]Exposure Factors Handbook (EPA August 1997).
[c]EPA Region VI guidance (EPA 1996).
[d]For radionuclides, RESRAD (ANL 1993).
[e]SNL/NM (February 1998).
EPA = U.S. Environmental Protection Agency.
g = Gram(s)
hr = Hour(s).
kg = Kilogram(s).
m = Meter(s).
mg = Milligram(s).
NA = Not applicable.
wk = Week(s).
yr = Year(s).

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Sandia National Laboratories/New Mexico
Environmental Restoration Project

REQUEST FOR SUPPLEMENTAL INFORMATION RESPONSE AND PROPOSAL FOR CORRECTIVE ACTION COMPLETE FOR DRAIN AND SEPTIC SYSTEMS SWMU 161, BUILDING 6636 SEPTIC SYSTEM AT TECHNICAL AREA III

June 2005

United States Department of Energy
Sandia Site Office

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Annex

A DSS SWMU 161 Exposure Pathway Discussion for Chemical and Radionuclide Contamination

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ACRONYMS AND ABBREVIATIONS

AOC	Area of Concern
AOP	Administrative Operating Procedure
bgs	below ground surface
CAC	Corrective Action Complete
COC	constituent of concern
COPEC	constituent of potential ecological concern
DCF	dose conversion factor
DOE	U.S. Department of Energy
DQO	data quality objective
DSS	Drain and Septic Systems
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
HE	high explosive(s)
HEAST	Health Effects Assessment Summary Tables
HI	hazard index
HRMB	Hazardous and Radioactive Materials Bureau
HWB	Hazardous Waste Bureau
IRIS	Integrated Risk Information System
KAFB	Kirtland Air Force Base
MDA	minimum detectable activity
mrem	millirem
NFA	no further action
NMED	New Mexico Environment Department
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
QA	quality assurance
QC	quality control
QES	Quanterra Environmental Services
RAGS	Risk Assessment Guidance for Superfund
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RME	reasonable maximum exposure
RPSD	Radiation Protection Sample Diagnostics
RSI	Request for Supplemental Information
SAP	Sampling and Analysis Plan
SNL/NM	Sandia National Laboratories/New Mexico
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
TEDE	total effective dose equivalent
TMA	Thermo Analytical Inc./Eberline Laboratories
TOP	Technical Operating Procedure
VOC	volatile organic compound
yr	year

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1.0 INTRODUCTION

1.1 Investigation History

Solid Waste Management Unit (SWMU) 161 was originally one of 23 SWMUs designated as Operable Unit (OU) 1295 at Sandia National Laboratories/New Mexico (SNL/NM). This number was reduced to 22 when a petition for Administrative No Further Action (NFA) was approved by the New Mexico Environment Department (NMED) for SWMU 139 in 1995.

In June 1996, an NFA proposal was submitted to the NMED for SWMU 161 (SNL/NM June 1996). In June 1998, the NMED Hazardous and Radioactive Materials Bureau (HRMB) responded with a Request for Supplemental Information (RSI) on the NFA proposal that required finalized location and site maps and the investigation of a potential soil-vapor plume indicated by PETREX™ passive soil-vapor survey data. In addition, the NMED required SNL/NM to analyze for high explosive (HE) compounds using U.S. Environmental Protection Agency (EPA) Method 8330, complete a revised risk assessment that follows NMED risk assessment protocols, and revise analytical tables to include complete analyte lists and method detection limits for the analytes (NMED June 1998).

SNL/NM responded to the RSI in November 1998, submitted revised maps and amended data tables, and committed to completing a revised risk assessment in accordance with current risk assessment procedures. SNL/NM also agreed to collect additional HE soil samples from up to three locations at the site (SNL/NM November 1998).

At that time, negotiations were being conducted to define a technical and decision-making approach to complete environmental assessment and characterization work at the 22 OU 1295 SWMUs and 61 other Drain and Septic Systems (DSS) Area of Concern (AOC) sites at SNL/NM. A Sampling and Analysis Plan (SAP) (SNL/NM October 1999) was written that documented investigations planned for completion at all OU 1295 SWMUs and AOC sites. The plan was approved by the NMED in January 2000 (Bearzi January 2000). The NMED notified SNL/NM in June 2000 that the need for additional work at SWMU 161 and other DSS sites would be determined after additional work was completed pursuant to the SAP (NMED June 2000). Technical details for soil sampling procedures, soil sample locations, laboratory analytical methods, and passive soil-vapor sampling requirements at these sites were specified in a follow-up Field Implementation Plan (SNL/NM November 2001), which was also approved by the NMED (Moats February 2002).

Because of the physical similarity of the SWMUs with the AOC sites, and because the same characterization procedures were used for both, the 22 SWMUs were combined into the AOC site investigation procedures outlined in the SAP (SNL/NM October 1999). Shallow subsurface soil and soil-vapor sampling investigations were completed at the SWMUs and AOC sites by November 2002. The data were evaluated and the candidate SWMU and AOC sites were ranked in order to select sites for deep soil-vapor well installation and sampling. SWMU 161 was not one of the sites selected for deep soil-vapor well sampling or any other additional work.

