Sandia National Laboratories

Sandia National Laboratories, New Mexico

Environmental Restoration Operations

A U.S. Department of Energy Environmental Cleanup Program

Consolidated Quarterly Report

April – June 2012

October 2012

U.S. DEPARTMENT OF ENERGY

United States Department of Energy
Sandia Site Office

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CONSOLIDATED QUARTERLY REPORT

October 2012

SANDIA NATIONAL LABORATORIES, NEW MEXICO

ENVIRONMENTAL RESTORATION OPERATIONS

U.S. DEPARTMENT OF ENERGY:	SANDIA SITE OFFICE
CONTRACTOR:	SANDIA CORPORATION
PROJECT MANAGER:	John Cochran

NUMBER OF POTENTIAL RELEASE SITES SUBJECT TO THIS PERMIT: 36

SUSPECT WASTE: Radionuclides, metals, organic compounds, and explosives

REPORTING PERIOD: **April 2012 – June 2012**

OVERVIEW

This Sandia National Laboratories, New Mexico Environmental Restoration Operations (ER) Consolidated Quarterly Report (ER Quarterly Report) addresses all quarterly reporting requirements pertaining to the Hazardous and Solid Waste Amendments (HSWA) Module of the Resource Conservation and Recovery Act Permit, the Compliance Order on Consent, and the Chemical Waste Landfill Post-Closure Care Permit. The 36 sites in the Corrective Action Complete regulatory process are listed in Table I-1. The 36 sites consist of 27 Solid Waste Management Units and 9 Areas of Concern (AOCs), including 8 Drain and Septic System sites and the Tijeras Arroyo Groundwater AOC. The Burn Site Groundwater and Technical Area V Groundwater AOCs are not included on the current HSWA Permit but have been added as AOCs to the revised HSWA Permit that is pending approval by the New Mexico Environment Department at this time. This ER Quarterly Report presents activities and data in sections as follows:

SECTION I:	Environmental Restoration Operations Consolidated Quarterly Report, April – June 2012
SECTION II:	Perchlorate Screening Quarterly Groundwater Monitoring Report, April – June 2012
SECTION III:	Solid Waste Management Units 149 and 154 Quarterly Groundwater Monitoring Report, April – June 2012
SECTION IV:	Solid Waste Management Units 8/58 and 68 Quarterly Groundwater Monitoring Report, April – June 2012

ABBREVIATIONS AND ACRONYMS

µg/L	microgram(s) per liter
AOC	Area of Concern
AOP	Administrative Operating Procedure
BSG	Burn Site Groundwater
CAC	Corrective Action Complete
CAMU	Corrective Action Management Unit
CCBA	Coyote Canyon Blast Area
CFR	Code of Federal Regulations
CME	Corrective Measures Evaluation
COA	Certificates of Analysis
CTF	Coyote Test Field
CWL	Chemical Waste Landfill
CY	Calendar Year
CYN	Canyons (Burn Site)
DI	deionized
DO	dissolved oxygen
DOE	U.S. Department of Energy
EB	equipment blank
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration Operations
ET Cover	evapotranspirative cover
FB	field blank
FOP	Field Operating Procedure
GEL	GEL Laboratories LLC
HE	high explosive(s)
HQ	hazard quotient
LTMMP	Long-Term Monitoring and Maintenance Plan
LTS	Long-Term Stewardship
LWDS	Liquid Waste Disposal System
MCL	maximum contaminant level
MDA	minimum detectable activity
MDL	method detection limit
mg/L	milligram(s) per liter
mL	milliliter(s)
MW	monitoring well
MWL	Mixed Waste Landfill
ND	nondetect

NMED	New Mexico Environment Department
NPDES	National Pollution Discharge Elimination System
NPN	nitrate plus nitrite
NTU	nephelometric turbidity units
OBS	Old Burn Site
ORP	oxidation-reduction potential
PCCP	Post-Closure Care Permit
pCi/L	picocuries per liter
QC	quality control
RCRA	Resource Conservation and Recovery Act
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
RPD	relative percent difference
Sandia	Sandia Corporation
SAP	Sampling and Analysis Plan
SC	specific conductance
SNL/NM	Sandia National Laboratories, New Mexico
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
TA	Technical Area
TAG	Tijeras Arroyo Groundwater
TAL	Target Analyte List
TB	trip blank
VOC	volatile organic compound

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SECTION I
ENVIRONMENTAL RESTORATION OPERATIONS CONSOLIDATED QUARTERLY REPORT, APRIL – JUNE 2012

1.0 Introduction

This Environmental Restoration Operations (ER) Consolidated Quarterly Report (ER Quarterly Report) provides the status of ongoing corrective actions being implemented by Sandia National Laboratories, New Mexico (SNL/NM) ER for the April, May, and June 2012 quarterly reporting period. The following sections outline the status of regulatory closure activities for the Mixed Waste Landfill (MWL), project management and site closure, site-wide hydrogeologic characterization, and ER/Long-Term Stewardship (LTS) activities.

2.0 Environmental Restoration Operations Work Completed

2.1 Mixed Waste Landfill

A draft plan was completed in June 2012 for reclamation of the MWL Borrow Pit in Technical Area (TA) III (Figure I-1). It defines the scope of work required to adequately stabilize the site and close the National Pollution Discharge Elimination System (NPDES) Construction Permit. The NPDES Permit was established through a Storm Water Pollution Prevention Plan submitted to the U.S. Environmental Protection Agency (EPA) in 2006 as part of the MWL evapotranspirative cover (ET Cover) project. Once the plan is finalized, the stabilization work will be contracted and performed just prior to the 2013 monsoon season (July 2013).

Figure I-1
View to the North of MWL Borrow Pit, June 2012

Groundwater monitoring activities for the MWL are discussed in Section I.2.3.4 of this ER Quarterly Report.

2.1.1 MWL Evapotranspirative Cover Supplemental Watering Activities

Three supplemental watering events were performed for the MWL ET Cover this reporting period during the month of June. For each watering event, approximately 56,000 gallons of water was applied over a 3-day period to stimulate a ½-inch rainfall event. Water was applied during the morning hours to minimize evaporation.

A comprehensive summary report of all supplemental watering performed prior to 2012 is provided in the revised MWL Long-Term Monitoring and Maintenance Plan (LTMMP) (SNL/NM March 2012a).

2.1.2 MWL Evapotranspirative Cover Maintenance Activities

Cover maintenance activities performed during this reporting period at the MWL included the application of pre-emergent and post-emergent herbicides on small (less than 200-square-foot) test plots at the south end of the ET Cover. The testing was informally approved by the New Mexico Environment Department (NMED) on March 29, 2012, to determine the effectiveness of common herbicides in controlling Russian thistle and other common invasive annual weed species. The pre-emergent and post-emergent herbicides were applied on April 13 and June 4, 2012.

A comprehensive summary report of all cover maintenance activities performed prior to 2012 is presented in the revised MWL LTMMP (SNL/NM March 2012a).

2.2 Project Management and Site Closure

ER sites currently undergoing regulatory closure activities are addressed in this section. The two permit modification requests in process with the NMED at this time are summarized in Sections I.2.2.1 and I.2.2.2. In April 2010, the U.S. Department of Energy (DOE) and Sandia Corporation (Sandia), hereafter referred to as DOE/Sandia, received formal written communication from the NMED regarding its decisions on these sites (NMED April 2010). The decisions, presented in the NMED letter dated April 8, 2010, are summarized in Section I.2.2.3.

2.2.1 Permit Modification Request Submitted in March 2006

This report contains 36 potential release sites that require corrective action under the Permit and Compliance Order on Consent (Table I-1); of these 36 sites, 26 sites were submitted to the NMED for the final determination of Corrective Action Complete (CAC) in March 2006 (Wagner March 2006). The sites included 19 Solid Waste Management Units (SWMUs)

and 7 Areas of Concern (AOCs). The NMED issued the "Notice of Public Comment Period and Intent to Approve a Class 3 Permit Modification of the Resource Conservation and Recovery Act (RCRA) Permit for Sandia National Laboratories" for these 26 sites in December 2007 (NMED December 2007). The NMED public review and comment period ended in February 2008. The following SWMUs and AOCs were included in this permit modification request:

- SWMUs 4, 5, 46, 49, 52, 68, 91, 101, 116, 138, 140, 147, 149, 150, 154, 161, 196, 233, and 234

- AOCs 1090, 1094, 1095, 1114, 1115, 1116, and 1117

2.2.2 Permit Modification Request Submitted in January 2008

Five sites were submitted for the final regulatory determination of CAC in a permit modification request submitted in January 2008 (Wagner January 2008). This permit modification included all remaining SNL/NM ER sites with the exception of three active sites (SWMUs 83, 84, and 240), the MWL (SWMU 76), and three groundwater investigation sites (TA-V, Burn Site Groundwater [BSG], and Tijeras Arroyo Groundwater [TAG]). The four SWMUs and one AOC included in the January 2008 permit modification request are:

- SWMUs 8, 28-2, 58, and 105
- AOC 1101

2.2.3 Status of Permit Modification Requests Submitted in March 2006 and January 2008

In April 2010, DOE/Sandia received a letter from the NMED entitled, "Class 3 Permit Modification Requests for Granting Corrective Action Complete Status for 26 SWMUs/AOCs (Request of March 1, 2006) and 5 Other SWMUs/AOCs (Request of January 7, 2008), Sandia National Laboratories, EPA ID #NM5890110518, HWB-SNL-06-007 and HWB-SNL-08-001" (NMED April 2010). This letter included four main sections as follows: (1) "SWMUs Requiring Additional Corrective Action," (2) "SWMUs/AOCs to be Subject to Groundwater Monitoring Controls," (3) "SWMUs/AOCs to be Restricted to Industrial Land Use," and (4) "SWMUs/AOCs that do not Require Corrective Action. The NMED requirements stated in this letter are summarized as follows:

- The section titled, "SWMUs Requiring Additional Corrective Action," specifies additional characterization requirements for SWMU 68 (Old Burn Site), SWMU 149 (Building 9930 Septic System), SWMU 154 (Building 9960 Septic System and Seepage Pits), and SWMUs 8/58 (Open Dump [Coyote Canyon Blast Area]/Coyote Canyon Blast Area). Activities associated with these requirements are summarized in Section I.2.3 of this ER Quarterly Report. Analytical results for groundwater sampling at these SWMUs are presented in Sections III and IV of this ER Quarterly Report.

- The section titled, "SWMUs/AOCs to be Subject to Groundwater Monitoring Controls," specifies that annual groundwater monitoring is to be conducted at SWMUs 49 and 116. Groundwater monitoring results are summarized in Sections I.2.3.8 and I.2.3.9, respectively, of this ER Quarterly Report.

- The section titled, "SWMUs/AOCs to be Restricted to Industrial Land Use," indicates that the NMED intends to restrict the future land use of the following SWMUs/AOCs to industrial:

    1. SWMU 4 – Liquid Waste Disposal System Surface Impoundments
    2. SWMU 46 – Old Acid Waste Line Outfall
    3. SWMU 91 – Lead Firing Site
    4. SWMU 196 – Building 6597 Cistern (TA-V)
    5. SWMU 234 – Storm Drain System Outfall
    6. AOC 1090 – Building 6721 Septic System (TA-III)

- The section titled, "SWMUs/AOCs that do not Require Corrective Action," includes the following 25 SWMUs/AOCs:

    1. SWMU 4 – Liquid Waste Disposal System Surface Impoundments
    2. SWMU 5 – Liquid Waste Disposal System Drainfield
    3. SWMU 28-2 – Mine Shaft
    4. SWMU 46 – Old Acid Waste Line Outfall
    5. SWMU 49 – Building 9820 Drains (Lurance Canyon)
    6. SWMU 91 – Lead Firing Site
    7. SWMU 101 – Building 9926/9926A Septic System and Seepage Pit (Coyote Test Field [CTF])
    8. SWMU 105 – Mercury Spill (Building 6536)
    9. SWMU 116 – Building 9990 Septic System (CTF)
    10. SWMU 138 – Building 6630 Septic Systems (TA-III)
    11. SWMU 140 – Building 9965 Septic System and Drywell (Thunder Range)
    12. SWMU 147 – Building 9925 Septic Systems (CTF)
    13. SWMU 150 – Building 9939/9939A Septic System and Drainfield (CTF)

14. SWMU 161 – Building 6636 Septic System (TA-III)
15. SWMU 196 – Building 6597 Cistern (TA-V)
16. SWMU 233 – Storm Drain System Outfall
17. SWMU 234 – Storm Drain System Outfall
18. AOC 1090 – Building 6721 Septic System (TA-III)
19. AOC 1094 – Live Fire Range East Septic System (Lurance Canyon)
20. AOC 1095 – Building 9938 Seepage Pit (CTF)
21. AOC 1101 – Building 885 Septic System
22. AOC 1114 – Building 9978 Drywell (CTF)
23. AOC 1115 – Former Offices Septic System (Solar Tower Complex)
24. AOC 1116 – Building 9981A Seepage Pit (Solar Tower Complex)
25. AOC 1117 – Building 9982 Drywell (Solar Tower Complex)

- SWMU 52, The Liquid Waste Disposal System (LWDS), was addressed in the April 2010 NMED letter as a request for additional information to aid the NMED in determining the status of SWMU 52 (Brandwein December 2009a and 2009b). In December 2011, SNL/NM ER personnel provided the requested information to the NMED along with a proposal to address NMED concerns about the future use of this LWDS site (SNL/NM December 2011).

2.3 Site-Wide Hydrogeologic Characterization

The following sections present site-wide hydrogeologic characterization activities conducted at three groundwater investigation sites (TA-V, BSG, and TAG), the MWL, the Chemical Waste Landfill (CWL), and the seven SWMUs subject to additional corrective action and groundwater monitoring controls as discussed in Section I.2.2.3 of this ER Quarterly Report.

Analytical results for groundwater monitoring at TA-V, BSG, TAG, the MWL, the CWL, and SWMUs 68, 149, 154, 8/58, 49, and 116 will be presented in the SNL/NM Calendar Year (CY) 2012 Annual Groundwater Monitoring Report (anticipated submittal to the NMED in summer 2013).

Perchlorate analysis of groundwater samples for the BSG and SWMUs 8/58, 68, 149, and 154 is discussed in Section II of this ER Quarterly Report.

Analytical results for the CWL groundwater monitoring will be presented and discussed in the CWL Annual Post-Closure Care Report for CY 2012.

Analytical results for the April 2012 groundwater sampling of monitoring wells at SWMUs 8/58 (CCBA-MW-1 and CCBA-MW-2) and SWMU 68 (OBS-MW-1, OBS-MW-2, and OBS-MW-3) are presented in Section IV of this ER Quarterly Report.

Analytical results for the June 2012 groundwater sampling of monitoring wells at SWMU 149 (CTF-MW-3) and SWMU 154 (CTF-MW-2) are presented in Section III of this ER Quarterly Report.

2.3.1 Technical Area V Groundwater

Groundwater sampling at TA-V was conducted in May and June 2012.

2.3.2 Burn Site Groundwater

The groundwater monitoring well installation report for the BSG groundwater monitoring wells CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12 and collection of subsurface soil samples at Boreholes BSG-BH001 through BSG-BH010 (SNL/NM January 2012) was approved by the NMED in June 2012 (NMED June 2012).

The Monitoring Well Plug and Abandonment Plan and Well Construction Plan for the BSG groundwater monitoring wells 12AUP01, CYN-MW1D, CYN-MW2S, and CYN-MW13 (SNL/NM February 2012) was approved by the NMED in April 2012 (NMED April 2012a).

Groundwater sampling for the BSG investigation was conducted in April 2012.

2.3.3 Tijeras Arroyo Groundwater

Groundwater sampling for the TAG investigation was conducted in June 2012.

2.3.4 Mixed Waste Landfill Groundwater

No MWL groundwater monitoring activities were performed during this reporting period.

2.3.5 Chemical Waste Landfill Groundwater

No CWL groundwater monitoring activities were performed during this reporting period.

2.3.6 SWMUs 8/58 Groundwater

Groundwater sampling for SWMUs 8/58 was conducted in April 2012.

The groundwater monitoring well installation report for the SWMUs 8/58 groundwater monitoring wells CCBA-MW1 and CCBA-MW2 (SNL/NM November 2011) was approved by the NMED in April 2012 (NMED April 2012b).

2.3.7 SWMU 68 Groundwater

Groundwater sampling for SWMU 68 was conducted in April 2012.

The groundwater monitoring well installation report for the SWMU 68 groundwater monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 (SNL/NM November 2011) was approved by the NMED in April 2012 (NMED April 2012b).

2.3.8 SWMU 49 Groundwater

No SWMU 49 groundwater monitoring activities were performed during this reporting period.

2.3.9 SWMU 116 Groundwater

No SWMU 116 groundwater monitoring activities were performed during this reporting period.

2.3.10 SWMU 149 Groundwater

Groundwater sampling for SWMU 149 was conducted in June 2012.

2.3.11 SWMU 154 Groundwater

Groundwater sampling for SWMU 154 was conducted in June 2012.

2.4 Environmental Restoration Operations Documents Submitted to the NMED Pending Regulatory Review and Approval

This section lists the ER documents that have been submitted to the NMED and are, as of this reporting period, still pending review and approval:

- The TA-V Groundwater Corrective Measures Evaluation (CME) Work Plan, submitted to the NMED on May 11, 2004 (SNL/NM April 2004).

- The BSG Interim Measures Work Plan, submitted to the NMED on May 26, 2005 (SNL/NM May 2005).

- The CME Report for the TAG Investigation, submitted to the NMED on September 1, 2005 (SNL/NM August 2005).

- The BSG Current Conceptual Model of Groundwater Flow and Contaminant Transport, submitted to the NMED on April 9, 2008 (SNL/NM March 2008).

- The TA-V Geophysical Logs and Slug Test Results Report, submitted to the NMED on November 24, 2010 (SNL/NM November 2010).

- Summary Report for TA-V Groundwater and Soil-Vapor Monitoring Well Installation submitted to the NMED on June 30, 2011 (SNL/NM June 2011).

- MWL Groundwater Monitoring Report for CY 2010 submitted to the NMED on September 30, 2011 (SNL/NM September 2011).

- MWL LTMMP submitted to the NMED on March 26, 2012 (SNL/NM March 2012a).

3.0 Long-Term Stewardship Work Completed

3.1 Chemical Waste Landfill

The CWL Post-Closure Care Permit (PCCP) (NMED October 2009) became effective on June 2, 2011, when the NMED approved the CWL Final RCRA Closure Report (Kieling June 2011), transitioning the CWL from SNL/NM ER to LTS. A summary of post-closure care activities at the CWL for this reporting period is provided in this ER Quarterly Report. More detailed documentation of ongoing activities under the PCCP will be reported in the CWL Annual Post-Closure Care Report (due to the NMED in March 2013).

- Quarterly inspection of the CWL ET Cover surface, storm-water diversion structures, and security fence was performed in June 2012. A request was submitted to SNL/NM Facilities to clear a storm water drainage channel of debris (primarily accumulated weeds) that was blocking greater than 1/3 of the drainage channel. This repair work will

be completed during the next reporting period. No other maintenance or repairs were required.

- A meeting was held at the NMED District 1 Office in Albuquerque on June 27, 2012, to discuss CWL Permit issues. Discussion topics included updating the NMED website version of the CWL Permit to reflect the February 2012 permit modification request approval (Kieling February 2012), correcting the February 2012 NMED approval replacement attachment, and addressing DOE/Sandia plans for another minor permit modification request to be submitted in 2012. Follow-up discussion of these topics is planned for the next reporting period.

- The final semiannual groundwater monitoring event will be performed in July 2012. All wells were inspected and no maintenance or repairs were required.

- No cover maintenance was performed on the CWL ET Cover during this reporting period.

3.2 Corrective Action Management Unit

Corrective Action Management Unit (CAMU) post-closure care operations consist of vadose zone monitoring, leachate removal, and post-closure inspections, as required in the PCCP. Activities for this reporting period (April through June 2012) include the following:

- Quarterly monitoring of the Vadose Zone Monitoring System was conducted in June 2012. The results will be presented in the 2012 CAMU Vadose Zone Monitoring System Annual Monitoring Results Report (anticipated submittal to the NMED in September 2012).

- Composite leachate sampling for waste characterization was conducted on May 22, 2012.

- Weekly pumping of leachate from the leachate collection and removal system was performed. Waste management associated with the leachate collection and removal system during this reporting period is outlined in Section I.3.2.1.

- Weekly inspections of the RCRA less-than-90-day accumulation area were conducted.

- Quarterly inspection of the site was performed on June 21 and June 28, 2012, which included the containment cell cover, storm-water diversion structures, security fences,

gates, signs, and benchmarks. Any findings not already dealt with will be addressed during the next reporting period. The inspection findings are as follows:

- Six four-wing saltbush plants were identified growing on the containment cell vegetative cover. Because these plants can develop extensive root systems that could damage the high-density polyethylene fabric that is part of the cover system, they were removed when they were identified. Figure I-2 presents a photograph of the native grasses and gravel mulch surface of the CAMU vegetative cover.

Figure I-2
Corrective Action Management Unit Vegetative Cover

- Signs on the north and south gate were noted as fading and need to be replaced.

- A warning sign on the fence north of monitoring location CSS-1 needs to be repaired.

- A bush at the westernmost benchmark needs to be trimmed so the benchmark is visible from the road.

- Windblown plywood debris inside the north gate needs to be removed.

3.2.1 CAMU Waste Management Activities

Waste management data for the CAMU are reported in this section for the reporting period of April through June 2012. Solid waste (i.e., personal protective equipment, paper wipes, and plastic drum pump) generated during this reporting period does not exceed 10 pounds.

- Leachate waste stored on site as of April 1, 2012:
  - 17 gallons

- Leachate waste generated on site during the reporting period:
  - 96 gallons

- Leachate waste removed from the site by Hazardous Waste Handling Facility personnel on May 31, 2012:
  - 76 gallons

- Leachate waste remaining on site at the end of this reporting period:
  - 37 gallons

3.2.2 CAMU Regulatory Activities

No regulatory activities occurred during this quarter.

3.3 Long-Term Stewardship Documents Submitted to the NMED Pending Regulatory Review and Approval

- One LTS document that has been submitted to the NMED is, as of this reporting period, still pending review and approval. The "Chemical Waste Landfill Annual Post-Closure Care Report – Calendar Year 2011" was submitted to the NMED on March 26, 2012 (SNL/NM March 2012b).

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Tables

Table I-1
Environmental Restoration Sites Subject to
Corrective Action Complete Regulatory Process

Solid Waste Management Units	
Site Number	**Site Description**
4	LWDS Surface Impoundments (TA-V)
5	LWDS Drainfield
8	Open Dump (CCBA)
28-2	Mine Shafts
46	Old Acid Waste Line Outfall
49	Building 9820 Drains (Lurance Canyon)
52	LWDS Holding Tank
58	CCBA
68	Old Burn Site
76	MWL (TA-III)
83	Long Sled Track
84	Gun Facilities
91	Lead Firing Site (Thunder Range)
101	Building 9926/9926A Septic System and Seepage Pit (CTF)
105	Mercury Building 6585
116	Building 9990 Septic System (CTF)
138	Building 6630 Septic System (TA-III)
140	Building 9965 Septic System (Thunder Range)
147	Building 9925 Septic System (CTF)
149	Building 9930 Septic System (CTF)
150	Buildings 9939/9939A Septic System and Drain Field (CTF)
154	9960 Septic System and Seepage Pits (CTF)
161	Building 6636 Septic System (TA-III)
196	Building 6597 Cistern (TA-V)
233	Storm Drain System Outfall
234	Storm Drain System Outfall
240	Short Sled Track
Total	**27**
Areas of Concern	
Site Number	**Site Description**
300	TAG Investigation
1090	Building 6721 Septic System (TA-III)
1094	Live Fire Range East Septic System (Lurance Canyon)
1095	Building 9938 Seepage Pit (CTF)
1101	Building 885 Septic System (TA-I)
1114	Building 9978 Drywell (CTF)
1115	Former Offices Septic System (Solar Tower Complex)
1116	Building 9981 Seepage Pit (Solar Tower Complex
1117	Building 9982 Drywell (Solar Tower Complex)
Total	**9**

CCBA = Coyote Canyon Blast Area.
CTF = Coyote Test Field.
LWDS = Liquid Waste Disposal System.
MWL = Mixed Waste Landfill.
TA = Technical Area.
TAG = Tijeras Arroyo Groundwater.

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Appendix B. Data Validation Sample Findings Summary Sheets for the Perchlorate Data

SECTION II
PERCHLORATE SCREENING QUARTERLY GROUNDWATER MONITORING REPORT, APRIL – JUNE 2012

1.0 Introduction

Section IV.B of the Compliance Order on Consent (the Order), between the New Mexico Environment Department (NMED), the U.S. Department of Energy (DOE), and Sandia Corporation (Sandia), hereafter referred to as DOE/Sandia, for Sandia National Laboratories, New Mexico (SNL/NM), effective on April 29, 2004, stipulates that a select group of groundwater monitoring wells at SNL/NM be sampled for perchlorate (NMED April 2004). This section of the Environmental Restoration Operations (ER) Consolidated Quarterly Report (ER Quarterly Report) summarizes the perchlorate screening groundwater monitoring completed during the Second Quarter of Calendar Year (CY) 2012 (April, May, and June) in response to the requirements of the Order. The outline of this report is based on the required elements of a "Periodic Monitoring Report" described in Section X.D. of the Order (NMED April 2004).

In November 2005, DOE/Sandia submitted a letter report on the status of perchlorate screening in groundwater at SNL/NM monitoring wells (SNL/NM November 2005). The purpose of the letter report was to summarize previous correspondence and sampling results and to outline proposed future work to comply with NMED requirements for perchlorate screening of groundwater. As specified in the letter report, quarterly reports will be submitted for wells active in the perchlorate-screening monitoring well network.

Based on the NMED response (NMED January 2006), DOE/Sandia will submit each quarterly report within 90 days following the quarter that the data represent. In November 2008, DOE/Sandia received approval from the NMED to proceed to semiannual reporting (NMED November 2008); however, upon further consideration, the NMED once more required quarterly reporting (NMED April 2009). This did not alter the previously negotiated frequency for monitoring well CYN-MW6, an existing Burn Site Groundwater (BSG) study area monitoring well that has been under the sampling and reporting requirements of the Order since the well was installed, which remains at a semiannual frequency for sampling and reporting. In September 2011, DOE/Sandia requested an extension of the submittal dates by one month for ER Quarterly Reports (SNL/NM September 2011). The request was approved by the NMED (September 2011), which allows DOE/Sandia to submit perchlorate quarterly reports within 120 days following the quarter that the data represent.

This report is the twenty-sixth to be submitted since the November 2005 letter report; the previous reports were submitted for Fourth Quarter of CY 2005 through the First Quarter of CY 2012 (SNL/NM February 2006, June 2006, September 2006, December 2006, March 2007, June 2007, September 2007, December 2007, March 2008, June 2008, September 2008, December 2008, June 2009, September 2009, December 2009, March 2010, June 2010a, September 2010a, December 2010, March 2011, June 2011, October 2011, January 2012a, April 2012, and July 2012).

Groundwater at BSG monitoring well CYN-MW6 has been sampled 19 times; Coyote Test Field (CTF) wells CTF-MW2 and CTF-MW3 have been sampled six times; Solid Waste Management Units (SWMUs) 8/58 wells CCBA-MW1 and CCBA-MW2 have been sampled three times; and SWMU 68 wells OBS-MW1, OBS-MW2, and OBS-MW3 have been sampled three times. (The Order requires that new wells be sampled for perchlorate for a minimum of four quarters [NMED April 2004]). Reporting will continue as long as groundwater monitoring wells remain active in the perchlorate-screening monitoring well network unless otherwise negotiated with the NMED.

2.0 Scope of Activities

This report provides perchlorate screening groundwater monitoring analytical results for the Second Quarter of CY 2012 (April, May, and June) for the wells currently active in the perchlorate-screening program as shown on Figure II-1 and listed in Table II-1. In accordance with the requirements of Table XI-1 of the Order, a well with four consecutive quarters of nondetects (NDs) for perchlorate at the screening level/method detection limit (MDL) of 4 micrograms per liter (µg/L) is removed from the requirement of continued monitoring for perchlorate.

Data for numerous wells identified in the Order have satisfied this requirement; therefore, these wells have been removed from the perchlorate-screening program. The perchlorate results for these wells have been provided in previous reports and are not discussed in this current report. Wells discussed in previous perchlorate-screening reports include the following: CYN-MW1D, CYN-MW5 (recently reinstated, discussed in Section II.3.0), CYN-MW7, CYN-MW8, CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12, LWDS-MW1, MRN-2, MRN-3D, MWL-BW1, MWL-BW2, MWL-MW1, MWL-MW7, MWL-MW8, MWL-MW9, NWTA3-MW2, SWTA3-MW4, TA1-W-03, TA1-W-06, TA1-W-08, TA2-W-01, TA2-W-27, TAV-MW11, TAV-MW12, TAV-MW13, and TAV-MW14.

SNL/NM personnel performed groundwater sampling for perchlorate at eight wells on the dates listed in Table II-1. Several of the wells were installed after the Order was finalized and were therefore required to be sampled for perchlorate as "new" wells; the other wells were sampled to meet other regulatory requirements (discussed in Section II.3.0). Groundwater sampling activities were conducted in accordance with procedures outlined in the following investigation-specific sampling and analysis plans (SAPs) entitled:

- "SWMUs 8/58 Groundwater Monitoring, Mini-SAP for Third Quarter, Fiscal Year 2012" (SNL/NM March 2012a).

- "SWMU 68 Groundwater Monitoring, Mini-SAP for Third Quarter, Fiscal Year 2012" (SNL/NM March 2012b).

- "Burn Site Groundwater Monitoring, Mini-SAP for Third Quarter, Fiscal Year 2012" (SNL/NM March 2012c).

- "SWMU 149 Groundwater Monitoring, Mini-SAP for Third Quarter, Fiscal Year 2012" (SNL/NM May 2012a).

- "SWMU 154 Groundwater Monitoring, Mini-SAP for Third Quarter, Fiscal Year 2012" (SNL/NM May 2012b).

As described in the Mini-SAPs, groundwater sampling was performed in accordance with current SNL/NM Environmental Management, Long-Term Stewardship Project Field Operating Procedures (FOPs). A portable Bennett™ groundwater sampling system was used to collect the groundwater samples. The sampling pump and tubing bundle were decontaminated prior to insertion into monitoring wells in accordance with procedures described in FOP 05-03, "Groundwater Monitoring Equipment Decontamination" (SNL/NM January 2012b). With the exception on CYN-MW6, each well was purged a minimum of one saturated screen volume before sampling in accordance with FOP 05-01, "Groundwater Monitoring Well Sampling and Field Analytical Measurements" (SNL/NM January 2012c). Well CYN-MW6 is a low-yield monitoring well and was purged dry and allowed to recover before sampling to ensure a representative groundwater sample.

Field water-quality measurements for turbidity, pH, temperature, specific conductance (SC), oxidation-reduction potential (ORP), and dissolved oxygen (DO) were obtained from the well prior to collecting groundwater samples. Groundwater temperature, SC, ORP, DO, and pH were measured with a YSI™ Model 6920 water quality meter. Turbidity was measured with a HACH™ Model 2100Q turbidity meter. Purging continued until four stable

measurements for turbidity, pH, temperature, and SC were obtained. Groundwater stability is considered acceptable when the following parameters are achieved:

- Turbidity measurements are less than 5 nephelometric turbidity units (NTU) or within 10% for turbidity values greater than 5 NTU.
- pH is within 0.1 units
- Temperature is within 1.0 degree Celsius
- SC is within 5%.

Field Measurement Logs documenting details of well purging and water quality measurements have been submitted to the SNL/NM Records Center.

The groundwater samples were submitted to GEL Laboratories LLC (GEL) for chemical analysis of perchlorate using U.S. Environmental Protection Agency Method 314.0 (EPA November 1999). The sample identification, Analysis Request/Chain-of-Custody form number, and the associated groundwater investigation are provided in Table II-2. The analytical report from GEL, including certificates of analyses (COA) (Appendix A), analytical methods, MDLs, practical quantitation limits, dates of analyses, and results of quality control (QC) analyses, and the data validation findings (Appendix B), have been submitted to the SNL/NM Records Center.

3.0 Regulatory Criteria

For a given monitoring well, four consecutive ND results using the screening level/MDL of 4 µg/L are considered by the NMED as evidence of the absence of perchlorate, such that additional monitoring for perchlorate in that well is not required. If perchlorate is detected using the screening level/MDL of 4 µg/L in a specific well, then monitoring will continue at that well at a frequency negotiated with the NMED. The Order (NMED April 2004) also requires that for detections equal to or greater than 4 µg/L, DOE/Sandia will evaluate the nature and extent of perchlorate contamination, based on a screening level/MDL of 4 µg/L, and incorporate the results of this evaluation into a Corrective Measures Evaluation (CME). Section VII.C of the Order clarifies that the CME process will be initiated where there is a documented release to the environment and where corrective measures are necessary to protect human health and the environment.

In March 2007, DOE/Sandia received a letter of approval from the NMED, which stated the requirement that DOE/Sandia "determine the nature and extent of the contamination and complete a CME for the perchlorate-impacted groundwater in the vicinity of CYN-MW6" (NMED March 2007). As this was based solely on the four quarters of monitoring results, DOE/Sandia submitted a letter to the NMED in April 2007 (SNL/NM April 2007), which recommended further characterization through continued quarterly monitoring of CYN-MW6 for four additional quarters, ending in December 2007, to ensure appropriate characterization of this well. In January 2008, DOE/Sandia requested a meeting with the NMED to discuss the need for continued monitoring or additional characterization work and, potentially, a CME.

In preparation for discussing the perchlorate-impacted groundwater in the vicinity of CYN-MW6 and to show that the requirement "to determine the nature and extent of contamination" (NMED March 2007) has been met, DOE/Sandia provided supporting information to the NMED (SNL/NM March 2008). Perchlorate in surface soil has been characterized at SWMUs in the study area (SNL/NM June 2006 and March 2008). Based on these data, DOE/Sandia consider that the nature and extent of perchlorate in groundwater at the Burn Site has been sufficiently characterized. Since 2004, groundwater samples from four other monitoring wells in the vicinity of the Burn Site have been analyzed for perchlorate, including CYN-MW1D, CYN-MW5, CYN-MW7, and CYN-MW8. All these wells were sampled for four quarters and all results were ND for perchlorate (SNL/NM March 2008).

In accordance with the requirements of Section VI.K.1.b of the Order (NMED April 2004), a human health risk assessment has been performed to evaluate the potential for adverse health effects from the concentrations of perchlorate detected in CYN-MW6 groundwater samples. The maximum perchlorate concentration to date of 8.93 μg/L was used in the risk assessment. The calculated hazard quotient (HQ) of 0.35 is less than the NMED target level of a hazard index (the sum of all HQs) of 1.0 (NMED June 2006, SNL/NM March 2008).

Because perchlorate concentrations in samples from monitoring well CYN-MW6 have exceeded the screening level, DOE/Sandia initiated a negotiation process with the NMED (SNL/NM March 2007) to determine the frequency of continued monitoring. In November 2008, DOE/Sandia received approval from the NMED to proceed with semiannual monitoring of perchlorate in CYN-MW6 and proceed with semiannual reporting of all perchlorate results (NMED November 2008). Upon further consideration, the NMED once more required that DOE/Sandia resume quarterly reporting of perchlorate results with the exception of CYN-MW6 (NMED April 2009).

In April 2009, DOE/Sandia received a letter from the NMED requiring DOE/Sandia to characterize the nature and extent of the perchlorate contamination in soil and groundwater in the BSG study area (NMED April 2009). A characterization work plan was prepared and submitted to the NMED (SNL/NM November 2009), approved by the NMED (February 2010), and implemented in July 2010. In the April 2009 letter, the NMED had also requested that DOE/Sandia monitor perchlorate concentrations for a minimum of four quarters at several Tijeras Arroyo Groundwater and Technical Area V monitoring wells (NMED April 2009); all these wells have been sampled for four consecutive monitoring events with no perchlorate detections and have since been removed from the perchlorate sampling list.

During the First Quarter of CY 2011, four monitoring wells were added to the perchlorate monitoring network based on the NMED letter of April 8, 2010, entitled, "Class 3 Permit Modification Requests for Granting Corrective Action Complete Status for 26 SWMUs/AOCs (Request of March 1, 2006) and 5 Other SWMUs/AOCs (Request of January 7, 2008), Sandia National Laboratories, EPA ID #NM5890110518 HWB-SNL-06-007 and HWB-SNL-08-001" (NMED April 2010). The NMED letter required work plans and groundwater monitoring at the following SWMUs:

- SWMU 49—Annual sampling of existing monitoring well CYN-MW5. This well was sampled four times from May 2004 through February 2005. Based on four consecutive ND results, CYN-MW5 was removed from the perchlorate monitoring network (SNL/NM November 2005).

- SWMU 116—Annual sampling of existing monitoring well CTF-MW1.

- SWMU 149—Submittal of a SAP and quarterly sampling of existing monitoring well CTF-MW3 for a minimum of eight quarters.

- SWMU 154—Submittal of a SAP and quarterly sampling of existing monitoring well CTF-MW2 for a minimum of eight quarters.

To fulfill the requirements of the April 2010 NMED letter, DOE/Sandia submitted a SAP for CTF-MW2 and CTF-MW3 (SNL/NM June 2010b) that was subsequently approved (with modifications) by the NMED (December 2010).