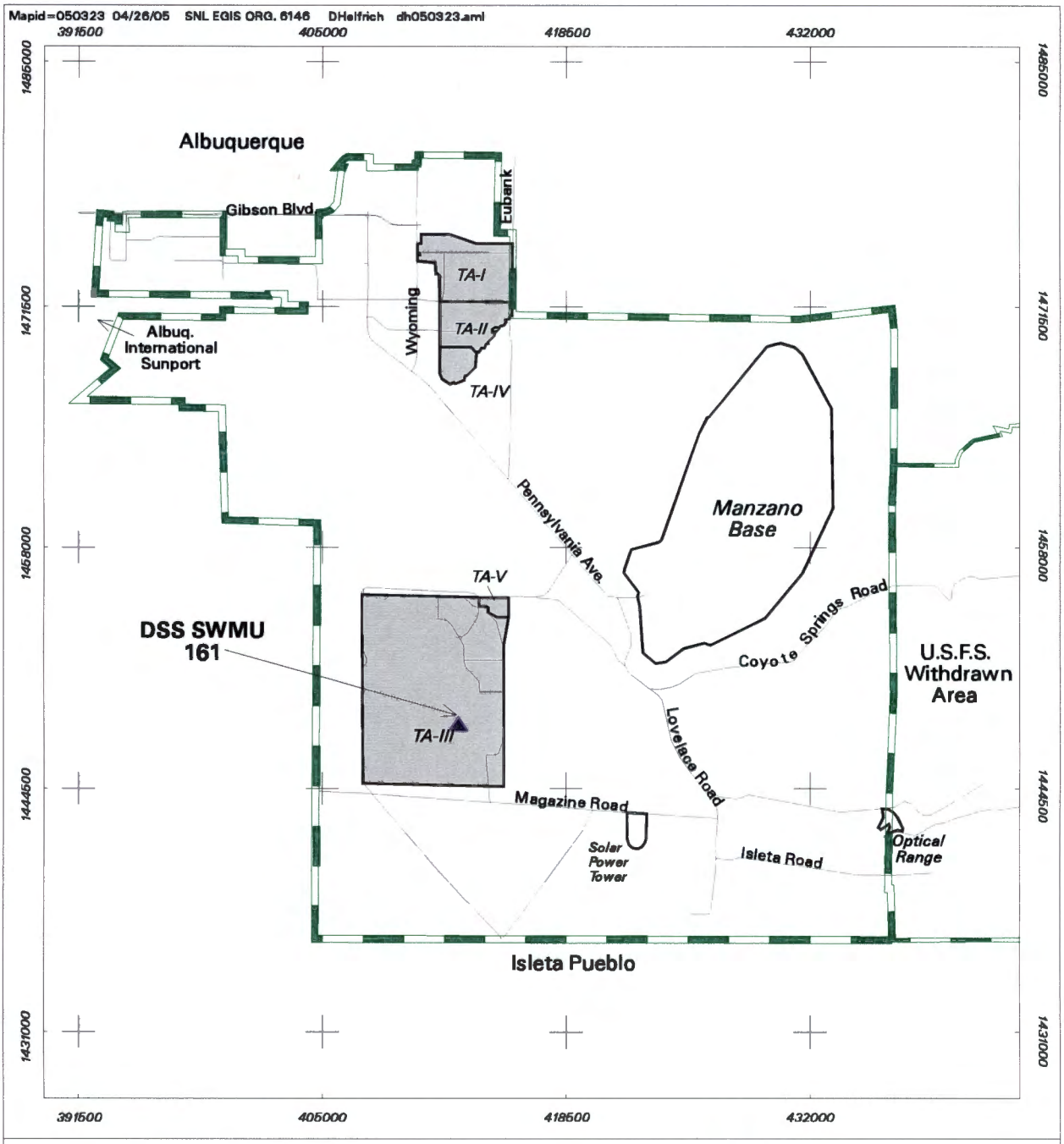
In January 2005, SNL/NM contacted the NMED Hazardous Waste Bureau (HWB) regarding the need for collection of the additional soil samples for HE compound analysis at SWMU 161; the NMED-HWB responded that no additional sampling would be required (Cooper February 2005).

1.2 Remaining RSI Requirement

The remaining requirement to fulfill the June 1998 RSI for SWMU 161 that is addressed in this RSI response is to:

- Submit a revised risk assessment using all available soil data.

An updated general location map (Figure 1.2-1), and an updated site location map showing the soil sampling locations at this site (Figure 1.2-2) are also provided. Because the site description and operational history were presented in the initial NFA proposal (SNL/NM June 1996), the information is only briefly summarized in the risk assessment report in Chapter 2.0.



Legend

- DSS SWMU 161
- Major Road
- KAFB Boundary
- USFS Withdrawn Area Boundary
- SNL Technical Area

Figure 1.2-1
Location Map of Drain and Septic Systems (DSS) SWMU 161, Bldg. 6636 Septic System, TA-III

0 4500 9000
Scale in Feet

0 1080 2160
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

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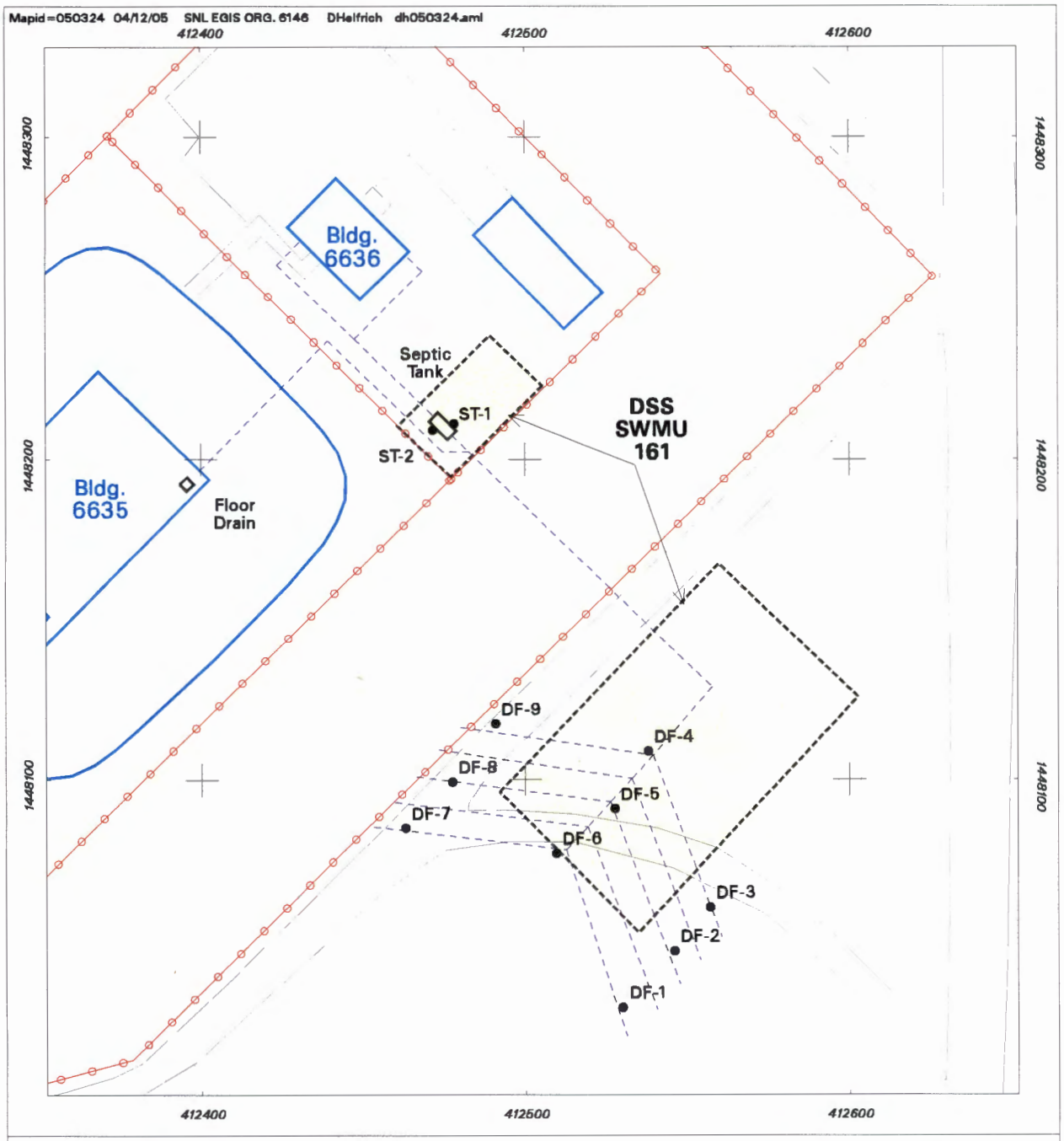

Legend

- Soil Boring Location
- Fence
- Road
- Septic Tank, Floor Drain
- Sanitary Sewerline, Drainfield, Drain line
- Building / Structure
- DSS SWMU 161

Figure 1.2-2
Site Map of Drain and Septic Systems (DSS) SWMU 161, Bldg. 6636 Septic System, TA-III

0 25 50
Scale in Feet

0 6 12
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

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2.0 RISK ASSESSMENT REPORT FOR DSS SWMU 161

2.1 Site Description and History

DSS SWMU 161, the Building 6636 Septic System at SNL/NM, is located in Technical Area III on federally owned land controlled by Kirtland Air Force Base (KAFB) and permitted to the U.S. Department of Energy (DOE). The abandoned septic system consisted of a 750-gallon septic tank connected to a drainfield consisting of 10, 60-foot-long, 4-inch-diameter, perforated clay pipe drain lines. In addition, Building 6635, located immediately southwest of Building 6636, contains floor drains in the east and west corners of the building that also discharge to the drainfield. Available information indicates that Buildings 6635 and 6636 were constructed in 1971 (SNL/NM March 2003), and it is assumed that the septic system was also constructed at that time. By 1993, discharges from the facilities were routed to the City of Albuquerque sanitary sewer system (Jones July 1993). The old septic system lines were disconnected and capped, and the system was abandoned in place concurrent with this change (Romero September 2003). Waste in the septic tank was removed and managed according to SNL/NM policy. The empty and decontaminated septic tank was inspected by the NMED on January 26, 1996, and a closure form was signed (SNL/NM January 1996). The septic tank was backfilled with clean, native soil from the area in early 1996.

Environmental concern about DSS SWMU 161 is based upon the potential for the release of constituents of concern (COCs) in effluent discharged to the environment via the Building 6636 septic system and Building 6635 floor drains 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 drainage lies approximately 1,000 feet south of the site and terminates in the playa just west of KAFB. No springs or perennial surface-water bodies are located within 2.5 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 SWMU 161 is unpaved with some native vegetation, and no storm sewers are used to direct surface water away from the site.

DSS SWMU 161 lies at an average elevation of approximately 5,384 feet above mean sea level. The groundwater beneath the site occurs in unconfined conditions in essentially unconsolidated silts, sands, and gravels. Groundwater is approximately 466 feet below ground surface (bgs). Groundwater flow is thought to be to the west in this area (SNL/NM April 2004). The nearest groundwater monitoring wells are located at the Chemical Waste Landfill, approximately 3,500 feet southeast of the site. The nearest production wells are north of the site and include KAFB-4 and KAFB-11, which are approximately 3.9 and 4.4 miles away, respectively.

2.2 Data Quality Objectives

Soil sampling was conducted in 1994 in accordance with the rationale and procedures described in the approved "Septic Tanks and Drainfields ADS [Activity Data Sheet]-1295 RCRA Facility Investigation Work Plan" (SNL/NM March 1993), the SAP for the RFI of the septic tanks and drainfields (IT March 1994), and subsequent site-specific addenda to the Work Plan and SAP based upon discussions with the NMED/HRMB.

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 2.2-1 summarizes the rationale for determining the sampling locations at this site. The source of potential COCs at DSS SWMU 161 was effluent discharged to the environment from the drainfield at this site.

Table 2.2-1
Summary of Sampling Performed to Meet Data Quality Objectives

DSS SWMU 161 Sampling Area(s)	Potential COC Source	Number of Sampling Locations	Sample Density (samples/acre)	Sampling Location Rationale
Soil beneath the septic system drainfield	Effluent discharged to the environment from the drainfield	9	NA	Evaluate potential COC releases to the environment from effluent discharged from the drainfield
Soil adjacent to, and beneath, the septic tank	Effluent discharged to the environment from the septic tank	2	NA	Evaluate potential COC releases to the environment from effluent discharged from the septic tank

COC = Constituent of concern.
DSS = Drain and Septic Systems.
NA = Not applicable.
SWMU = Solid Waste Management Unit.

In 1994, soil samples were collected from boreholes drilled in the drainfield and adjacent to the septic tank using a Geoprobe™. The 1994 drainfield sampling intervals started at 10 and 20 feet bgs in each of the drainfield borings. The DSS SWMU 161 septic tank borehole sampling intervals started 7.5 feet bgs; a depth equal to the base of the septic tank. Soil samples were collected using procedures described in the RFI Work Plan (SNL/NM March

1993) and the SAP for the RFI of septic tanks and drainfields (IT March 1994). Table 2.2-2 summarizes the types of confirmatory and quality assurance (QA)/quality control (QC) samples collected at the site and the laboratories that performed the analyses.

The soil samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), RCRA metals, hexavalent chromium, cyanide, tritium, and radionuclides by gamma spectroscopy. The samples were analyzed by off-site laboratories (Quanterra Environmental Services [QES] and Thermo Analytical Inc./Eberline Laboratories [TMA]) and the on-site SNL/NM Radiation Protection Sample Diagnostics (RPSD) Laboratory. Table 2.2-3 summarizes the analytical methods and the data quality requirements from the RFI Work Plan (SNL/NM March 1993) and the SAP for the RFI of septic tanks and drainfields (IT March 1994).

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), two field duplicates, and one set of equipment blanks. No significant QA/QC problems were identified in the QA/QC samples.

All of the DSS SWMU 161 soil sample results were verified/validated by SNL/NM. The off-site laboratory results from QES and TMA were reviewed according to "Verification and Validation of Chemical and Radiochemical Data," Technical Operating Procedure (TOP) 94-03, Rev. 0 (SNL/NM July 1994) or earlier ER Project Administrative Operating Procedures (AOPs). 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) or an earlier procedure. The reviews confirmed that the analytical data are defensible and therefore acceptable for use in this RSI response. Therefore, the data quality objectives (DQOs) have been fulfilled.