The NMED letter of April 8, 2010, also required work plans, installation of groundwater monitoring wells, and groundwater monitoring at the following SWMUs:

- SWMUs 8/58—Two groundwater monitoring wells must be installed (CCBA-MW1 and CCBA-MW2) and sampled quarterly for a minimum of eight quarters.

- SWMU 68—Three groundwater monitoring wells must be installed (OBS-MW1, OBS-MW2, and OBS-MW3) and sampled quarterly for a minimum of eight quarters.

To fulfill the requirements of the April 2010 NMED letter, DOE/Sandia submitted a Well Installation Plan/SAP for CCBA-MW1, CCBA-MW2, OBS-MW1, OBS-MW2, and OBS-MW3 (SNL/NM September 2010b) that was subsequently approved (with modification) by the NMED (January 2011).

4.0 Monitoring Results

Table II-3 summarizes current and historical perchlorate results for wells currently in the perchlorate-screening monitoring network. The analytical laboratory COA for the Second Quarter of CY 2012 perchlorate data is provided in Appendix A. Consistent with historical analytical results, no perchlorate was detected above the screening level in any samples collected from CCBA-MW1, CCBA-MW2, CTF-MW2, CTF-MW3, OBS-MW1, OBS-MW2, or OBS-MW3. Also consistent with historical analytical results, perchlorate was detected above the screening level in the sample from CYN-MW6.

As shown in Table II-3, the April 2012 perchlorate concentrations reported for well CYN-MW6 environmental and duplicate environmental samples are 7.31 and 7.32 µg/L, which are consistent with the average concentration detected since sampling began in March 2006 (Figure II-2). The hydrograph for well CYN-MW6 (Figure II-2) shows that the water table is rapidly declining.

Table II-4 summarizes the stabilized water-quality values measured immediately before the groundwater samples were collected. The field water quality measurements include turbidity, pH, temperature, SC, ORP, and DO.

The analytical data were reviewed and validated in accordance with Administrative Operating Procedure 00-03, "Data Validation Procedure for Chemical and Radiochemical Data," Revision 3 (SNL/NM May 2011). No problems were identified with the analytical data that resulted in qualification of the data as unusable. The data are acceptable, and reported QC measures are adequate. The data validation sample findings summary sheets for the perchlorate data are provided in Appendix B.

No variances or nonconformances in perchlorate sampling field activities or field conditions from requirements in the groundwater monitoring Mini-SAPs (SNL/NM March 2012a, March 2012b, March 2012c, May 2012a, and May 2012b) were identified during the Second Quarter of CY 2012 sampling activities.

5.0 Summary and Conclusions

Based on the analytical data presented in Table II-3 and in previous reports, the following statements can be made:

- No perchlorate was detected in the environmental samples from groundwater monitoring wells CCBA-MW1, CCBA-MW2, CTF-MW2, CTF-MW3, OBS-MW1, OBS-MW2, or OBS-MW3 at the screening level/MDL of 4 μg/L.

- Since June 2004 (the start of sampling as required by the Order), perchlorate was detected above the screening level/MDL (4 μg/L) in groundwater samples from only one of the wells (CYN-MW6) in the perchlorate-screening monitoring well network.

- The perchlorate concentrations for well CYN-MW6 for the Second Quarter of CY 2012 sampling event are 7.31 and 7.32 μg/L (Table II-3), which are consistent with the average concentration reported since the inception of perchlorate sampling at well CYN-MW6 in March 2006 (Figure II-2).

- A human health risk assessment was performed to evaluate the potential for adverse health effects from the concentrations of perchlorate detected in CYN-MW6 groundwater samples. The maximum concentration of perchlorate in CYN-MW6 samples to date (8.93 μg/L) was used in the assessment. The calculated HQ of 0.35 is less than the NMED target level of a hazard index (the sum of all HQs) of 1.0 (NMED June 2006 and SNL/NM March 2008).

DOE/Sandia will continue annual monitoring of perchlorate for CTF-MW1 and CYN-MW5, semiannual monitoring for CYN-MW6, and quarterly monitoring for wells CCBA-MW1, CCBA-MW2, CTF-MW2, CTF-MW3, OBS-MW1, OBS-MW2, and OBS-MW3.

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

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Figures

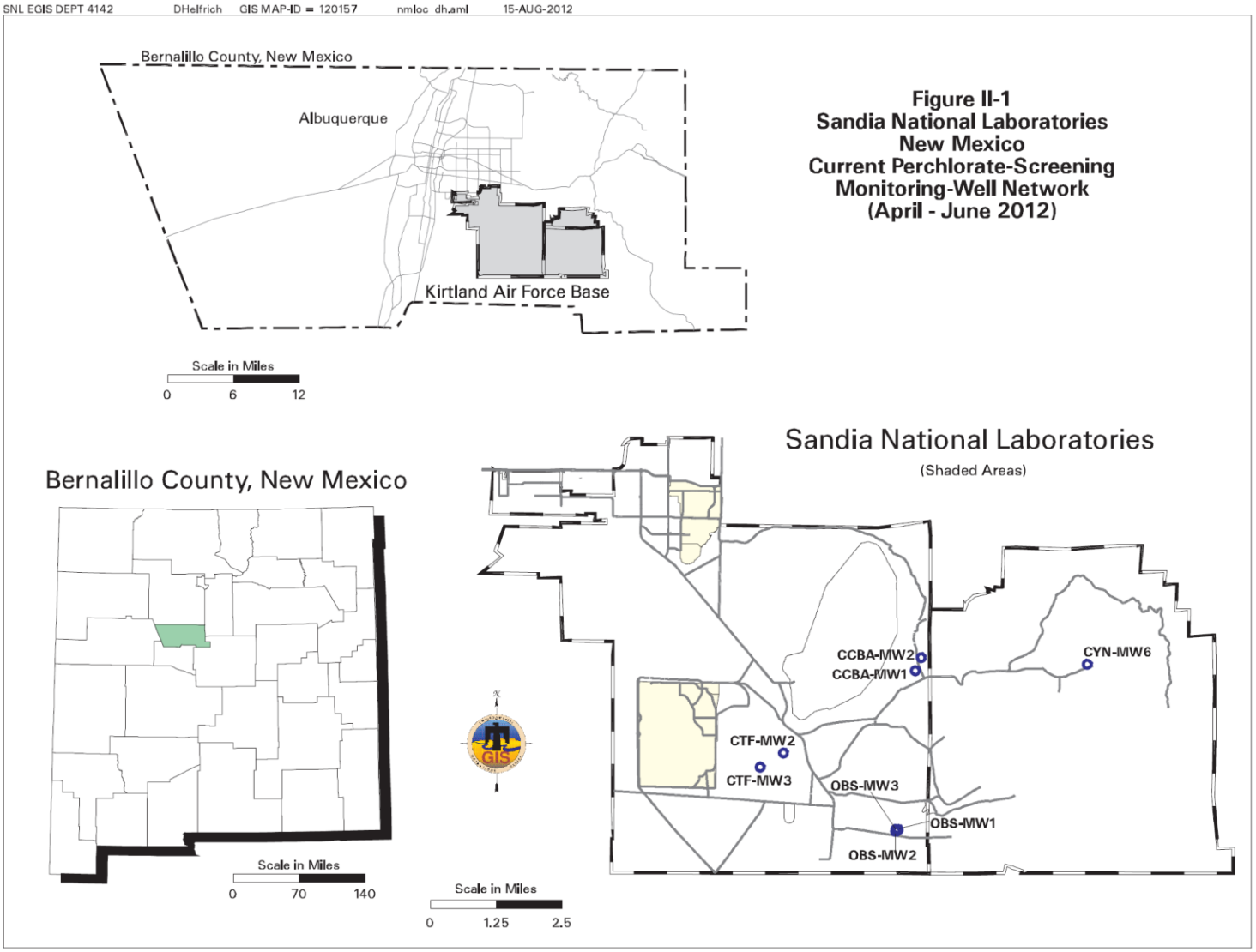

Figure II-1

Sandia National Laboratories, New Mexico

Current Perchlorate-Screening Monitoring Well Network, April – June 2012

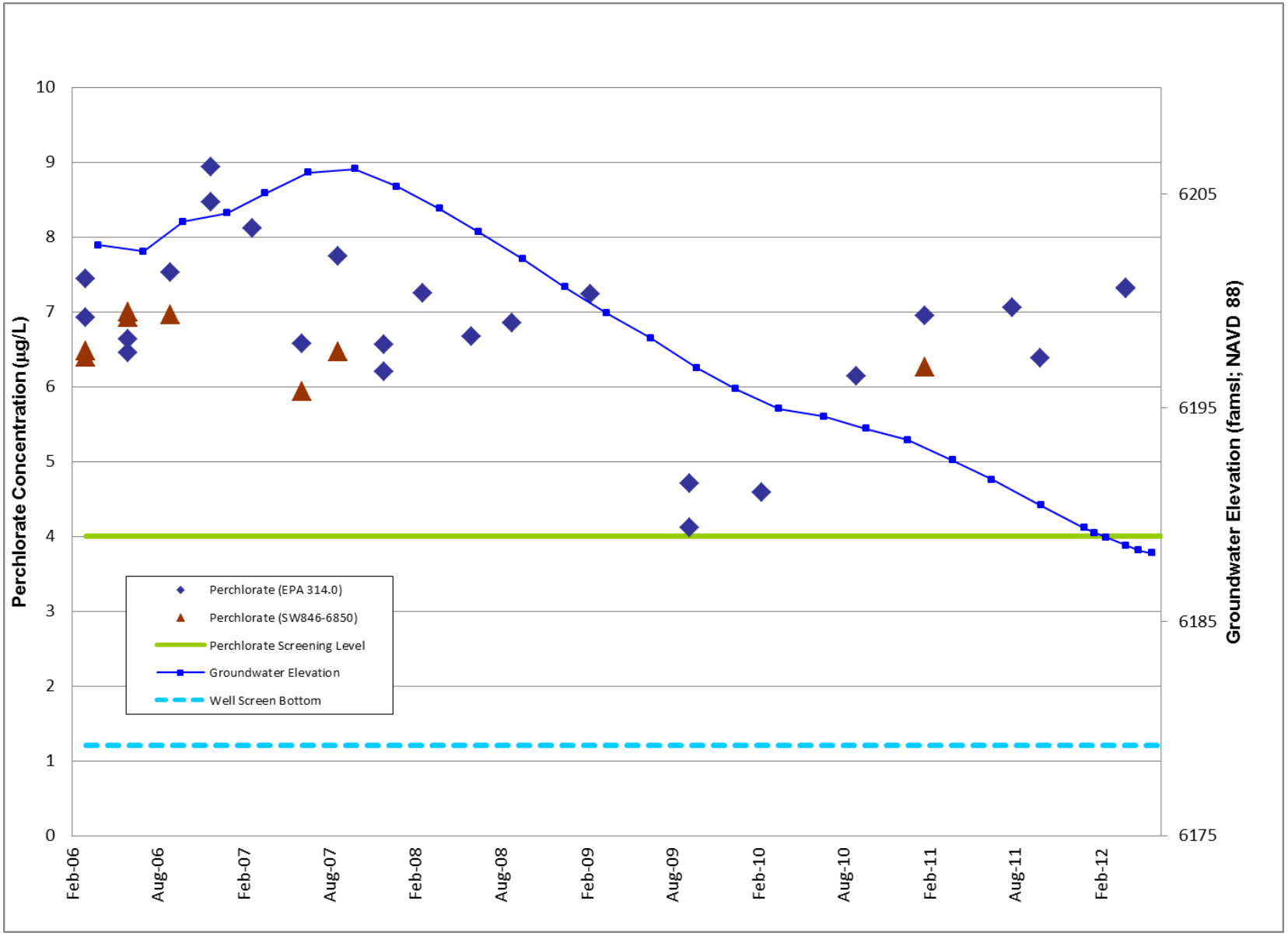

Figure II-2

Groundwater Elevations and Perchlorate Concentrations over Time in CYN-MW6

Tables

Table II-1
Current Perchlorate Screening Monitoring Well Network
Second Quarter, CY 2012
(April – June 2012)

Well	Date Sampled	Number of Consecutive Sampling Events[a]	Remaining Number of Sampling Events[b]	Sampling Equipment
CCBA-MW1	23-Apr-12	3	5	Bennett™ Pump
CCBA-MW2	24-Apr-12	3	5	Bennett™ Pump
CTF-MW2	19-Jun-12	6	2	Bennett™ Pump
CTF-MW3	16-Jun-12	6	2	Bennett™ Pump
CYN-MW6	16-Apr-12	19	TBD[c]	Bennett™ Pump
OBS-MW1	18-Apr-12	3	5	Bennett™ Pump
OBS-MW2	19-Apr-12	3	5	Bennett™ Pump
OBS-MW3	17-Apr-12	3	5	Bennett™ Pump

Notes

[a]Includes this sampling event.
[b]Per the requirements of Table XI-1 of the Order (NMED April 2004), a well will be removed from the perchlorate-screening monitoring well network after four quarters unless perchlorate is detected above the screening level/MDL of 4 µg/L. However, the eight wells currently in the network are being sampled for a minimum of eight events based on site-specific NMED requirements (NMED April 2010).
[c]TBD = To be determined. This well has been sampled for the required initial four quarters. Because perchlorate concentrations in this well have exceeded the screening level, DOE/Sandia and the NMED have agreed to further characterization requirements in the BSG study area (NMED February 2010).

µg/L = Microgram(s) per liter.
BSG = Burn Site Groundwater.
CCBA = Coyote Canyon Blast Area.
CTF = Coyote Test Field.
CY = Calendar Year.
CYN = Canyons (Burn Site).
DOE = U.S. Department of Energy.
MDL = Method detection limit.
MW = Monitoring well.
NMED = New Mexico Environment Department.
OBS = Old Burn Site.
Sandia = Sandia Corporation.

Table II-2
Sample Details for Second Quarter, CY 2012 Perchlorate Sampling

Well	Sample Identification	AR/COC Number	Associated Groundwater Investigation
CCBA-MW1	092291-020	614155	SWMUs 8/58
CCBA-MW2	092296-020 092297-020	614157	
CTF-MW2	092538-020	614255	SWMU 154
CTF-MW3	092535-020	614254	SWMU 149
CYN-MW6	091990-020 091991-020	614071	BSG
OBS-MW1	092022-020 092023-020	614081	SWMU 68
OBS-MW2	092025-020	614082	
OBS-MW3	092018-020	614079	

Notes

AR/COC = Analysis Request/Chain of Custody.
BSG = Burn Site Groundwater.
CCBA = Coyote Canyon Blast Area.
CTF = Coyote Test Field.
CY = Calendar Year.
CYN = Canyons (Burn Site).
MW = Monitoring Well.
OBS = Old Burn Site.
SWMU = Solid Waste Management Unit.

Table II-3
Summary of Perchlorate Screening Analytical Results for the Current Monitoring Well Network as of Second Quarter, CY 2012

Well ID	Sample Date	AR/COC Number	Sample Number	Perchlorate Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Analytical Method[g]	Comments
CCBA-MW1	31-Oct-11	613883	091345-020	ND	4.0	12	NE	U		EPA 314.0	
	16-Jan-12	613958	091615-020	ND	4.0	12	NE	U		EPA 314.0	
			091616-020	ND	4.0	12	NE	U		EPA 314.0	Duplicate sample
	23-Apr-12	614155	092291-020	ND	4.0	12	NE	U		EPA 314.0	
CCBA-MW2	01-Nov-11	613885	091349-020	ND	4.0	12	NE	U		EPA 314.0	
			091350-020	ND	4.0	12	NE	U		EPA 314.0	Duplicate sample
	12-Jan-12	613956	091610-020	ND	4.0	12	NE	U		EPA 314.0	
	24-Apr-12	614157	092296-020	ND	4.0	12	NE	U		EPA 314.0	
			092297-020	ND	4.0	12	NE	U		EPA 314.0	Duplicate sample
CTF-MW2	08-Mar-11	613448	090237-020	ND	4.0	12	NE	U		EPA 314.0	
			090238-020	ND	4.0	12	NE	U		EPA 314.0	Duplicate sample
	31-May-11	613578	090670-020	ND	4.0	12	NE	U		EPA 314.0	
	29-Sep-11	613855	091259-020	ND	4.0	12	NE	U		EPA 314.0	
	09-Dec-11	613929	091525-020	ND	4.0	12	NE	U		EPA 314.0	
	30-Mar-12	614055	091949-020	ND	4.0	12	NE	U		EPA 314.0	
			091950-020	ND	4.0	12	NE	U		EPA 314.0	Duplicate sample
	19-Jun-12	614255	092538-020	ND	4.0	12	NE	U		EPA 314.0	
CTF-MW3	09-Mar-11	613450	090243-020	ND	4.0	12	NE	U		EPA 314.0	
			090244-020	ND	4.0	12	NE	U		EPA 314.0	Duplicate sample
	03-Jun-11	613579	090672-020	ND	4.0	12	NE	U		EPA 314.0	
	23-Sep-11	613854	091257-020	ND	4.0	12	NE	U		EPA 314.0	
	08-Dec-11	613928	091523-020	ND	4.0	12	NE	U		EPA 314.0	
	26-Mar-12	614053	091943-020	ND	4.0	12	NE	U		EPA 314.0	
			091944-020	ND	4.0	12	NE	U		EPA 314.0	Duplicate sample
	16-Jun-12	614254	092536-020	ND	4.0	12	NE	U		EPA 314.0	

Table II-3 (Continued)
Summary of Perchlorate Screening Analytical Results for the Current Monitoring Well Network as of Second Quarter, CY 2012

Well ID	Sample Date	AR/COC Number	Sample Number	Perchlorate Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Analytical Method[g]	Comments
CYN-MW6	23-Mar-06	609578	075985-020	**6.92**	4.0	12	NE	J		EPA 314.0	
			075986-020	**7.44**	4.0	12	NE	J		EPA 314.0	Duplicate sample
			075985-R20	**6.39**	0.50	2.0	NE	Hh	HT, J	EPA 6850M	Verification/Reanalysis
			075986-R20	**6.48**	0.50	2.0	NE	Hh	HT, J	EPA 6850M	Verification/Reanalysis
	22-Jun-06	609929	078687-020	**6.63**	4.0	12	NE	J		EPA 314.0	
			078688-020	**6.45**	4.0	12	NE	J		EPA 314.0	Duplicate sample
			078687-021	**6.99**	1.0	4.0	NE			EPA 6850M	Verification
			078688-021	**6.92**	1.0	4.0	NE			EPA 6850M	Verification/Duplicate Sample
	20-Sep-06	610652	081626-020	**7.52**	4.0	12	NE	J		EPA 314.0	
			081626-R20	**6.96**	1.0	4.0	NE		P2	EPA 6850M	Verification/Reanalysis
	15-Dec-06	611057	083858-020	**8.46**	4.0	12	NE	J		EPA 314.0	
			083859-020	**8.93**	4.0	12	NE	J		EPA 314.0	Duplicate sample
	14-Mar-07	611200	084237-020	**8.12**	4.0	12	NE	J		EPA 314.0	
	27-Jun-07	611399	084833-020	**6.57**	4.0	12	NE	J	J-, X1	EPA 314.0	
			084833-R20	**5.94**	0.5	2.0	NE			EPA 6850M	Verification/Reanalysis
	12-Sep-07	611581	085249-020	**7.74**	4.0	12	NE	J		EPA 314.0	
			085249-R20	**6.46**	0.5	2.0	NE	Hh	J	EPA 6850M	Verification/Reanalysis
	18-Dec-07	611668	085446-020	**6.20**	4.0	12	NE	J		EPA 314.0	
			085447-020	**6.56**	4.0	12	NE	J		EPA 314.0	Duplicate sample
	10-Mar-08	611749	085661-020	**7.25**	4.0	12	NE	J		EPA 314.0	
	23-Jun-08	611912	086280-020	**6.67**	4.0	12	NE	J		EPA 314.0	
	17-Sep-08	612004	086782-020	**6.85**	4.0	12	NE	J		EPA 314.0	
	02-Mar-09	612120	087047-020	**7.24**	4.0	12	NE	J		EPA 314.0	
	30-Sep-09	612392	087734-020	**4.12**	4.0	12	NE	J	J-	EPA 314.0	
			087735-020	**4.71**	4.0	12	NE	J	J-	EPA 314.0	Duplicate sample
	03-Mar-10	612580	088180-020	**4.59**	4.0	12	NE	J		EPA 314.0	
	20-Sep-10	613279	089659-020	**6.14**	4.0	12	NE	J		EPA 314.0	
	14-Feb-11	613413	090000-020	**6.95**	4.0	12	NE	J	J-	EPA 314.0	
				6.26	0.5	2.0	NE	Hh		EPA 6850M	Verification/Reanalysis
	18-Aug-11	613723	091035-020	**7.06**	4.0	12	NE	J		EPA 314.0	
	17-Oct-11	613871	091320-020	**6.38**	4.0	12	NE	J		EPA 314.0	
	16-Apr-12	614071	091990-020	**7.31**	4.0	12	NE	J		EPA 314.0	
			091991-020	**7.32**	4.0	12	NE	J		EPA 314.0	Duplicate sample

Table II-3 (Continued)
Summary of Perchlorate Screening Analytical Results for the Current Monitoring-Well Network, as of Second Quarter, CY 2012

Well ID	Sample Date	AR/COC Number	Sample Number	Perchlorate Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Analytical Method[g]	Comments
OBS-MW1	25-Oct-11	613879	091335-020	ND	4.0	12	NE	U		EPA 314.0	
	09-Jan-12	613952	091600-020	ND	4.0	12	NE	U		EPA 314.0	
	18-Apr-12	614081	092022-020	ND	4.0	12	NE	U		EPA 314.0	
			092023-020	ND	4.0	12	NE	U		EPA 314.0	Duplicate sample
OBS-MW2	26-Oct-11	613880	091337-020	ND	4.0	12	NE	U		EPA 314.0	
	10-Jan-12	613954	091604-020	ND	4.0	12	NE	U		EPA 314.0	
			091605-020	ND	4.0	12	NE	U		EPA 314.0	Duplicate sample
	19-Apr-12	614082	092025-020	ND	4.0	12	NE	U		EPA 314.0	
OBS-MW3	24-Oct-11	613882	091342-020	ND	4.0	12	NE	U		EPA 314.0	
			091343-020	ND	4.0	12	NE	U		EPA 314.0	Duplicate sample
	11-Jan-12	613955	091607-020	ND	4.0	12	NE	U		EPA 314.0	
	17-Apr-12	614079	092018-020	ND	4.0	12	NE	U		EPA 314.0	

Notes

AR/COC = Analysis Request and Chain of Custody.
CCBA = Coyote Canyon Blast Area.
CFR = Code of Federal Regulations.
CTF = Coyote Test Field.
CY = Calendar Year.
CYN = Canyons (Burn Site).
EPA = U.S. Environmental Protection Agency.
ID = Identification.
MW = Monitoring well.
OBS = Old Burn Site.

[a]Result
ND = Not detected (at MDL).
µg/L = Micrograms per liter.

[b]MDL
Method detection limit. The minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.

[c]PQL
Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by the indicated method under routine laboratory operating conditions.

[d]MCL
Maximum contaminant level. Established by the U.S. Environmental Protection Agency Primary Water Regulations (40 CFR 141.11, Subpart B) and subsequent amendments or Title 20, Chapter 7, Part 1 of the New Mexico Administrative Code, incorporating 40 CFR 141.
NE = Not established.

Table II-3 (Concluded)
Summary of Perchlorate Screening Analytical Results for the Current Monitoring-Well Network, as of Second Quarter, CY 2012

Notes (continued)

[e]Laboratory Qualifier
H = Analytical holding time was exceeded.
h = Preparation holding time was exceeded.
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
U = Analyte is absent or below the method detection limit.

[f]Validation Qualifier
If cell is blank, then all quality control samples meet acceptance criteria with respect to submitted samples and no qualifier was assigned.
HT = The holding time was exceeded for the associated sample analysis.
J = The associated value is an estimated quantity.
J- = The associated numerical value is an estimated quantity with a suspected negative bias.
P2 = Insufficient Quality control data to determine laboratory precision.
X1 = General data quality is suspect.

[g]Analytical Method
EPA 314.0: EPA, November 1999, "Perchlorate in Drinking Water Using Ion Chromatography," EPA 815/R-00-014 (EPA November 1999).
EPA 6850M: U.S. Environmental Protection Agency, April 2005, "Perchlorate in Water, Soils, and Solids Using High Performance Liquid Chromatography/Electrospray Ionization/Mass Spectrometry (HPLC/ESI/MS)," draft, Method 6850 (EPA April 2005).

Table II-4
Perchlorate Screening Groundwater Monitoring
Field Water Quality Measurements[a], Second Quarter, CY 2012

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmhos/cm)	Oxidation-Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
CCBA-MW1	23-Apr-12	16.51	509	112.5	6.96	0.40	28.8	2.80
CCBA-MW2	24-Apr-12	18.90	610	102.0	7.87	0.48	63.5	5.86
CTF-MW2	19-Jun-12	19.58	3310	34.1	6.03	0.83	1.3	0.12
CTF-MW3	16-Jun-12	20.09	1530	178.7	6.89	0.19	87.4	7.84
CYN-MW6	16-Apr-12	15.79	977	132.3	7.42	6.17	30.3	3.04
OBS-MW1	18-Apr-12	17.70	531	99.5	7.75	0.47	39.0	3.71
OBS-MW2	19-Apr-12	17.54	531	100.7	7.73	0.46	39.2	3.74
OBS-MW3	17-Apr-12	16.39	531	30.6	7.74	0.52	43.4	4.24

Notes

[a]Field measurements obtained immediately before the groundwater sample was collected.
°C = Degrees Celsius.
% Sat = Percent saturation.
µmhos/cm = Micromhos per centimeter.
CCBA = Coyote Canyon Blast Area.
CTF = Coyote Test Field.
CY = Calendar Year.
CYN = Canyons (Burn Site).
ID = Identification.
mg/L = Milligrams per liter.
mV = Millivolt(s).
MW = Monitoring well.
NTU = Nephelometric turbidity unit.
OBS = Old Burn Site.
pH = Potential of hydrogen (negative logarithm of the hydrogen ion concentration).

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Appendix A
Analytical Laboratory Certificates of Analysis for the Perchlorate Data

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. NA

SMO Use

AR/COC 614071

Dept. No./Mail Stop:	4142/1126	Date Samples Shipped:	4/16/12	Project/Task No.	146422.10.11.01
Project/Task Manager:	Don Schofield	Carrier/Waybill No.	139784	SMO Authorization:	Jon Veltman SMO
Project Name:	Burn Site GWM	Lab Contact:	Edie Kent/803-556-8171	Contract #:	PO 691436
Record Center Code:	ER/1333/DAT	Lab Destination:	GEL		See Bottle Order
Logbook Ref. No.:	ER 058	SMO Contact/Phone:	Lorraine Herrera/505-844-3199		
Service Order No.	CF#058-12	Send Report to SMO:	Lorraine Herrera/505-844-3199		
Location	Tech Area	Reference LOV(available at SMO)	302715		
Building	Room				

☐ Waste Characterization
-Send preliminary/copy report to:

☐ Released by COC No.:_____
☑ Validation Required

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

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
091990-001	CYN-MW6	164	NA	4-16-12 / 0930	GW	G	3x40 ml	HCL	G	SA	TCL VOC ((SW846-8260B)	
091990-005	CYN-MW6	164	NA	4-16-12 / 0932	GW	AG	4x1 L	4C	G	SA	TPH DRO (SW846-8015A/B) SVOC	
091990-006	CYN-MW6	164	NA	4-16-12 / 0935	GW	AG	3x40 ml	4C	G	SA	TPH GRO (SW846-8015A/B) VOC	
091990-010	CYN-MW6	164	NA	4-16-12 / 0937	GW	P	500 ml	HNO3	G	SA	TAL Metals+U(SW846-6010/6020/7470)	
091990-016	CYN-MW6	164	NA	4-16-12 / 0939	GW	P	125 ml	4C	G	SA	Anions SW846-9056)	
091990-018	CYN-MW6	164	NA	4-16-12 / 0940	GW	P	125 ml	H2SO4	G	SA	NPN (353.2)	
091990-020	CYN-MW6	164	NA	4-16-12 / 0942	GW	P	250 ml	4C	G	SA	Perchlorate (314.0)	
091990-033	CYN-MW6	164	NA	4-16-12 / 0944	GW	P	1 L	HNO3	G	SA	Gamma Spec (short list) (901.0)	
091990-034	CYN-MW6	164	NA	4-16-12 / 0946	GW	P	1 L	HNO3	G	SA	Gross Alpha/Beta (900.0)	
091990-035	CYN-MW6	164	NA	4-16-12 / 0948	GW	P	1 L	HNO3	G	SA	ISO Uranium (ASTM D3972-09M)	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day

Sample Tracking Smo Use
Date Entered(mm/dd/yy) 04/18/12
Entered by: RIC

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level D Package ☐ es ☑ No

Abnormal Conditions on Receipt

Return Samples By: ☐ Negotiated TAT QC inits.

	Name	Signature	Init	Company/Organization/Phone/Cellular
Sample Team Members	Gilbert Quintana			SNL/4143/850-8524
	Robert Lynch		RL	SNL/4142/844-4013/250-7090
	Tim Jackson		TJ	SNL/4142/284-2547

*Send report to:
Tim Jackson/Org.4142/MS 0729/505-284-2547
LAST SAMPLE FOR BURN SITE GWM
Anions as Br,Cl,F,SO4
No perchlorate verification analysis required.
VOC trip blank has headspace.
*Please list as separate report.

Lab Use

1.Relinquished by		Org. 4142	Date 4-16-12	Time 1045	4.Relinquished by		Org.	Date	Time
1. Received by		Org. 4142	Date 4/16/12	Time 1045	4. Received by		Org.	Date	Time
2.Relinquished by		Org. 4142	Date 4/16/12	Time 1200	5.Relinquished by		Org.	Date	Time
2. Received by		Org.	Date	Time	5. Received by		Org.	Date	Time
3.Relinquished by		Org.	Date	Time	6.Relinquished by		Org.	Date	Time
3. Received by		Org.	Date	Time	6. Received by		Org.	Date	Time

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

AR/COC- 614071

Project Name:	Burn Site GWM	Project/Task Manger:	Don Schofield	Project/Task No.:	146422.10.11.01
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
091990-036	CYN-MW6	164	NA	4-16-12 / 0950	GW	AG	250 ml	4C	G	SA	Tritium (906.0)	
091991-001	CYN-MW6	164	NA	4-16-12 / 0930	GW	G	3x40 ml	HCL	G	DU	TCL VOC ((SW846-8260B)	
091991-005	CYN-MW6	164	NA	4-16-12 / 0932	GW	AG	4x1 L	4C	G	DU	TPH DRO (SW846-8015A/B) SVOC	
091991-006	CYN-MW6	164	NA	4-16-12 / 0936	GW	AG	3x40 ml	4C	G	DU	TPH GRO (SW846-8015A/B) VOC	
091991-010	CYN-MW6	164	NA	4-16-12 / 0938	GW	P	500 ml	HNO3	G	DU	TAL Metals+U(SW846-6010/6020/7470)	
091991-016	CYN-MW6	164	NA	4-16-12 / 0939	GW	P	125 ml	4C	G	DU	Anions SW846-9056)	
091991-018	CYN-MW6	164	NA	4-16-12 / 0941	GW	P	125 ml	H2SO4	G	DU	NPN (353.2)	
091991-020	CYN-MW6	164	NA	4-16-12 / 0943	GW	P	250 ml	4C	G	DU	Perchlorate (314.0)	
091991-033	CYN-MW6	164	NA	4-16-12 / 0945	GW	P	1 L	HNO3	G	DU	Gamma Spec (short list) (901.0)	
091991-034	CYN-MW6	164	NA	4-16-12 / 0947	GW	P	1 L	HNO3	G	DU	Gross Alpha/Beta (900.0)	
091991-035	CYN-MW6	164	NA	4-16-12 / 0949	GW	P	1 L	HNO3	G	DU	ISO Uranium (ASTM D3972-09M)	
091991-036	CYN-MW6	164	NA	4-16-12 / 0951	GW	AG	250 ml	4C	G	DU	Tritium (906.0)	
091992-001	CYN-TB17	NA	NA	4-16-12 / 0915	DIW	G	3x40 ml	HCL	G	TB	TCL VOC ((SW846-8260B)	
091992-006	CYN-TB18	NA	NA	4-16-12 / 0915	DIW	AG	3x40 ml	4C	G	TB	TPH GRO (SW846-8015A/B) VOC	
091995-001	CYN-FB3	NA	NA	4-16-12 / 0915	DIW	G	3x40 ml	HCL	G	FB	TCL VOC ((SW846-8260B)	
091995-006	CYN-FB4	NA	NA	4-16-12 / 0915	DIW	AG	3x40 ml	4C	G	FB	TPH GRO (SW846-8015A/B) VOC	

Abnormal Conditions on Receipt

LAB USE

Recipient Initials_____

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

Certificate of Analysis

Report Date: May 3, 2012

Company :	Sandia National Laboratories
Address :	MS-0756, Org. 06765, Bldg. 823/Rm. 4276 1515 Eubank SE Albuquerque, New Mexico 87123
Contact:	Ms. Pamela M. Puissant
Project:	Level C, Groundwater Monitoring

Client Sample ID:	091990-020	Project:	SNLSGWater
Sample ID:	302715007	Client ID:	SNLS003
Matrix:	AQUEOUS		
Collect Date:	16-APR-12 09:42		
Receive Date:	17-APR-12	Client Desc.:	CYN-MW6
Collector:	Client	Vol. Recv.:	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
EPA 314.0 Perchlorate by IC "As Received"											
Perchlorate	J	0.00731	0.004	0.012	mg/L	1	MAR1	04/27/12	0836	1205390	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 314.0 DOE-AL	

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

Certificate of Analysis

Report Date: May 3, 2012

Company :	Sandia National Laboratories
Address :	MS-0756, Org. 06765, Bldg. 823/Rm. 4276 1515 Eubank SE Albuquerque, New Mexico 87123
Contact:	Ms. Pamela M. Puissant
Project:	Level C, Groundwater Monitoring

Client Sample ID:	091991-020	Project:	SNLSGWater
Sample ID:	302715018	Client ID:	SNLS003
Matrix:	AQUEOUS		
Collect Date:	16-APR-12 09:43		
Receive Date:	17-APR-12	Client Desc.:	CYN-MW6
Collector:	Client	Vol. Recv.:	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
EPA 314.0 Perchlorate by IC "As Received"											
Perchlorate	J	0.00732	0.004	0.012	mg/L	1	MAR1	04/27/12	0934	1205390	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 314.0 DOE-AL	

SMO 2012-ARCOC (4-2012)

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

AOP 95-16

Internal Lab

Batch No. NA

SMO Use

AR/COC 614081

Project Name:	SWMU 68 GW Char	Date Samples Shipped:	4/18/12	SMO Authorization:	Don Watenpaugh SMO
Project/Task Manager:	Alicia Aragon	Carrier/Waybill No.	140138	SMO Contact Phone:	
Project/Task Number:	98026/01.13	Lab Contact:	Edie Kent/803.556.8171		SCe Bottle order
Service Order:	CF 263-12	Lab Destination:	GEL	Send Report to SMO:	
		Contract No.:	PO 691436		Rita Kavanaugh/505.284.2553
Tech Area:					
Building:	Room:	Operational Site:			

☐ Waste Characterization
☐ RMMA
☐ Released by COC No.
☐ 4° Celsius

Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154 302859

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
092022	-001	OBS-MW1	154	4/18/12 9:24	GW	G	3x40ml	HCL	G	SA	TCL VOC (SW846-8260B)	001
092022	-002	OBS-MW1	154	4/18/12 9:30	GW	AG	4x1L	None	G	SA	TCL SVOC (SW846-8270C)	002
092022	-009	OBS-MW1	154	4/18/12 9:31	GW	P	500 ml	HNO3	G	SA	TAL Metals+U(SW846-6010/6020/7470)	003
092022	-014	OBS-MW1	154	4/18/12 9:33	GW	P	250 ml	None	G	SA	Hexavalent Chromium (SW846-7196A)	004
092022	-016	OBS-MW1	154	4/18/12 9:34	GW	P	125 ml	None	G	SA	Anions (SW846-9056)	005
092022	-017	OBS-MW1	154	4/18/12 9:35	FGW	P	250 ml	HNO3	G	SA	Cations (SW846-6020)	302861 001
092022	-018	OBS-MW1	154	4/18/12 9:36	GW	P	125 ml	H2SO4	G	SA	NPN (353.2)	302859 006
092022	-020	OBS-MW1	154	4/18/12 9:37	GW	P	250 ml	None	G	SA	Perchlorate (314.0)	007
092022	-022	OBS-MW1	154	4/18/12 9:38	GW	P	500 ml	None	G	SA	Alkalinity (SM2320B)	008
092022	-024	OBS-MW1	154	4/18/12 9:40	GW	AG	4x1L	None	G	SA	HE (SW846-8321A)	009

Last Chain:	☐ Yes	Sample Tracking	SMO Use
Validation Req'd:	☑ Yes	Date Entered:	
Background:	☐ Yes	Entered by:	
Confirmatory:	☐ Yes	QC inits.:	

Special Instructions/QC Requirements:

EDD ☑ Yes ☐ No

Turnaround Time ☐ 7 Day* ☐ 15 Day* ☑ Day

Negotiated TAT ☐

Sample Disposal ☐ Return to Client ☑ Disposal by Lab

Return Samples By:

Comments:

If perchorate detected, then perform verification analysis using SW846-6850. Report anions (as Br, Cl, F, SO4),cations (as Ca, Mg, K, Na), alkalinity (as bicarbonate and carbonate), and gamma spec (short list isotopes).