2.3 Determination of Nature, Rate, and Extent of Contamination

2.3.1 Introduction

The determination of the nature, migration rate, and extent of contamination at DSS SWMU 161 is based upon an initial conceptual model validated with confirmatory sampling at the site. The initial conceptual model was developed from archival site research, site inspections, soil sampling, and passive soil-vapor sampling. The DQOs contained in the RFI Work Plan (SNL/NM March 1993), the SAP for the RFI of septic tanks and drainfields (IT March 1994), and subsequent negotiations with the NMED/HRMB 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 SWMU 161, which is presented in this risk assessment report. The quality of the data specifically used to determine the nature, migration rate, and extent of contamination is described in the following sections.

Table 2.2-2
Number of Confirmatory Soil and QA/QC Samples Collected from DSS SWMU 161

Sample Type	VOCs	SVOCs	RCRA Metals	Hexavalent Chromium	Total Cyanide	Tritium	Gamma Spectroscopy Radionuclides
Confirmatory	20	20	20	20	20	2	2
Duplicates	2	2	2	2	2	0	0
EBs and TBs[a]	3	1	1	1	1	0	0
Total Samples	25	23	23	23	23	2	2
Analytical Laboratory	QES	QES	QES	QES	QES	TMA	RPSD

[a]TBs for VOCs only.
DSS = Drain and Septic Systems.
EB = Equipment blank.
QA/QC = Quality assurance/quality control.
QES = Quanterra Environmental Services.
RCRA = Resource Conservation and Recovery Act.
RPSD = Radiation Protection Sample Diagnostics Laboratory.
SVOC = Semivolatile organic compound.
SWMU = Solid Waste Management Unit.
TB = Trip blank.
TMA = Thermo Analytical Inc./Eberline Laboratories.
VOC = Volatile organic compound.

Table 2.2-3
Summary of Data Quality Requirements for DSS SWMU 161

Analytical Method[a]	Data Quality Level	QES	TMA	RPSD
VOCs EPA Method 8260	Defensible	20	None	None
SVOCs EPA Method 8270	Defensible	20	None	None
RCRA Metals EPA Method 6000/7000	Defensible	20	None	None
Hexavalent Chromium EPA Method 7196A	Defensible	20	None	None
Total Cyanide EPA Method 9012A	Defensible	20	None	None
Tritium EPA Method 906.0 or equivalent	Defensible	None	2	None
Gamma Spectroscopy Radionuclides EPA Method 901.1	Defensible	None	None	2

Note: The number of samples does not include composite samples or 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.
QA/QC = Quality assurance/quality control.
QES = Quanterra Environmental Services.
RCRA = Resource Conservation and Recovery Act.
RPSD = Radiation Protection Sample Diagnostics Laboratory.
SVOC = Semivolatile organic compound.
SWMU = Solid Waste Management Unit.
TMA = Thermo Analytical Inc./Eberline Laboratories.
VOC = Volatile organic compound.

2.3.2 Nature of Contamination

Both the nature of contamination and the potential for the degradation of COCs at DSS SWMU 161 are evaluated using laboratory analyses of the soil samples. The analytical requirements included analyses for VOCs, SVOCs, RCRA metals, hexavalent chromium, cyanide, tritium, and radionuclides by gamma spectroscopy. The analytes and methods listed in Tables 2.2-2 and 2.2-3 are appropriate to characterize the COCs and potential degradation products at SWMU 161.

2.3.3 Rate of Contaminant Migration

The septic system at DSS SWMU 161 was deactivated in the early 1990s when Buildings 6635 and 6636 were connected to an extension of the City of Albuquerque sanitary sewer system. The migration rate of COCs that may have been introduced into the subsurface via the septic system and floor drains at this site was therefore dependent upon the volume of aqueous

effluent discharged to the environment from this system when it was operational. Any migration of COCs from this site after use of the system was discontinued has been predominantly dependent upon precipitation. However, it is highly unlikely that sufficient precipitation has fallen on the site to reach the depth at which COCs may have been discharged to the subsurface from this system. Analytical data generated from the soil sampling conducted at the site are adequate to characterize the rate of COC migration at SWMU 161.

2.3.4 Extent of Contamination

Subsurface soil samples were collected from boreholes drilled at 11 locations beneath and/or adjacent to the effluent release points and areas (septic tank and drainfield) at the site to assess whether releases of effluent from the septic system caused any environmental contamination.

The soil samples were collected at sampling depths starting at 10 and 20 feet bgs in the drainfield area, and 7.5 feet bgs adjacent to the septic tank. Sampling intervals started at the depths at which effluent discharged from the septic tank and drainfield drain lines would have entered the subsurface environment at the site. This sampling procedure was required by 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 of any COCs.

2.4 Comparison of COCs to Background Levels

Site history and characterization activities are used to identify potential COCs. The DSS SWMU 161 NFA proposal (SNL/NM June 1996) 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 2.4-1 and 2.4-2.

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 2.4-1 lists the nonradiological COCs and Table 2.4-2 lists the radiological COCs for the human health risk assessment at DSS SWMU 161. 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 2.6.4 discusses the results presented in Tables 2.4-1 and 2.4-2.

Table 2.4-1
Nonradiological COCs for Human Health Risk Assessment at DSS SWMU 161 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	4.3	4.4	Yes	44[c]	--	**Yes**
Barium	172	214	Yes	170[d]	--	**Yes**
Cadmium	0.53	0.9	Yes	64[c]	--	**Yes**
Chromium, total	22	15.9	**No**	16[c]	--	No
Chromium VI	0.05[e]	1	Yes	16[c]	--	No
Cyanide	0.0006	NC	**Unknown**	NC	--	**Unknown**
Lead	10.3	11.8	Yes	49[c]	--	**Yes**
Mercury	0.05[e]	<0.1	Yes	5,500[c]	--	**Yes**
Selenium	0.25[e]	<1	Yes	800[f]	--	**Yes**
Silver	40.8	<1	**No**	0.5[c]	--	No
Organic						
Acetone	0.017	NA	**NA**	0.69[g]	-0.24[g]	No
Methylene chloride	0.0035 J	NA	**NA**	5[g]	1.25[g]	No
Methyl ethyl ketone	0.0058 J	NA	**NA**	1[h]	0.29[h]	No
Methyl isobutyl ketone	0.005[e]	NA	**NA**	5[i]	1.19[i]	No

Note: **Bold** indicates the COCs that exceed the background screening values and/or are bioaccumulators.
[a]Dinwiddie September 1997, Southwest Area Supergroup.
[b]NMED March 1998a.
[c]Yanicak March 1997.
[d]Neumann 1976.
[e]Nondetected concentration (i.e., one-half the maximum detection limit, if value is greater than the maximum detected concentration or analyte was not detected at all).
[f]Callahan et al. 1979.
[g]Howard 1990.
[h]Howard 1993.
[i]Micromedex, Inc. 1998.

Table 2.4-1 (Concluded)
Nonradiological COCs for Human Health Risk Assessment at DSS SWMU 161 with Comparison to the Associated SNL/NM Background Screening Value, BCF, and Log K_{ow}

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

Table 2.4-2
Radiological COCs for Human Health Risk Assessment at DSS SWMU 161 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)
Cesium-137	ND (0.0322)	0.079	Yes	3,000[d]	**Yes**
Thorium-232	0.428	1.01	Yes	3,000[d]	**Yes**
Tritium	ND (0.0135)	0.021[e]	Yes	NA	No
Uranium-235	**ND (0.187)**	0.16	**No**	900[d]	**Yes**
Uranium-238	0.869	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, Southwest Area Supergroup.
[c]NMED March 1998a.
[d]Baker and Soldat 1992.
[e]Tharp February 1999, 420 pCi/L = 0.021 pCi/g assuming a soil density of 1 gram/cubic centimeter and a 5 percent soil moisture.
BCF = Bioconcentration factor.
COC = Constituent of concern.
DSS = Drain and Septic Systems.
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.
NMED = New Mexico Environment Department.
pCi/g = Picocurie(s) per gram.
SNL/NM = Sandia National Laboratories/New Mexico.
SWMU = Solid Waste Management Unit.

2.5 Fate and Transport

The primary releases of COCs at DSS SWMU 161 were to the subsurface soil resulting from the discharge of effluents from the Building 6636 septic system and the Building 6635 floor drains. Wind, water, and biota are natural mechanisms of COC transport from the primary release point; however, because the discharge was to subsurface soil, none of these mechanisms are considered to be of potential significance as transport mechanisms at this site. Because the drainfield is no longer active, additional infiltration of water is not expected. Infiltration of precipitation is essentially nonexistent at DSS SWMU 161, as virtually all of the moisture either drains away from the site or evaporates. Because groundwater at this site is approximately 466 feet bgs, the potential for COCs to reach groundwater through the unsaturated zone above the water table is extremely low.

The COCs at DSS SWMU 161 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 (uranium-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 SWMU 161 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 2.5-1 summarizes the fate and transport processes that can occur at DSS SWMU 161. 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 2.5-1
Summary of Fate and Transport at DSS SWMU 161

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.
SWMU = Solid Waste Management Unit.

2.6 Human Health Risk Assessment

2.6.1 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 EPA, NMED, and DOE to determine whether further evaluation and potential site cleanup are required. Nonradiological COC risk values also are compared to background risk so that an incremental risk can be calculated.
Step 7.	Uncertainties of the above steps are addressed.

2.6.2 Step 1. Site Data

Section 2.1 of this risk assessment provides the site description and history for DSS SWMU 161. Section 2.2 presents a comparison of results to DQOs. Section 2.3 discusses the nature, rate, and extent of contamination.

2.6.3 Step 2. Pathway Identification

DSS SWMU 161 has been designated with a future land-use scenario of industrial (DOE et al. September 1995) (see Annex A 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 SWMU 161 is approximately 466 feet bgs. No intake routes through plant, meat, or milk ingestion are considered appropriate for either the industrial or residential land-use scenarios. Figure 2.6.3-1 shows the conceptual site model flow diagram for SWMU 161.

Pathway Identification

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

2.6.4 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.

2.6.4.1 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 2.4-1 and used to calculate risk attributable to background in Section 2.6.6.2. 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.