Conditions on Receipt

Lab Use

Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell
	Robert Lynch	Robert Lynch	RL	SNL/4142/844-4013/250-7090
	Gilbert Quintana	Gilbert Quintana	GQ	SNL/4142/844-5130/228-0710
	Tim Jackson	Tim Jackson	TJ	SNL/4142/284-2547

1.Relinquished by	Tim Jackson	Org. 4142	Date 4-18-12	Time 1035	3.Relinquished by		Org.	Date	Time
1. Received by	Don Watenpaugh	Org. 4142	Date 4/18/12	Time 1035	3. Received by		Org.	Date	Time
2.Relinquished by	Don Watenpaugh	Org. 4142	Date 4/18/12	Time 1200	4.Relinquished by		Org.	Date	Time
2. Received by	Mike Soulas	Org. CEL	Date 4-19-12	Time 0725	4. Received by		Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

SMO 2012-ARCOC (4-2012)

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

AOP 95-16

AR/COC 614081

Project Name:	SWMU 68 GW Char	Project/Task Manager:	Alicia Aragon	Project/Task No.:	98026/01.13		
Tech Area:							
Building:	Room:						

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab use Lab Sample ID
092022	-027	OBS-MW1	154	4/18/12 9:42	GW	P	250 ml	NaOH	G	SA	Total Cyanide (SW846-9012)	010
092022	-033	OBS-MW1	154	4/18/12 9:43	GW	P	1 L	HNO3	G	SA	Gamma Spec (short list)(901.0)	011
092022	-034	OBS-MW1	154	4/18/12 9:44	GW	P	1 L	HNO3	G	SA	Gross Alpha/Beta (900.0)	012
092022	-035	OBS-MW1	154	4/18/12 9:45	GW	P	1 L	HNO3	G	SA	Isotopic U (ASTM D3972-09M)	013
092023	-001	OBS-MW1	154	4/18/12 9:24	GW	G	3x40ml	HCL	G	DU	TCL VOC (SW846-8260B)	014
092023	-002	OBS-MW1	154	4/18/12 9:30	GW	AG	4x1L	None	G	DU	TCL SVOC (SW846-8270C)	015
092023	-009	OBS-MW1	154	4/18/12 9:31	GW	P	500 ml	HNO3	G	DU	TAL Metals + U (SW846-6020/7470)	016
092023	-014	OBS-MW1	154	4/18/12 9:33	GW	P	250 ml	None	G	DU	Hexavalent Chromium (SW846-719)	017
092023	-016	OBS-MW1	154	4/18/12 9:34	GW	P	125 ml	None	G	DU	Anions (SW846-9056)	018
092023	-017	OBS-MW1	154	4/18/12 9:35	FGW	P	250 ml	HNO3	G	DU	Cations (SW846-6020)	302861 002
092023	-018	OBS-MW1	154	4/18/12 9:36	GW	P	125 ml	H2SO4	G	DU	NPN (353.2)	302859 019
092023	-020	OBS-MW1	154	4/18/12 9:37	GW	P	250 ml	None	G	DU	Perchlorate (314.0)	020
092023	-022	OBS-MW1	154	4/18/12 9:38	GW	P	500 ml	None	G	DU	Alkalinity (SM2320B)	021
092023	-024	OBS-MW1	154	4/18/12 9:40	GW	AG	4x1L	None	G	DU	HE (SW846-8321A)	022
092023	-027	OBS-MW1	154	4/18/12 9:42	GW	P	250 ml	NaOH	G	DU	Total Cyanide (SW846-9012)	023
092023	-033	OBS-MW1	154	4/18/12 9:43	GW	P	1 L	HNO3	G	DU	Gamma Spec (short list)(901.0)	024
092023	-034	OBS-MW1	154	4/18/12 9:44	GW	P	1 L	HNO3	G	DU	Gross Alpha/Beta (900.0)	025
092023	-035	OBS-MW1	154	4/18/12 9:45	GW	P	1 L	HNO3	G	DU	Isotopic U (ASTM D3972-09M)	026
092024	-001	OBS-TB3	N/A	4/18/12 9:24	DIW	G	3x40ml	HCL	G	TB	TCL VOC (SW846-8260B)	027

Recipient Initials MK

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

Certificate of Analysis

Report Date: May 17, 2012

Company :	Sandia National Laboratories
Address :	MS-0756, Org. 06765, Bldg. 823/Rm. 4276 1515 Eubank SE Albuquerque, New Mexico 87123
Contact:	Ms. Pamela M. Puissant
Project:	Level C, Groundwater Monitoring

Client Sample ID:	092022-020	Project:	SNLSGWater
Sample ID:	302859007	Client ID:	SNLS003
Matrix:	AQUEOUS		
Collect Date:	18-APR-12 09:37		
Receive Date:	19-APR-12	Client Desc.:	OBS-MW1
Collector:	Client	Vol. Recv.:	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
EPA 314.0 Perchlorate by IC "As Received"											
Perchlorate	U	ND	0.004	0.012	mg/L	1	MAR1	04/27/12	1110	1205390	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 314.0 DOE-AL	

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

Certificate of Analysis

Report Date: May 17, 2012

Company :	Sandia National Laboratories
Address :	MS-0756, Org. 06765, Bldg. 823/Rm. 4276 1515 Eubank SE Albuquerque, New Mexico 87123
Contact:	Ms. Pamela M. Puissant
Project:	Level C, Groundwater Monitoring

Client Sample ID:	092023-020	Project:	SNLSGWater
Sample ID:	302859020	Client ID:	SNLS003
Matrix:	AQUEOUS		
Collect Date:	18-APR-12 09:37		
Receive Date:	19-APR-12	Client Desc.:	OBS-MW1
Collector:	Client	Vol. Recv.:	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
EPA 314.0 Perchlorate by IC "As Received"											
Perchlorate	U	ND	0.004	0.012	mg/L	1	MAR1	04/27/12	1129	1205390	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 314.0 DOE-AL	

SMO 2012-ARCOC (4-2012)

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

AOP 95-16

Internal Lab
Batch No. NA

SMO Use

AR/COC 614082

Project Name: SWMU 68 GW Char	Date Samples Shipped: 4/19/12	SMO Authorization: Don Witteman/SNL	☐ Waste Characterization
Project/Task Manager: Alicia Aragon	Carrier/Waybill No. 139869	SMO Contact Phone:	☐ RMMA
Project/Task Number: 98026/01.13	Lab Contact: Edie Kent/803.556.8171	See Bottle Order	☐ Released by COC No.
Service Order: CF 0263-12	Lab Destination: GEL	Send Report to SMO:	☑ 4° Celsius
	Contract No.: PO 691436	Rita Kavanaugh/505.284.2553	Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154 302948
Tech Area:			
Building: Room:	Operational Site:		

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
092025	-001	OBS-MW2	253	4/19/12 9:34	GW	G	3x40ml	HCL	G	SA	TCL VOC (SW846-8260B)	001 .1
092025	-002	OBS-MW2	253	4/19/12 9:37	GW	AG	4x1L	None	G	SA	TCL SVOC (SW846-8270C)	002 .2
092025	-009	OBS-MW2	253	4/19/12 9:38	GW	P	500 ml	HNO3	G	SA	TAL Metals+U(SW846-6010/6020/7470)	003 .3
092025	-014	OBS-MW2	253	4/19/12 9:39	GW	P	250 ml	None	G	SA	Hexavalent Chromium (SW846-7196A)	004 .4
092025	-016	OBS-MW2	253	4/19/12 9:40	GW	P	125 ml	None	G	SA	Anions (SW846-9056)	005 .5
092025	-017	OBS-MW2	253	4/19/12 9:41	FGW	P	250 ml	HNO3	G	SA	Cations (SW846-6020)	302949 001
092025	-018	OBS-MW2	253	4/19/12 9:42	GW	P	125 ml	H2SO4	G	SA	NPN (353.2)	302948 006 .6
092025	-020	OBS-MW2	253	4/19/12 9:43	GW	P	250 ml	None	G	SA	Perchlorate (314.0)	007 .7
092025	-022	OBS-MW2	253	4/19/12 9:44	GW	P	500 ml	None	G	SA	Alkalinity (SM2320B)	008 .8
092025	-024	OBS-MW2	253	4/19/12 9:47	GW	AG	4x1L	None	G	SA	HE (SW846-8321A)	009 .9

Last Chain:	☒ Yes	Sample Tracking SMO Use	Special Instructions/QC Requirements:
Validation Req'd:	☑ Yes	Date Entered:	EDD ☑ Yes ☐ No
Background:	☐ Yes	Entered by:	Turnaround Time ☐ 7 Day* ☐ 15 Day* (30) ☑ Day
Confirmatory:	☐ Yes	QC inits.:	Negotiated TAT ☐
			Sample Disposal ☐ Return to Client ☑ Disposal by Lab

Conditions on Receipt

Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell
	Robert Lynch	RLynch	RL	SNL/4142/844-4013/250-7090
	Gilbert Quintana	Gilbert Quintana	GQ	SNL/4143/844-2507/850-8524
	Tim Jackson	Tim Jackson	TJ	SNL/4142/284-2547

Return Samples By:

Comments: Send report to Tim Jackson/4142/MS 0729/284-2547
2 TB vials received with headspace *
If perchlorate detected, then perform verification analysis using SW846-6850.
Report anions (as Br, Cl, F, SO4), cations (as Ca, Mg, K, Na), alkalinity (as bicarbonate and carbonate), and gamma spectroscopy (short list isotopes)

Lab Use

1.Relinquished by		Org. 4142	Date 4-19-12	Time 1030	3.Relinquished by	Org.	Date	Time
1. Received by		Org. 4142	Date 4/19/12	Time 1030	3. Received by	Org.	Date	Time
2.Relinquished by		Org. 4142	Date 4/19/12	Time 1100	4.Relinquished by	Org.	Date	Time
2. Received by		Org. CEL	Date 4-20-12	Time 0730	4. Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

SMO 2012-ARCOC (4-2012)

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

AOP 95-16

AR/COC 614082

Project Name:	SWMU 68 GW Char	Project/Task Manager:	Alicia Aragon	Project/Task No.:	98026/01.13		Lab use
Tech Area:							
Building:	Room:						

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
092025	-027	OBS-MW2	253	4/19/12 9:48	GW	P	250 ml	NaOH	G	SA	Total Cyanide (SW846-9012)	010
092025	-033	OBS-MW2	253	4/19/12 9:49	GW	P	1 L	HNO3	G	SA	Gamma Spec (short list)(901.0)	011
092025	-034	OBS-MW2	253	4/19/12 9:50	GW	P	1 L	HNO3	G	SA	Gross Alpha/Beta (900.0)	012
092025	-035	OBS-MW2	253	4/19/12 9:51	GW	P	1 L	HNO3	G	SA	Isotopic Ur (ASTM D3972-09M)	013
092026	-001	OBS-TB4	N/A	4/19/12 9:25	DIW	G	3x40ml	HCL	G	TB	VOC (SW846-8260B)	014
092027	-001	OBS-FB1	N/A	4/19/12 9:25	DIW	G	3x40ml	HCL	G	FB	VOC (SW846-8260B)	015

Recipient Initials MK

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

Certificate of Analysis

Report Date: May 17, 2012

Company :	Sandia National Laboratories
Address :	MS-0756, Org. 06765, Bldg. 823/Rm. 4276 1515 Eubank SE Albuquerque, New Mexico 87123
Contact:	Ms. Pamela M. Puissant
Project:	Level C, Groundwater Monitoring

Client Sample ID:	092025-020	Project:	SNLSGWater
Sample ID:	302948007	Client ID:	SNLS003
Matrix:	AQUEOUS		
Collect Date:	19-APR-12 09:43		
Receive Date:	20-APR-12	Client Desc.:	OBS-MW2
Collector:	Client	Vol. Recv.:	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
EPA 314.0 Perchlorate by IC "As Received"											
Perchlorate	U	ND	0.004	0.012	mg/L	1	MAR1	04/27/12	1148	1205390	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 314.0 DOE-AL	

SMO 2012-ARCOC (4-2012)

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

AOP 95-16

Internal Lab

Page 1 of 2

Batch No. NA

SMO Use

AR/COC 614079

Project Name:	SWMU 68 GW Char	Date Samples Shipped:	4/17/12	SMO Authorization:	Jon Veteyman SMO
Project/Task Manager:	Alicia Aragon	Carrier/Waybill No.	139961	SMO Contact Phone:	
Project/Task Number:	98026/01.13	Lab Contact:	Edie Kent/803.556.8171		
Service Order:	CF 263-12	Lab Destination:	GEL	Send Report to SMO:	
		Contract No.:	PO 691436	Rita Kavanaugh/505.284.2553	
Tech Area:					
Building:	Room:	Operational Site:			

☐ Waste Characterization
☐ RMMA
☐ Released by COC No.
☑ 4° Celsius

Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154 302788

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
092018	-001	OBS-MW3	209	4/17/12 9:10	GW	G	3x40ml	HCL	G	SA	TCL VOC (SW846-8260B)	001
092018	-002	OBS-MW3	209	4/17/12 9:12	GW	AG	4x1L	4C	G	SA	TCL SVOC (SW846-8270C)	002
092018	-009	OBS-MW3	209	4/17/12 9:13	GW	P	500 ml	HNO3	G	SA	TAL Metals+U(SW846-6010/6020/7470)	003
092018	-014	OBS-MW3	209	4/17/12 9:14	GW	P	250 ml	4C	G	SA	Hexavalent Chromium (SW846-7196A)	004
092018	-016	OBS-MW3	209	4/17/12 9:15	GW	P	125 ml	4C	G	SA	Anions (SW846-9056)	005
092018	-017	OBS-MW3	209	4/17/12 9:16	FGW	P	250 ml	HNO3	G	SA	Cations (SW846-6020)	302741 001
092018	-018	OBS-MW3	209	4/17/12 9:17	GW	P	125 ml	H2SO4	G	SA	NPN (353.2)	302788 006
092018	-020	OBS-MW3	209	4/17/12 9:18	GW	P	250 ml	4C	G	SA	Perchlorate (314.0)	007
092018	-022	OBS-MW3	209	4/17/12 9:19	GW	P	500 ml	4C	G	SA	Alkalinity (SM2320B)	008
092018	-024	OBS-MW3	209	4/17/12 9:21	GW	AG	4x1L	4C	G	SA	HE (SW846-8321A)	009

Last Chain:	☐ Yes	Sample Tracking	SMO Use
Validation Req'd:	☑ Yes	Date Entered:	
Background:	☐ Yes	Entered by:	
Confirmatory:	☐ Yes	QC inits.:	

Special Instructions/QC Requirements:
EDD ☑ Yes ☐ No
Turnaround Time ☐ 7 Day* ☐ 15 Day* ☑ Day
Negotiated TAT ☐
Sample Disposal ☐ Return to Client ☑ Disposal by Lab
Return Samples By:
Comments: Send report to Tim Jackson/4142/MS 0729/284-2547 (Br, Cl, F, SO4) Emd 4/15/12
FGW (Filtered in field w/40 micron filter), Anions (~~Cl,SO4~~), Cations (Ca,Mg,K,Na). If perchlorate detected, then perform verification analysis
Alkalinity (total,bicarbonate,carbonate)

Conditions on Receipt
Lab Use

Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell
	Robert Lynch	Robert Lynch	RL	SNL/4142/844-4013/250-7090
	Gilbert Quintana	Gilbert Quintana	GQ	SNL/4143/844-2507/850-8524
	Tim Jackson	Tim Jackson	TJ	SNL/4142/284-2547

1.Relinquished by	Tim Jackson	Org.	4142	Date	4-17-12	Time	1055	3.Relinquished by	Org.	Date	Time
1. Received by	Jon Veteyman SMO	Org.	4142	Date	4/17/12	Time	1055	3. Received by	Org.	Date	Time
2.Relinquished by	Rita Kavanaugh SMO	Org.	4142	Date	4/17/12	Time	1140	4.Relinquished by	Org.	Date	Time
2. Received by	Mike Sanchez	Org.	GEL	Date	4-18-12	Time	0725	4. Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

SMO 2012-ARCOC (4-2012)

AOP 95-16

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

AR/COC 614079

Project Name:	SWMU 68 GW Char	Project/Task Manager:	Alicia Aragon	Project/Task No.:	98026/01.13		Lab use
Tech Area:							
Building:	Room:						

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
092018	-027	OBS-MW3	209	4/17/12 9:22	GW	P	250 ml	NaOH	G	SA	Total Cyanide (SW846-9012)	010
092018	-033	OBS-MW3	209	4/17/12 9:23	GW	P	1 L	HNO3	G	SA	Gamma Spec (short list)(901.0)	011
092018	-034	OBS-MW3	209	4/17/12 9:24	GW	P	1 L	HNO3	G	SA	Gross Alpha/Beta (900.0)	012
092018	-035	OBS-MW3	209	4/17/12 9:25	GW	P	1 L	HNO3	G	SA	Isotopic Ur (ASTM D3972-09M)	013
092019	-001	OBS-TB1	N/A	4/17/12 9:10	DIW	G	3x40ml	HCL	G	TB	VOC (SW846-8260B)	014

Recipient Initials MK

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

Certificate of Analysis

Report Date: May 16, 2012

Company :	Sandia National Laboratories
Address :	MS-0756, Org. 06765, Bldg. 823/Rm. 4276 1515 Eubank SE Albuquerque, New Mexico 87123
Contact:	Ms. Pamela M. Puissant
Project:	Level C, Groundwater Monitoring

Client Sample ID:	092018-020	Project:	SNLSGWater
Sample ID:	302788007	Client ID:	SNLS003
Matrix:	AQUEOUS		
Collect Date:	17-APR-12 09:18		
Receive Date:	18-APR-12	Client Desc.:	OBS-MW3
Collector:	Client	Vol. Recv.:	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
EPA 314.0 Perchlorate by IC "As Received"											
Perchlorate	U	ND	0.004	0.012	mg/L	1	MAR1	04/27/12	1031	1205390	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 314.0 DOE-AL	

SMO 2012-ARCOC (4-2012)

AOP 95-16

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab:

Batch No.: NA

SMO Use

ARCOC 614155

Project Name:	SWMU 8/58 GWM	Date Samples Shipped:	4/23/12	SMO Authorization.:	Waste Characterization
Project/Task Manager:	Alicia Aragon	Carrier/Waybill No.	138471	SMO Contact Phone: See Bottle order	RMMA
Project/Task Number:	98026.01.12	Lab Contact:	Edie Kent	Lorraine Hererra/508-844-3199	Released by COC No.
Service Order:	CF262-12	Lab Destination:	GEL	Send Report to SMO:	4° Celsius
		Contract No.:	691436	Rita Kavanaugh/505.284.2553	Bill to: Sandia National Laboratories (Accounts Payable); P.O. Box 5800, MS-0154; Albuquerque, NM 87185-0154
Tech Area:					303091
Building :	Room:	Operational Site:			

Sample Number	Fraction	Sample Location Detail	Depth (ft)	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Vol	Preservative	Collect Method	Sample Type	Parameter & Method Requested	Lab Sample Id
092291	001	CCBA-MW1	79	4/23/12 0919	GW	G	3x40 ml	HCL	G	SA	TCL VOC (SW846-8260B)	001
092291	002	CCBA-MW1	79	4/23/12 0921	GW	AG	4x1L	None	G	SA	TCL SVOC (SW846-8270C)	002
092291	009	CCBA-MW1	79	4/23/12 0922	GW	P	500 ml	HNO3	G	SA	TAL Metals+U(SW846-6010/6020/7470)	003
092291	016	CCBA-MW1	79	4/23/12 0923	GW	P	125 ml	None	G	SA	Anions (SW846-9056)	004
092291	017	CCBA-MW1	79	4/23/12 0924	FGW	P	250 ml	HNO3	G	SA	Cations (SW846-6020)	303092 001
092291	018	CCBA-MW1	79	4/23/12 0925	GW	P	125 ml	H2SO4	G	SA	NPN (353.2)	303091 005
092291	020	CCBA-MW1	79	4/23/12 0926	GW	P	250 ml	None	G	SA	Perchlorate (314.0)	006
092291	022	CCBA-MW1	79	4/23/12 0927	GW	P	500 ml	None	G	SA	Alkalinity (SM2320B)	007
092291	024	CCBA-MW1	79	4/23/12 0929	GW	AG	4x1L	None	G	SA	High Explosives (SW846-8321A) Mod.	008
092291	027	CCBA-MW1	79	4/23/12 0930	GW	P	250 ml	NaOH	G	SA	Total Cyanide (SW846-9012)	009

Last Chain:	☐ Yes
Validation Req'd:	☑ Yes
Background:	☐ Yes
Confirmatory:	☐ Yes

Sample Tracking	SMO Use
Date Entered:	
Entered by:	
QC inits.:	

Special Instructions/QC Requirements:

EDD: Yes ☑ No ☐

Turnaround Time: ☐ 7 Day* ☐ 15 Day * ☑ 30 Day

Negotiated TAT: ☐

Sample Disposal: ☐ Return to Client ☑ Disposal by Lab

Return Samples By:

Comments:
If perchlorate detected, then perform verification analysis using SW846-6850. Report anions (as Br,Cl,F,SO4), cations (as Ca,Mg,K,Na), alkalinity (as bicarbonate and carbonate), and gamma spec (short list).

*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members	Name	Signature	Init.	Company/Org/Phone/Cell
	William Gibson			SNL/4142/844-4013/239-7367
	Robert Lynch			SNL/4142/844-4013/250-7090
	Alfred Santillanes			SNL/4142/844-5130/228-0710

1. Relinquished by		Org. 4142	Date 4/23/12	Time 1118	3. Relinquished by	Org.	Date	Time
1. Received by		Org. 4142	Date 4/23/12	Time 1118	3. Received by	Org.	Date	Time
2. Relinquished by		Org. 4142	Date 4/23/12	Time 1800	4. Relinquished by	Org.	Date	Time
2. Received by		Org. GEL	Date 4-24-12	Time 0740	4. Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT LABORATORY
Analysis Request And Chain Of Custody (Continuation)

ARCOC- 614155

Project Name:	SWMU 8/58 GWM	Project/Task Manager: Alicia Aragon		Project/Task No.: 98026.01.12								Lab use
Tech Area:												
Building:	Room:											
Sample Number	Fraction	Sample Location Detail	Depth (ft)	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Vol	Preser-vative	Collect Method	Sample Type	Parameter & Method Requested	Lab Sample Id
092291	033	CCBA-MW1	79	4/23/12 0932	GW	P	1L	HNO3	G	SA	Gamma Spec (short list)(901.0)	010
092291	034	CCBA-MW1	79	4/23/12 0933	GW	P	1L	HNO3	G	SA	Gross Alpha/Beta (900.0)	011
092291	035	CCBA-MW1	79	4/23/12 0934	GW	P	1L	HNO3	G	SA	Isotopic U (ASTM D3972-09M)	012
092292	001	CCBA-TB1	na	4/23/12 0919	DIW	G	3x40 ml	HCL	G	TB	TCL VOC (SW846-8260B)	013
092293	001	CCBA-FB1	na	4/23/12 0909	DIW	G	3x40 ml	HCL	G	FB	TCL VOC (SW846-8260B)	014

Recipient Initials MK

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

Certificate of Analysis

Report Date: May 23, 2012

Company :	Sandia National Laboratories
Address :	MS-0756, Org. 06765, Bldg. 823/Rm. 4276 1515 Eubank SE Albuquerque, New Mexico 87123
Contact:	Ms. Pamela M. Puissant
Project:	Level C, Groundwater Monitoring

Client Sample ID:	092291-020	Project:	SNLSGWater
Sample ID:	303091006	Client ID:	SNLS003
Matrix:	AQUEOUS		
Collect Date:	23-APR-12 09:26		
Receive Date:	24-APR-12	Client Desc.:	CCBA-MW1
Collector:	Client	Vol. Recv.:	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
EPA 314.0 Perchlorate by IC "As Received"											
Perchlorate	U	ND	0.004	0.012	mg/L	1	MAR1	04/27/12	1324	1207232	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 314.0 DOE-AL	

SMO 2012-ARCOC (4-2012)

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

AOP 95-16

Internal Lab:

Batch No.: NA

Page 1 of 1

SMO Use

ARCOC 614157

Project Name:	SWMU 8/58 GWM	Date Samples Shipped:	4/24/12	SMO Authorization.:	☐ Waste Characterization
Project/Task Manager:	Alicia Aragon	Carrier/Waybill No.	140 209	SMO Contact Phone:	☐ RMMA
Project/Task Number:	98026.01.12	Lab Contact:	Edie Kent	Lorraine Hererra/508-844-3199	☐ Released by COC No.
Service Order:	CF262-12	Lab Destination:	GEL	Send Report to SMO:	☐ 4° Celsius
		Contract No.:	691436	Rita Kavanaugh/505.284.2553	Bill to: Sandia National Laboratories (Accounts Payable); P.O. Box 5800, MS-0154; Albuquerque, NM 87185-0154
Tech Area:					303091
Building :	Room:	Operational Site:			

Sample Number	Fraction	Sample Location Detail	Depth (ft)	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Vol	Preser-vative	Collect Method	Sample Type	Parameter & Method Requested	Lab Sample Id
092296	001	CCBA-MW2	117	4-24-12/0938	GW	G	3x40 ml	HCL	G	SA	TCL VOC (SW846-8260B)	028
092296	002	CCBA-MW2	117	4-24-12/0940	GW	AG	4x1L	None	G	SA	TCL SVOC (SW846-8270C)	029
092296	009	CCBA-MW2	117	4-24-12/0944	GW	P	500 ml	HNO3	G	SA	TAL Metals+U(SW846-6010/6020/7470)	030
092296	016	CCBA-MW2	117	4-24-12/0946	GW	P	125 ml	None	G	SA	Anions (SW846-9056)	031
092296	017	CCBA-MW2	117	4-24-12/0947	FGW	P	250 ml	HNO3	G	SA	Cations (SW846-6020)	303092 003
092296	018	CCBA-MW2	117	4-24-12/0949	GW	P	125 ml	H2SO4	G	SA	NPN (353.2)	303091 032
092296	020	CCBA-MW2	117	4-24-12/0950	GW	P	250 ml	None	G	SA	Perchlorate (314.0)	033
092296	022	CCBA-MW2	117	4-24-12/0951	GW	P	500 ml	None	G	SA	Alkalinity (SM2320B)	034
092296	024	CCBA-MW2	117	4-24-12/0952	GW	AG	4x1L	None	G	SA	High Explosives (SW846-8321A) Mod.	035
092296	027	CCBA-MW2	117	4-24-12/0956	GW	P	250 ml	NaOH	G	SA	Total Cyanide (SW846-9012)	036

Last Chain:	☐ Yes	Sample Tracking SMO Use	Special Instructions/QC Requirements:
Validation Req'd:	☑ Yes	Date Entered:	EDD: Yes ☑ No ☐
Background:	☐ Yes	Entered by:	Turnaround Time: ☐ 7 Day* ☐ 15 Day * ☑ 30 Day
Confirmatory:	☐ Yes	QC inits.:	Negotiated TAT: ☐

Abnormal Conditions on Receipt

Sample Team Members w/SA	Name	Signature	Init.	Company/Org/Phone/Cell
	William Gibson	William D Gibson	WDG	SNL/4142/844-4013/239-7367
	Robert Lynch	Robert Lynch	RTL	SNL/4142/844-4013/250-7090
	~~Alfred Santillanes~~			~~SNL/4142/844-5130/228-0710~~

Sample Disposal: ☐ Return to Client ☑ Disposal by Lab

Return Samples By:

Comments:
If perchlorate detected, then perform verification analysis using SW846-6850. Report anions (as Br,Cl,F,SO4), cations (as Ca,Mg,K,Na), alkalinity (as bicarbonate and carbonate), and gamma spec (short list).

**Please list as separate report.*

Lab Use

1. Relinquished by	William D Gibson	Org. 4142	Date 4/24/12	Time 1045	3. Relinquished by	Org.	Date	Time
1. Received by		Org. 4142	Date 4/24/12	Time 1045	3. Received by	Org.	Date	Time
2. Relinquished by		Org. 4142	Date 4/24/12	Time 1130	4. Relinquished by	Org.	Date	Time
2. Received by		Org. Ces	Date 4-25-12	Time 0730	4. Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT LABORATORY
Analysis Request And Chain Of Custody (Continuation)

ARCOC- 614157

Project Name:	SWMU 8/58 GWM	Project/Task Manager: Alicia Aragon	Project/Task No.: 98026.01.12
Tech Area:			
Building:	Room:		

Sample Number	Fraction	Sample Location Detail	Depth (ft)	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Vol	Preser-vative	Collect Method	Sample Type	Parameter & Method Requested	Lab use Lab Sample Id
092296	033	CCBA-MW2	117	4-24-12 / 0957	GW	P	1L	HNO3	G	SA	Gamma Spec (short list)(901.0)	037
092296	034	CCBA-MW2	117	4-24-12 / 0959	GW	P	1L	HNO3	G	SA	Gross Alpha/Beta (900.0)	038
092296	035	CCBA-MW2	117	4-24-12 / 1000	GW	P	1L	HNO3	G	SA	Isotopic U (ASTM D3972-09M)	039
092297	001	CCBA-MW2	117	4-24-12 / 0938	GW	G	3x40 ml	HCL	G	DU	TCL VOC (SW846-8260B)	040
092297	002	CCBA-MW2	117	4-24-12 / 0940	GW	AG	4x1L	None	G	DU	TCL SVOC (SW846-8270C)	041
092297	009	CCBA-MW2	117	4-24-12 / 0944	GW	P	500 ml	HNO3	G	DU	TAL Metals+U(SW846-6010/6020/7470)	042
092297	016	CCBA-MW2	117	4-24-12 / 0946	GW	P	125 ml	None	G	DU	Anions (SW846-9056)	043
092297	017	CCBA-MW2	117	4-24-12 / 0947	FGW	P	250 ml	HNO3	G	DU	Cations (SW846-6020)	303092 004
092297	018	CCBA-MW2	117	4-24-12 / 0949	GW	P	125 ml	H2SO4	G	DU	NPN (353.2)	303091 044
092297	020	CCBA-MW2	117	4-24-12 / 0950	GW	P	250 ml	None	G	DU	Perchlorate (314.0)	045
092297	022	CCBA-MW2	117	4-24-12 / 0951	GW	P	500 ml	None	G	DU	Alkalinity (SM2320B)	046
092297	024	CCBA-MW2	117	4-24-12 / 0952	GW	AG	4x1L	None	G	DU	High Explosives (SW846-8321A) Mod.	047
092297	027	CCBA-MW2	117	4-24-12 / 0956	GW	P	250 ml	NaOH	G	DU	Total Cyanide (SW846-9012)	048
092297	033	CCBA-MW2	117	4-24-12 / 0957	GW	P	1L	HNO3	G	DU	Gamma Spec (short list)(901.0)	049
092297	034	CCBA-MW2	117	4-24-12 / 0959	GW	P	1L	HNO3	G	DU	Gross Alpha/Beta (900.0)	050
092297	035	CCBA-MW2	117	4-24-12 / 1000	GW	P	1L	HNO3	G	DU	Isotopic U (ASTM D3972-09M)	051
092298	001	CCBA-TB3	na	4-24-12 / 0938	DIW	G	3x40 ml	HCL	G	TB	TCL VOC (SW846-8260B)	052

Recipient Initials MH

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

Certificate of Analysis

Report Date: May 23, 2012

Company :	Sandia National Laboratories
Address :	MS-0756, Org. 06765, Bldg. 823/Rm. 4276 1515 Eubank SE Albuquerque, New Mexico 87123
Contact:	Ms. Pamela M. Puissant
Project:	Level C, Groundwater Monitoring

Client Sample ID:	092296-020	Project:	SNLSGWater
Sample ID:	303091033	Client ID:	SNLS003
Matrix:	AQUEOUS		
Collect Date:	24-APR-12 09:50		
Receive Date:	25-APR-12	Client Desc.:	CCBA-MW2
Collector:	Client	Vol. Recv.:	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
EPA 314.0 Perchlorate by IC "As Received"											
Perchlorate	U	ND	0.004	0.012	mg/L	1	MAR1	04/27/12	1440	1207232	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 314.0 DOE-AL	

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

Certificate of Analysis

Report Date: May 23, 2012

Company :	Sandia National Laboratories
Address :	MS-0756, Org. 06765, Bldg. 823/Rm. 4276 1515 Eubank SE Albuquerque, New Mexico 87123
Contact:	Ms. Pamela M. Puissant
Project:	Level C, Groundwater Monitoring

Client Sample ID:	092297-020	Project:	SNLSGWater
Sample ID:	303091045	Client ID:	SNLS003
Matrix:	AQUEOUS		
Collect Date:	24-APR-12 09:50		
Receive Date:	25-APR-12	Client Desc.:	CCBA-MW2
Collector:	Client	Vol. Recv.:	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
EPA 314.0 Perchlorate by IC "As Received"											
Perchlorate	U	ND	0.004	0.012	mg/L	1	MAR1	04/27/12	1459	1207232	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 314.0 DOE-AL	

SMO 2012-ARCOC (4-2012)

AOP 95-16

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab NM

Batch No.

Page 1 of 1

AR/COC 614254

Project Name:	SWMU 149 GWM	Date Samples Shipped:	6/18/12	SMO Authorization:	Don Delaney
Project/Task Manager:	Clinton Lum	Carrier/Waybill No.	142743	SMO Contact Phone:	See bottle order
Project/Task Number:	98026.01.14	Lab Contact:	Edie Kent/803-556-8171		Lorraine Herrera/505-844-3199
Service Order:	CF250-12	Lab Destination:	GEL	Send Report to SMO:	
		Contract No.:	PO 691436		Rita Kavanaugh/505-284-2553
Tech Area:					
Building:	Room:	Operational Site:			

SMO Use

☐ Waste Characterization
☐ RMMA
☐ Released by COC No.
☑ 4° Celsius

Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154, Albuquerque, NM 87185-0154 306314

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
092535	-001	CTF-MW3	359	6/16/12 9:32	GW	G	3x40 mL	HCL	G	SA	TCL VOC (SW846-8260B)	001
092535	-009	CTF-MW3	359	6/16/12 9:33	GW	P	500 mL	HNO3	G	SA	TAL Metals (SW846-6010/6020/7470	002
092535	-010	CTF-MW3	359	6/16/12 9:34	FGW	P	500 mL	HNO3	G	SA	TAL Metals (SW846-6010/6020/7470	306315 001
092535	-016	CTF-MW3	359	6/16/12 9:35	GW	P	125 mL	4C	G	SA	Anions (SW846-9056)	306314 003
092535	-018	CTF-MW3	359	6/16/12 9:36	GW	P	125 mL	H2SO4	G	SA	NPN (EPA 353.2)	004
092535	-020	CTF-MW3	359	6/16/12 9:37	GW	P	250 mL	4C	G	SA	Perchlorate (EPA 314.0)	005
092535	-022	CTF-MW3	359	6/16/12 9:38	GW	P	500 mL	4C	G	SA	Alkalinity (SM2320B)	006
092536	-001	SWMU 149-TB1	na	6/16/12 9:32	DIW	G	3x40 mL	HCL	G	TB	TCL VOC (SW846-8260B)	007

Last Chain:	☑ Yes
Validation Req'd:	☑ Yes
Background:	☐ Yes
Confirmatory:	☐ Yes

Sample Tracking (SMO Use)
Date Entered:
Entered by:
QC inits.:

Special Instructions/QC Requirements:
EDD ☑ Yes ☐ No
Turnaround Time ☐ 7 Day* ☐ 15 Day* ☑ Day
Negotiated TAT ☐
Sample Disposal ☐ Return to Client ☑ Disposal by Lab
Return Samples By:
Comments: Send report to Tim Jackson/4142/MS 0729/284-2547

If perchlorate detected, then perform verification analysis using method SW846-6850M. Report anions (as Br,Cl,F,SO4) and alkalinity (as total as CACO3, HCO3, and CO3).

Conditions on Receipt

Lab Use

Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell
	Robert Lynch	Robert Lynch	RL	SNL/4142/505-844-4013/505-250-7090
	Alfred Santillanes	Alfred Santillanes	AS	SNL/4142/505-844-5130/505-228-0710
	Bill Gibson	William Gibson	WG	SNL/4142/505-284-3307/505-239-7367

1. Relinquished by	Alfred Santillanes	Org.	4142	Date	6/18/12	Time	0920	3. Relinquished by	Org. Date Time
1. Received by	Don Delaney	Org.	4142	Date	6/18/12	Time	0920	3. Received by	Org. Date Time
2. Relinquished by	Don Delaney	Org.	4142	Date	6/18/12	Time	1100	4. Relinquished by	Org. Date Time
2. Received by		Org.	GEL	Date	6-19-12	Time	0300	4. Received by	Org. Date Time

*Prior confirmation with SMO required for 7 and 15 day TAT

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

Certificate of Analysis

Report Date: July 13, 2012

Company :	Sandia National Laboratories
Address :	MS-0756, Org. 06765, Bldg. 823/Rm. 4276 1515 Eubank SE Albuquerque, New Mexico 87123
Contact:	Ms. Pamela M. Puissant
Project:	Level C, Groundwater Monitoring

Client Sample ID:	092535-020	Project:	SNLSGWater
Sample ID:	306314005	Client ID:	SNLS003
Matrix:	AQUEOUS		
Collect Date:	16-JUN-12 09:37		
Receive Date:	19-JUN-12	Client Desc.:	CTF-MW3
Collector:	Client	Vol. Recv.:	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
EPA 314.0 Perchlorate by IC "As Received"											
Perchlorate	U	ND	0.004	0.012	mg/L	1	MAR1	06/22/12	1610	1223673	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 314.0 DOE-AL	

SMO 2012-ARCOC (4-2012)

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

AOP 95-16

Internal Lab NA

Page 1 of 2

Batch No.

SMO Use

AR/COC 614255

Project Name:	SWMU 154 GWM	Date Samples Shipped:	6/19/12	SMO Authorization:	Don Stevenson
Project/Task Manager:	Clinton Lum	Carrier/Waybill No.	140364	SMO Contact Phone:	See Bottle Order
Project/Task Number:	98026.01.15	Lab Contact:	Edie Kent/803-556-8171		Lorraine Herrera/505-844-3199
Service Order:	CF251-12	Lab Destination:	GEL	Send Report to SMO:	
		Contract No.:	PO 691436		Rita Kavanaugh/505-284-2553
Tech Area:					
Building:	Room:	Operational Site:			

☐ Waste Characterization
☐ RMMA
☐ Released by COC No.
☑ °Celsius

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

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
09253B	-001	CTF-MW2	129	6/19/12 9:28	GW	G	3x40 mL	HCL	G	SA	TCL VOC (SW846-8260B)	306356 001
09253B	-002	CTF-MW2	129	6/19/12 9:30	GW	AG	4x1 L	4C	G	SA	TCL SVOC (SW846-8270C)	306356 002
09253B	-009	CTF-MW2	129	6/19/12 9:31	GW	P	500 mL	HNO3	G	SA	TAL Metals+U(SW846-6010/6020/7470)	306356 003
09253B	-010	CTF-MW2	129	6/19/12 9:32	FGW	P	500 mL	HNO3	G	SA	TAL Metals+U(SW846-6010/6020/7470)	306364 001
09253B	-016	CTF-MW2	129	6/19/12 9:33	GW	P	125 mL	4C	G	SA	Anions (SW846-9056)	306356 004
09253B	-018	CTF-MW2	129	6/19/12 9:34	GW	P	125 mL	H2SO4	G	SA	NPN (EPA 353.2)	306356 005
09253B	-020	CTF-MW2	129	6/19/12 9:35	GW	P	250 mL	4C	G	SA	Perchlorate (EPA 314.0)	306356 006
09253B	-022	CTF-MW2	129	6/19/12 9:36	GW	P	500 mL	4C	G	SA	Alkalinity (SM2320B)	306356 007
09253B	-024	CTF-MW2	129	6/19/12 9:38	GW	AG	4x1 L	4C	G	SA	High Explosives (SW846-8321A)	306356 008
09253B	-033	CTF-MW2	129	6/19/12 9:39	GW	P	1 L	HNO3	G	SA	Gamma Spectroscopy (EPA 901.0)	306356 009

Last Chain:	☑ Yes	Sample Tracking	SMO Use
Validation Req'd:	☑ Yes	Date Entered:	
Background:	☐ Yes	Entered by:	
Confirmatory:	☐ Yes	QC inits.:	

Special Instructions/QC Requirements:

EDD ☑ Yes ☐ No

Turnaround Time ☐ 7 Day* ☐ 5 Day* 3 ☑ Day

Negotiated TAT ☐

Sample Disposal ☐ Return to Client ☑ Disposal by Lab

Return Samples By:

Comments: Send report to Tim Jackson/4142/MS 0729/284-2547

If perchlorate detected, then perform verification analysis using method SW846-6850M. Report anions (as Br,Cl,F,SO4), alkalinity (as total as CACO3, HCO3, and CO3), and gamma spectroscopy (short list isotopes).

Conditions on Receipt

Lab Use

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cell
	William Gibson	William Gibson	WMG	SNL/4142/505-284-3307/505-239-7367
	Alfred Santillanes	Alfred Santillanes	AS	SNL/4142/505-844-5130/505-228-0710
	Robert Lynch	Robert Lynch	RL	SNL/4142/505-844-4013/505-250-7090

1. Relinquished by	Alfred Santillanes	Org. 4142	Date 6/19/12	Time 1007	3. Relinquished by		Org.	Date	Time
1. Received by	Don Stevenson	Org. 4142	Date 6/19/12	Time 1007	3. Received by		Org.	Date	Time
2. Relinquished by	Don Stevenson	Org. 4142	Date 6/19/12	Time 1130	4. Relinquished by		Org.	Date	Time
2. Received by		Org. GEL	Date 6-20-12	Time 0740	4. Received by		Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

SMO 2012-ARCOC (4-2012)

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

AOP 95-16

AR/COC 614255

Project Name:	SWMU 154 GWM	Project/Task Manager:	Clinton Lum	Project/Task No.:	98026.01.15
Tech Area:					
Building:	Room:				

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab use Lab Sample ID
092538	-034	CTF-MW2	129	6/19/12 9:41	GW	P	1 L	HNO3	G	SA	Gross Alpha/Beta (EPA 900.0)	306356 010
092538	-035	CTF-MW2	129	6/19/12 9:42	GW	P	1 L	HNO3	G	SA	Isotopic Uranium(ASTM D3972-09M)	306356 011
~~092538~~ 092539	-001	SWMU 154-TB1	na	6/19/12 9:28	DIW	G	3x40 mL	HCL	G	TB	TCL VOC (SW846-8260B)	306356 012

Recipient Initials MK

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

Certificate of Analysis

Report Date: July 13, 2012

Company :	Sandia National Laboratories
Address :	MS-0756, Org. 06765, Bldg. 823/Rm. 4276 1515 Eubank SE Albuquerque, New Mexico 87123
Contact:	Ms. Pamela M. Puissant
Project:	Level C, Groundwater Monitoring

Client Sample ID:	092538-020	Project:	SNLSGWater
Sample ID:	306356006	Client ID:	SNLS003
Matrix:	AQUEOUS		
Collect Date:	19-JUN-12 09:35		
Receive Date:	20-JUN-12	Client Desc.:	CTF-MW2
Collector:	Client	Vol. Recv.:	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
EPA 314.0 Perchlorate by IC "As Received"											
Perchlorate	U	ND	0.004	0.012	mg/L	1	MAR1	06/22/12	1708	1223673	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 314.0 DOE-AL	

Appendix B
Data Validation Sample Findings
Summary Sheets for the Perchlorate Data

ANALYTICAL QUALITY ASSOCIATES, INC.

PO Box 21987
Albuquerque, NM 87154
1-888-678-5447
www.aqainc.net

Memorandum

Date: May 31, 2012

To: File

From: Ken Salaz

Subject: Inorganic Data Review and Validation – SNL
Site: Burn Site GWM
AR/COC: 614071
SDG: 302715
Laboratory: GEL
Project/Task: 146422.10.11.01
Analysis: General Chemistry

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 3.

Summary

Two samples were prepared and analyzed with accepted procedures using methods EPA314.0 (Perchlorate), EPA9056 (Anions), and EPA353.2 (nitrate/nitrite as nitrogen). Data were reported for all required analytes. 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 and Preservation

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

Calibration

The initial and continuing calibrations met all QC acceptance criteria.

Blanks

No target analytes were detected in the blanks with the following exceptions.

Anions:

Chloride was detected in EB sample 302619-001 from COC 614070 associated with the samples in this SDG . All associated sample results were >5X the blank concentration and, therefore, will not be qualified.

Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria.

Matrix Spike (MS)

All MS recoveries met QC acceptance criteria.

Laboratory Replicate

The replicate analyses met all QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported. No samples were diluted with the following exceptions.

Anions:
The samples were diluted 10X for chloride & sulfate and 50X for nitrate/nitrite due to high concentrations. All associated matrix QC samples were analyzed at relative dilution factors ≤5X those of the samples.

Other QC

Field duplicate pairs were submitted on this 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 that affect data quality were identified.

Reviewed by: Marcia Hilchey **Date**: 06/01/12

Sample Findings Summary

AR/COC: 614071

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
DOE EML HASL-300, U-02-RC			
	091990-035/CYN-MW6	Uranium-235/236 (13982-70-2)	J, FR7
	091991-035/CYN-MW6	Uranium-235/236 (13982-70-2)	J, FR7
EPA 900.0/SW846 9310			
	091990-034/CYN-MW6	ALPHA (12587-46-1)	J, FR7
	091990-034/CYN-MW6	BETA (12587-47-2)	NJ+, FR7, B2
	091991-034/CYN-MW6	ALPHA (12587-46-1)	J, FR7
	091991-034/CYN-MW6	BETA (12587-47-2)	BD, FR7
EPA 901.1			
	091990-033/CYN-MW6	Americium-241 (14596-10-2)	BD, FR3
	091990-033/CYN-MW6	Cesium-137 (10045-97-3)	BD, FR3
	091990-033/CYN-MW6	Cobalt-60 (10198-40-0)	BD, FR3
	091990-033/CYN-MW6	Potassium-40 (13966-00-2)	BD, FR3
	091991-033/CYN-MW6	Americium-241 (14596-10-2)	BD, FR3
	091991-033/CYN-MW6	Cesium-137 (10045-97-3)	BD, FR3
	091991-033/CYN-MW6	Cobalt-60 (10198-40-0)	BD, FR3
	091991-033/CYN-MW6	Potassium-40 (13966-00-2)	R, Z2
EPA 906.0 Modified			
	091990-036/CYN-MW6	Tritium (10028-17-8)	BD, FR3
	091991-036/CYN-MW6	Tritium (10028-17-8)	BD, BR3
SW846 7470A			
	091990-010/CYN-MW6	Mercury (7439-97-6)	UJ, B4
	091991-010/CYN-MW6	Mercury (7439-97-6)	UJ, B4
SW846 8260B DOE-AL			
	091995-001/CYN-FB3	Bromodichloromethane (75-27-4)	1.0U, B2
	091995-001/CYN-FB3	Chloroform (67-66-3)	6.4U, B2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	091995-001/CYN-FB3	Dibromochloromethane (124-48-1)	1.0U, B2

All other analyses met QC acceptance criteria; no further data should be qualified.

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Memorandum

Date: June 17, 2012

To: File

From: Ken Salaz

Subject: Inorganic Data Review and Validation – SNL
Site: SWMU 68 GWM (ER)
AR/COC: 614079, 614080
SDG: 302948
Laboratory: GEL
Project/Task: 98026.01.13
Analysis: General Chemistry

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 3.

Summary

Two samples were prepared and analyzed with accepted procedures using methods EPA9012A (Total CN), EPA314.0 (Perchlorate), EPA9056 (Anions), EPA353.2 (nitrate/nitrite as nitrogen), EPA7196A (Cr+6), and SM2320B (Alkalinity). Data were reported for all required analytes. Problems were identified with the data package that result in the qualification of data.

Total CN:

1. The ICAL intercept was negative with an absolute value > but < 3X the MDL. Also, Total CN was detected in the ICB and CCB at negative concentrations with absolute values > the MDL but < the PQL. The associated sample results were all NDs and, therefore, will be **qualified UJ, I5, B4**.

Anions:

1. The ICAL intercept for chloride was > the MDL. The associated result of sample 302788-019 was a detect <3X the intercept and, therefore, will be **qualified J+, I5**

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

Holding Times and Preservation

The samples were prepared and analyzed within the prescribed holding times and properly preserved.

Calibration

The initial and continuing calibrations met QC acceptance criteria except as noted above in the Summary Section and the following.

Anions:
The ICAL intercepts for chloride, fluoride, and sulfate were > the MDL. However, the associated sample results not qualified above in the Summary section were all either ND or >3X the intercept and, therefore, will not be qualified.

Blanks

No target analytes were detected in any of the blanks except as noted above in the Summary section and the following. In the EB, chloride was detected. However, this EB is associated with samples in another data package (COC 614081) and should not be applied to samples in this SDG.

Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria.

Matrix Spike (MS)

All MS recoveries met QC acceptance criteria.

Anions, Perchlorate:
It should be noted that the MS analyses were performed on SNL samples of similar matrix from other SDGs. No sample data will be qualified as a result.

Laboratory Replicate

The replicate analyses met all QC acceptance criteria.

Anions, Perchlorate:
It should be noted that the Replicate analyses were performed on SNL samples of similar matrix from other SDGs. No sample data will be qualified as a result.

Detection Limits/Dilutions

All detection limits were properly reported. No samples were diluted with the following exceptions.

Anions & Nitrate/Nitrite as Nitrogen:
Sample 302788-005 was diluted 5X for chloride & sulfate, and sample -006 was diluted 10X for nitrate/nitrite as nitrogen due to high concentrations or matrix interference. All associated matrix QC samples were analyzed at relative dilution factors ≤5X those of the samples.

Other QC

One EB was submitted on the AR/COC.

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey **Date:** 6/17/12

Sample Findings Summary

AR/COC: 614079, 614080

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
DOE EML HASL-300, U-02-RC			
	092020-035/OBS-EB1	Uranium-233/234 (N/A)	BD, FR3
	092020-035/OBS-EB1	Uranium-235/236 (13982-70-2)	BD, FR3
	092020-035/OBS-EB1	Uranium-238 (7440-61-1)	BD, FR3
EPA 900.0/SW846 9310			
	092018-034/OBS-MW3	BETA (12587-47-2)	J, FR7
	092020-034/OBS-EB1	ALPHA (12587-46-1)	BD, FR3
	092020-034/OBS-EB1	BETA (12587-47-2)	BD, FR3
EPA 901.1			
	092018-033/OBS-MW3	Americium-241 (14596-10-2)	BD, FR3
	092018-033/OBS-MW3	Cesium-137 (10045-97-3)	BD, FR3
	092018-033/OBS-MW3	Cobalt-60 (10198-40-0)	BD, FR3
	092018-033/OBS-MW3	Potassium-40 (13966-00-2)	BD, FR3
	092020-033/OBS-EB1	Americium-241 (14596-10-2)	BD, FR3
	092020-033/OBS-EB1	Cesium-137 (10045-97-3)	BD, FR3
	092020-033/OBS-EB1	Cobalt-60 (10198-40-0)	BD, FR3
	092020-033/OBS-EB1	Potassium-40 (13966-00-2)	BD, FR3
SW846 3005/6020 DOE-AL			
	092018-009/OBS-MW3	Chromium (7440-47-3)	0.0109U, B
	092018-009/OBS-MW3	Magnesium (7439-95-4)	J, D1
	092018-017/OBS-MW3	Magnesium (7439-95-4)	J, D1
	092020-009/OBS-EB1	Calcium (7440-70-2)	0.3025U, B
	092020-009/OBS-EB1	Chromium (7440-47-3)	0.0109U, B
	092020-017/OBS-EB1	Calcium (7440-70-2)	0.3025U, B
SW846 3535/8321A Modified			
	092018-024/OBS-MW3	m-Nitrotoluene (99-08-1)	UJ, I4

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	092018-024/OBS-MW3	o-Nitrotoluene (88-72-2)	UJ, I4
	092018-024/OBS-MW3	p-Nitrotoluene (99-99-0)	UJ, I4
	092020-024/OBS-EB1	m-Nitrotoluene (99-08-1)	UJ, I4
	092020-024/OBS-EB1	o-Nitrotoluene (88-72-2)	UJ, I4
	092020-024/OBS-EB1	p-Nitrotoluene (99-99-0)	UJ, I4
SW846 7470A			
	092018-009/OBS-MW3	Mercury (7439-97-6)	UJ, I5, B4
	092020-009/OBS-EB1	Mercury (7439-97-6)	UJ, I5, B4
SW846 9012B			
	092018-027/OBS-MW3	Cyanide, Total (57-12-5)	UJ, I5, B4
	092020-027/OBS-EB1	Cyanide, Total (57-12-5)	UJ, I5, B4
SW846 9056			
	092020-016/OBS-EB1	Chloride (16887-00-6)	J+, I5

All other analyses met QC acceptance criteria; no further data should be qualified.

ANALYTICAL QUALITY ASSOCIATES, INC.

PO Box 21987
Albuquerque, NM 87154
1-888-678-5447
www.aqainc.net

Memorandum

Date: June 19, 2012

To: File

From: Ken Salaz

Subject: Inorganic Data Review and Validation – SNL
Site: SWMU 68 GWM (ER)
AR/COC: 614081
SDG: 302859
Laboratory: GEL
Project/Task: 98026.01.13
Analysis: General Chemistry

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 3.

Summary

Two samples were prepared and analyzed with accepted procedures using methods EPA9012A (Total CN), EPA314.0 (Perchlorate), EPA9056 (Anions), EPA353.2 (nitrate/nitrite as nitrogen), EPA7196A (Cr+6), and SM2320B (Alkalinity). Data were reported for all required analytes. Problems were identified with the data package that result in the qualification of data.

Total CN:

1. The ICAL intercept was negative with an absolute value > the MDL but < 3X the MDL. Also, Total CN was detected in the ICB and CCB at negative concentrations with absolute values > the MDL but < the PQL. The associated sample results were all NDs and, therefore, will be **qualified UJ, I5, B4**.

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

Holding Times and Preservation

The samples were prepared and analyzed within the prescribed holding times and properly preserved.

Calibration

The initial and continuing calibrations met QC acceptance criteria except as noted above in the Summary Section and the following.

Anions:
The ICAL intercepts for fluoride, chloride, and sulfate were > the MDL. However, the associated sample results were all >3X the intercept and, therefore, will not be qualified.

Blanks

No target analytes were detected in any of the blanks except for the following.

Anions:
In EB sample 302788-019 from COC 614080, chloride was detected. However, this sample result was qualified U due to blank contamination and, therefore, will not be applied to sample results.

Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria.

Matrix Spike (MS)

All MS recoveries met QC acceptance criteria.

Total cyanide, Anions, Perchlorate, & Nitrate/Nitrite as Nitrogen:
It should be noted that the MS analyses were performed on SNL samples of similar matrix from other SDGs. No sample data will be qualified as a result.

Laboratory Replicate

The replicate analyses met all QC acceptance criteria.

Total cyanide, Anions, Perchlorate, Total CN, & Nitrate/Nitrite as Nitrogen:
It should be noted that the Replicate analyses were performed on SNL samples of similar matrix from other SDGs. No sample data will be qualified as a result.

Detection Limits/Dilutions

All detection limits were properly reported. No samples were diluted with the following exceptions.

Anions & Nitrate/Nitrite as Nitrogen:
The samples were diluted 5X for chloride & sulfate and 10X for nitrate/nitrite as nitrogen due to high concentrations. All associated matrix QC samples were analyzed at relative dilution factors ≤5X those of the samples.

Other QC

A field duplicate pair was submitted on the COC. There are no "required" review criteria for field duplicate analyses comparability. No sample data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey **Date:** 6/25/12

Sample Findings Summary

AR/COC: 614081

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
DOE EML HASL-300, U-02-RC			
	092022-035/OBS-MW1	Uranium-235/236 (13982-70-2)	J, FR7
EPA 900.0/SW846 9310			
	092022-034/OBS-MW1	BETA (12587-47-2)	J, FR7
	092023-034/OBS-MW1	BETA (12587-47-2)	J, FR7
EPA 901.1			
	092022-033/OBS-MW1	Americium-241 (14596-10-2)	BD, FR3
	092022-033/OBS-MW1	Cesium-137 (10045-97-3)	BD, FR3
	092022-033/OBS-MW1	Cobalt-60 (10198-40-0)	BD, FR3
	092022-033/OBS-MW1	Potassium-40 (13966-00-2)	BD, Z2
	092023-033/OBS-MW1	Americium-241 (14596-10-2)	BD, FR3
	092023-033/OBS-MW1	Cesium-137 (10045-97-3)	BD, FR3
	092023-033/OBS-MW1	Cobalt-60 (10198-40-0)	BD, FR3
	092023-033/OBS-MW1	Potassium-40 (13966-00-2)	R, Z2
SW846 3005/6020 DOE-AL			
	092022-009/OBS-MW1	Copper (7440-50-8)	0.0065U, B2
	092023-009/OBS-MW1	Antimony (7440-36-0)	0.0064U, B2
	092023-009/OBS-MW1	Copper (7440-50-8)	0.0065U, B2
SW846 3535/8321A Modified			
	092022-024/OBS-MW1	m-Nitrotoluene (99-08-1)	UJ, I4
	092022-024/OBS-MW1	o-Nitrotoluene (88-72-2)	UJ, I4
	092022-024/OBS-MW1	p-Nitrotoluene (99-99-0)	UJ, I4
	092023-024/OBS-MW1	m-Nitrotoluene (99-08-1)	UJ, I4
	092023-024/OBS-MW1	o-Nitrotoluene (88-72-2)	UJ, I4
	092023-024/OBS-MW1	p-Nitrotoluene (99-99-0)	UJ, I4
SW846 7470A			
	092022-009/OBS-MW1	Mercury (7439-97-6)	UJ, I5, B4

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	092023-009/OBS-MW1	Mercury (7439-97-6)	UJ, I5, B4
SW846 9012B			
	092022-027/OBS-MW1	Cyanide, Total (57-12-5)	UJ, I5, B4
	092023-027/OBS-MW1	Cyanide, Total (57-12-5)	UJ, I5, B4

All other analyses met QC acceptance criteria; no further data should be qualified.

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Memorandum

Date: June 14, 2012

To: File

From: Ken Salaz

Subject: Inorganic Data Review and Validation – SNL
Site: SWMU 68 GWM (ER)
AR/COC: 614082
SDG: 302948
Laboratory: GEL
Project/Task: 98026.01.13
Analysis: General Chemistry

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 3.

Summary

One sample was prepared and analyzed with accepted procedures using methods EPA9012A (Total CN), EPA314.0 (Perchlorate), EPA9056 (Anions), EPA353.2 (nitrate/nitrite as nitrogen), EPA7196A (Cr+6), and SM2320B (Alkalinity). Data were reported for all required analytes. Problems were identified with the data package that result in the qualification of data.

Total CN:

1. The ICAL intercept was negative with an absolute value > the MDL but < 3X the MDL. Also, Total CN was detected in the ICB and CCB at negative concentrations with absolute values > the MDL but < the PQL. The associated sample result was ND and, therefore, will be **qualified UJ, I5, B4**.

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

Holding Times and Preservation

The sample was prepared and analyzed within the prescribed holding times and properly preserved.

Calibration

The initial and continuing calibrations met QC acceptance criteria except as noted above in the Summary Section and the following.

Anions:
The ICAL intercepts for fluoride, chloride, and sulfate were > the MDL. However, the associated sample results were all >3X the intercept and, therefore, will not be qualified.

Blanks

No target analytes were detected in any of the blanks.

Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria.

Matrix Spike (MS)

All MS recoveries met QC acceptance criteria.

Anions, Perchlorate, & Nitrate/Nitrite as Nitrogen:
It should be noted that the MS analyses were performed on SNL samples of similar matrix from other SDGs. No sample data will be qualified as a result.

Laboratory Replicate

The replicate analyses met all QC acceptance criteria.

Anions, Perchlorate, & Nitrate/Nitrite as Nitrogen:
It should be noted that the Replicate analyses were performed on SNL samples of similar matrix from other SDGs. No sample data will be qualified as a result.

Detection Limits/Dilutions

All detection limits were properly reported. No samples were diluted with the following exceptions.

Anions & Nitrate/Nitrite as Nitrogen:
The samples were diluted 5X for chloride, sulfate, and nitrate/nitrite as nitrogen due to high concentrations. All associated matrix QC samples were analyzed at relative dilution factors ≤5X those of the samples.

Other QC

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey **Date:** 6/15/12

Sample Findings Summary

AR/COC: 614082

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 900.0/SW846 9310			
	092025-034/OBS-MW2	BETA (12587-47-2)	J, FR7
EPA 901.1			
	092025-033/OBS-MW2	Americium-241 (14596-10-2)	BD, FR3
	092025-033/OBS-MW2	Cesium-137 (10045-97-3)	BD, FR3
	092025-033/OBS-MW2	Cobalt-60 (10198-40-0)	BD, FR3
	092025-033/OBS-MW2	Potassium-40 (13966-00-2)	BD, Z2
SW846 3005/6020 DOE-AL			
	092025-009/OBS-MW2	Cadmium (7440-43-9)	U, B, B3
SW846 3535/8321A Modified			
	092025-024/OBS-MW2	2,6-Dinitrotoluene (606-20-2)	UJ, L3
	092025-024/OBS-MW2	4-Amino-2,6-dinitrotoluene (19406-51-0)	UJ, L3
	092025-024/OBS-MW2	m-Nitrotoluene (99-08-1)	UJ, I4
	092025-024/OBS-MW2	o-Nitrotoluene (88-72-2)	UJ, I4
	092025-024/OBS-MW2	p-Nitrotoluene (99-99-0)	UJ, I4
SW846 7470A			
	092025-009/OBS-MW2	Mercury (7439-97-6)	UJ, I5, B4
SW846 9012B			
	092025-027/OBS-MW2	Cyanide, Total (57-12-5)	UJ, I5, B4

All other analyses met QC acceptance criteria; no further data should be qualified.

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Memorandum

Date: June 23, 2012

To: File

From: Marcia Hilchey

Subject: Inorganic Data Review and Validation – SNL
Site: SWMU 8/58 GWM
AR/COC: 614155, -156, -157
SDG: 303091
Laboratory: GEL
Project/Task: 98026.01.12
Analysis: General Chemistry

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 3.

Summary

Four samples were prepared and analyzed with accepted procedures using methods EPA 9056 (anions by ion chromatography); EPA 9012A (total cyanide); EPA 314.0 (perchlorate by IC); SM 2320B (alkalinity); and EPA 353.2 (nitrate/nitrite by Cd reduction). Data were reported for all required analytes. Problems were identified with the data package that results in the qualification of data.

Anions:
The ICAL intercept for chloride was positive and > the MDL. The associated result for sample 303091-018 was a detect < 3X the intercept value and will be **qualified J+, I5**.

Total cyanide:
The ICAL intercept for total cyanide was negative, with an absolute value > MDL but ≤2X the PQL. Also, total cyanide was detected in ICB and CCB at a negative value with absolute value > MDL. The total cyanide result for sample -048 was a detect < 5X the MDL and < 3X the absolute value of the intercept and will be **qualified NJ-, I5, B4**. The total cyanide results for samples -009, -023, and -036 were ND and will be **qualified UJ, I5, B4**.

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

Holding Times and Preservation

The samples were prepared and analyzed within the prescribed holding times and properly preserved.

Calibration

All initial and continuing calibration met QC acceptance criteria except as noted above in the Summary section and as follows.

Anions:
The ICAL intercepts for fluoride and chloride were positive and > the MDL. Associated sample results that are ND or > 3X the intercept value will not be qualified.

Blanks

No target analytes were detected in the blanks except as noted above in the Summary section and as follows.

Anions:
Chloride was detected in the EB. Associated sample results were > 5X the EB concentration and will not be qualified.

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

All LCS/LCSD acceptance criteria were met.

Matrix Spike (MS)

All MS/PS recoveries met QC acceptance criteria.

Laboratory Replicate

The replicate analyses met all QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported. No samples were diluted except as follows.

Nitrate/Nitrite:
Samples -005, -032, and -044 were diluted 10X, and sample -019 was diluted 5X.

Anions:
Sample -004 was diluted 5X for chloride and sulfate; samples -031 and -043 were diluted 10X for chloride and sulfate.

All associated batch QC samples were analyzed at dilution factors that resulted in relative dilution factors to the sample that were ≤5X. No sample data will be qualified as a result.

Other QC

EBs and field duplicates were submitted on the AR/COC(s). There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result. No other specific issues that affect data quality were identified.

Reviewed By: Ken Salaz **Date: 06/26/12**

Sample Findings Summary

AR/COC: 614155, 614156, 614157

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
DOE EML HASL-300, U-02-RC			
	092291-035/CCBA-MW1	Uranium-235/236 (13982-70-2)	BD, FR3
	092294-035/CCBA-EB1	Uranium-233/234 (N/A)	BD, FR3
	092294-035/CCBA-EB1	Uranium-235/236 (13982-70-2)	BD, FR3
	092294-035/CCBA-EB1	Uranium-238 (7440-61-1)	BD, FR3
	092296-035/CCBA-MW2	Uranium-235/236 (13982-70-2)	J, FR7
	092297-035/CCBA-MW2	Uranium-235/236 (13982-70-2)	J, FR7
EPA 900.0/SW846 9310			
	092291-034/CCBA-MW1	ALPHA (12587-46-1)	J, FR7
	092294-034/CCBA-EB1	ALPHA (12587-46-1)	BD, FR3
	092294-034/CCBA-EB1	BETA (12587-47-2)	BD, FR3
	092296-034/CCBA-MW2	BETA (12587-47-2)	J, FR7
	092297-034/CCBA-MW2	BETA (12587-47-2)	J, FR7
EPA 901.1			
	092291-033/CCBA-MW1	Americium-241 (14596-10-2)	BD, FR3
	092291-033/CCBA-MW1	Cesium-137 (10045-97-3)	BD, FR3
	092291-033/CCBA-MW1	Cobalt-60 (10198-40-0)	BD, FR3
	092291-033/CCBA-MW1	Potassium-40 (13966-00-2)	R, Z2
	092294-033/CCBA-EB1	Americium-241 (14596-10-2)	BD, FR3
	092294-033/CCBA-EB1	Cesium-137 (10045-97-3)	BD, FR3
	092294-033/CCBA-EB1	Cobalt-60 (10198-40-0)	BD, FR3
	092294-033/CCBA-EB1	Potassium-40 (13966-00-2)	BD, FR3
	092296-033/CCBA-MW2	Americium-241 (14596-10-2)	BD, FR3
	092296-033/CCBA-MW2	Cesium-137 (10045-97-3)	BD, FR3
	092296-033/CCBA-MW2	Cobalt-60 (10198-40-0)	BD, FR3
	092296-033/CCBA-MW2	Potassium-40 (13966-00-2)	R, Z2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	092297-033/CCBA-MW2	Americium-241 (14596-10-2)	BD, Z2
	092297-033/CCBA-MW2	Cesium-137 (10045-97-3)	BD, FR3
	092297-033/CCBA-MW2	Cobalt-60 (10198-40-0)	BD, FR3
	092297-033/CCBA-MW2	Potassium-40 (13966-00-2)	BD, FR3
SW846 3005/6020 DOE-AL			
	092291-009/CCBA-MW1	Calcium (7440-70-2)	J, D1
	092291-009/CCBA-MW1	Chromium (7440-47-3)	0.01885U, B
	092291-009/CCBA-MW1	Thallium (7440-28-0)	0.0038U, B3
	092291-017/CCBA-MW1	Calcium (7440-70-2)	J, D1
	092294-009/CCBA-EB1	Calcium (7440-70-2)	0.03695UJ, B,D1
	092294-009/CCBA-EB1	Chromium (7440-47-3)	0.01885U, B
	092294-017/CCBA-EB1	Calcium (7440-70-2)	0.398UJ, B,D1
	092296-009/CCBA-MW2	Calcium (7440-70-2)	J, D1
	092296-009/CCBA-MW2	Chromium (7440-47-3)	0.01885U, B
	092296-009/CCBA-MW2	Copper (7440-50-8)	0.00555U, B2
	092296-017/CCBA-MW2	Calcium (7440-70-2)	J, D1
	092297-009/CCBA-MW2	Calcium (7440-70-2)	J, D1
	092297-009/CCBA-MW2	Chromium (7440-47-3)	0.01885U, B
	092297-009/CCBA-MW2	Copper (7440-50-8)	0.00555U, B2
	092297-017/CCBA-MW2	Calcium (7440-70-2)	J, D1
SW846 3535/8321A Modified			
	092291-024/CCBA-MW1	2,6-Dinitrotoluene (606-20-2)	UJ, L3
	092291-024/CCBA-MW1	4-Amino-2,6-dinitrotoluene (19406-51-0)	UJ, L3
	092291-024/CCBA-MW1	m-Nitrotoluene (99-08-1)	UJ, I4
	092291-024/CCBA-MW1	o-Nitrotoluene (88-72-2)	UJ, I4
	092291-024/CCBA-MW1	p-Nitrotoluene (99-99-0)	UJ, I4
	092294-024/CCBA-EB1	2,6-Dinitrotoluene (606-20-2)	UJ, L3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	092294-024/CCBA-EB1	4-Amino-2,6-dinitrotoluene (19406-51-0)	UJ, L3
	092294-024/CCBA-EB1	m-Nitrotoluene (99-08-1)	UJ, I4
	092294-024/CCBA-EB1	o-Nitrotoluene (88-72-2)	UJ, I4
	092294-024/CCBA-EB1	p-Nitrotoluene (99-99-0)	UJ, I4
	092296-024/CCBA-MW2	2,6-Dinitrotoluene (606-20-2)	UJ, L3
	092296-024/CCBA-MW2	4-Amino-2,6-dinitrotoluene (19406-51-0)	UJ, L3
	092296-024/CCBA-MW2	m-Nitrotoluene (99-08-1)	UJ, I4
	092296-024/CCBA-MW2	o-Nitrotoluene (88-72-2)	UJ, I4
	092296-024/CCBA-MW2	p-Nitrotoluene (99-99-0)	UJ, I4
	092297-024/CCBA-MW2	2,6-Dinitrotoluene (606-20-2)	UJ, L3
	092297-024/CCBA-MW2	4-Amino-2,6-dinitrotoluene (19406-51-0)	UJ, L3
	092297-024/CCBA-MW2	m-Nitrotoluene (99-08-1)	UJ, I4
	092297-024/CCBA-MW2	o-Nitrotoluene (88-72-2)	UJ, I4
	092297-024/CCBA-MW2	p-Nitrotoluene (99-99-0)	UJ, I4
SW846 7470A			
	092291-009/CCBA-MW1	Mercury (7439-97-6)	UJ, B4
	092294-009/CCBA-EB1	Mercury (7439-97-6)	UJ, B4
	092296-009/CCBA-MW2	Mercury (7439-97-6)	UJ, B4
	092297-009/CCBA-MW2	Mercury (7439-97-6)	UJ, B4
SW846 9012B			
	092291-027/CCBA-MW1	Cyanide, Total (57-12-5)	UJ, I5,B4
	092294-027/CCBA-EB1	Cyanide, Total (57-12-5)	UJ, I5,B4
	092296-027/CCBA-MW2	Cyanide, Total (57-12-5)	UJ, I5,B4
	092297-027/CCBA-MW2	Cyanide, Total (57-12-5)	NJ-, I5,B4
SW846 9056			
	092294-016/CCBA-EB1	Chloride (16887-00-6)	J+, I5

All other analyses met QC acceptance criteria; no further data should be qualified.

ANALYTICAL QUALITY ASSOCIATES, INC.

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Memorandum

Date: July 27, 2012

To: File

From: Marcia Hilchey

Subject: Inorganic Data Review and Validation – SNL
Site: SWMU 149 GWM
AR/COC: 614254
SDG: 306314
Laboratory: GEL
Project/Task: 98026.01.14
Analysis: General Chemistry

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 3.

Summary

One sample was prepared and analyzed with accepted procedures using methods EPA9056 (Anions), EPA353.2 (Nitrate/Nitrite), SM2320B (Alkalinity), and EPA314.0 (perchlorate). Data were reported for all required analytes. A problem was identified with the data package that resulted 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 and Preservation

The sample was prepared and analyzed within the prescribed holding times and properly preserved.

Calibration

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

Anions:
The ICAL intercepts for chloride, fluoride, and sulfate were > the MDL. All associated sample results were >3X the intercept values and will not be qualified.

Blanks

No target analytes were detected in the blanks.

Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria.

Matrix Spike (MS)

All MS recoveries met QC acceptance criteria.

Laboratory Replicate

The replicate analyses met all QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported. The sample was not diluted except as follows.

Anions and Nitrate/Nitrite:
Samples were diluted.

Other QC

No other specific issues that affect data quality were identified.

Sample Findings Summary

AR/COC: 614254

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
SW846 8260B DOE-AL			
	092535-001/CTF-MW3	Dibromochloromethane (124-48-1)	J+, I5

All other analyses met QC acceptance criteria; no further data should be qualified.

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Memorandum

Date: July 30, 2012

To: File

From: Marcia Hilchey

Subject: Inorganic Data Review and Validation – SNL
Site: SWMU 154 GWM
AR/COC: 614255
SDG: 306356
Laboratory: GEL
Project/Task: 98026.01.15
Analysis: General Chemistry

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 3.

Summary

One sample was prepared and analyzed with accepted procedures using methods EPA9056 (Anions), EPA353.2 (Nitrate/Nitrite), SM2320B (Alkalinity), and EPA314.0 (perchlorate). Data were reported for all required analytes. A problem was identified with the data package that resulted 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 and Preservation

The sample was prepared and analyzed within the prescribed holding times and properly preserved.

Calibration

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

Anions:
The ICAL intercept for sulfate was > the MDL. The associated sample result was >3X the intercept value and will not be qualified.

Blanks

No target analytes were detected in the blanks.

Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria.

Matrix Spike (MS)

All MS recoveries met QC acceptance criteria.

Laboratory Replicate

The replicate analyses met all QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported. The sample was not diluted except as follows.

Anions and Nitrate/Nitrite:
Samples were diluted.

Other QC

No other specific issues that affect data quality were identified.