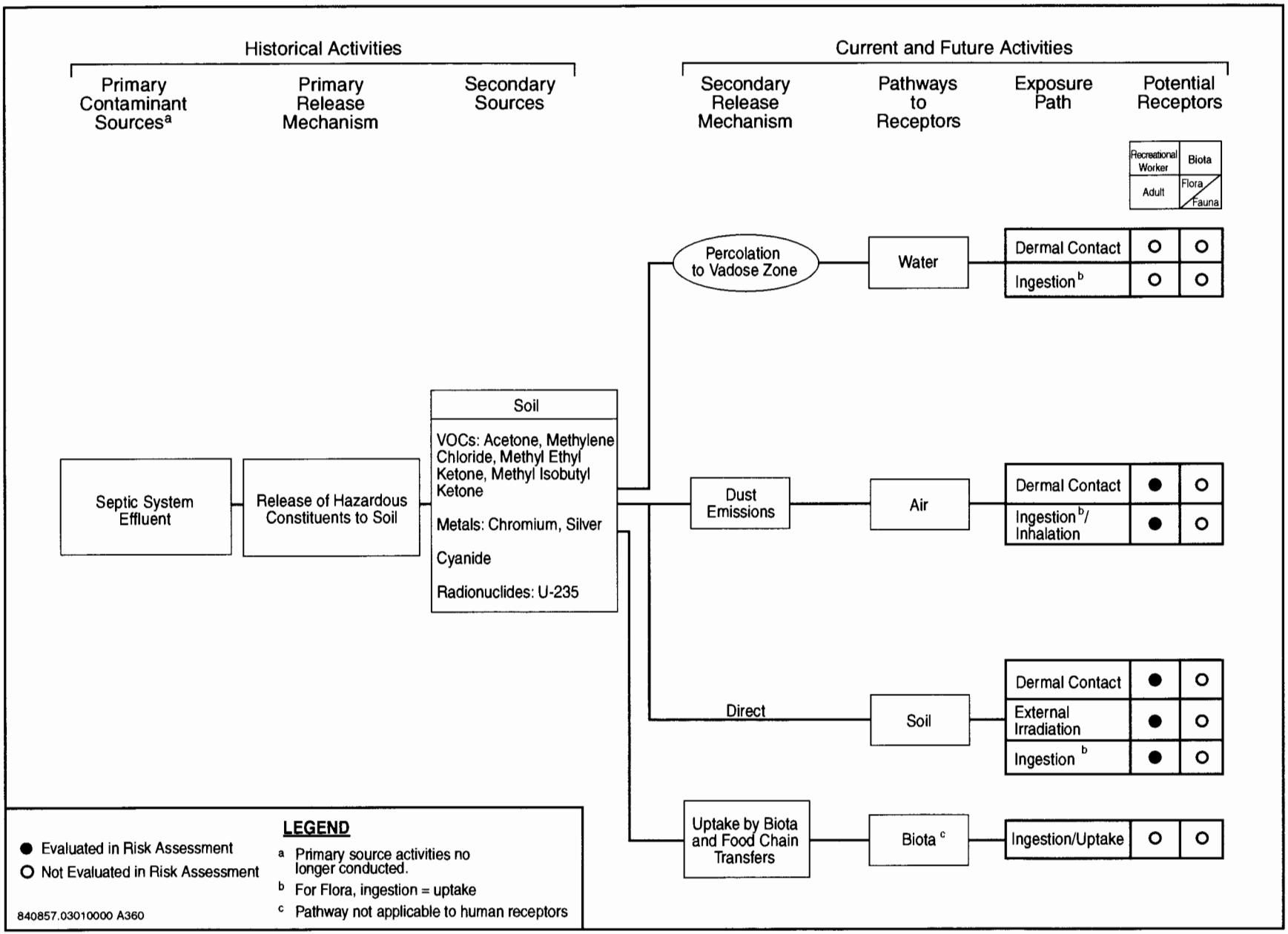

Figure 2.6.3-1

Conceptual Site Model Flow Diagram for DSS SWMU 161, Building 6636 Septic System

2.6.4.2 Results

Tables 2.4-1 and 2.4-2 show the DSS SWMU 161 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 (chromium and silver) were measured at concentrations greater than the background screening values. One constituent (cyanide) does not have a quantified background screening concentration; therefore it is unknown whether this COC exceeds background. Four constituents are organic compounds that do not have corresponding background screening values.

For the radiological COCs, one constituents (uranium-235) exhibited an MDA greater than the background screening level.

2.6.5 Step 4. Identification of Toxicological Parameters

Tables 2.6.5-1 (nonradiological) and 2.6.5-2 (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 2.6.5-1 were obtained from the Integrated Risk Information System (IRIS) (EPA 2004a), the Health Effects Assessment Summary Tables (HEAST) (EPA 1997a), the Technical Background Document for Development of Soil Screening Levels (NMED February 2004), Risk Assessment Information System (ORNL 2003), and EPA Region 6 (EPA 2004b) databases. 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).

2.6.6 Step 5. Exposure Assessment and Risk Characterization

Section 2.6.6.1 describes the exposure assessment for this risk assessment. Section 2.6.6.2 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.

Table 2.6.5-1
Toxicological Parameter Values for DSS SWMU 161 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	1.5E+0[c]	L	--	--	--	--	D	0.01[d]
Cyanide	2E-2[c]	M	--	--	--	--	D	0.1[d]
Silver	5E-3[c]	L	--	--	--	--	D	0.01[d]
Organic								
Acetone	1E-1[c]	L	1E-1[e]	--	--	--	D	0.01[f]
Methylene chloride	6E-2[c]	M	8.6E-1[g]	--	7.5E-3[c]	1.6E-3[c]	B2	0.1[d]
Methyl ethyl ketone	6E-1[c]	L	2.9E-1[c]	L	--	--	D	0.1[d]
Methyl isobutyl ketone	8E-2[g]	--	2.3E-2[g]	--	--	--	--	0.01[f]

[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):
B2 = Probable human carcinogen. Sufficient evidence in animals and inadequate or no evidence in humans.
D = Not classifiable as to human carcinogenicity.
[c]Toxicological parameter values from IRIS electronic database (EPA 2004a).
[d]Toxicological parameter values from NMED (February 2004).
[e]Toxicological parameter values from EPA Region 6 (EPA 2004b).
[f]Toxicological parameter values from Risk Assessment Information System (ORNL 2003).
[g]Toxicological parameter values from HEAST (EPA 1997a).

ABS = Gastrointestinal absorption coefficient.
COC = Constituent of concern.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
HEAST = Health Effects Assessment Summary Tables.
IRIS = Integrated Risk Information System.
mg/kg-d = Milligram(s) per kilogram-day.
$(mg/kg\text{-}d)^{-1}$ = 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.
SWMU = Solid Waste Management Unit.
-- = Information not available.

Table 2.6.5-2
Radiological Toxicological Parameter Values for DSS SWMU 161 COCs
Obtained from RESRAD Risk Coefficients[a]

COC	SF_o (1/pCi)	SF_{inh} (1/pCi)	SF_{ev} (g/pCi-yr)	Cancer Class[b]
Uranium-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.
SWMU = Solid Waste Management Unit.

2.6.6.1 Exposure Assessment

Annex A 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 annex shows parameters for both industrial and residential land-use scenarios. The equations for nonradiological COCs are based upon the Risk Assessment Guidance for Superfund (RAGS) (EPA 1989). Parameters are based upon information from the RAGS (EPA 1989), the Technical Background Document for Development of Soil Screening Levels (NMED February 2004), as well as other EPA and NMED guidance documents, and reflect the reasonable maximum exposure (RME) approach advocated by the RAGS (EPA 1989). For the radiological COC, the coded equation provided in RESRAD computer code is used to estimate the incremental TEDE and cancer risk for individual exposure pathways. Further discussion of this process is provided in the "Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD" (Yu et al. 1993a).

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

2.6.6.2 Risk Characterization

Table 2.6.6-1 shows an HI of 0.01 for the DSS SWMU 161 nonradiological COCs and an estimated excess cancer risk of 2E-8 for the designated industrial land-use scenario. The numbers presented include exposure from soil ingestion, dermal contact, and dust and volatile inhalation for nonradiological COCs. Table 2.6.6-2 shows an HI of 0.00 and no quantified estimated excess cancer risk for the DSS SWMU 161 associated background constituents under the designated industrial land-use scenario.

Table 2.6.6-1
Risk Assessment Values for DSS SWMU 161 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	22	0.00	--	0.00	--
Cyanide	0.0006	0.00	--	0.00	--
Silver	40.8	0.01	--	0.11	--
Organic					
Acetone	0.017	0.00	--	0.00	--
Methylene chloride	0.0035 J	0.00	2E-8	0.00	5E-8
Methyl ethyl ketone	0.0058 J	0.00	--	0.00	--
Methyl isobutyl ketone	0.005[b]	0.00	--	0.00	--
Total		0.01	2E-8	0.11	5E-8

[a]EPA 1989.
[b]Nondetected concentration (i.e., one-half the maximum detection limit is greater than the maximum detected concentration).
COC = Constituent of concern.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
J = Estimated concentration.
mg/kg = Milligram(s) per kilogram.
SWMU = Solid Waste Management Unit.
-- = Information not available.