Reviewed By: Ken Salaz **Date:** 07/31/12

Sample Findings Summary

AR/COC: 614255

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
DOE EML HASL-300, U-02-RC			
	092538-035/CTF-MW2	Uranium-235/236 (13982-70-2)	J, FR7
EPA 901.1			
	092538-033/CTF-MW2	Americium-241 (14596-10-2)	BD, FR3
	092538-033/CTF-MW2	Cesium-137 (10045-97-3)	BD, FR3
	092538-033/CTF-MW2	Cobalt-60 (10198-40-0)	BD, FR3
	092538-033/CTF-MW2	Potassium-40 (13966-00-2)	R, Z2
SW846 3005/6020 DOE-AL			
	092538-009/CTF-MW2	Nickel (7440-02-0)	J-, MS3
	092538-010/CTF-MW2	Nickel (7440-02-0)	J-, MS3
SW846 8270C			
	092538-002/CTF-MW2	3,3'-Dichlorobenzidine (91-94-1)	R, MS3
	092538-002/CTF-MW2	4-Chloroaniline (106-47-8)	UJ, MS3, MS5
	092538-002/CTF-MW2	Diethylphthalate (84-66-2)	UJ, MS3
	092538-002/CTF-MW2	Di-n-butylphthalate (84-74-2)	UJ, MS3
	092538-002/CTF-MW2	Hexachlorocyclopentadiene (77-47-4)	R, MS3

All other analyses met QC acceptance criteria; no further data should be qualified.

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SECTION III
SOLID WASTE MANAGEMENT UNITS 149 AND 154 QUARTERLY GROUNDWATER MONITORING REPORT, APRIL – JUNE 2012

1.0 Introduction

This section of the Environmental Restoration Operations (ER) Consolidated Quarterly Report (ER Quarterly Report) has been prepared pursuant to the "U.S. Department of Energy (DOE)/Sandia Corporation (Sandia) Response to the New Mexico Environment Department (NMED) letter of April 8, 2010, entitled, *Class 3 Permit Modification Requests for Granting Corrective Action Complete Status for 26 SWMUs/AOCs (Request of March 1, 2006) and 5 Other SWMUs/AOCs (Request of January 7, 2008), Sandia National Laboratories EPA ID #NM5890110518 HWB-SNL-06-007 and HWB-SNL-08-001"* (SNL/NM June 2010). The activities associated with the groundwater monitoring task for Solid Waste Management Units (SWMUs) 149 and 154 at Sandia National Laboratories, New Mexico (SNL/NM) are summarized in this section.

Monitoring wells CTF-MW2 and CTF-MW3 were installed in August 2001. Prior to the June 2012 sampling event, CTF-MW2 and CTF-MW3 had been sampled 16 and 17 times, respectively, for a variety of constituents. Monitoring well CTF-MW3 is located approximately 290 feet to the west and downgradient of SWMU 149 (Figure III-1). Monitoring well CTF-MW2 is located approximately 260 feet to the southwest and downgradient of SWMU 154 (Figure III-2). Both wells are screened in Precambrian bedrock.

This report summarizes the sixth of eight quarterly groundwater sampling events for Coyote Test Field (CTF) monitoring well CTF-MW3, located near SWMU 149 (Building 9930 Septic System), and monitoring well CTF-MW2, located near SWMU 154 (Building 9960 Septic System and Seepage Pits). This groundwater characterization at the two SWMUs is designed to address the requirements of Section VII.D.6 of the Compliance Order on Consent (the Order) (NMED April 2004) and the letter dated April 8, 2010, from the NMED Hazardous Waste Bureau (NMED April 2010). The analytical results discussed in this section correspond to the reporting period of April through June 2012. Monitoring wells CTF-MW3 and CTF-MW2 were sampled on June 16 and June 19, 2012, respectively.

This groundwater sampling event was conducted in conformance with procedures outlined in the "Sampling and Analysis Plan for Collection and Analysis of Additional

Groundwater Samples Collected from Monitoring Well CTF-MW3, Located Near SNL/NM SWMU 149" (SNL/NM June 2010, Attachment 1) and "Sampling and Analysis Plan for Collection and Analysis of Additional Groundwater Samples Collected from Monitoring Well CTF-MW2, Located Near SNL/NM SWMU 154" (SNL/NM June 2010, Attachment 2). These Sampling and Analysis Plans (SAPs) were approved by the NMED in December 2010 (NMED December 2010).

The samples from CTF-MW3 were analyzed for the required constituents, consisting of general chemistry parameters, volatile organic compounds (VOCs), perchlorate, Target Analyte List (TAL) metals, and nitrate plus nitrite (NPN). The samples from CTF-MW2 were analyzed for the required constituents, consisting of general chemistry parameters, VOCs, semivolatile organic compounds (SVOCs), high explosive (HE) compounds, perchlorate, TAL metals, NPN, gross alpha/beta activity, radionuclides by gamma spectroscopy, and uranium.

Analytical results for the June 2012 groundwater samples were compared with the U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) for drinking water (EPA 2009). No analytical results for the CTF-MW3 groundwater samples exceed the corresponding MCLs. Except for arsenic, none of the analytical results for the CTF-MW2 groundwater samples exceed the MCLs. Arsenic was detected above the MCL of 0.010 milligrams per liter (mg/L) in CTF-MW2 groundwater samples at concentrations of 0.0433 mg/L in the unfiltered sample and 0.0276 mg/L in the filtered sample. These values are comparable to previous sampling results for this monitoring well. The elevated concentrations of arsenic in the groundwater samples are most likely attributable to background because monitoring well CTF-MW2 is screened in a fault-gouge zone in the Precambrian granite. Because of the fine-grained nature and disrupted texture of the rock surrounding CTF-MW2, naturally-occurring arsenic may be more likely to be present in the local groundwater.

Quality control (QC) samples consisting of two trip blank (TB) samples were also submitted for analysis during this quarterly sampling event. The following sections provide descriptions of the field methods used and discussions of the analytical and QC sampling results.

This groundwater sampling event represents the sixth of eight supplemental quarterly events for monitoring wells CTF-MW3 and CTF-MW2. The seventh of the eight supplemental quarterly groundwater sampling events will be conducted during the upcoming quarter (July – September 2012).

2.0 Field Methods and Measurements

The quarterly groundwater sampling field measurements were collected in conformance with the DOE/Sandia Response to the NMED letter of April 8, 2010 (SNL/NM June 2010). Groundwater monitoring at CTF-MW3 and CTF-MW2 was performed according to the SAPs submitted as Attachments 1 and 2 to the DOE/Sandia Response (SNL/NM June 2010) and SNL/NM Administrative Operating Procedures (AOPs) (SNL/NM May 2011) and Field Operating Procedures (FOPs) (SNL/NM January 2012a and January 2012b). Groundwater samples were analyzed for relevant parameters, listed in Table III-1. Table III-2 presents the details for groundwater samples collected from CTF-MW3 and CTF-MW2 during the Second Quarter of Calendar Year (CY) 2012.

2.1 Equipment Decontamination

A portable Bennett™ groundwater sampling system was used to collect the groundwater samples from both wells. The Bennett™ sampling pump and tubing bundle were decontaminated prior to installation into the monitoring wells in accordance with the procedures described in SNL/NM FOP 05-03, "Groundwater Monitoring Equipment Decontamination" (SNL/NM January 2012a).

2.2 Well Evacuation

In accordance with procedures described in SNL/NM FOP 05-01, "Groundwater Monitoring Well Sampling and Field Analytical Measurements" (SNL/NM January 2012b), all wells were purged a minimum of one saturated casing volume (the volume of one length of the saturated screen plus the borehole annulus around the saturated screen interval) and monitored for stability of water quality parameters.

Field water-quality measurements for turbidity, pH, temperature, specific conductance (SC), oxidation-reduction potential (ORP), and dissolved oxygen (DO) were obtained from the wells prior to collecting groundwater samples. Groundwater temperature, SC, ORP, DO, and pH were measured with a YSI™ Model 6920 water quality meter. Turbidity was measured with a HACH™ Model 2100P turbidity meter. Purging continued until four stable measurements for turbidity, pH, temperature, and SC were obtained. Groundwater stability is considered acceptable when the following parameters are achieved:

- Turbidity measurements are within 10%, or less than 5 nephelometric turbidity units
- pH is within 0.1 units

- Temperature is within 1.0 degree Celsius
- SC is within 5% as micromhos per centimeter

Table III-3 summarizes the temperature, pH, SC, and turbidity measurements, which are discussed in Section III.3.1. Field Measurement Logs (Appendix A) documenting details of well purging and water quality measurements have been submitted to the SNL/NM Records Center.

2.3 Groundwater Sample Collection

All groundwater samples were collected directly from the sample discharge tubing into laboratory-prepared sample containers. Chemical preservatives for samples intended for chemical analyses were added to the sample containers at the laboratory prior to shipment to SNL/NM. The groundwater samples were submitted to GEL Laboratories LLC (GEL) for chemical analysis using methods outlined in Table III-1. Table III-1 also lists the sample containers and preservation requirements. Section III.3.0 summarizes the analytical results.

The sample identification number, Analysis Request/Chain-of-Custody form number, and the associated groundwater investigation are provided in Table III-2. Chain-of-custody forms are provided in Appendix B.

3.0 Analytical Results

Groundwater samples were submitted to GEL for chemical and radiological analyses. Samples were analyzed in accordance with applicable EPA analytical methods (EPA 1980, 1984, 1986, and 1999; Clesceri, et al. 1998; DOE 1990). Groundwater sampling results are compared with established EPA MCLs for drinking water (EPA 2009). Analytical results and method detection limits (MDLs) for samples collected from wells CTF-MW3 and CTF-MW2 are shown in tabulated form in Tables III-4 through III-15. Analytical reports, including certificates of analyses, analytical methods, MDLs, minimum detectable activity (MDA), critical level, practical quantitation limits, dates of analyses, results for QC analyses, and data validation findings are filed in the SNL/NM Records Center.

The analytical data were reviewed and qualified in accordance with AOP 00-03, "Data Validation Procedure for Chemical and Radiochemical Data," Revision 3 (SNL/NM May 2011). Other than the rejected results for potassium-40 in the sample from CTF-MW2 (SWMU 154), no problems were identified with the analytical data that resulted in qualification of the data as unusable. The data are acceptable, and reported QC measures are adequate. The data validation sample findings summary sheets are provided in Appendix C.

3.1 Field Water Quality Measurements

SWMU 149, CTF-MW3. Table III-3 summarizes field water quality measurements (turbidity, pH, temperature, SC, ORP, and DO) collected prior to sampling well CTF-MW3.

SWMU 154, CTF-MW2. Table III-3 summarizes field water quality measurements (turbidity, pH, temperature, SC, ORP, and DO) collected prior to sampling well CTF-MW2.

3.2 Volatile Organic Compounds

SWMU 149, CTF-MW3. No VOCs were detected at concentrations above established MCLs. The compounds bromodichloromethane, chloroform, dibromochloromethane, and toluene were detected above laboratory MDLs. The VOC dibromochloromethane was qualified as an estimated value during data validation because the initial calibration intercept was below the MDL. Table III-4 summarizes detected VOCs in environmental groundwater samples, and Table III-5 lists the VOC MDLs.

SWMU 154, CTF-MW2. No VOCs were detected at concentrations above established MCLs in the CTF-MW2 environmental sample. The VOC toluene was detected at a concentration of 0.580 micrograms per liter (µg/L). Table III-4 summarizes VOCs detected in the environmental sample and Table III-6 lists the VOC MDLs.

3.3 Semivolatile Organic Compounds

SWMU 149, CTF-MW3. Analysis of SVOCs is not required for CTF-MW3.

SWMU 154, CTF-MW2. No SVOCs were detected at concentrations above established MCLs in the CTF-MW2 environmental sample. No SVOCs were reported above laboratory MDLs. The SVOC results for 3,3-dichlorobenzidine and

hexachlorocyclopentadiene were qualified as unusable because associated matrix spike and matrix spike duplicate samples were recovered outside acceptance criteria. Table III-6 lists the SVOC MDLs.

3.4 High Explosive Compounds

SWMU 149, CTF-MW3. Analysis of HE compounds is not required for CTF-MW3.

SWMU 154, CTF-MW2. No HE compounds were detected in the CTF-MW2 groundwater sample at concentrations above laboratory MDLs, except RDX [hexahydro-1,3,5-trinitro-1,3,5-triazine]. RDX was detected in the environmental sample collected from CTF-MW2 at a concentration of 0.199 µg/L. Table III-4 summarizes the HE compounds detected in the environmental groundwater sample, and Table III-7 lists the HE compound MDLs.

3.5 Nitrate Plus Nitrite

SWMU 149, CTF-MW3. Table III-8 summarizes NPN results. NPN values were compared with the nitrate MCL of 10 mg/L. No NPN was detected above the nitrate MCL. The result for NPN was reported at a concentration of 5.39 mg/L in the CTF-MW3 environmental sample.

SWMU 154, CTF-MW2. Table III-8 summarizes NPN results for CTF-MW2. NPN values were compared with the nitrate MCL of 10 mg/L. No NPN was detected above the nitrate MCL. NPN was reported at a concentration of 0.278 mg/L in the CTF-MW2 environmental sample.

3.6 Anions and Alkalinity

SWMU 149, CTF-MW3. Table III-9 summarizes alkalinity and major anion (as bromide, chloride, fluoride, and sulfate) results for CTF-MW3. No parameters were detected above established MCLs.

SWMU 154, CTF-MW2. Table III-9 summarizes alkalinity and major anion (as bromide, chloride, fluoride, and sulfate) results for CTF-MW2. No parameters were detected above established MCLs.

3.7 Perchlorate

SWMU 149, CTF-MW3. Perchlorate was not detected above the NMED-specified screening level/MDL of 4 µg/L (0.004 mg/L) in the sample from CTF-MW3. Table III-10 presents the perchlorate results.

SWMU 154, CTF-MW2. Perchlorate was not detected above the NMED-specified screening level/MDL of 4 µg/L (0.004 mg/L) in the sample from CTF-MW2. Table III-10 presents the perchlorate results.

Perchlorate results are discussed in more detail in Section II of this ER Quarterly Report.

3.8 Metals

Metal analyses were conducted for filtered and unfiltered groundwater samples. Groundwater samples obtained for total metal analyses are collected without filtering, and dissolved metal samples are collected by filtering the sample prior to analysis. TAL metals in both the unfiltered and filtered fractions were analyzed for all samples. The sample from CTF-MW2 also included analysis of uranium in both the unfiltered and filtered fractions.

SWMU 149, CTF-MW3. No metal parameters were detected above established MCLs in any groundwater sample. Metal results for both unfiltered and filtered samples from CTF-MW3 are summarized in Tables III-11 and III-12, respectively.

SWMU 154, CTF-MW2. No metals were detected above established MCLs in the CTF-MW2 groundwater sample, except for arsenic. Arsenic was detected above the MCL of 0.010 mg/L with total arsenic reported at a concentration of 0.0433 mg/L, and dissolved arsenic at 0.0276 mg/L. The elevated concentrations of arsenic in the groundwater sample are most likely attributable to background because monitoring well CTF-MW2 is screened in a fault-gouge zone in the Precambrian granite, as noted in Section III.1.0. Unfiltered and filtered metal results for CTF-MW2 are summarized in Tables III-13 and III-14, respectively. In addition, arsenic concentrations since March 2002 are plotted on Figure III-3.

3.9 Gamma Spectroscopy and Radioisotopic Analyses

SWMU 149, CTF-MW3. Gamma spectroscopy analysis is not required for CTF-MW3.

SWMU 154, CTF-MW2. The CTF-MW2 groundwater sample was screened for gamma-emitting radionuclides and gross alpha/beta activity (EPA 1980 and DOE 1990). An additional sample for isotopic uranium was collected to support evaluation of gross alpha activity results. The results for gamma spectroscopy, gross alpha/beta activity, and isotopic uranium are presented in Table III-15.

Gamma spectroscopy activities for short-list radionuclides are less than the associated MDAs, except for potassium-40. The result for potassium-40 activity was qualified as unusable during data validation because the peak could not be identified.

Radioisotopic analyses included gross alpha, gross beta, and isotopic uranium analyses. Gross alpha activity is measured as a screening tool and, according to Title 40, Code of Federal Regulations, Parts 9, 141, and 142, Table I-4, does not include uranium, which is measured independently. Therefore, gross alpha activity measurements were corrected by subtracting out the uranium activity.

The corrected gross alpha activity is below the MCL of 15 picocuries per liter (pCi/L). Gross beta results do not exceed established MCLs. Isotopic uranium-233/234 was reported at 56.9 ± 7.48 pCi/L, uranium-235/236 at 1.02 ± 0.376 pCi/L, and uranium-238 at 8.96 ± 1.47 pCi/L. In this region, naturally occurring uranium in groundwater is elevated due to contact with bedrock, which contains minerals high in uranium.

3.10 Sample Results Exceeding Maximum Contaminant Levels

Table III-16 lists the results for all constituents that have been detected at concentrations exceeding the EPA MCLs (EPA 2009) during all quarterly sampling events. The only constituent exceeding MCLs in samples collected during this quarter consists of arsenic, which was detected in the CTF-MW2 samples. Figure III-3 shows the concentrations of arsenic and groundwater elevations over time for CTF-MW2. The elevated concentrations of arsenic in the groundwater samples are most likely attributable to background because monitoring well CTF-MW2 is screened in a fault-gouge zone in the Precambrian granite.

4.0 Quality Control Samples

Field and laboratory QC samples are prepared to determine the accuracy of the methods used and to detect inadvertent sample contamination that may have occurred during the sampling and analysis process. The following sections discuss each sample type.

4.1 Field Quality Control Samples

Field QC samples included TB samples. According to the approved SAPs for SWMUs 149 and 154 (SNL/NM June 2010, Attachments 1 and 2), QC samples for environmental duplicate, field blank, and equipment blank samples were not required during this sampling event. The TB samples were submitted for analysis along with the groundwater samples in accordance with QC procedures specified in the SAPs.

TB samples are submitted whenever samples are collected for VOC analyses to assess whether contamination of the samples has occurred during shipment and storage. TB samples consist of laboratory reagent-grade water with hydrochloric acid preservative contained in 40-milliliter volatile organic analysis vials prepared by the analytical laboratory, which accompany the empty sample containers supplied by the laboratory. The TB samples were brought to the field and accompanied each sample shipment.

TB samples were submitted with the samples collected during the June 2012 sampling event. No VOCs were detected above associated laboratory MDLs in the TB samples.

4.2 Laboratory Quality Control Samples

Internal laboratory QC samples, including method blanks and duplicate laboratory control samples, were analyzed concurrently with all groundwater samples. All chemical data were reviewed and qualified in accordance with AOP 00-03, "Data Validation Procedure for Chemical and Radiochemical Data" (SNL/NM May 2011).

Although some analytical results were qualified during the data validation process, no significant data quality problems were noted for project constituents of concern. The data validation sample findings summary sheets are provided in Appendix C. The data are acceptable, and reported QC measures are adequate.

4.3 Variances and Nonconformances

No variances or nonconformances from the requirements in the Groundwater Monitoring SAPs for SWMUs 149 and 154 (SNL/NM June 2010, Attachments 1 and 2) or project-specific issues were identified during the June 2012 sampling activities at CTF-MW3 and CTF-MW2.

5.0 Summary

During the Second Quarter of CY 2012, samples were collected from monitoring well CTF-MW3, located near SWMU 149, and CTF-MW2, located near SWMU 154, representing the sixth of eight required quarterly groundwater sampling events. Sampling results were compared with EPA MCL guidelines for drinking water (EPA 2009).

Analytical parameters for CTF-MW3 samples include VOCs, NPN, major anions, alkalinity, TAL total metals, and perchlorate. No parameters were detected above established MCLs. All groundwater monitoring data for CTF-MW3 are comparable to previous results.

Analytical parameters for CTF-MW2 include VOCs, SVOCs, HE compounds, NPN, major anions, alkalinity, TAL total metals plus uranium, perchlorate, radionuclides by gamma spectroscopy, gross alpha/beta activity, and isotopic uranium. No parameters were detected above established MCLs, except for arsenic. Arsenic detections exceed the MCL of 0.010 mg/L in the CTF-MW2 groundwater sample at concentrations of 0.0433 mg/L in the unfiltered sample and 0.0276 mg/L in the filtered samples. The elevated concentrations of arsenic in the groundwater samples are most likely attributable to background because monitoring well CTF-MW2 is screened in a fault-gouge zone in the Precambrian granite. These values are comparable to previous results.

6.0 References

Clesceri, L.S., A.E. Greenburg, and A.D. Eaton, 1998. *Standard Methods for the Examination of Water and Wastewater,* 20th ed., Standard Method 2320B, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation, Washington, D.C.

DOE, see U.S. Department of Energy.

EPA, see U.S. Environmental Protection Agency.

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

New Mexico Environment Department (NMED), April 2010. "Class 3 Permit Modification Requests for Granting Corrective Action Complete Status for 26 SWMUs/AOCs (Request of March 1, 2006) and 5 Other SWMUs/AOCs (Request of January 7, 2008), Sandia National Laboratories, EPA ID#NM5890110518, HWB-SNL-06-007 and HWB-SNL-08-001," New Mexico Environment Department Hazardous Waste Bureau, Santa Fe, New Mexico, April 8, 2010.

New Mexico Environment Department (NMED), December 2010. "Approval with Modifications, Response to April 8, 2010 Letter, Groundwater Monitoring Plan for SWMUs 149 and 154," New Mexico Environment Department Hazardous Waste Bureau, Santa Fe, New Mexico.

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Sandia National Laboratories, New Mexico (SNL/NM), January 2012a. "Groundwater Monitoring Equipment Decontamination," Field Operating Procedure 05-03, Revision 04, Long-Term Environmental Stewardship, Environmental Management Department, Sandia National Laboratories, New Mexico.

Sandia National Laboratories, New Mexico (SNL/NM), January 2012b. "Groundwater Monitoring Well Sampling and Field Analytical Measurements," Field Operating Procedure 05-01, Revision 04, Long-Term Environmental Stewardship, Environmental Management Department, Sandia National Laboratories, New Mexico.

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

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U.S. Environmental Protection Agency (EPA), 1980, "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.

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U.S. Environmental Protection Agency (EPA), 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed., U.S. Environmental Protection Agency, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 1999, "Perchlorate in Drinking Water Using Ion Chromatography," EPA 815/R-00-014, U.S. Environmental Protection Agency, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 2009, "National Primary Drinking Water Standards," 40 CFR 141.11, Subpart B, EPA 816-F-09-0004, U.S. Environmental Protection Agency, Washington, D.C.

Figures

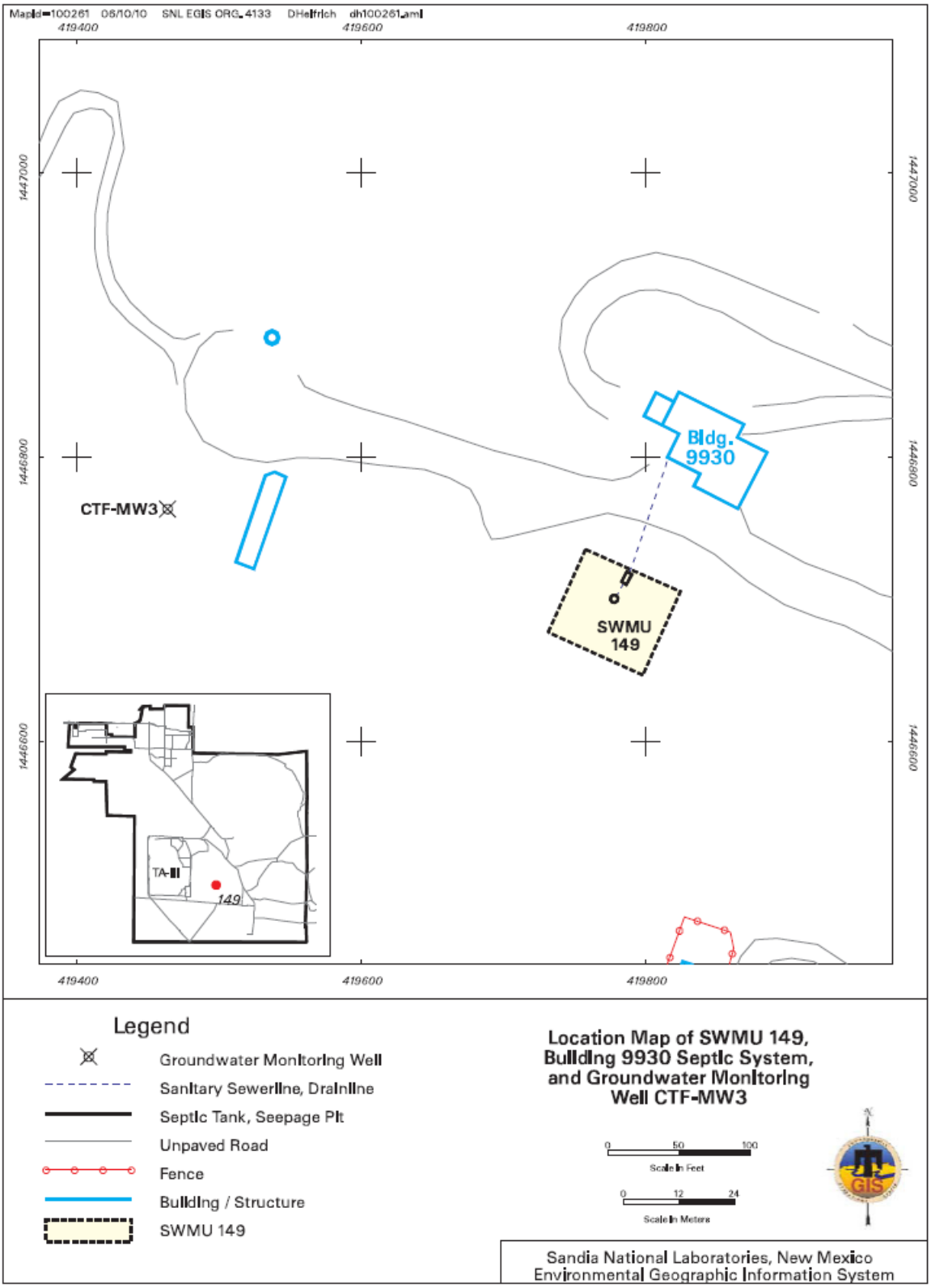

Figure III-1

Location of Monitoring Well CTF-MW3 near SWMU 149

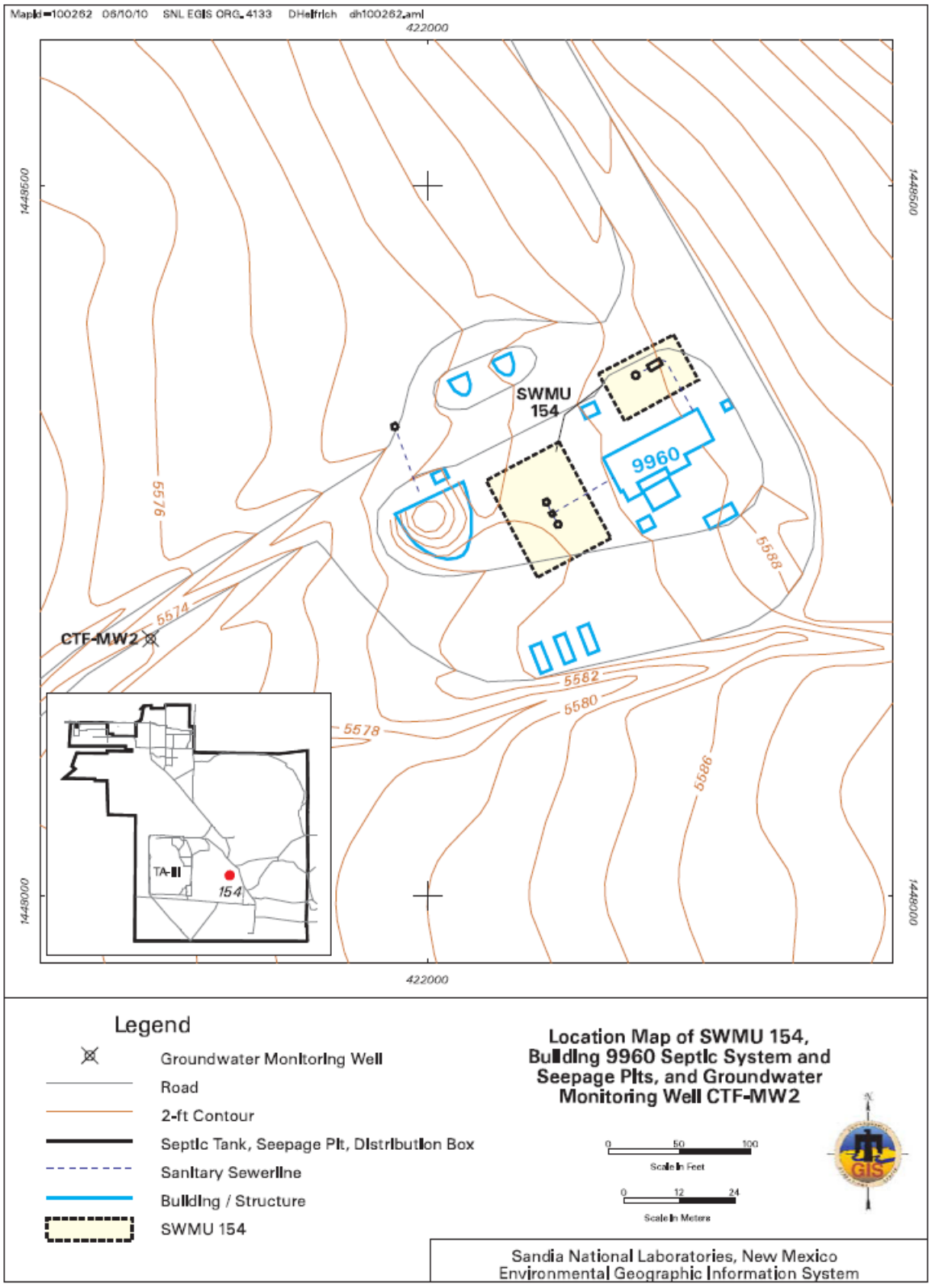

Figure III-2

Location of Monitoring Well CTF-MW2 near SWMU 154

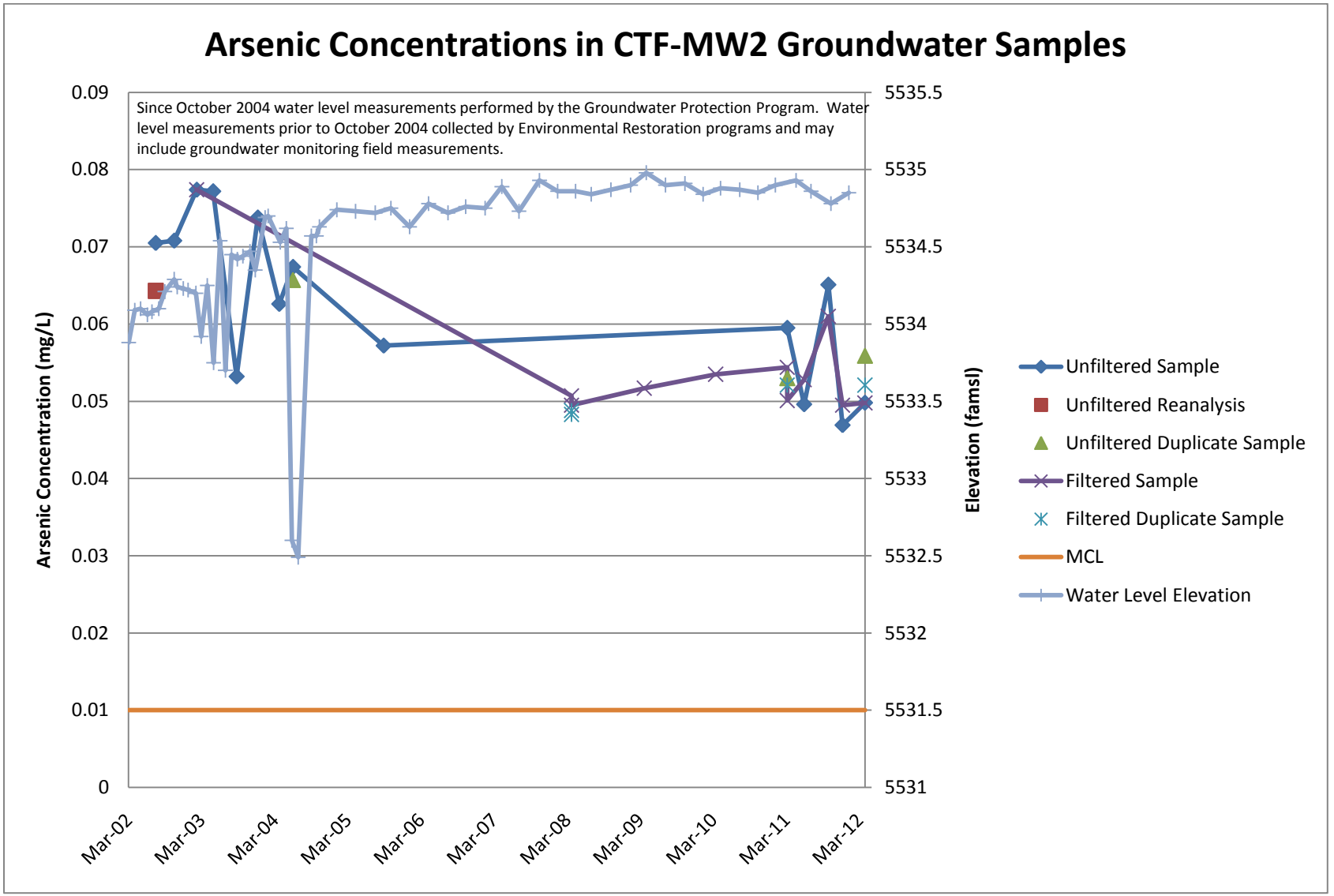

Figure III-3

Concentrations of Arsenic and Groundwater Elevations over Time in CTF-MW2 near SWMU 154

Tables

Table III-1

Laboratory Analytical Methods, Container Types, and Preservation Requirements for SWMUs 149 and 154 Groundwater Samples

Analysis	Analytical Method[a]	Volume and Container Type/ Preservation Requirements
Volatile Organic Compounds	EPA 8260B	3 x 40-mL glass, HCl, 4°C
Semivolatile Organic Compounds	EPA 8270C	3 x 1-L Amber Glass, 4°C
High Explosives	EPA 8321A	4 x 1-L Amber Glass, 4°C
Metals[b]	EPA 6010/6020/7470	1 x 500-mL polyethylene, HNO_3, 4°C
Perchlorate	EPA 314.0	1 x 250-mL polyethylene, 4°C
Major Anions and Cations[c]	EPA 6020/7470/9056	1 x 500-mL polyethylene, 4°C
Alkalinity as Total, Carbonate, and Bicarbonate	SM 2320B	1 x 500-mL polyethylene, 4°C
Nitrate plus Nitrite	EPA 353.2	1 x 250-mL polyethylene, H_2SO_4, 4°C
Gross Alpha/Beta	EPA 900.0	1 x 1-L polyethylene, HNO_3, 4°C
Gamma Spectroscopy[d]	EPA 901.0	1 x 1-L polyethylene, HNO_3, 4°C
Isotopic Uranium	ASTM D3972-09	1 x 1-L polyethylene, HNO_3, 4°C

Notes

[a]U.S. Environmental Protection Agency, 1986 (and updates), "*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*," SW-846, 3rd ed., U.S. Environmental Protection Agency, Washington, D.C.
U.S. Environmental Protection Agency, 1999, "*Perchlorate in Drinking Water Using Ion Chromatography*," EPA 815/R-00-014, U.S. Environmental Protection Agency, Washington, D.C.
Clesceri, L.S., A.E. Greenburg, and A.D. Eaton, 1998. *Standard Methods for the Examination of Water and Wastewater,* 20th ed., Standard Method 2320B, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation, Washington, D.C.
U.S. Environmental Protection Agency, 1980, "*Prescribed Procedures for Measurement of Radioactivity in Drinking Water,"* EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.
ASTM International, 2009. "Standard Test Method for Isotopic Uranium in Water by Radiochemistry," ASTM D3972-09, ASTM International, West Conshohocken, Pennsylvania.
[b]Metals = filtered and unfiltered samples, TAL metals including barium, calcium, magnesium, potassium, and sodium, plus uranium.
[c]Major anions include bromide, chloride, fluoride, and sulfate.
[d]Gamma spectroscopy = Americium-241, Cesium-137, Cobalt-60, and Potassium-40.
°C = Degrees Celsius.
EPA = U.S. Environmental Protection Agency.
H_2SO_4 = Sulfuric acid.
HCl = Hydrochloric acid.
HNO_3 = Nitric acid.
L = Liter
mL = Milliliter(s).
SM = Standard Method.
SWMU = Solid Waste Management Unit.
TAL = Target Analyte List.

Table III-2

Sample Details for Second Quarter, CY 2012 Groundwater Sampling

Solid Waste Management Units 149 and 154 Groundwater Monitoring Quarterly Assessment

April – June 2012

Well	Sample Identification	AR/COC Number	Associated Groundwater Investigation
CTF-MW3	092535	614254	SWMU 149
CTF-MW2	092538	614255	SWMU 154

Notes

AR/COC = Analysis Request/Chain of Custody.
CTF = Coyote Test Field.
CY = Calendar Year
MW = Monitoring well.
SWMU = Solid Waste Management Unit.

Table III-3

Summary of Field Water Quality Measurements[a]

Solid Waste Management Units 149 and 154 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmhos/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
SWMU 149								
CTF-MW3	16-Jun-12	20.09	1530	178.7	6.89	0.19	87.4	7.84
SWMU 154								
CTF-MW2	19-Jun-12	19.58	3310	34.1	6.03	0.83	1.3	0.12

Notes

[a]Field measurements collected prior to sampling.
°C = Degrees Celsius.
% Sat = Percent saturation.
µmhos/cm = Micromhos per centimeter.
CTF = Coyote Test Field.
ID = Identification.
mg/L = Milligrams per liter.
mV = Millivolts.
MW = Monitoring well.
NTU = Nephelometric turbidity units.
pH = Potential of hydrogen (negative logarithm of the hydrogen ion concentration).
SWMU = Solid Waste Management Unit.