Table 2.6.6-2
Risk Assessment Values for DSS SWMU 161 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	15.9	0.00	--	0.00	--
Cyanide	NC	--	--	--	--
Silver	<1	--	--	--	--
Total		0.00	--	0.00	--

[a]Dinwiddie September 1997, Southwest Area 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.
SWMU = Solid Waste Management Unit.
-- = Information not quantified.

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 3.9E-3 millirem (mrem)/year (yr). In accordance with EPA guidance found in Office of Solid Waste and Emergency Response (OSWER) Directive No. 9200.4-18 (EPA 1997b), an incremental TEDE of 15 mrem/yr is used for the probable land-use scenario (industrial in this case); the calculated dose value for DSS SWMU 161 for the industrial land-use scenario is well below this guideline. The estimated excess cancer risk is 3.3E-8.

For the nonradiological COCs under the residential land-use scenario, the HI is 0.11 with an estimated excess cancer risk of 5E-8 (Table 2.6.6-1). The numbers in the table include exposure from soil ingestion, dermal contact, and dust and volatile inhalation. Although the EPA (1991) guidelines generally recommend that inhalation not be included in a residential land-use scenario, this pathway is included because of the potential for soil in Albuquerque, New Mexico, to be eroded and for dust to be present in predominantly residential areas. Because of the nature of the local soil, other exposure pathways are not considered (see Annex A). Table 2.6.6-2 shows an HI of 0.00 and no quantified estimated excess cancer risk for the DSS SWMU 161 associated background constituents under the residential land-use scenario.

For the radiological COCs, the incremental TEDE for the residential land-use scenario is 1.0E-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 SWMU 161 for the residential land-use scenario is well below this guideline. Consequently, SWMU 161 is eligible for unrestricted radiological release as the residential land-use scenario resulted in an incremental TEDE of less than 75 mrem/yr to the on-site receptor. The estimated excess cancer risk is 9.6E-8. The excess cancer risk from the nonradiological and radiological COCs should be summed to provide risk estimates for persons exposed to both types of carcinogenic contaminants, as noted in OSWER Directive No. 9200.4-18 "Establishment of Cleanup Levels for CERCLA [Comprehensive Environmental Response, Compensation, and Liability Act] Sites with Radioactive Contamination," (EPA 1997b). This summation is tabulated in Section 2.6.9.

2.6.7 Step 6. Comparison of Risk Values to Numerical Guidelines

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

For the nonradiological COCs under the industrial land-use scenario, the HI is 0.01 (less than the numerical guideline of 1 suggested in the RAGS [EPA 1989]). The estimated excess cancer risk is 2E-8. NMED guidance states that cumulative excess lifetime cancer risk must be less than 1E-5 (Bearzi January 2001); thus the excess cancer risk for this site is below the suggested acceptable risk value. This assessment also 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 0.01 and the estimated incremental excess cancer risk is 2.27E-8 for the industrial land-use scenario. These incremental risk calculations indicate insignificant risk to human health from nonradiological COCs under an industrial land-use scenario.

For the radiological COC under the industrial land-use scenario, the incremental TEDE is 3.9E-3 mrem/yr, which is significantly lower than the EPA's numerical guideline of 15 mrem/yr (EPA 1997b). The estimated incremental excess cancer risk is 3.3E-8.

The calculated HI for the nonradiological COCs under the residential land-use scenario is 0.11, which is below numerical guidance of 1 suggested in the RAGS (EPA 1989). The estimated excess cancer risk is 5E-8. NMED guidance states that cumulative excess lifetime cancer risk must be less than 1E-5 (Bearzi January 2001); thus the excess cancer risk for this site is below the suggested acceptable risk value. The incremental HI is 0.11 and the estimated incremental cancer risk is 4.83E-8 for the residential land-use scenario. These incremental risk calculations indicate insignificant risk to human health from nonradiological COCs under the residential land-use scenario.

The incremental TEDE for a residential land-use scenario from the radiological components is 1.0E-2 mrem/yr, which is significantly lower than the numerical guideline of 75 mrem/yr suggested in the SNL/NM "RESRAD Input Parameter Assumptions and Justification" (SNL/NM February 1998). The estimated excess cancer risk is 9.6E-8.

2.6.8 Step 7. Uncertainty Discussion

The determination of the nature, rate, and extent of contamination at DSS SWMU 161 is based upon an initial conceptual model that was validated with sampling conducted at the site. The sampling was implemented in accordance with procedures and DQOs in the RFI Work Plan (SNL/NM March 1993), the SAP for the RFI of septic tanks and drainfields (IT March 1994), and subsequent negotiations with the NMED/HRMB. The data from soil samples collected at effluent release points are representative of potential COC releases to the site. The analytical requirements and results satisfy the DQOs, and data quality was verified/validated in accordance with SNL/NM procedures. Therefore, there is no uncertainty associated with the data quality used to perform the risk assessment at SWMU 161.

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

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

Table 2.6.5-1 shows the uncertainties (confidence levels) in nonradiological toxicological parameter values. There is a combination of estimated values and values from the IRIS (EPA 2004a), HEAST (EPA 1997a), EPA Region 6 (EPA 2004b), Risk Assessment Information System (ORNL 2003), and Technical Background Document for Development of Soil Screening Levels (NMED February 2004). Where values are not provided, information is not available

from the HEAST (EPA 1997a), IRIS (EPA 2004a), Technical Background Document for Development of Soil Screening Levels (NMED February 2004), Risk Assessment Information System (ORNL 2003), or EPA regions (EPA 2004b, EPA 2002a, EPA 2002b). Because of the conservative nature of the RME approach, uncertainties in toxicological values are not expected to change the conclusion from the risk assessment analysis.

Risk assessment values for 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.

2.6.9 Summary

DSS SWMU 161 contains identified COCs consisting of some inorganic, organic, and radiological compounds. Because of the location of the site, the designated industrial land-use scenario, and the nature of contamination, potential exposure pathways identified for this site include soil ingestion, dermal contact, and dust and volatile inhalation for chemical COCs, and soil ingestion, dust inhalation, and direct gamma exposure for radionuclides. The same exposure pathways are applied to the residential land-use scenario.

Using conservative assumptions and an RME approach to risk assessment, calculations for the nonradiological COCs show that for the industrial land-use scenario the HI (0.01) is significantly lower than the accepted numerical guidance from the EPA. The estimated excess cancer risk is 2E-8; thus, excess cancer risk is also below the acceptable risk value provided by the NMED for an industrial land-use scenario (Bearzi January 2001). The incremental HI is 0.01 and the estimated incremental excess cancer risk is 2.27E-8 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 (0.11) is below the accepted numerical guidance from the EPA. The estimated excess cancer risk is 5E-8. Thus, excess cancer risk is below the acceptable risk value provided by the NMED for a residential land-use scenario (Bearzi January 2001). The incremental HI is 0.11 and the estimated incremental excess cancer risk is 4.83E-8 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 3.9E-3 mrem/yr for the industrial land-use scenario, which is much lower than the EPA's numerical guidance of 15 mrem/yr (EPA 1997b). The corresponding estimated incremental excess cancer risk value is 3.3E-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 1.0E-2 mrem/yr with an associated risk of 9.6E-8. The guideline for this scenario is 75 mrem/yr (SNL/NM February 1998). Therefore, DSS SWMU 161 is eligible for unrestricted radiological release.