Table III-4

Summary of Detected Volatile Organic, Semivolatile Organic, and High Explosive Compounds

Solid Waste Management Units 149 and 154 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Well ID	Analyte	Result (µg/L)	MDL (µg/L)	PQL (µg/L)	MCL (µg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample Number	Analytical Method[c]
SWMU 149									
CTF-MW3	Bromodichloromethane	0.500	0.300	1.00	NE	J		092535-001	SW846-8260B
16-Jun-12	Chloroform	0.710	0.300	1.00	NE	J		092535-001	SW846-8260B
	Dibromochloromethane	1.12	0.300	1.00	NE		J+	092535-001	SW846-8260B
	Toluene	0.510	0.300	1.00	1000	J		092535-001	SW846-8260B
SWMU 154									
CTF-MW2	Toluene	0.580	0.300	1.00	1000	J		092538-001	SW846-8260B
19-Jun-12	RDX	0.199	0.821	0.256	NE	J		092538-024	SW846-8321A

Notes

µg/L = Micrograms per liter.
CFR = Code of Federal Regulations.
CTF = Coyote Test Field.
EPA = U.S. Environmental Protection Agency.
ID = Identification.
MCL = Maximum contaminant level. Established by the EPA Primary Water Regulations (40 CFR 141.11, Subpart B), National Primary Drinking Water Standards (EPA, 2009).
MDL = Method detection limit. The minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.
MW = Monitoring well.
NE = Not established.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.
RDX = Hexahydro-trinitro-triazine.
SWMU = Solid Waste Management Unit.

[a]Laboratory Qualifier
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.

[b]Validation Qualifier
If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.
J+ = The associated numerical value is an estimated quantitation with a suspected positive bias.

[c]Analytical Method
U.S. Environmental Protection Agency, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.
U.S. Environmental Protection Agency, 1984, "Methods for Chemical Analysis of Water and Wastes," EPA 600-4-79-020.

Table III-5

Method Detection Limits for Volatile Organic Compounds (EPA Method 8260)

Solid Waste Management Unit 149 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Analyte	MDL (µg/L)
1,1,1-Trichloroethane	0.300
1,1,2,2-Tetrachloroethane	0.300
1,1,2-Trichloroethane	0.300
1,1-Dichloroethane	0.300
1,1-Dichloroethene	0.300
1,2-Dichloroethane	0.300
1,2-Dichloropropane	0.300
2-Butanone	2.00
2-Hexanone	2.20
4-methyl-, 2-Pentanone	1.50
Acetone	3.00
Benzene	0.300
Bromodichloromethane	0.300
Bromoform	0.300
Bromomethane	0.300
Carbon disulfide	1.50
Carbon tetrachloride	0.300
Chlorobenzene	0.300
Chloroethane	0.300
Chloroform	0.300
Chloromethane	0.300
Dibromochloromethane	0.300
Ethyl benzene	0.300
Methylene chloride	3.00
Styrene	0.300
Tetrachloroethene	0.300
Toluene	0.300
Trichloroethene	0.300
Vinyl acetate	1.50
Vinyl chloride	0.300
Xylene	0.300
cis-1,2-Dichloroethene	0.300
cis-1,3-Dichloropropene	0.300
trans-1,2-Dichloroethene	0.300
trans-1,3-Dichloropropene	0.300

Notes

µg/L = Micrograms per liter.
EPA = U.S. Environmental Protection Agency.
MDL = Method detection limit. The minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.

Table III-6
Method Detection Limits for Volatile and Semivolatile Organic Compounds
Solid Waste Management Unit 154 Groundwater Monitoring
Quarterly Assessment, April – June 2012

Analyte	MDL[b] (µg/L)	Analytical Method[g]	Analyte	MDL[b] (µg/L)	Analytical Method[g]	Analyte	MDL[b] (µg/L)	Analytical Method[g]
1,1,1-Trichloroethane	0.300	8260B	1,2,4-Trichlorobenzene	2.94	8270C	Di-n-butyl phthalate	2.94	8270C
1,1,2,2-Tetrachloroethane	0.300	8260B	1,2-Dichlorobenzene	2.94	8270C	Di-n-octyl phthalate	2.94	8270C
1,1,2-Trichloroethane	0.300	8260B	1,3-Dichlorobenzene	2.94	8270C	Dibenz[a,h]anthracene	0.294	8270C
1,1-Dichloroethane	0.300	8260B	1,4-Dichlorobenzene	2.94	8270C	Dibenzofuran	2.94	8270C
1,1-Dichloroethene	0.300	8260B	2,4,5-Trichlorophenol	2.94	8270C	Diethylphthalate	2.94	8270C
1,2-Dichloroethane	0.300	8260B	2,4,6-Trichlorophenol	2.94	8270C	Dimethylphthalate	2.94	8270C
1,2-Dichloropropane	0.300	8260B	2,4-Dichlorophenol	2.94	8270C	4,6-Dinitro-o-cresol	2.94	8270C
2-Butanone	2.00	8260B	2,4-Dimethylphenol	2.94	8270C	Diphenyl amine	2.94	8270C
2-Hexanone	2.20	8260B	2,4-Dinitrophenol	4.90	8270C	Fluoranthene	0.294	8270C
4-methyl-, 2-Pentanone	1.50	8260B	2,4-Dinitrotoluene	2.94	8270C	Fluorene	0.294	8270C
Acetone	3.00	8260B	2,6-Dinitrotoluene	2.94	8270C	Hexachlorobenzene	2.94	8270C
Benzene	0.300	8260B	2-Chloronaphthalene	0.294	8270C	Hexachlorobutadiene	2.94	8270C
Bromodichloromethane	0.300	8260B	2-Chlorophenol	2.94	8270C	Hexachlorocyclopentadiene	2.94	8270C
Bromoform	0.300	8260B	2-Methylnaphthalene	0.294	8270C	Hexachloroethane	2.94	8270C
Bromomethane	0.300	8260B	2-Nitroaniline	2.94	8270C	Indeno(1,2,3-c,d)pyrene	0.294	8270C
Carbon disulfide	1.50	8260B	2-Nitrophenol	2.94	8270C	Isophorone	2.94	8270C
Carbon tetrachloride	0.300	8260B	3,3'-Dichlorobenzidine	2.94	8270C	Naphthalene	0.294	8270C
Chlorobenzene	0.300	8260B	3-Nitroaniline	2.94	8270C	Nitro-benzene	2.94	8270C
Chloroethane	0.300	8260B	4-Bromophenyl phenyl ether	2.94	8270C	Pentachlorophenol	2.94	8270C
Chloroform	0.300	8260B	4-Chloro-3-methylphenol	2.94	8270C	Phenanthrene	0.294	8270C
Chloromethane	0.300	8260B	4-Chlorobenzenamine	3.24	8270C	Phenol	2.94	8270C
Dibromochloromethane	0.300	8260B	4-Chlorophenyl phenyl ether	2.94	8270C	Pyrene	0.294	8270C
Ethyl benzene	0.300	8260B	4-Nitroaniline	2.94	8270C	bis(2-Chloroethoxy)methane	2.94	8270C
Methylene chloride	3.00	8260B	4-Nitrophenol	2.94	8270C	bis(2-Chloroethyl)ether	2.94	8270C
Styrene	0.300	8260B	Acenaphthene	0.294	8270C	bis(2-Chloroisopropyl)ether	2.94	8270C
Tetrachloroethene	0.300	8260B	Acenaphthylene	0.294	8270C	bis(2-Ethylhexyl)phthalate	2.94	8270C
Toluene	0.300	8260B	Anthracene	0.294	8270C	m,p-Cresol	2.94	8270C
Trichloroethene	0.300	8260B	Benzo(a)anthracene	0.294	8270C	n-Nitrosodipropylamine	2.94	8270C
Vinyl acetate	1.50	8260B	Benzo(a)pyrene	0.431	8270C	o-Cresol	2.94	8270C
Vinyl chloride	0.300	8260B	Benzo(b)fluoranthene	0.294	8270C			
Xylene	0.300	8260B	Benzo(ghi)perylene	0.294	8270C			
cis-1,2-Dichloroethene	0.300	8260B	Benzo(k)fluoranthene	0.294	8270C			
cis-1,3-Dichloropropene	0.300	8260B	Butylbenzyl phthalate	2.94	8270C			
trans-1,2-Dichloroethene	0.300	8260B	Carbazole	0.294	8270C			
trans-1,3-Dichloropropene	0.300	8260B	Chrysene	0.294	8270C			

Table III-6 (Concluded)
Method Detection Limits for Volatile and Semivolatile Organic Compounds
Solid Waste Management Unit 154 Groundwater Monitoring
Quarterly Assessment, April – June 2012

Notes

[a]U.S. Environmental Protection Agency, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.
U.S. Environmental Protection Agency, 1984, "Methods for Chemical Analysis of Water and Wastes," EPA 600-4-79-020.
µg/L = Micrograms per liter.
MDL = Method detection limit. The minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.

Table III-7

Method Detection Limits for High Explosive Compounds (EPA Method 8321A)

Solid Waste Management Unit 154 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Analyte	MDL (µg/L)
1,3,5-Trinitrobenzene	0.0821
1,3-Dinitrobenzene	0.0821
2,4,6-Trinitrotoluene	0.0821
2,4-Dinitrotoluene	0.0821
2,6-Dinitrotoluene	0.0821
2-Amino-4,6-dinitrotoluene	0.0821
2-Nitrotoluene	0.0841
3-Nitrotoluene	0.0821
4-Amino-2,6-dinitrotoluene	0.0821
4-Nitrotoluene	0.154
HMX	0.0821
Nitro-benzene	0.0821
Pentaerythritol tetranitrate	0.103
RDX	0.0821
Tetryl	0.0821

Notes

µg/L = Micrograms per liter.
EPA = U.S. Environmental Protection Agency.
HMX = Tetrahexamine tetranitramine.
MDL = Method detection limit. The minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.
RDX = Hexahydro-trinitro-triazine.
Tetryl = 2,4,6-trinitrophenylmethylnitramine.

Table III-8

Summary of Nitrate Plus Nitrite Results

Solid Waste Management Units 149 and 154 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample Number	Analytical Method[c]
SWMU 149									
CTF-MW3 16-Jun-12	Nitrate plus nitrite as N	5.39	0.170	0.500	10.0			092535-018	EPA 353.2
SWMU 154									
CTF-MW2 19-Jun-12	Nitrate plus nitrite as N	0.278	0.085	0.250	10.0			092538-018	EPA 353.2

Notes

CFR = Code of Federal Regulations.
CTF = Coyote Test Field.
EPA = U.S. Environmental Protection Agency.
ID = Identification.
MCL = Maximum contaminant level. Established by the EPA Primary Water Regulations (40 CFR 141.11, Subpart B), National Primary Drinking Water Standards (EPA, 2009).
MDL = Method detection limit. The minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.
mg/L = Milligrams per liter.
MW = Monitoring well.
N = Nitrogen.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.
SWMU = Solid Waste Management Unit.

[a]Laboratory Qualifier

[b]Validation Qualifier
If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

[c]Analytical Method
U.S. Environmental Protection Agency, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.
U.S. Environmental Protection Agency, 1984, "Methods for Chemical Analysis of Water and Wastes," EPA 600-4-79-020.

Table III-9
Summary of Anion and Alkalinity Results
Solid Waste Management Units 149 and 154 Groundwater Monitoring
Quarterly Assessment, April – June 2012

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample Number	Analytical Method[c]
SWMU 149									
CTF-MW3	Bicarbonate Alkalinity	329	0.725	1.00	NE			092535-022	SM2320B
16-Jun-12	Carbonate Alkalinity	ND	0.725	1.00	NE		U	092535-022	SM2320B
	Bromide	1.16	0.067	0.200	NE			092535-016	SW846 9056
	Chloride	115	1.34	4.00	NE			092535-016	SW846 9056
	Fluoride	2.28	0.033	0.100	4.0			092535-016	SW846 9056
	Sulfate	486	2.66	8.00	NE			092535-016	SW846 9056
SWMU 154									
CTF-MW2	Total Alkalinity	1600	0.725	1.00	NE			092538-022	SM2320B
19-Jun-12	Bromide	ND	0.067	0.200	NE	U		092538-016	SW846 9056
	Chloride	432	3.35	10.0	NE			092538-016	SW846 9056
	Fluoride	2.23	0.033	0.100	4.0			092538-016	SW846 9056
	Sulfate	148	6.65	20.0	NE			092538-016	SW846 9056

Notes

CFR = Code of Federal Regulations.
CTF = Coyote Test Field.
EPA = U.S. Environmental Protection Agency.
ID = Identification.
MCL = Maximum contaminant level. Established by the EPA Primary Water Regulations (40 CFR 141.11, Subpart B), National Primary Drinking Water Standards (EPA, 2009).
MDL = Method detection limit. The minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.
mg/L = Milligrams per liter.
MW = Monitoring well.
ND = Not detected (at MDL).
NE = Not established.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.
SM = Standard Method.
SWMU = Solid Waste Management Unit.

[a]Laboratory Qualifier
U = Analyte is absent or below the method detection limit.

[b]Validation Qualifier
If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.
U = The analyte was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.

Table III-9 (Concluded)

Summary of Anion and Alkalinity Results

Solid Waste Management Units 149 and 154 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Notes (continued)

[c]Analytical Method
U.S. Environmental Protection Agency, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.
U.S. Environmental Protection Agency, 1984, "Methods for Chemical Analysis of Water and Wastes," EPA 600-4-79-020, U.S. Environmental Protection Agency, Washington, D.C. or Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B.

Table III-10

Summary of Perchlorate Results

Solid Waste Management Units 149 and 154 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Well ID	Perchlorate Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample Number	Analytical Method[c]
SWMU 149								
CTF-MW3 16-Jun-12	ND	0.004	0.012	NE	U		092535-020	EPA 314.0
SWMU 154								
CTF-MW2 19-Jun-12	ND	0.004	0.012	NE	U		092538-020	EPA 314.0

Notes

CFR = Code of Federal Regulations.
CTF = Coyote Test Field.
EPA = U.S. Environmental Protection Agency.
ID = Identification.
MCL = Maximum contaminant level. Established by the EPA Primary Water Regulations (40 CFR 141.11, Subpart B), National Primary Drinking Water Standards (EPA, 2009).
MDL = Method detection limit. The minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.
mg/L = Milligrams per liter.
MW = Monitoring well.
ND = Not detected (at MDL).
NE = Not established.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.
SWMU = Solid Waste Management Unit.

[a]Laboratory Qualifier
U = Analyte is absent or below the method detection limit.

[b]Validation Qualifier
If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

[c]Analytical Method
U.S. Environmental Protection Agency, 1999 (and updates), *"Perchlorate in Drinking Water Using Ion Chromatography,"* EPA 815/R-00-014.

Table III-11
Summary of Unfiltered Total Metal Results
Solid Waste Management Unit 149 Groundwater Monitoring
Quarterly Assessment, April – June 2012

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample Number	Analytical Method[c]
CTF-MW3	Aluminum	ND	0.015	0.050	NE	U		092535-009	SW846 6020
16-Jun-12	Antimony	ND	0.001	0.003	0.006	U		092535-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		092535-009	SW846 6020
	Barium	0.029	0.0006	0.002	2.00			092535-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		092535-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		092535-009	SW846 6020
	Calcium	184	0.600	2.00	NE			092535-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		092535-009	SW846 6020
	Cobalt	0.000346	0.0001	0.001	NE	J		092535-009	SW846 6020
	Copper	0.00186	0.00035	0.001	NE			092535-009	SW846 6020
	Iron	0.392	0.033	0.100	NE			092535-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		092535-009	SW846 6020
	Magnesium	45.0	0.010	0.030	NE			092535-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		092535-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		092535-009	SW846 7470
	Nickel	0.00391	0.0005	0.002	NE			092535-009	SW846 6020
	Potassium	11.3	0.080	0.300	NE			092535-009	SW846 6020
	Selenium	0.0243	0.0015	0.005	0.050			092535-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		092535-009	SW846 6020
	Sodium	161	0.800	2.50	NE			092535-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		092535-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		092535-009	SW846 6010
	Zinc	0.00525	0.0035	0.010	NE	J		092535-009	SW846 6020

Table III-11 (Concluded)
Summary of Unfiltered Total Metal Results
Solid Waste Management Unit 149 Groundwater Monitoring
Quarterly Assessment, April – June 2012

Notes

CFR = Code of Federal Regulations.
CTF = Coyote Test Field.
EPA = U.S. Environmental Protection Agency.
ID = Identification.
MCL = Maximum contaminant level. Established by the EPA Primary Water Regulations (40 CFR 141.11, Subpart B), National Primary Drinking Water Standards (EPA, 2009).
MDL = Method detection limit. The minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.
mg/L = Milligrams per liter.
MW = Monitoring well.
ND = Not detected (at MDL).
NE = Not established.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

[a]**Laboratory Qualifier**
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
U = Analyte is absent or below the method detection limit.

[b]**Validation Qualifier**
If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

[c]**Analytical Method**
U.S. Environmental Protection Agency, 1986 (and updates), *"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,"* SW-846, 3rd ed.
U.S. Environmental Protection Agency, 1984, *"Methods for Chemical Analysis of Water and Wastes,"* EPA 600-4-79-020.

Table III-12

Summary of Filtered Total Metal Results

Solid Waste Management Unit 149 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample Number	Analytical Method[c]
CTF-MW3	Aluminum	ND	0.015	0.050	NE	U		092535-010	SW846 6020
16-Jun-12	Antimony	ND	0.001	0.003	0.006	U		092535-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		092535-010	SW846 6020
	Barium	0.0294	0.0006	0.002	2.00			092535-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		092535-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		092535-010	SW846 6020
	Calcium	193	0.600	2.00	NE			092535-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		092535-010	SW846 6020
	Cobalt	0.000404	0.0001	0.001	NE	J		092535-010	SW846 6020
	Copper	0.00203	0.00035	0.001	NE			092535-010	SW846 6020
	Iron	0.396	0.033	0.100	NE			092535-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		092535-010	SW846 6020
	Magnesium	47.1	0.010	0.030	NE			092535-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		092535-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		092535-010	SW846 7470
	Nickel	0.00377	0.0005	0.002	NE			092535-010	SW846 6020
	Potassium	11.2	0.080	0.300	NE			092535-010	SW846 6020
	Selenium	0.0245	0.0015	0.005	0.050			092535-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		092535-010	SW846 6020
	Sodium	172	0.800	2.50	NE			092535-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		092535-010	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		092535-010	SW846 6010
	Zinc	0.00522	0.0035	0.010	NE	J		092535-010	SW846 6020

Table III-12 (Concluded)

Summary of Filtered Total Metal Results

Solid Waste Management Unit 149 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Notes

CFR = Code of Federal Regulations.
CTF = Coyote Test Field.
EPA = U.S. Environmental Protection Agency.
ID = Identification.
MCL = Maximum contaminant level. Established by the EPA Primary Water Regulations (40 CFR 141.11, Subpart B), National Primary Drinking Water Standards (EPA, 2009).
MDL = Method detection limit. The minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.
mg/L = Milligrams per liter.
MW = Monitoring well.
ND = Not detected (at MDL).
NE = Not established.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

[a]**Laboratory Qualifier**
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
U = Analyte is absent or below the method detection limit.

[b]**Validation Qualifier**
If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

[c]**Analytical Method**
U.S. Environmental Protection Agency, 1986 (and updates), *"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,"* SW-846, 3rd ed.
U.S. Environmental Protection Agency, 1984, *"Methods for Chemical Analysis of Water and Wastes,"* EPA 600-4-79-020.

Table III-13
Summary of Unfiltered Total Metal Results
Solid Waste Management Unit 154 Groundwater Monitoring
Quarterly Assessment, April – June 2012

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample Number	Analytical Method[c]
CTF-MW2	Aluminum	0.122	0.015	0.050	NE			092538-009	SW846 6020
19-Jun-12	Antimony	ND	0.001	0.003	0.006	U		092538-009	SW846 6020
	Arsenic	**0.0433**	0.0017	0.005	0.010			092538-009	SW846 6020
	Barium	0.0756	0.0006	0.002	2.00			092538-009	SW846 6020
	Beryllium	0.00266	0.0002	0.0005	0.004			092538-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		092538-009	SW846 6020
	Calcium	383	1.20	4.00	NE			092538-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		092538-009	SW846 6020
	Cobalt	0.00883	0.0001	0.001	NE			092538-009	SW846 6020
	Copper	0.00156	0.00035	0.001	NE			092538-009	SW846 6020
	Iron	2.17	0.033	0.100	NE			092538-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		092538-009	SW846 6020
	Magnesium	83.6	0.200	0.600	NE			092538-009	SW846 6020
	Manganese	2.93	0.020	0.100	NE			092538-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		092538-009	SW846 7470
	Nickel	0.0162	0.0005	0.002	NE		J-	092538-009	SW846 6020
	Potassium	40.2	0.080	0.300	NE			092538-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		092538-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		092538-009	SW846 6020
	Sodium	492	1.60	5.00	NE			092538-009	SW846 6020
	Thallium	0.00126	0.00045	0.002	0.002	J		092538-009	SW846 6020
	Uranium	0.0278	0.000067	0.0002	0.03			092538-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		092538-009	SW846 6010
	Zinc	0.208	0.0035	0.010	NE			092538-009	SW846 6020

Table III-13 (Concluded)

Summary of Unfiltered Total Metal Results

Solid Waste Management Unit 154 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Notes

Bold = Indicates that a result exceeds the MCL.
CFR = Code of Federal Regulations.
CTF = Coyote Test Field.
EPA = U.S. Environmental Protection Agency.
ID = Identification.
MCL = Maximum contaminant level. Established by the EPA Primary Water Regulations (40 CFR 141.11, Subpart B), National Primary Drinking Water Standards (EPA, 2009).
MDL = Method detection limit. The minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.
mg/L = Milligrams per liter.
MW = Monitoring well.
ND = Not detected (at MDL).
NE = Not established.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

[a]Laboratory Qualifier
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
U = Analyte is absent or below the method detection limit.

[b]Validation Qualifier
If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.
J- = The associated numerical value is an estimated quantity with a suspected negative bias.

[c]Analytical Method
U.S. Environmental Protection Agency, 1986 (and updates), *"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,"* SW-846, 3rd ed.
U.S. Environmental Protection Agency, 1984, *"Methods for Chemical Analysis of Water and Wastes,"* EPA 600-4-79-020.

Table III-14

Summary of Filtered Total Metal Results

Solid Waste Management Unit 154 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample Number	Analytical Method[c]
CTF-MW2	Aluminum	0.0663	0.015	0.050	NE			092538-010	SW846 6020
19-Jun-12	Antimony	ND	0.001	0.003	0.006	U		092538-010	SW846 6020
	Arsenic	**0.0276**	0.0017	0.005	0.010			092538-010	SW846 6020
	Barium	0.0769	0.0006	0.002	2.00			092538-010	SW846 6020
	Beryllium	0.00147	0.0002	0.0005	0.004			092538-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		092538-010	SW846 6020
	Calcium	389	1.20	4.00	NE			092538-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		092538-010	SW846 6020
	Cobalt	0.00791	0.0001	0.001	NE			092538-010	SW846 6020
	Copper	0.0794	0.00035	0.001	NE			092538-010	SW846 6020
	Iron	1.84	0.033	0.100	NE			092538-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		092538-010	SW846 6020
	Magnesium	84.7	0.200	0.600	NE			092538-010	SW846 6020
	Manganese	2.85	0.020	0.100	NE			092538-010	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U		092538-010	SW846 7470
	Nickel	0.0166	0.0005	0.002	NE		J-	092538-010	SW846 6020
	Potassium	39.9	0.080	0.300	NE			092538-010	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		092538-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		092538-010	SW846 6020
	Sodium	500	1.60	5.00	NE			092538-010	SW846 6020
	Thallium	0.00123	0.00045	0.002	0.002	J		092538-010	SW846 6020
	Uranium	0.00692	0.000067	0.0002	0.03			092538-010	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		092538-010	SW846 6010
	Zinc	1.71	0.0035	0.010	NE			092538-010	SW846 6020

Table III-14 (Concluded)

Summary of Filtered Total Metal Results

Solid Waste Management Unit 154 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Notes

Bold = Indicates that a result exceeds the MCL.
CFR = Code of Federal Regulations.
CTF = Coyote Test Field.
EPA = U.S. Environmental Protection Agency.
ID = Identification.
MCL = Maximum contaminant level. Established by the EPA Primary Water Regulations (40 CFR 141.11, Subpart B), National Primary Drinking Water Standards (EPA, 2009).
MDL = Method detection limit. The minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.
mg/L = Milligrams per liter.
MW = Monitoring well.
ND = Not detected (at MDL).
ND = Not detected (at MDL).
NE = Not established.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

[a]Laboratory Qualifier
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
U = Analyte is absent or below the method detection limit.

[b]Validation Qualifier
If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.
J- = The associated numerical value is an estimated quantity with a suspected negative bias.

[c]Analytical Method
U.S. Environmental Protection Agency, 1986 (and updates), *"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,"* SW-846, 3rd ed.
U.S. Environmental Protection Agency, 1984, *"Methods for Chemical Analysis of Water and Wastes,"* EPA 600-4-79-020.

Table III-15

Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results

Solid Waste Management Unit 154 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Well ID	Analyte	Activity[a] (pCi/L)	MDA (pCi/L)	Critical Level[b] (pCi/L)	MCL (pCi/L)	Laboratory Qualifier[c]	Validation Qualifier[d]	Sample Number	Analytical Method[e]
CTF-MW2	Americium-241	-39.2 ± 21.8	19.1	9.30	NE	U	BD	092538-033	EPA 901.1
19-Jun-12	Cesium-137	-0.819 ± 1.94	3.31	1.58	NE	U	BD	092538-033	EPA 901.1
	Cobalt-60	-1.07 ± 2.08	3.51	1.64	NE	U	BD	092538-033	EPA 901.1
	Potassium-40	36.7 ± 56.5	33.1	15.3	NE	X	R	092538-033	EPA 901.1
	Gross Alpha	12.72	NA	NA	15	NA	None	092538-034	EPA 900.0
	Gross Beta	74.0 ± 15.7	13.0	6.30	4mrem/yr			092538-034	EPA 900.0
	Uranium-233/234	56.9 ± 7.48	0.710	0.320	NE			092538-035	HASL-300
	Uranium-235/236	1.02 ± 0.376	0.396	0.155	NE		J	092538-035	HASL-300
	Uranium-238	8.96 ± 1.47	0.368	0.149	NE			092538-035	HASL-300

Notes

CFR = Code of Federal Regulations
CTF = Coyote Test Field.
EPA = U.S. Environmental Protection Agency.
HASL = Health and Safety Laboratory.
ID = Identification.
MCL = Maximum contaminant level. The following are the MCLs for gross alpha particles and beta particles in community water systems:
15 pCi/L = Gross alpha particle activity, excluding total uranium (40 CFR Parts 9, 141, and 142, Table I-4)
4 mrem/yr = any combination of beta and/or gamma emitting radionuclides (as dose rate).
MDA = The minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level.
mrem/yr = Millirem per year.
MW = Monitoring well.
NA = Not applicable for gross alpha activities. The MDA or critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.
NE = Not established.
pCi/L = Picocuries per liter.

[a]Activities of zero or less are considered to be not detected. Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table I-4).

[b]The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions. The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.

Table III-15 (Concluded)

Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results

Solid Waste Management Unit 154 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Notes (continued)

[c]Laboratory Qualifier
NA = Not applicable.
U = Analyte is absent or below the method detection limit.
X = Data rejected due to peak not meeting identification criteria.

[d]Validation Qualifier
If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.
BD = Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J = The associated value is an estimated quantity.
None = No data validation for corrected gross alpha activity.
R = The data are unusable. Resampling and reanalysis are necessary for verification.

[e]Analytical Method
U.S. Environmental Protection Agency, 1980, "*Prescribed Procedures for Measurement of Radioactivity in Drinking Water,"* EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio
U.S. Department of Energy, 1990, *"EML Procedures Manual,"* 27th ed., Vol. 1, Rev. 1992, Environmental Measurements Laboratory HASL-300.

Table III-16

Summary of Constituents Detected above Established MCLs

Solid Waste Management Units 149 and 154 Groundwater Monitoring

Quarterly Assessments through June 2012

Well ID	Date	Analyte	Result	MCL	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample Number	Analytical Method[c]
SWMU 154								
CTF-MW2	08-Mar-11	Arsenic—Filtered	0.0544 mg/L	0.010 mg/L			090237-010	EPA 6020
CTF-MW2 (Duplicate)	08-Mar-11	Arsenic—Filtered	0.0521 mg/L	0.010 mg/L			090238-010	EPA 6020
CTF-MW2	31-May-11	Arsenic—Filtered	0.0528 mg/L	0.010 mg/L			090670-010	EPA 6020
CTF-MW2	29-Sep-11	Arsenic—Filtered	0.0610 mg/L	0.010 mg/L			090670-010	EPA 6020
CTF-MW2	09-Dec-11	Arsenic—Filtered	0.0495 mg/L	0.010 mg/L			091525-010	EPA 6020
CTF-MW2	30-Mar-12	Arsenic—Filtered	0.0498 mg/L	0.010 mg/L			091949-010	EPA 6020
CTF-MW2 (Duplicate)	30-Mar-12	Arsenic—Filtered	0.0521 mg/L	0.010 mg/L			091950-010	EPA 6020
CTF-MW2	19-June-12	Arsenic – Filtered	0.0276 mg/L	0.010 mg/L			092538-010	EPA 6020
CTF-MW2	08-Mar-11	Arsenic—Unfiltered	0.0595 mg/L	0.010 mg/L			090237-009	EPA 6020
CTF-MW2	31-May-11	Arsenic—Unfiltered	0.0496 mg/L	0.010 mg/L			090670-009	EPA 6020
CTF-MW2	29-Sep-11	Arsenic—Unfiltered	0.0651 mg/L	0.010 mg/L			091259-009	EPA 6020
CTF-MW2	09-Dec-11	Arsenic—Unfiltered	0.0469 mg/L	0.010 mg/L			091525-009	EPA 6020
CTF-MW2	30-Mar-12	Arsenic—Unfiltered	0.0498 mg/L	0.010 mg/L			091949-009	EPA 6020
CTF-MW2 (Duplicate)	30-Mar-12	Arsenic—Unfiltered	0.0559 mg/L	0.010 mg/L			091950-009	EPA 6020
CTF-MW2	19-June-12	Arsenic—Unfiltered	0.0433 mg/L	0.010 mg/L			092538-009	EPA 6020
CTF-MW2	31-May-11	Gross Alpha	23.38 pCi/L	15 pCi/L			090670-010	EPA 900.0
CTF-MW2	08-Mar-11	Thallium—Unfiltered	0.00249 mg/L	0.002 mg/L	J		090237-009	EPA 6020

Notes

CFR = Code of Federal Regulations.
CTF = Coyote Test Field.
EPA = U.S. Environmental Protection Agency.
ID = Identification.
MCL = Maximum contaminant level. Established by the EPA Primary Water Regulations (40 CFR 141.11, Subpart B), National Primary Drinking Water Standards (EPA, 2009).
MDL = Method detection limit. The minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.
mg/L = Milligrams per liter.
MW = Monitoring well.
pCi/L = Picocuries per liter.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.
SWMU = Solid Waste Management Unit.

[a]Laboratory Qualifier
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.

Table III-16 (Concluded)

Summary of Constituents Detected above Established MCLs

Solid Waste Management Units 149 and 154 Groundwater Monitoring

Quarterly Assessments through June 2012

Notes (continued)

[b]Validation Qualifier
If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

[c]Analytical Method
U.S. Environmental Protection Agency, 1986 (and updates), *"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,"* SW-846, 3rd ed.
U.S. Environmental Protection Agency, 1984, *"Methods for Chemical Analysis of Water and Wastes,"* EPA 600-4-79-020.
U.S. Environmental Protection Agency, 1980, "*Prescribed Procedures for Measurement of Radioactivity in Drinking Water,"* EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.

Appendix A
Field Measurement Logs for Monitoring Wells CTF-MW3 and CTF-MW2

FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: SWMU 149 GWM	Project No.: 146422.10.11.01 / 98026.01.14
Well I.D.: CTF-MW3	Date: 6/16/12
Well Condition:	Weather Condition:
Method: Portable pump X	Dedicated pump _____ Pump depth: 359'

PURGE MEASUREMENTS

Depth to Water (ft)	Time 24 hr	Vol. (L/gal)	Temp (°C)	SC (µS/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (%)	Comments DO mg/L
307.33	0804	/	START						
314.26	0822	5	20.43	1515	184.7	6.88	0.34	90.7	8.13
317.82	0832	10	20.00	1515	183.9	6.89	0.29	89.5	8.13
320.69	0843	15	19.61	1515	182.8	6.89	0.32	89.5	8.16
322.93	0853	20	19.65	1519	181.6	6.89	0.31	88.5	8.05
324.31	0900	23	19.63	1520	181.2	6.90	0.26	88.1	8.02
325.09	0904	25	19.68	1520	181.1	6.89	0.30	87.6	7.98
325.66	0909	27	19.79	1524	180.4	6.89	0.23	87.8	7.99
326.17	0914	29	19.90	1523	180.0	6.89	0.25	87.6	7.93
326.60	0920	31	20.03	1530	179.3	6.89	0.20	88.5	8.00
327.03	0925	33	20.07	1530	179.2	6.89	0.20	87.6	7.93
327.36	0931	35	20.09	1530	178.7	6.89	0.19	87.4	7.84
	0932	/	Sampling						
									~4.00 gals purged from tubing
									0813

FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: SWMU 154 GWM	Project No.: 146422.10.11.01 / 98026.01.15
Well I.D.: CTF-MW2	Date: 06/19/12
Well Condition:	Weather Condition:
Method: Portable pump X	Dedicated pump _____ Pump depth: 128

PURGE MEASUREMENTS

Depth to Water (ft)	Time 24 hr	Vol. (L gal)	Temp (°C)	SC (µS/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (%)	Comments DO mg/L
43.78	0747	✓	START						
47.48	0802	5	19.55	2904	141.8	5.99	1.46	4.6	0.41
47.35	0812	10	19.03	3085	101.5	5.95	0.50	3.0	0.27
47.48	0822	15	18.85	3177	73.6	5.94	0.51	2.1	0.20
47.54	0833	20	18.81	3232	39.3	5.96	0.41	1.7	0.16
47.46	0844	25	18.84	3279	40.3	5.99	0.59	1.5	0.14
47.32	0856	30	19.07	3300	39.0	6.00	0.88	1.4	0.13
47.25	0905	33	19.28	3318	37.1	6.03	0.87	1.4	0.13
47.23	0910	35	19.33	3310	38.3	6.03	0.85	1.4	0.13
47.18	0916	37	19.42	3317	37.8	6.03	0.83	1.4	0.12
47.08	0921	39	19.51	3303	37.6	6.03	0.67	1.3	0.12
47.00	0927	41	19.58	3310	34.1	6.03	0.83	1.3	0.12
	0928	✓	SAMPLING						
									~4.00 gals purged from tubing
									0754

Appendix B
Analytical Laboratory
Certificates of Analysis for Monitoring Wells CTF-MW3 and CTF-MW2
Groundwater Data

SMO 2012-ARCOC (4-2012)

AOP 95-16

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab NA

Page 1 of 1

Batch No.

SMO Use

AR/COC 614254

Project Name:	SWMU 149 GWM	Date Samples Shipped:	6/18/12	SMO Authorization:	Don Wolfenbarger
Project/Task Manager:	Clinton Lum	Carrier/Waybill No.	142743	SMO Contact Phone:	See Bottle and
Project/Task Number:	98026.01.14	Lab Contact:	Edie Kent/803-556-8171		Lorraine Herrera/505-844-3199
Service Order:	CF250-12	Lab Destination:	GEL	Send Report to SMO:	
		Contract No.:	PO 691436		Rita Kavanaugh/505-284-2553
Tech Area:					
Building:	Room:	Operational Site:			

☐ Waste Characterization
☐ RMMA
☐ Released by COC No.
☑ 4° Celsius

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

306314

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
092535	-001	CTF-MW3	359	6/16/12 9:32	GW	G	3x40 mL	HCL	G	SA	TCL VOC (SW846-8260B)	
092535	-009	CTF-MW3	359	6/16/12 9:33	GW	P	500 mL	HNO3	G	SA	TAL Metals (SW846-6010/6020/7470	
092535	-010	CTF-MW3	359	6/16/12 9:34	FGW	P	500 mL	HNO3	G	SA	TAL Metals (SW846-6010/6020/7470	
092535	-016	CTF-MW3	359	6/16/12 9:35	GW	P	125 mL	4C	G	SA	Anions (SW846-9056)	
092535	-018	CTF-MW3	359	6/16/12 9:36	GW	P	125 mL	H2SO4	G	SA	NPN (EPA 353.2)	
092535	-020	CTF-MW3	359	6/16/12 9:37	GW	P	250 mL	4C	G	SA	Perchlorate (EPA 314.0)	
092535	-022	CTF-MW3	359	6/16/12 9:38	GW	P	500 mL	4C	G	SA	Alkalinity (SM2320B)	
092536	-001	SWMU 149-TB1	na	6/16/12 9:32	DIW	G	3x40 mL	HCL	G	TB	TCL VOC (SW846-8260B)	

Last Chain:	☑ Yes	Sample Tracking	SMO Use
Validation Req'd:	☑ Yes	Date Entered:	06/19/12
Background:	☐ Yes	Entered by:	RL
Confirmatory:	☐ Yes	QC inits.:	JLS

Special Instructions/QC Requirements:

EDD ☑ Yes ☐ No

Turnaround Time ☐ 7 Day* ☐ 15 Day* ☑ Day

Negotiated TAT ☐

Sample Disposal ☐ Return to Client ☑ Disposal by Lab

Return Samples By:

Comments: Send report to Tim Jackson/4142/MS 0729/284-2547

If perchlorate detected, then perform verification analysis using method SW846-6850M. Report anions (as Br,Cl,F,SO4) and alkalinity (as total as CACO3, HCO3, and CO3).

Conditions on Receipt

Lab Use

Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell
	Robert Lynch	Robert Lynch	RL	SNL/4142/505-844-4013/505-250-7090
	Alfred Santillanes	Alfred Santillanes	AS	SNL/4142/505-844-5130/505-228-0710
	Bill Gibson	William Gibson	WG	SNL/4142/505-284-3307/505-239-7367

1. Relinquished by	Alfred Santillanes	Org. 4142	Date 6/18/12	Time 0920	3. Relinquished by	Org.	Date	Time
1. Received by	Dave Delgado	Org. 4142	Date 6/18/12	Time 0920	3. Received by	Org.	Date	Time
2. Relinquished by	Don Wolfenbarger	Org. 4142	Date 6/18/12	Time 1100	4. Relinquished by	Org.	Date	Time
2. Received by		Org.	Date	Time	4. Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

SMO 2012-ARCOC (4-2012)

AOP 95-16

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab NA

Batch No.

AR/COC 614255

SMO Use

Project Name:	SWMU 154 GWM	Date Samples Shipped:	6/19/12	SMO Authorization:	Don Witemyer
Project/Task Manager:	Clinton Lum	Carrier/Waybill No.	140364	SMO Contact Phone:	See Bottle Order
Project/Task Number:	98026.01.15	Lab Contact:	Edie Kent/803-556-8171		Lorraine Herrera/505-844-3199
Service Order:	CF251-12	Lab Destination:	GEL	Send Report to SMO:	
		Contract No.:	PO 691436		Rita Kavanaugh/505-284-2553
Tech Area:					
Building:	Room:	Operational Site:	306356		

☐ Waste Characterization
☐ RMMA
☐ Released by COC No.
☑ ° Celsius

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

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
092537	-001	CTF-MW2	129	6/19/12 9:28	GW	G	3x40 mL	HCL	G	SA	TCL VOC (SW846-8260B)	
092537	-002	CTF-MW2	129	6/19/12 9:30	GW	AG	4x1 L	4C	G	SA	TCL SVOC (SW846-8270C)	
092537	-009	CTF-MW2	129	6/19/12 9:31	GW	P	500 mL	HNO3	G	SA	TAL Metals+U(SW846-6010/6020/7470)	
092537	-010	CTF-MW2	129	6/19/12 9:32	FGW	P	500 mL	HNO3	G	SA	TAL Metals+U(SW846-6010/6020/7470)	
092537	-016	CTF-MW2	129	6/19/12 9:33	GW	P	125 mL	4C	G	SA	Anions (SW846-9056)	
092537	-018	CTF-MW2	129	6/19/12 9:34	GW	P	125 mL	H2SO4	G	SA	NPN (EPA 353.2)	
092537	-020	CTF-MW2	129	6/19/12 9:35	GW	P	250 mL	4C	G	SA	Perchlorate (EPA 314.0)	
092537	-022	CTF-MW2	129	6/19/12 9:36	GW	P	500 mL	4C	G	SA	Alkalinity (SM2320B)	
092537	-024	CTF-MW2	129	6/19/12 9:38	GW	AG	4x1 L	4C	G	SA	High Explosives (SW846-8321A)	
092537	-033	CTF-MW2	129	6/19/12 9:39	GW	P	1 L	HNO3	G	SA	Gamma Spectroscopy (EPA 901.0)	

Last Chain: ☑ Yes
Validation Req'd: ☑ Yes
Background: ☐ Yes
Confirmatory: ☐ Yes

Sample Tracking (SMO Use)
Date Entered: 06/19/12
Entered by: RL
QC inits.: JLS

Special Instructions/QC Requirements:
EDD ☑ Yes ☐ No
Turnaround Time ☐ 7 Day* ☐ 5 Day* 3 ☑ Day
Negotiated TAT ☐
Sample Disposal ☐ Return to Client ☑ Disposal by Lab
Return Samples By:
Comments: Send report to Tim Jackson/4142/MS 0729/284-2547

If perchlorate detected, then perform verification analysis using method SW846-6850M. Report anions (as Br,Cl,F,SO4), alkalinity (as total as CACO3, HCO3, and CO3), and gamma spectroscopy (short list isotopes).

Conditions on Receipt

Lab Use

Sample Team Members

Name	Signature	Init	Company/Organization/Phone/Cell
William Gibson	William Gibson	WG	SNL/4142/505-284-3307/505-239-7367
Alfred Santillanes	Alfred Santillanes	AS	SNL/4142/505-844-5130/505-228-0710
Robert Lynch	Robert Lynch	RL	SNL/4142/505-844-4013/505-250-7090

1.Relinquished by	Alfred Santillanes	Org. 4142	Date 6/19/12	Time 1007	3.Relinquished by		Org.	Date	Time
1. Received by	Don Witemyer	Org. 4142	Date 6/19/12	Time 1007	3. Received by		Org.	Date	Time
2.Relinquished by	Don Witemyer	Org. 4142	Date 6/19/12	Time 1130	4.Relinquished by		Org.	Date	Time
2. Received by		Org.	Date	Time	4. Received by		Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

AR/COC 614255

Project Name:	SWMU 154 GWM	Project/Task Manager:	Clinton Lum	Project/Task No.:	98026.01.15		Lab use
Tech Area:							
Building:	Room:						

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
092537	-034	CTF-MW2	129	6/19/12 9:41	GW	P	1 L	HNO3	G	SA	Gross Alpha/Beta (EPA 900.0)	
092537	-035	CTF-MW2	129	6/19/12 9:42	GW	P	1 L	HNO3	G	SA	Isotopic Uranium(ASTM D3972-09M)	
~~092538~~	-001	SWMU 154-TB1	na	6/19/12 9:28	DIW	G	3x40 mL	HCL	G	TB	TCL VOC (SW846-8260B)	
092539												

Recipient Initials_____

SMO 2012-ARCOC (4-2012)

AOP 95-16

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab IN4

Batch No.

SMO Use

AR/COC 614256

Project Name:	SWMU 154 GWM	Date Samples Shipped:	6/14/12	SMO Authorization:	[signature]
Project/Task Manager:	Clinton Lum	Carrier/Waybill No.	140364	SMO Contact Phone:	See Bottle Order
Project/Task Number:	98026.01.15	Lab Contact:	Edie Kent/803-556-8171		Lorraine Herrera/505-844-3199
Service Order:	CF251-12	Lab Destination:	GEL	Send Report to SMO:	Rita Kavanaugh/505-284-2553
		Contract No.:	PO 691436		

☑ Waste Characterization ☐ RMMA ☐ Released by COC No.

☑ ° Celsius

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

Tech Area: | Building: | Room: | Operational Site:

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
~~092539~~	-009	CTF-MW2	na	6/19/12 9:13	WGW	P	500 mL	HNO3	G	WC	Arsenic (SW846-6020)	
092540												

Last Chain:	☐ Yes	Sample Tracking	SMO Use
Validation Req'd:	☐ Yes	Date Entered:	06/19/12
Background:	☐ Yes	Entered by:	RK
Confirmatory:	☐ Yes	QC inits.:	JRS

Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell
	William Gibson	[signature]	WJG	SNL/4142/505-284-3307/505-239-7367
	Alfred Santillanes	[signature]	AS	SNL/4142/505-844-5130/505-228-0710
	Robert Lynch	[signature]	RL	SNL/4142/505-844-4013/505-250-7090

Special Instructions/QC Requirements:

EDD ☑ Yes ☐ No

Turnaround Time ☐ 7 Day* ☐ 5 Day* 3 ☑ Day

Negotiated TAT ☐

Sample Disposal ☐ Return to Client ☑ Disposal by Lab

Return Samples By:

Comments: Send report to Tim Jackson/4142/MS 0729/284-2547

Waste Characterization Sample.

Conditions on Receipt

Lab Use

1. Relinquished by	[signature]	Org. 4142	Date 6/19/12	Time 1009	3. Relinquished by	Org.	Date	Time
1. Received by	[signature]	Org. 4142	Date 6/16/12	Time 1009	3. Received by	Org.	Date	Time
2. Relinquished by	[signature]	Org. 4142	Date 6/19/12	Time 1009	4. Relinquished by	Org.	Date	Time
2. Received by		Org.	Date	Time	4. Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

Appendix C
Data Validation Sample Findings Summary Sheets for Monitoring Wells CTF-MW3 and CTF-MW2 Groundwater Data

Sample Findings Summary

AR/COC: 614254

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
SW846 8260B DOE-AL			
	092535-001/CTF-MW3	Dibromochloromethane (124-48-1)	J+, I5

All other analyses met QC acceptance criteria; no further data should be qualified.

ANALYTICAL QUALITY ASSOCIATES, IN

PO Box 2198
Albuquerque, NM 8715
1-888-678-544
www.aqainc.ne

Memorandum

Date: July 27, 2012

To: File

From: Marcia Hilchey

Subject: Inorganic Data Review and Validation – SNL
Site: SWMU 149 GWM
AR/COC: 614254
SDG: 306314
Laboratory: GEL
Project/Task: 98026.01.14
Analysis: General Chemistry

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 3.

Summary

One sample was prepared and analyzed with accepted procedures using methods EPA9056 (Anions), EPA353.2 (Nitrate/Nitrite), SM2320B (Alkalinity), and EPA314.0 (perchlorate). Data were reported for all required analytes. A problem was identified with the data package that resulted 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 and Preservation

The sample was prepared and analyzed within the prescribed holding times and properly preserved.

Calibration

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

Anions:
The ICAL intercepts for chloride, fluoride, and sulfate were > the MDL. All associated sample results were >3X the intercept values and will not be qualified.

Blanks

No target analytes were detected in the blanks.

Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria.

Matrix Spike (MS)

All MS recoveries met QC acceptance criteria.

Laboratory Replicate

The replicate analyses met all QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported. The sample was not diluted except as follows.

Anions and Nitrate/Nitrite:
Samples were diluted.

Other QC

No other specific issues that affect data quality were identified.

ANALYTICAL QUALITY ASSOCIATES, IN

PO Box 2198
Albuquerque, NM 8715
1-888-678-544
www.aqainc.ne

Memorandum

Date: July 27, 2012

To: File

From: Marcia Hilchey

Subject: Inorganic Data Review and Validation – SNL
Site: SWMU 149 GWM
AR/COC: 614254
SDG: 306414 and 306415
Laboratory: GEL
Project/Task: 98026.01.14
Analysis: Metals

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 3.

Summary

Two samples were prepared and analyzed with approved procedures using methods EPA 6020 (ICP-MS metals), EPA 6010B (ICP metals), and EPA 7470A (CVAA mercury). Data were reported for all required analytes. No problems were identified with the data package that resulted 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 and Preservation

The samples were prepared and analyzed within the prescribed holding times and properly preserved.

ICP-MS Instrument Tune

All instrument tune requirements were met.

Calibration

All initial and continuing calibration met QC acceptance criteria.

Reporting Limit Verification

All CRA/CRI recoveries met QC acceptance criteria.

Blanks

No target analytes were detected in the blanks.

ICP -MS Internal Standards

All internal standards met QC acceptance criteria.

Matrix Spike (MS)

The parent sample concentrations for Ca, Mg, and Na were >4X the spike. However, an MS analysis is not required for these analytes. Therefore, no sample data will be qualified.

ICP; CVAA:
The MS analysis associated with sample 306414-002 was performed on a sample of similar matrix from another SNL SDG. No sample data were qualified as a result.

ICP-MS; CVAA:

The MS analysis associated with sample 306415-001 was performed on a sample of similar matrix from another SNL SDG. No sample data were qualified as a result.

Laboratory Replicate

All replicates met QC acceptance criteria.

ICP; CVAA:
The MS analysis associated with sample 306414-002 was performed on a sample of similar matrix from another SNL SDG. No sample data were qualified as a result.

ICP-MS; CVAA:

The MS analysis associated with sample 306415-001 was performed on a sample of similar matrix from another SNL SDG. No sample data were qualified as a result.

Laboratory Control Sample (LCS)

All LCS QC acceptance criteria were met.

Detection Limits/Dilutions

All detection limits were properly reported. The samples were diluted 10X for Na and Ca.

ICP Interference Check Sample (ICS A and AB)

Results of the ICS A and AB analyses were not evaluated because the concentrations of Al, Ca, Fe, and Mg in the samples were < those in the ICS solutions. No sample data will be qualified as a result.

ICP Serial Dilution

The serial dilution analyses met all QC acceptance criteria.

Other QC

No other specific issues that affect data quality were identified.

ANALYTICAL QUALITY ASSOCIATES, IN

PO Box 2198
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www.aqainc.ne

Memorandum

Date: July 27, 2012

To: File

From: Marcia Hilchey

Subject: GC/MS Organic Data Review and Validation – SNL
Site: SWMU 149 GWM
AR/COC: 614254
SDG: 306314
Laboratory: GEL
Project/Task: 98026.01.14
Analysis: VOCs

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 3.

Summary

Two samples were prepared and analyzed with accepted procedures using method EPA 8260B (VOCs). All compounds were successfully analyzed. A problems was identified with the data package that resulted in the qualification of data.

1) The initial calibration intercept for dibromochloromethane was > MDL but < 3X MDL. Associated detected sample results that were < 3X the value of the intercept will be **qualified J+, I5**.

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

Holding Times

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

Instrument Tune

All instrument tune requirements were met.

Calibration

The initial calibration and continuing calibration data met QC acceptance criteria except as noted above in the Summary section and as follows.

The initial calibration intercept for dibromochloromethane was > MDL but < 3X MDL. Associated ND sample results will not be qualified.

The initial calibration RSD for bromoform was > 15% but < 40%. All associated sample results were ND, and there were no other associated calibration infractions. No sample results were qualified.

The ICV and/or CCV %Ds for vinyl acetate, bromoform, acetone, and 2-hexanone were >20% but < 40% with positive bias. All associated sample results were ND and will not be qualified.

Blanks

No target analytes were detected in the blanks.

Surrogates

All surrogate recoveries met QC acceptance criteria.

Internal Standards

All internal standards met QC acceptance criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

All MS/MSD acceptance criteria were met.

Laboratory Control Sample (LCS)

All LCS acceptance criteria were met.

Detection Limits/Dilutions

All detection limits were properly reported. The samples were not diluted.

Tentatively Identified Compounds (TICs)

TIC reports were not required.

Other QC

A TB was submitted on the AR/COC(s).

No other specific issues that affect data quality were identified.

Sample Findings Summary

AR/COC: 614255

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
DOE EML HASL-300, U-02-RC			
	092538-035/CTF-MW2	Uranium-235/236 (13982-70-2)	J, FR7
EPA 901.1			
	092538-033/CTF-MW2	Americium-241 (14596-10-2)	BD, FR3
	092538-033/CTF-MW2	Cesium-137 (10045-97-3)	BD, FR3
	092538-033/CTF-MW2	Cobalt-60 (10198-40-0)	BD, FR3
	092538-033/CTF-MW2	Potassium-40 (13966-00-2)	R, Z2
SW846 3005/6020 DOE-AL			
	092538-009/CTF-MW2	Nickel (7440-02-0)	J-, MS3
	092538-010/CTF-MW2	Nickel (7440-02-0)	J-, MS3
SW846 8270C			
	092538-002/CTF-MW2	3,3'-Dichlorobenzidine (91-94-1)	R, MS3
	092538-002/CTF-MW2	4-Chloroaniline (106-47-8)	UJ, MS3, MS5
	092538-002/CTF-MW2	Diethylphthalate (84-66-2)	UJ, MS3
	092538-002/CTF-MW2	Di-n-butylphthalate (84-74-2)	UJ, MS3
	092538-002/CTF-MW2	Hexachlorocyclopentadiene (77-47-4)	R, MS3

All other analyses met QC acceptance criteria; no further data should be qualified.

ANALYTICAL QUALITY ASSOCIATES, IN

PO Box 2198
Albuquerque, NM 8715
1-888-678-544
www.aqainc.ne

Memorandum

Date: July 30, 2012

To: File

From: Marcia Hilchey

Subject: Inorganic Data Review and Validation – SNL
Site: SWMU 154 GWM
AR/COC: 614255
SDG: 306356
Laboratory: GEL
Project/Task: 98026.01.15
Analysis: General Chemistry

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 3.

Summary

One sample was prepared and analyzed with accepted procedures using methods EPA9056 (Anions), EPA353.2 (Nitrate/Nitrite), SM2320B (Alkalinity), and EPA314.0 (perchlorate). Data were reported for all required analytes. A problem was identified with the data package that resulted 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 and Preservation

The sample was prepared and analyzed within the prescribed holding times and properly preserved.

Calibration

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

Anions:
The ICAL intercept for sulfate was > the MDL. The associated sample result was >3X the intercept value and will not be qualified.

Blanks

No target analytes were detected in the blanks.

Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria.

Matrix Spike (MS)

All MS recoveries met QC acceptance criteria.

Laboratory Replicate

The replicate analyses met all QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported. The sample was not diluted except as follows.

Anions and Nitrate/Nitrite:
Samples were diluted.

Other QC

No other specific issues that affect data quality were identified.

Reviewed By: Ken Salaz **Date:** 07/31/12

ANALYTICAL QUALITY ASSOCIATES, INC.

616 Maxine NE
Albuquerque, NM 87123
505-299-5201
www.aqainc.net

Memorandum

Date: July 30, 2012

To: File

From: Marcia Hilchey

Subject: LC/MS/MS Organic Data Review and Validation – SNL
Site: SWMU 154 GWM
AR/COC: 614255
SDG: 306356
Laboratory: GEL
Project/Task: 98026.01.15
Analysis: High Explosives (HE) by LCMSMS

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 3.

Summary

One sample was prepared and analyzed with accepted procedures using method EPA 8321A Mod (HE by LCMSMS). All compounds were successfully analyzed. Problems were identified with the data package that result in the qualification of data.

1) M-nitrotoluene and p-nitrotoluene had initial calibration response factors of < 0.05 but > 0.01. All associated sample results were ND and will be **qualified UJ, I4**.

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

Holding Times

The sample was extracted and analyzed within the prescribed holding times and properly preserved.

Calibration

All initial and continuing calibration met QC acceptance criteria except as noted above in the Summary section.

Reporting Limit Verification

All CRI recoveries met QC acceptance criteria.

Blanks

No target analytes were detected in the blanks with the following exception. HMX was detected in the MB at > PQL. The associated sample result was ND and will not be qualified.

Surrogates

All surrogate recoveries met QC acceptance criteria.

Internal Standards

All internal standards met QC acceptance criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS/MSD analyses met QC acceptance criteria.

Laboratory Control Sample (LCS)

All LCS QC acceptance criteria were met.

Detection Limits/Dilutions

All detection limits were properly reported. According to laboratory procedure, all sample and QC extracts were diluted 2X with HPLC grade water.

Other QC

No other specific issues that affect data quality were identified.

Reviewed By: Ken Salaz **Date:** 07/31/12

ANALYTICAL QUALITY ASSOCIATES, IN

PO Box 2198
Albuquerque, NM 8715
1-888-678-544
www.aqainc.ne

Memorandum

Date: July 30, 2012

To: File

From: Marcia Hilchey

Subject: Inorganic Data Review and Validation – SNL
Site: SWMU 154 GWM
AR/COC: 614255
SDG: 306356 and 306364
Laboratory: GEL
Project/Task: 98026.01.15
Analysis: Metals

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 3.

Summary

Two samples were prepared and analyzed with approved procedures using methods EPA 6020 (ICP-MS metals), EPA 6010B (ICP metals), and EPA 7470A (CVAA mercury). Data were reported for all required analytes. A problem was identified with the data package that resulted in the qualification of data.

ICPMS:
The MS %R for Ni was < the LAL. The associated sample results were detects and will be **qualified J-, MS3.**

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

Holding Times and Preservation

The samples were prepared and analyzed within the prescribed holding times and properly preserved.

ICP-MS Instrument Tune

All instrument tune requirements were met.

Calibration

All initial and continuing calibration met QC acceptance criteria.

Reporting Limit Verification

All CRA/CRI recoveries met QC acceptance criteria.

Blanks

No target analytes were detected in the blanks.

ICP -MS Internal Standards

All internal standards met QC acceptance criteria.

Matrix Spike (MS)

All MS analyses met QC acceptance criteria except as noted above in the Summary section and as follows. The parent sample concentrations for Ca, K, Mg, and Na were >4X the spike. However, an MS analysis is not required for these analytes. Therefore, no sample data will be qualified.

ICPMS; ICP; CVAA:
The MS analysis associated with sample 306356-003 was performed on a sample of similar matrix from another SNL SDG. No sample data were qualified as a result.

Laboratory Replicate

All replicates met QC acceptance criteria.

ICPMS; ICP; CVAA:
The MS analysis associated with sample 306356-003 was performed on a sample of similar matrix from another SNL SDG. No sample data were qualified as a result.

Laboratory Control Sample (LCS)

All LCS QC acceptance criteria were met.

Detection Limits/Dilutions

All detection limits were properly reported. The samples were diluted 20X for Na, K, Mg, and Ca.

ICP Interference Check Sample (ICS A and AB)

Results of the ICS A and AB analyses were not evaluated because the concentrations of Al, Ca, Fe, and Mg in the samples were < those in the ICS solutions. No sample data will be qualified as a result.

ICP Serial Dilution

The serial dilution analyses met all QC acceptance criteria.

Other QC

No other specific issues that affect data quality were identified.

Reviewed By: Ken Salaz **Date:** 07/31/12

ANALYTICAL QUALITY ASSOCIATES, IN

PO Box 2198
Albuquerque, NM 8715
1-888-678-544
www.aqainc.ne

Memorandum

Date: July 30, 2012

To: File

From: Marcia Hilchey

Subject: Radiochemical Data Review and Validation – SNL
Site: SWMU 154 GWM
AR/COC: 614255
SDG: 306356
Laboratory: GEL
Project/Task: 98026.01.15
Analysis: RAD

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 3.

Summary

One sample was prepared and analyzed with approved procedures using methods EPA 901.1 (gamma spec – short list), EPA 900.0 (gross alpha/beta), and HASL 300, U-02-RC Mod (Alpha Spec U). Problems were identified with the data package that result in the qualification of data.

Gamma Spec, Iso-U; Gross Alpha/Beta:

1) All sample results which were either < the associated 2-sigma TPU or < the associated MDA will be **qualified BD, FR3.**
2) The U-235/236 sample result was > MDA but <3X the associated MDA and will be **qualified J, FR7.**

Gamma Spec:

1) The K-40 result for sample 306356-009 was X-flagged by the laboratory due to the peak not meeting identification criteria and will be **qualified R, Z2.**

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

Holding Times and Preservation

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

Quantification

All quantification criteria were met except as noted above in the Summary section.

Calibration

The case narratives stated that the instruments used were properly calibrated.

Blanks

No target analytes were detected in the blanks at concentrations > the MDA and 2-sigma TPU.

Tracer/Carrier Recovery

All tracer/carrier recoveries met QC acceptance criteria.

Matrix Spike (MS)

All MS recoveries met QC acceptance criteria.

Laboratory Replicate

All replicate error ratio acceptance criteria were met.

Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria.

Detection Limits/Dilutions

All required detection limits were met. No dilutions were required.

Other QC

No other specific issues that affect data quality were identified.

Reviewed By: Ken Salaz **Date:** 07/31/12

ANALYTICAL QUALITY ASSOCIATES, INC.

616 Maxine NE
Albuquerque, NM 87123
505-299-5201
www.aqainc.net

Memorandum

Date: July 30, 2012

To: File

From: Marcia Hilchey

Subject: GC/MS Organic Data Review and Validation – SNL
Site: SWMU 154 GWM
AR/COC: 614255
SDG: 306356
Laboratory: GEL
Project/Task: 98026.01.15
Analysis: SVOCs

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 3.

Summary

One sample was prepared and analyzed with accepted procedures using method EPA 8270C (SVOCs). All compounds were successfully analyzed. Problems were identified with the data package that resulted in the qualification of data.

1) The MS and/or MSD recoveries for di-n-butylphthalate; diethylphthalate; and 4-chloroaniline were < the LAL but > 10%. All associated sample results were ND and will be **qualified UJ, MS3**.

2) The MS/MSD RPD for 4-chloroaniline was > the UAL. The associated sample result was ND and will be **qualified UJ, MS5**.

3) The MS and MSD recoveries for 3,3'-dichlorobenzidine and hexachlorocyclopentadiene were < 10%. The associated sample results were ND and will be **qualified R, MS3**.

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

Holding Times

The sample was prepared and analyzed within the prescribed holding times and properly preserved.

Instrument Tune

All instrument tune requirements were met.

Calibration

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

The ICAL intercepts for 2,4-dinitrophenol; pentachlorophenol; and 2-methyl-4,6-dinitrophenol were > the MDL. The associated sample results were all NDs and will not be qualified.

The CCV %Ds for seven target compounds were >20% but <40% with negative bias. The associated sample results were ND, with no other calibration infractions, and will not be qualified.

Blanks

No target analytes were detected in the blank.

Surrogates

All surrogate recoveries met QC acceptance criteria.

Internal Standards

All internal standards met QC acceptance criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

All MS/MSD acceptance criteria were met except as noted above in the Summary section.

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

Laboratory Control Sample (LCS)

All LCS acceptance criteria were met with the following exceptions. The LCS %Rs for 2-nitrophenol and hexachlorocyclopentadiene were < the LAL. These infractions are within the allowable marginal exceedances. No sample results will be qualified.

Detection Limits/Dilutions

All detection limits were properly reported. The sample was not diluted.

Tentatively Identified Compounds (TICs)

TIC reports were not required.

Other QC

An EB was submitted on the AR/COC(s). No other specific issues that affect data quality were identified.

Reviewed By: Ken Salaz **Date:** 07/31/12

ANALYTICAL QUALITY ASSOCIATES, IN

PO Box 2198
Albuquerque, NM 8715
1-888-678-544
www.aqainc.ne

Memorandum

Date: July 30, 2012

To: File

From: Marcia Hilchey

Subject: GC/MS Organic Data Review and Validation – SNL
Site: SWMU 154 GWM
AR/COC: 614255
SDG: 306356
Laboratory: GEL
Project/Task: 98026.01.15
Analysis: VOCs

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 3.

Summary

Two samples were prepared and analyzed with accepted procedures using method EPA 8260B (VOCs). All compounds were successfully analyzed. No problems were identified with the data package that resulted 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

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

Instrument Tune

All instrument tune requirements were met.

Calibration

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

The initial calibration intercept for dibromochloromethane was > MDL but < 3X MDL. All associated sample results were ND and will not be qualified.

The initial calibration RSD for bromoform was > 15% but < 40%. All associated sample results were ND, and there were no other associated calibration infractions. No sample results were qualified.

The ICV and/or CCV %Ds for vinyl acetate and bromoform were >20% but < 40% with positive bias. All associated sample results were ND and will not be qualified.

Blanks

No target analytes were detected in the blanks.

Surrogates

All surrogate recoveries met QC acceptance criteria.

Internal Standards

All internal standards met QC acceptance criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

All MS/MSD acceptance criteria were met.

Laboratory Control Sample (LCS)

All LCS acceptance criteria were met.

Detection Limits/Dilutions

All detection limits were properly reported. The samples were not diluted.

Tentatively Identified Compounds (TICs)

TIC reports were not required.

Other QC

A TB was submitted on the AR/COC(s).

No other specific issues that affect data quality were identified.

Reviewed By: Ken Salaz **Date:** 07/31/12

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SECTION IV
SOLID WASTE MANAGEMENT UNITS 8/58 AND 68 QUARTERLY GROUNDWATER MONITORING REPORT, APRIL – JUNE 2012

1.0 Introduction

This section of the Environmental Restoration Operations (ER) Consolidated Quarterly Report (ER Quarterly Report) has been prepared pursuant to the "SWMU 68 and SWMUs 8/58 Groundwater Characterization Work Plans – U.S. Department of Energy (DOE)/Sandia Corporation (Sandia) Response to the New Mexico Environment Department (NMED) letter of April 8, 2010, entitled, *Class 3 Permit Modification Requests for Granting Corrective Action Complete Status for 26 SWMUs/AOCs (Request of March 1, 2006) and 5 Other SWMUs/AOCs (Request of January 7, 2008), Sandia National Laboratories, EPA ID #NM5890110518 HWB-SNL-06-007 and HWB-SNL-08-001"* (SNL/NM September 2010) and the NMED approval of "Solid Waste Management Units 8 and 58, Proposed Groundwater Monitoring Well Location Adjustment" (NMED June 2011). The activities associated with the groundwater monitoring task for Solid Waste Management Units (SWMUs) 8/58 and 68 at Sandia National Laboratories, New Mexico (SNL/NM) are summarized in this section.

The third of eight quarterly groundwater sampling events occurred in April 2012 for Coyote Canyon Blast Area (CCBA) monitoring wells CCBA-MW1 and CCBA-MW2, located within SWMUs 8/58, and monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3, located within SWMU 68 (Old Burn Site). Monitoring wells CCBA-MW1, CCBA-MW2, OBS-MW1, OBS-MW2, and OBS-MW3 were installed in August 2011 (SNL/NM November 2011). CCBA-MW1 is located at the southwestern corner of SWMU 8, approximately 0.2 miles north of the ephemeral channel in Lurance Canyon and approximately 0.7 miles east of Coyote Springs (Figure IV-1). CCBA-MW2 is located near the center of SWMU 58, approximately 0.4 miles north of the ephemeral channel in Lurance Canyon and approximately 1 mile northeast of Coyote Springs (Figure IV-1). OBS-MW1, OBS-MW2, and OBS-MW3 are located at SWMU 68 in the Coyote Test Field, approximately 0.6 miles southwest of the Starfire Optical Range (Figure IV-2).

The supplemental groundwater monitoring at the five newly installed monitoring wells is designed to address the requirements of Section VII.D.6 of the Compliance Order on Consent (the Order) (NMED April 2004) and the letter dated April 8, 2010, from the NMED Hazardous Waste Bureau (NMED April 2010). The analytical results discussed in

this report correspond to the Second Quarter, Calendar Year (CY) 2012 reporting period (April – June 2012).

This groundwater sampling event was conducted in conformance with procedures outlined in the "Groundwater Characterization Work Plan for SWMU 8 – Open Dump (Coyote Canyon Blast Area) and SWMU 58 – Coyote Canyon Blast Area, Foothills Test Area" and "Groundwater Characterization Work Plan for SWMU 68, Old Burn Site" (SNL/NM September 2010). These Work Plans were approved by the NMED in January 2011 (NMED January 2011).

Monitoring wells CCBA-MW1 and CCBA-MW2 were sampled on April 23 and April 24, 2012, respectively. The samples were analyzed for the required constituents, consisting of volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), high explosive (HE) compounds, nitrate plus nitrite (NPN), major anions (as bromide, chloride, fluoride, and sulfate), major cations (as calcium, magnesium, potassium, and sodium), alkalinity, Target Analyte List (TAL) metals plus uranium, perchlorate, total cyanide, radionuclides by gamma spectroscopy, gross alpha/beta activity, and isotopic uranium.

Monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 were sampled from April 17 to April 19, 2012. The samples were analyzed for the required constituents, consisting of VOCs, SVOCs, HE compounds, NPN, major anions (as bromide, chloride, fluoride, and sulfate), major cations (as calcium, magnesium, potassium, and sodium), alkalinity, TAL metals plus uranium, hexavalent chromium, perchlorate, total cyanide, radionuclides by gamma spectroscopy, gross alpha/beta activity, and isotopic uranium.

Analytical results for the groundwater samples were compared with the U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) for drinking water (EPA 2009). Except for fluoride, none of the analytical results for the groundwater samples from SWMUs 8/58 exceed the MCLs. Fluoride was detected above the established MCL of 4.0 milligrams per liter (mg/L) in the CCBA-MW1 environmental sample at a concentration of 4.93 mg/L. Fluoride in both the CCBA-MW2 environmental sample and the duplicate environmental sample exceed the method detection limit (MDL) at a concentration of 1.54 mg/L. No analytical results for the SWMU 68 groundwater samples exceed the corresponding MCLs.

Quality control (QC) samples consisting of duplicate environmental, equipment blank (EB), trip blank (TB), and field blank (FB) samples were also submitted for analysis

during this quarterly sampling event. The following sections provide descriptions of the field methods used and discussions of the analytical and QC sampling results.

This groundwater sampling event represents the third of eight supplemental quarterly events for the five monitoring wells. The fourth of the eight supplemental quarterly groundwater sampling events will be conducted during the upcoming quarter (July to September 2012).

2.0 Field Methods and Measurements

The quarterly groundwater sampling field measurements were collected in conformance with the DOE/Sandia Response to the NMED letter of April 8, 2010 (SNL/NM September 2010). Groundwater monitoring at SWMUs 8/58 and 68 was performed according to the Work Plans submitted as Attachments A and B to the DOE/Sandia Response (SNL/NM September 2010) and SNL/NM Administrative Operating Procedures (AOPs) (SNL/NM May 2011) and Field Operating Procedures (FOPs) (SNL/NM January 2012a and January 2012b). Groundwater samples were analyzed for relevant parameters, listed in Table IV-1. Table IV-2 presents the details for groundwater samples collected from all five monitoring wells during Second Quarter, CY 2012.

2.1 Equipment Decontamination

A portable Bennett™ groundwater sampling system was used to collect the groundwater samples from both wells. The Bennett™ sampling pump and tubing bundle were decontaminated prior to installation into the monitoring wells in accordance with the procedures described in SNL/NM FOP 05-03, "Groundwater Monitoring Equipment Decontamination" (SNL/NM January 2012a). Section IV.4.1.2 discusses the QC results for the EB samples.

2.2 Well Evacuation

In accordance with procedures described in SNL/NM FOP 05-01, "Groundwater Monitoring Well Sampling and Field Analytical Measurements" (SNL/NM January 2012b), all wells were purged a minimum of one saturated casing volume (the volume of one length of the saturated screen plus the borehole annulus around the saturated screen interval) and monitored for stability of water quality parameters, if applicable.

Field water-quality measurements for turbidity, pH, temperature, specific conductance (SC), oxidation-reduction potential (ORP), and dissolved oxygen (DO) were obtained from the wells prior to collecting groundwater samples. Groundwater temperature, SC, ORP, DO, and pH were measured with a YSI™ Model 6920 water quality meter. Turbidity was measured with a HACH™ Model 2100P turbidity meter. Purging continued until four stable measurements for turbidity, pH, temperature, and SC were obtained. Groundwater stability is considered acceptable when the following parameters are achieved:

- Turbidity measurements are within 10%, or less than 5 nephelometric turbidity units
- pH is within 0.1 units
- Temperature is within 1.0 degree Celsius
- SC is within 5% as micromhos per centimeter

Table IV-3 summarizes the temperature, pH, SC, and turbidity measurements, which are discussed in Section IV.3.1. Field Measurement Logs (Appendix A) documenting details of well purging and water quality measurements have been submitted to the SNL/NM Records Center.

2.3 Groundwater Sample Collection

All groundwater samples were collected directly from the sample discharge tubing into laboratory-prepared sample containers. Chemical preservatives for samples intended for chemical analyses were added to the sample containers at the laboratory prior to shipment to SNL/NM. The groundwater samples were submitted to GEL Laboratories LLC (GEL) for chemical analysis using methods outlined in Table IV-1. Table IV-1 also lists the sample containers and preservation requirements. Section IV.3.0 summarizes the analytical results.

The sample identification number, Analysis Request/Chain-of-Custody form number, and the associated groundwater investigation are provided in Table IV-2. Chain-of-custody forms are included in Appendix B.

3.0 Analytical Results

Groundwater samples were submitted to GEL for chemical and radiological analyses. Samples were analyzed in accordance with applicable EPA analytical methods (EPA 1980, 1984, 1986, and 1999; Clesceri, et al. 1998; DOE 1990). Table IV-4 lists the MDLs

for VOCs and SVOCs analyzed and Table IV-5 lists the MDLs for HE compounds analyzed. Groundwater sampling results are compared with established EPA MCLs for drinking water (EPA 2009). Analytical results for samples collected from all five monitoring wells are shown in tabulated form in Tables IV-6 through IV-13. Analytical reports, including certificates of analyses, analytical methods, MDLs, minimum detectable activity (MDA), critical level, practical quantitation limits, dates of analyses, results of QC analyses, and data validation findings are filed in the SNL/NM Records Center.

The analytical data were reviewed and qualified in accordance with AOP 00-03, "Data Validation Procedure for Chemical and Radiochemical Data," Revision 3 (SNL/NM May 2011). No problems were identified with the analytical data that resulted in qualification of the data as unusable. The data are acceptable, and reported QC measures are adequate. The data validation sample findings summary sheets are provided as Appendix C.

3.1 Field Water Quality Measurements

SWMUs 8/58, CCBA-MW1 and CCBA-MW2. Table IV-3 summarizes field water quality measurements (turbidity, pH, temperature, SC, ORP, and DO) collected prior to sampling.

SWMU 68, OBS-MW1, OBS-MW2, and OBS-MW3. Table IV-3 summarizes field water quality measurements (turbidity, pH, temperature, SC, ORP, and DO) collected prior to sampling.