The excess cancer risk from the nonradiological and radiological COCs should be summed to provide risk estimates for persons exposed to both types of carcinogenic contaminants, as noted in OSWER Directive No. 9200.4-18 (EPA 1997b). The summation of the nonradiological and radiological carcinogenic risks is tabulated in Table 2.6.9-1.

Table 2.6.9-1
Summation of Incremental Nonradiological and Radiological Risks from
DSS SWMU 161, Building 6636 Septic System Carcinogens

Scenario	Nonradiological Risk	Radiological Risk	Total Risk
Industrial	2.27E-8	3.3E-8	5.6E-8
Residential	4.83E-8	9.6E-8	1.4E-7

DSS = Drain and Septic Systems.
SWMU = Solid Waste Management Unit.

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.

2.7 Ecological Risk Assessment

2.7.1 Introduction

This section addresses the ecological risks associated with exposure to constituents of potential ecological concern (COPECs) in the soil at DSS SWMU 161. A component of the NMED Risk-Based Decision Tree (NMED March 1998a) is to conduct an ecological risk assessment that corresponds with that presented in the EPA's Ecological RAGS (EPA 1997c). The current methodology is tiered and contains an initial scoping assessment followed by a more detailed risk assessment if warranted by the results of the scoping assessment. Initial components of NMED's decision tree (a discussion of DQOs, data assessment, and evaluations of bioaccumulation as well as fate and transport potential) are addressed in previous sections of this report. At the end of the scoping assessment, a determination is made as to whether a more detailed examination of potential ecological risk is necessary.

2.7.2 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 2.7.2.4) summarizes the scoping results and assesses the need for further examination of potential ecological impacts.

2.7.2.1 Data Assessment

As indicated in Section 2.4, all COCs at DSS SWMU 161 are at depths of 5 feet bgs or greater. Therefore, no complete ecological exposure pathways exist at this site, and no COCs are considered to be COPECs.

2.7.2.2 Bioaccumulation

Because no COPECs are associated with this site, bioaccumulation potential is not evaluated.

2.7.2.3 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 2.5. As noted in Table 2.5-1, 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.

2.7.2.4 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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3.0 RECOMMENDATION FOR CORRECTIVE ACTION COMPLETE WITHOUT CONTROLS DETERMINATION

3.1 Rationale

Based upon field investigation data and the human health and ecological risk assessment analyses, a determination of Corrective Action Complete (CAC) without controls (NMED April 2004) is recommended for DSS SWMU 161 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.

3.2 Criterion

Based upon the evidence provided in Section 3.1, a determination of CAC without controls (NMED April 2004) is recommended for DSS SWMU 161. This is consistent with the NMED's NFA Criterion 5, which states, "the SWMU/AOC 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 1998b).

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ANNEX A
DSS SWMU 161
Exposure Pathway Discussion for Chemical and Radionuclide Contamination

ANNEX A
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)

$$= C \times (CR \times EFD/BW/AT) \times \text{Toxicity Effect} \qquad (1)$$

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

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

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

Summary

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

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

Parameter	Industrial	Recreational	Residential
General Exposure Parameters			
Exposure Frequency (day/yr)	250[a,b]	8.7 (4 hr/wk for 52 wk/yr)[a,b]	350[a,b]
Exposure Duration (yr)	25[a,b,c]	30[a,b,c]	30[a,b,c]
Body Weight (kg)	70[a,b,c]	70 Adult[a,b,c] 15 Child[a,b,c]	70 Adult[a,b,c] 15 Child[a,b,c]
Averaging Time (days) for Carcinogenic Compounds (= 70 yr x 365 day/yr) for Noncarcinogenic Compounds (= ED x 365 day/yr)	25,550[a,b] 9,125[a,b]	25,550[a,b] 10,950[a,b]	25,550[a,b] 10,950[a,b]
Soil Ingestion Pathway			
Ingestion Rate (mg/day)	100[a,b]	200 Child[a,b] 100 Adult[a,b]	200 Child[a,b] 100 Adult[a,b]
Inhalation Pathway			
Inhalation Rate (m^3/day)	20[a,b]	15 Child[a] 30 Adult[a]	10 Child[a] 20 Adult[a]
Volatilization Factor (m^3/kg)	Chemical Specific	Chemical Specific	Chemical Specific
Particulate Emission Factor (m^3/kg)	1.36E9[a]	1.36E9[a]	1.36E9[a]
Water Ingestion Pathway			
Ingestion Rate (liter/day)	2.4[a]	2.4[a]	2.4[a]
Dermal Pathway			
Skin Adherence Factor (mg/cm^2)	0.2[a]	0.2 Child[a] 0.07 Adult[a]	0.2 Child[a] 0.07 Adult[a]
Exposed Surface Area for Soil/Dust (cm^2/day)	3,300[a]	2,800 Child[a] 5,700 Adult[a]	2,800 Child[a] 5,700 Adult[a]
Skin Adsorption Factor	Chemical Specific	Chemical Specific	Chemical Specific

[a]Technical Background Document for Development of Soil Screening Levels (NMED December 2000).
[b]Risk Assessment Guidance for Superfund, Vol. 1, Part B (EPA 1991).
[c]Exposure Factors Handbook (EPA August 1997).
ED = Exposure duration.
EPA = U.S. Environmental Protection Agency.
hr = Hour(s).
kg = Kilogram(s).
m = Meter(s).
mg = Milligram(s).
NA = Not available.
wk = Week(s).
yr = Year(s).

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

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

[a]Risk Assessment Guidance for Superfund, Vol. 1, Part B (EPA 1991).
[b]Exposure Factors Handbook (EPA August 1997).
[c]EPA Region VI guidance (EPA 1996).
[d]For radionuclides, RESRAD (ANL 1993).
[e]SNL/NM (February 1998).
EPA = U.S. Environmental Protection Agency.
g = Gram(s)
hr = Hour(s).
kg = Kilogram(s).
m = Meter(s).
mg = Milligram(s).
NA = Not applicable.
wk = Week(s).
yr = Year(s).

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