3.2 Volatile Organic Compounds

SWMUs 8/58, CCBA-MW1 and CCBA-MW2. No VOCs were detected above laboratory MDLs in any groundwater sample from SWMUs 8/58. Table IV-4 lists MDLs for associated VOCs analyzed.

SWMU 68, OBS-MW1, OBS-MW2, and OBS-MW3. No VOCs were detected above laboratory MDLs in any groundwater sample from SWMU 68. Table IV-4 lists MDLs for associated VOCs analyzed.

3.3 Semivolatile Organic Compounds

SWMUs 8/58, CCBA-MW1 and CCBA-MW2. No SVOCs were detected above laboratory MDLs in any groundwater sample from SWMUs 8/58. Table IV-4 lists MDLs for associated SVOCs analyzed.

SWMU 68, OBS-MW1, OBS-MW2, and OBS-MW3. No SVOCs were detected above laboratory MDLs in any groundwater sample from SWMU 68. Table IV-4 lists MDLs for associated SVOCs analyzed.

3.4 High Explosive Compounds

SWMUs 8/58, CCBA-MW1 and CCBA-MW2. No HE compounds were detected above laboratory MDLs in any groundwater sample from SWMUs 8/58. Table IV-5 lists MDLs for associated HE compounds analyzed.

SWMU 68, OBS-MW1, OBS-MW2, and OBS-MW3. No HE compounds were detected above laboratory MDLs in any groundwater sample from SWMU 68. Table IV-5 lists MDLs for associated HE compounds analyzed.

3.5 Nitrate Plus Nitrite

SWMUs 8/58, CCBA-MW1 and CCBA-MW2. Table IV-6 summarizes NPN results. NPN values were compared with the nitrate MCL of 10 mg/L. NPN was not detected above the MCL in any groundwater sample. NPN was reported at a maximum concentration of 3.72 mg/L in the CCBA-MW2 environmental sample.

SWMU 68, OBS-MW1, OBS-MW2, and OBS-MW3. Table IV-6 summarizes NPN results. NPN values were compared with the nitrate MCL of 10 mg/L. NPN was not detected above the MCL in any groundwater sample. NPN was reported at a maximum concentration of 1.85 mg/L in the OBS-MW1 duplicate environmental sample.

3.6 Anions and Alkalinity

SWMUs 8/58, CCBA-MW1 and CCBA-MW2. Table IV-7 summarizes alkalinity, major anion (as bromide, chloride, fluoride, and sulfate), and total cyanide results. Fluoride was detected above the established MCL of 4.0 mg/L in the sample from CCBA-MW1 at a concentration of 4.93 mg/L. This detection is most likely attributable to the mineralization of the Precambrian bedrock in which the well is completed and not associated with SNL/NM testing activities. Fluoride was reported in both the

CCBA-MW2 environmental and duplicate environmental samples at a concentration of 1.54 mg/L, which is below the MCL. No other anions or total cyanide were detected above established MCLs. Total cyanide was reported below the MCL of 0.200 mg/L in the CCBA-MW2 duplicate environmental sample. This value was qualified as an estimated value during data validation due to negative values associated with laboratory calibration blank samples. Total cyanide was not detected above the laboratory MDL in the CCBA-MW1 or CCBA-MW2 environmental samples. There are no established MCLs for bromide, chloride, sulfate, or alkalinity.

SWMU 68, OBS-MW1, OBS-MW2, and OBS-MW3. Table IV-7 summarizes alkalinity, major anion (as bromide, chloride, fluoride, and sulfate) and total cyanide results. No parameters were detected above established MCLs in groundwater samples from the SWMU 68 monitoring wells.

3.7 Perchlorate

SWMUs 8/58, CCBA-MW1 and CCBA-MW2. Perchlorate was not detected above the NMED-specified screening level/MDL of 4 micrograms per liter (µg/L) (0.004 mg/L) in any groundwater sample from SWMUs 8/58. Table IV-8 presents perchlorate results.

SWMU 68, OBS-MW1, OBS-MW2, and OBS-MW3. Perchlorate was not detected above the NMED-specified screening level/MDL of 4 µg/L (0.004 mg/L) in any groundwater sample from SWMU 68. Table IV-8 presents perchlorate results.

Perchlorate results are discussed in more detail in Section II of this ER Quarterly Report.

3.8 Hexavalent Chromium

SWMUs 8/58, CCBA-MW1 and CCBA-MW2. Analysis of hexavalent chromium is not required for SWMUs 8/58.

SWMU 68, OBS-MW1, OBS-MW2, and OBS-MW3. Hexavalent chromium results for SWMU 68 are summarized in Table IV-9. No hexavalent chromium was detected above laboratory MDLs. No MCL is established for this analyte.

3.9 Metals

SWMUs 8/58, CCBA-MW1 and CCBA-MW2. TAL metals plus uranium were analyzed in samples from both monitoring wells at SWMUs 8/58. Metal results for

SWMUs 8/58 are summarized in Table IV-10. No metal parameters were detected above established MCLs in any groundwater sample.

SWMU 68, OBS-MW1, OBS-MW2, and OBS-MW3. TAL metals plus uranium were analyzed in samples from all SWMU 68 monitoring wells. No metal parameters were detected above established MCLs in any groundwater sample. Metal results for SWMU 68 are summarized on Table IV-11.

3.10 Cations

SWMUs 8/58, CCBA-MW1 and CCBA-MW2. Filtered fractions for major cations as calcium, magnesium, potassium, and sodium were analyzed in all groundwater samples from SWMUs 8/58. There are no established MCLs for these analytical parameters. The results are presented in Table IV-12.

SWMU 68, OBS-MW1, OBS-MW2, and OBS-MW3. Filtered fractions for major cations as calcium, magnesium, potassium, and sodium were analyzed in all SWMU 68 groundwater samples. There are no established MCLs for these analytical parameters. The results are presented in Table IV-12.

3.11 Gamma Spectroscopy and Radioisotopic Analyses

All groundwater samples collected from SWMUs 8/58 and 68 were screened for gamma-emitting radionuclides and gross alpha/beta activity (EPA 1980 and DOE 1990). Additional samples for isotopic uranium were collected to support evaluation of gross alpha activity results. The results for gamma spectroscopy, gross alpha/beta activity, and isotopic uranium are presented in Table IV-13.

Radioisotopic analyses included gross alpha, gross beta, and isotopic uranium analyses. Gross alpha activity is measured as a screening tool and, according to Title 40, Code of Federal Regulations, Parts 9, 141, and 142, Table I-4, does not include uranium, which is measured independently. Therefore, gross alpha activity measurements were corrected by subtracting out the uranium activity.

SWMUs 8/58, CCBA-MW1 and CCBA-MW2. Gamma spectroscopy activity results for short-list radionuclides are less than the associated MDAs for all groundwater samples. The result for potassium-40 activity was qualified as unusable during data validation in the CCBA-MW1 and CCBA-MW2 environmental samples because the laboratory was unable to meet peak identification criteria.

The corrected gross alpha activity was reported below the MCL of 15 picocuries per liter (pCi/L) in all samples. Gross beta activity results do not exceed established MCLs. Isotopic uranium activities range from 0.0382 ± 0.0358 pCi/L for uranium-235/236 to 7.15 ± 0.906 pCi/L for uranium-233/234.

SWMU 68, OBS-MW1, OBS-MW2, and OBS-MW3. Gamma spectroscopy activity results for short-list radionuclides are less than the associated MDAs, except for potassium-40. The results for potassium-40 activity in the OBS-MW1 duplicate environmental sample and the OBS-MW2 environmental sample were qualified as unusable during data validation as the laboratory could not meet identification criteria.

The corrected gross alpha activity reported is below the MCL of 15 pCi/L in all samples. Gross beta activity results do not exceed established MCLs. Isotopic uranium activities range from 0.197 ± 0.0604 pCi/L for uranium-235/236 to 20.6 ± 2.66 pCi/L for uranium-233/234. In this region, groundwater contacts bedrock, which contains material high in naturally occurring uranium.

3.12 Sample Results Exceeding Maximum Contaminant Levels

Table IV-14 lists the results for all constituents that have been detected at concentrations exceeding the EPA MCLs (EPA 2009) during the quarterly sampling events at SWMUs 8/58 and 68. The only constituent exceeding the MCL in samples collected during this quarter consists of fluoride, which was detected in the CCBA-MW1 environmental sample from SWMUs 8/58. This detection is most likely attributable to the mineralization of the Precambrian bedrock in which the well is completed and not associated with SNL/NM testing activities.

4.0 Quality Control Samples

Field and laboratory QC samples are prepared to determine the accuracy of the methods used and to detect inadvertent sample contamination that may have occurred during the sampling and analysis process. The following sections discuss each sample type.

4.1 Field Quality Control Samples

Field QC samples for this sampling event included duplicate environmental, EB, TB, and FB samples. The field QC samples were submitted for analysis along with the

groundwater samples in accordance with QC procedures specified in the Groundwater Characterization Work Plans for SWMUs 8/58 and 68 (SNL/NM September 2010).

4.1.1 Duplicate Environmental Samples

Duplicate environmental samples were collected from CCBA-MW2 and OBS-MW1 and analyzed to estimate the overall reproducibility of the sampling and analytical process. The duplicate environmental samples were collected immediately after the original environmental sample to reduce variability caused by time and/or sampling mechanics. Duplicate environmental samples were analyzed for all parameters.

Table IV-15 summarizes the results for duplicate sample analyses and calculated relative percent difference (RPD) values for CCBA-MW2 and OBS-MW1. RPD values were calculated only for detected parameters. The Work Plans for SWMUs 8/58 and 68 do not specify QC acceptance criteria for duplicate environmental sample data; however, duplicate sample results show good correlation (RPD values of less than 20 for organic compounds and less than 35 for inorganic analytes) for all calculated parameters.

4.1.2 Equipment Blank Samples

A portable Bennett™ groundwater sampling system was used to collect groundwater samples from all wells. The sampling pump and tubing bundle were decontaminated prior to installation into monitoring wells according to procedures described in SNL/NM FOP 05-03 "Groundwater Monitoring Equipment Decontamination," (SNL/NM January 2012a). In accordance with SNL/NM FOP 05-03, the following solutions were pumped through the sampling system: 5 gallons of deionized (DI) water mixed with 20 milliliters (mL) nonphosphate laboratory detergent; 5 gallons of DI water; 5 gallons of DI water mixed with 20 mL reagent-grade nitric acid; and 15 gallons of DI water. In addition, the outside of the pump tubing was rinsed with DI water. EB samples are collected to verify the effectiveness of the equipment decontamination process. EB samples were collected prior to sampling monitoring wells CCBA-MW2 and OBS-MW1 and were submitted for all analyses.

SWMUs 8/58, CCBA-MW2. Bicarbonate alkalinity, bromodichloromethane, chloroform, chloride, copper, dibromochloromethane, and sodium were detected above the laboratory MDLs. Copper was detected in the CCBA-MW2 samples at concentrations less than five times the associated EB result, and the results was qualified as not detected during data validation. No corrective action was necessary for bicarbonate alkalinity, bromodichloromethane, chloroform, chloride, dibromochloromethane, or sodium as these

analytes were either not detected in environmental samples or detected at concentrations greater than five times the blank result.

SWMU 68, OBS-MW1. Antimony, bromodichloromethane, chloroform, copper, dibromochloromethane, and chloride were detected above laboratory MDLs. No corrective action was necessary for bromodichloromethane, chloroform, dibromochloromethane, or chloride as these analytes were either not detected in environmental samples or detected at concentrations greater than five times the blank result. Antimony in the OBS-MW1 duplicate environmental sample and copper in both OBS-MW1 environmental samples were detected at concentrations less than five times the associated EB result, and the results were qualified as not detected during data validation**.**

4.1.3 Trip Blank Samples

TB samples are submitted whenever samples are collected for VOC analyses to assess whether contamination of the samples has occurred during shipment and storage. TB samples consist of laboratory reagent-grade water with hydrochloric acid preservative contained in 40-mL volatile organic analysis vials prepared by the analytical laboratory, which accompany the empty sample containers supplied by the laboratory. TBs were brought to the field and accompanied each sample shipment.

SWMUs 8/58. A total of three TB samples were submitted with the samples collected during the April 2012 sampling event. No VOCs were detected above associated laboratory MDLs.

SWMU 68. A total of four TB samples were submitted with the samples collected during the April 2012 sampling event. No VOCs were detected above associated laboratory MDLs.

4.1.4 Field Blank Samples

FB samples were collected for VOC analysis to assess whether contamination of the samples resulted from ambient field conditions. FB samples are prepared by pouring DI water into sample containers at the sampling point (CCBA-MW2 and OBS-MW3) to simulate the transfer of environmental samples from the sampling system to the sample container.

SWMUs 8/58, CCBA-MW1. The VOC compounds bromodichloromethane, chloroform, and dibromochloromethane were detected above associated laboratory MDLs. No corrective action was required as these compounds were not detected in the associated environmental sample.

SWMU 68, OBS-MW2. The VOC compounds bromodichloromethane, chloroform, and dibromochloromethane were detected above the laboratory MDLs. No corrective action was necessary as these compounds were not detected in the associated environmental samples.

4.2 Laboratory Quality Control Samples

Internal laboratory QC samples, including method blanks and duplicate laboratory control samples, were analyzed concurrently with all groundwater samples. All chemical data were reviewed and qualified in accordance with AOP 00-03, "Data Validation Procedure for Chemical and Radiochemical Data" (SNL/NM May 2011).

Some analytical results were qualified during the data validation process and the results for potassium-40 activity in the CCBA-MW1 and CCBA-MW2 environmental samples, the OBS-MW1 duplicate environmental sample, and the OBS-MW2 environmental sample were qualified as unusable. No other significant data quality problems were noted. The data validation sample findings summary sheets are provided in Appendix C.

4.3 Variances and Nonconformances

No variances or nonconformances from requirements in the Groundwater Characterization Work Plans for SWMUs 8/58 and 68 (SNL/NM September 2010) occurred during the April 2012 sampling activities.

5.0 Summary

During the Second Quarter of CY 2012, samples were collected from monitoring wells CCBA-MW1 and CCBA-MW2, located within SWMUs 8/58; and OBS-MW1, OBS-MW2, and OBS-MW3, located within SWMU 68. Sampling results were compared with EPA MCL guidelines for drinking water (EPA 2009).

Analytical parameters for CCBA-MW1 and CCBA-MW2 consist of VOCs, SVOCs, HE compounds, NPN, major anions, major cations, alkalinity, TAL metals plus uranium,

perchlorate, total cyanide, radionuclides by gamma spectroscopy, gross alpha/beta activity, and isotopic uranium. No parameters were detected above established MCLs, except for fluoride. Fluoride was detected above the established MCL of 4.0 mg/L in the CCBA-MW1 environmental sample at a concentration of 4.93 mg/L. This detection is most likely attributable to the mineralization of the Precambrian bedrock in which the well is completed and not associated with SNL/NM testing activities.

Analytical parameters for OBS-MW1, OBS-MW2, and OBS-MW3 consist of VOCs, SVOCs, HE compounds, NPN, major anions, major cations, alkalinity, TAL metals plus uranium, hexavalent chromium, perchlorate, total cyanide, radionuclides by gamma spectroscopy, gross alpha/beta activity, and isotopic uranium. No parameters were detected above established MCLs in groundwater samples collected from SWMU 68 monitoring wells.

6.0 References

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U.S. Environmental Protection Agency (EPA), 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed., U.S. Environmental Protection Agency, Washington, D.C.

U.S. Environmental Protection Agency (EPA), 1999, "Perchlorate in Drinking Water Using Ion Chromatography," EPA 815/R-00-014, U.S. Environmental Protection Agency, Washington, D.C.

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Figures

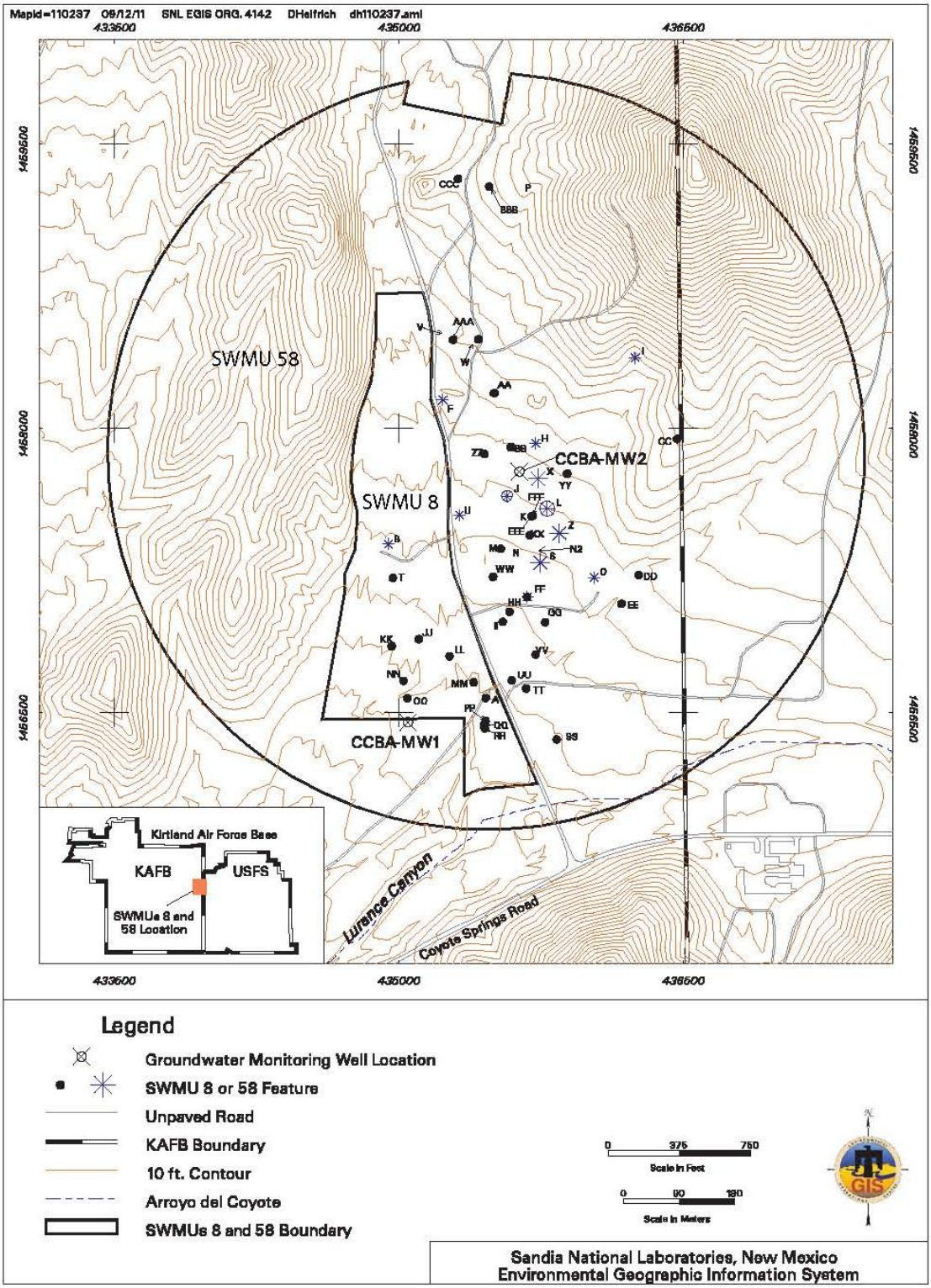

Figure IV-1

Location of Monitoring Wells CCBA-MW1 and CCBA-MW2 within SWMUs 8/58

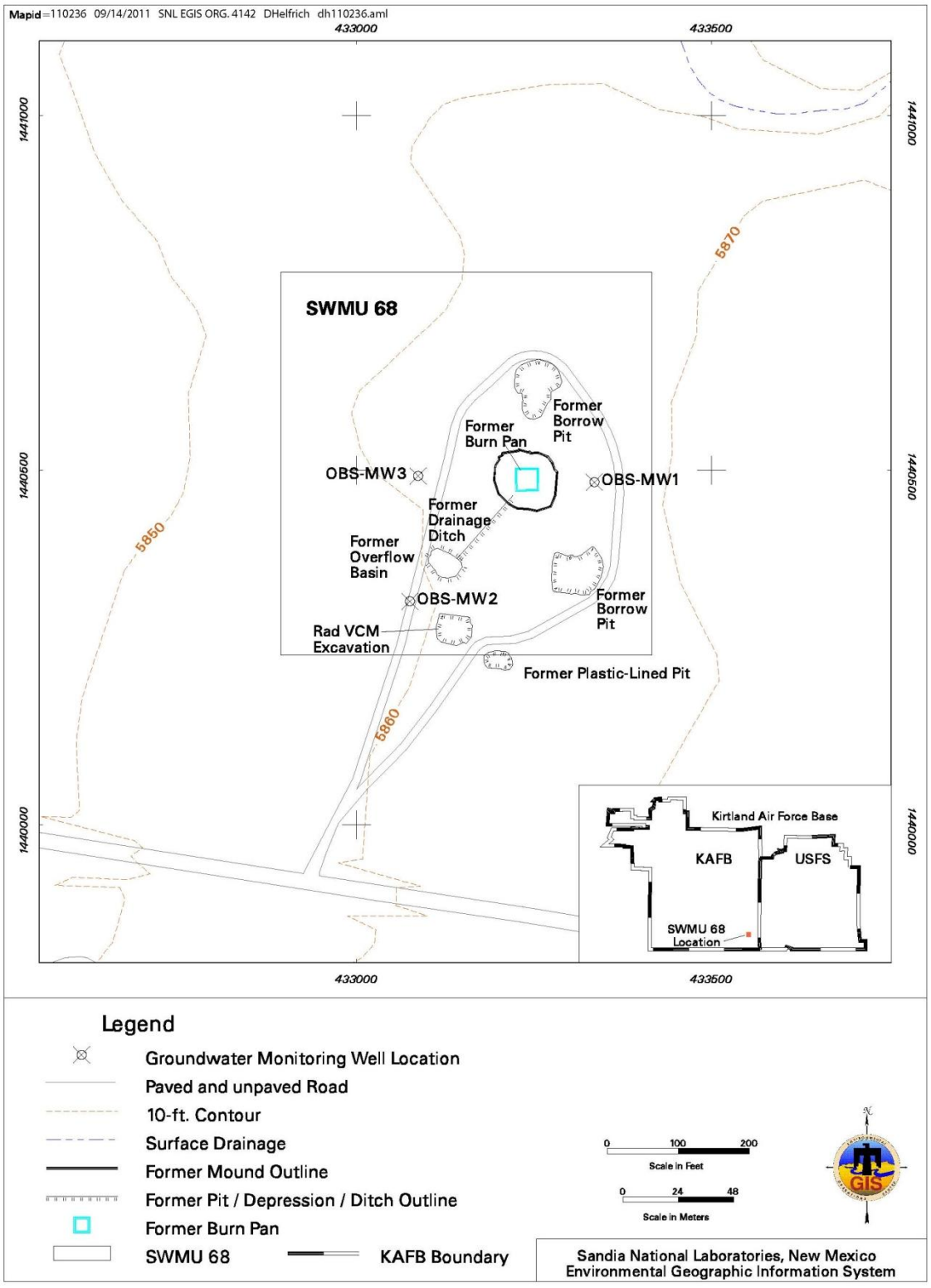

Figure IV-2

Location of Monitoring Wells OBS-MW1, OBS-MW2, and OBS-MW3 within SWMU 68

Tables

Table IV-1

Laboratory Analytical Methods, Container Types, and Preservation Requirements for SWMUs 8/58 and 68 Groundwater Samples

Analysis	Analytical Method[a]	Volume and Container Type/Preservation Requirements
Volatile Organic Compounds	EPA 8260B	3 x 40-mL glass, HCL, 4°C
Semivolatile Organic Compounds	EPA 8270C	3 x 1-L Amber Glass, 4°C
High Explosives	EPA 8321A	4 x 1-L Amber Glass, 4°C
Metals[b]	EPA 6010/6020/7470	1 x 500-mL polyethylene, HNO_3, 4°C
Hexavalent Chromium	EPA 7196A	1 x 250-mL polyethylene, 4°C
Perchlorate	EPA 314.0	1 x 250-mL polyethylene, 4°C
Major Anions and Cations[c]	EPA 6020/9056	1 x 500-mL polyethylene, 4°C
Alkalinity as Total, Carbonate, and Bicarbonate	SM 2320B	1 x 500-mL polyethylene, 4°C
Total Cyanide	EPA SW-846 9012	1 x 250-ML polyethylene, NaOH, 4°C
Nitrate plus Nitrite	EPA 353.2	1 x 250-mL polyethylene, H_2SO_4, 4°C
Gross Alpha/Beta	EPA 900.0	1 x 1-L polyethylene, HNO_3, 4°C
Gamma Spectroscopy[d]	EPA 901.0	1 x 1-L polyethylene, HNO_3, 4°C
Isotopic Uranium	HASL-300	1 x 1-L polyethylene, HNO_3, 4°C

Notes

[a]U.S. Environmental Protection Agency, 1986 (and updates), "*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*," SW-846, 3rd ed., U.S. Environmental Protection Agency, Washington, D.C.
U.S. Environmental Protection Agency, 1999, "*Perchlorate in Drinking Water Using Ion Chromatography*," EPA 815/R-00-014, U.S. Environmental Protection Agency, Washington, D.C.
Clesceri, L.S., A.E. Greenburg, and A.D. Eaton, 1998. *Standard Methods for the Examination of Water and Wastewater,* 20th ed., Standard Method 2320B, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation, Washington, D.C.
U.S. Environmental Protection Agency, 1980, "*Prescribed Procedures for Measurement of Radioactivity in Drinking Water,"* EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.
U.S. Department of Energy, 1990, *"EML Procedures Manual,"* 27th ed., Vol. 1, Rev. 1992, Environmental Measurements Laboratory HASL-300.
[b]Metals = TAL metals including barium, calcium, magnesium, potassium, and sodium, plus uranium.
[c]Major anions include bromide, chloride, fluoride, and sulfate; major cations include calcium, magnesium, potassium, and sodium.
[d]Gamma spectroscopy = Americium-241, Cesium-137, Cobalt-60, and Potassium-40.
°C = Degrees Celsius.
EPA = U.S. Environmental Protection Agency.
H_2SO_4 = Sulfuric acid.
HASL = Health and Safety Laboratory.
HCL = Hydrochloric acid.
HNO_3 = Nitric acid.
L = Liter
mL = Milliliter(s).
NaOH = Sodium Hydroxide.
SM = Standard Method.
SWMU = Solid Waste Management Unit.
TAL = Target Analyte List.

Table IV-2

Sample Details for Second Quarter, CY 2012 Groundwater Sampling

Solid Waste Management Units 8/58 and 68 Groundwater Monitoring Quarterly Assessment

April – June 2012

Well	Sample Identification	AR/COC Number	Associated Groundwater Investigation
CCBA-MW1	092291	614155	SWMUs 8/58
CCBA-MW2	092296	614157	
CCBA-MW2 (dup)	092297		
OBS-MW1	092022	614081	SWMU 68
OBS-MW1 (dup)	092023		
OBS-MW2	092025	614082	
OBS-MW3	092018	614079	

Notes

AR/COC = Analysis Request/Chain of Custody.
CCBA = Coyote Canyon Blast Area.
CY = Calendar Year.
dup = Duplicate environmental sample.
MW = Monitoring well.
OBS = Old Burn Site.
SWMU = Solid Waste Management Unit.

Table IV-3

Summary of Field Water Quality Measurements[a]

Solid Waste Management Units 8/58 and 68 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmhos/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
SWMUs 8/58								
CCBA-MW1	23-Apr-12	16.51	509	112.5	6.96	0.40	28.8	2.80
CCBA-MW2	24-Apr-12	18.90	610	102.0	7.87	0.48	63.5	5.86
SWMU 68								
OBS-MW1	18-Apr-12	17.70	531	99.5	7.75	0.47	39.0	3.71
OBS-MW2	19-Apr-12	17.54	531	100.7	7.73	0.46	39.2	3.74
OBS-MW3	17-Apr-12	16.39	531	30.6	7.74	0.52	43.4	4.24

Notes

[a]Field measurements collected prior to sampling.
°C = Degrees Celsius.
% Sat = Percent saturation.
µmhos/cm = Micromhos per centimeter.
CCBA = Coyote Canyon Blast Area.
ID = Identification.
mg/L = Milligrams per liter.
mV = Millivolts.
MW = Monitoring well.
NTU = Nephelometric turbidity units.
OBS = Old Burn Site.
pH = Potential of hydrogen (negative logarithm of the hydrogen ion concentration).
SWMU = Solid Waste Management Unit.

Table IV-4
Method Detection Limits for Volatile and Semivolatile Organic Compounds
Solid Waste Management Units 8/58 and 68 Groundwater Monitoring
Quarterly Assessment, April – June 2012

SWMU 8/58								
Analyte	**MDL (µg/L)**	**Analytical Method[a]**	**Analyte**	**MDL (µg/L)**	**Analytical Method[a]**	**Analyte**	**MDL (µg/L)**	**Analytical Method[a]**
1,1,1-Trichloroethane	0.300	8260B	1,2,4-Trichlorobenzene	3.00 - 3.16	8270C	Di-n-butyl phthalate	3.00 - 3.16	8270C
1,1,2,2-Tetrachloroethane	0.300	8260B	1,2-Dichlorobenzene	3.00 - 3.16	8270C	Di-n-octyl phthalate	3.00 - 3.16	8270C
1,1,2-Trichloroethane	0.300	8260B	1,3-Dichlorobenzene	3.00 - 3.16	8270C	Dibenz[a,h]anthracene	0.300 - 0.316	8270C
1,1-Dichloroethane	0.300	8260B	1,4-Dichlorobenzene	3.00 - 3.16	8270C	Dibenzofuran	3.00 - 3.16	8270C
1,1-Dichloroethene	0.300	8260B	2,4,5-Trichlorophenol	3.00 - 3.16	8270C	Diethylphthalate	3.00 - 3.16	8270C
1,2-Dichloroethane	0.300	8260B	2,4,6-Trichlorophenol	3.00 - 3.16	8270C	Dimethylphthalate	3.00 - 3.16	8270C
1,2-Dichloropropane	0.300	8260B	2,4-Dichlorophenol	3.00 - 3.16	8270C	Dinitro-o-cresol	3.00 - 3.16	8270C
2-Butanone	2.00	8260B	2,4-Dimethylphenol	3.00 - 3.16	8270C	Diphenyl amine	3.00 - 3.16	8270C
2-Hexanone	2.20	8260B	2,4-Dinitrophenol	5.00 - 5.26	8270C	Fluoranthene	0.300 - 0.316	8270C
4-methyl-, 2-Pentanone	1.50	8260B	2,4-Dinitrotoluene	3.00 - 3.16	8270C	Fluorene	0.300 - 0.316	8270C
Acetone	3.00	8260B	2,6-Dinitrotoluene	3.00 - 3.16	8270C	Hexachlorobenzene	3.00 - 3.16	8270C
Benzene	0.300	8260B	2-Chloronaphthalene	0.300 - 0.316	8270C	Hexachlorobutadiene	3.00 - 3.16	8270C
Bromodichloromethane	0.300	8260B	2-Chlorophenol	3.00 - 3.16	8270C	Hexachlorocyclopentadiene	3.00 - 3.16	8270C
Bromoform	0.300	8260B	2-Methylnaphthalene	0.003 - 0.316	8270C	Hexachloroethane	3.00 - 3.16	8270C
Bromomethane	0.300	8260B	2-Nitroaniline	3.00 - 3.16	8270C	Indeno(1,2,3-c,d)pyrene	0.300 - 0.316	8270C
Carbon disulfide	1.50	8260B	2-Nitrophenol	3.00 - 3.16	8270C	Isophorone	3.00 - 3.16	8270C
Carbon tetrachloride	0.300	8260B	3,3'-Dichlorobenzidine	3.00 - 3.16	8270C	Naphthalene	0.300 - 0.316	8270C
Chlorobenzene	0.300	8260B	3-Nitroaniline	3.00 - 3.16	8270C	Nitro-benzene	3.00 - 3.16	8270C
Chloroethane	0.300	8260B	4-Bromophenyl phenyl ether	3.00 - 3.16	8270C	Pentachlorophenol	3.00 - 3.16	8270C
Chloroform	0.300	8260B	4-Chloro-3-methylphenol	3.00 - 3.16	8270C	Phenanthrene	0.300 - 0.316	8270C
Chloromethane	0.300	8260B	4-Chlorobenzenamine	3.00 - 3.16	8270C	Phenol	3.00 - 3.16	8270C
Dibromochloromethane	0.300	8260B	4-Chlorophenyl phenyl ether	3.00 - 3.16	8270C	Pyrene	0.300 - 0.316	8270C
Ethyl benzene	0.300	8260B	4-Nitroaniline	3.00 - 3.16	8270C	bis(2-Chloroethoxy)methane	3.00 - 3.16	8270C
Methylene chloride	3.00	8260B	4-Nitrophenol	3.00 - 3.16	8270C	bis(2-Chloroethyl)ether	3.00 - 3.16	8270C
Styrene	0.300	8260B	Acenaphthene	0.300 - 0.316	8270C	bis(2-Ethylhexyl)phthalate	3.00 - 3.16	8270C
Tetrachloroethene	0.300	8260B	Acenaphthylene	0.300 - 0.316	8270C	bis-Chloroisopropyl ether	3.00 - 3.16	8270C
Toluene	0.300	8260B	Anthracene	0.300 - 0.316	8270C	m,p-Cresol	3.00 - 3.16	8270C
Trichloroethene	0.300	8260B	Benzo(a)anthracene	0.300 - 0.316	8270C	n-Nitrosodipropylamine	3.00 - 3.16	8270C
Vinyl acetate	1.50	8260B	Benzo(a)pyrene	0.300 - 0.316	8270C	o-Cresol	3.00 - 3.16	8270C
Vinyl chloride	0.300	8260B	Benzo(b)fluoranthene	0.300 - 0.316	8270C			
Xylene	0.300	8260B	Benzo(ghi)perylene	0.300 - 0.316	8270C			
cis-1,2-Dichloroethene	0.300	8260B	Benzo(k)fluoranthene	0.300 - 0.316	8270C			
cis-1,3-Dichloropropene	0.300	8260B	Butylbenzyl phthalate	3.00 - 3.16	8270C			
trans-1,2-Dichloroethene	0.300	8260B	Carbazole	0.300 - 0.316	8270C			
trans-1,3-Dichloropropene	0.300	8260B	Chrysene	0.300 - 0.316	8270C			

Table IV-4 (Continued)
Method Detection Limits for Volatile and Semivolatile Organic Compounds
Solid Waste Management Units 8/58 and 68 Groundwater Monitoring
Quarterly Assessment, April – June 2012

SWMU 68								
Analyte	**MDL (µg/L)**	**Analytical Method[a]**	**Analyte**	**MDL (µg/L)**	**Analytical Method[a]**	**Analyte**	**MDL (µg/L)**	**Analytical Method[a]**
1,1,1-Trichloroethane	0.300	8260B	1,2,4-Trichlorobenzene	2.83 - 3.00	8270C	Di-n-butyl phthalate	2.83 - 3.00	8270C
1,1,2,2-Tetrachloroethane	0.300	8260B	1,2-Dichlorobenzene	2.83 - 3.00	8270C	Di-n-octyl phthalate	2.83 - 3.00	8270C
1,1,2-Trichloroethane	0.300	8260B	1,3-Dichlorobenzene	2.83 - 3.00	8270C	Dibenz[a,h]anthracene	0.283 - 0.300	8270C
1,1-Dichloroethane	0.300	8260B	1,4-Dichlorobenzene	2.83 - 3.00	8270C	Dibenzofuran	2.83 - 3.00	8270C
1,1-Dichloroethene	0.300	8260B	2,4,5-Trichlorophenol	2.83 - 3.00	8270C	Diethylphthalate	2.83 - 3.00	8270C
1,2-Dichloroethane	0.300	8260B	2,4,6-Trichlorophenol	2.83 - 3.00	8270C	Dimethylphthalate	2.83 - 3.00	8270C
1,2-Dichloropropane	0.300	8260B	2,4-Dichlorophenol	2.83 - 3.00	8270C	Dinitro-o-cresol	2.83 - 3.00	8270C
2-Butanone	2.00	8260B	2,4-Dimethylphenol	2.83 - 3.00	8270C	Diphenyl amine	2.83 - 3.00	8270C
2-Hexanone	2.22	8260B	2,4-Dinitrophenol	4.72 - 5.00	8270C	Fluoranthene	0.283 - 0.300	8270C
4-methyl-, 2-Pentanone	1.50	8260B	2,4-Dinitrotoluene	2.83 - 3.00	8270C	Fluorene	0.283 - 0.300	8270C
Acetone	3.00	8260B	2,6-Dinitrotoluene	2.83 - 3.00	8270C	Hexachlorobenzene	2.83 - 3.00	8270C
Benzene	0.300	8260B	2-Chloronaphthalene	0.283 - 0.300	8270C	Hexachlorobutadiene	2.83 - 3.00	8270C
Bromodichloromethane	0.300	8260B	2-Chlorophenol	2.83 - 3.00	8270C	Hexachlorocyclopentadiene	2.83 - 3.00	8270C
Bromoform	0.300	8260B	2-Methylnaphthalene	0.283 - 0.300	8270C	Hexachloroethane	2.83 - 3.00	8270C
Bromomethane	0.300	8260B	2-Nitroaniline	2.83 - 3.00	8270C	Indeno(1,2,3-c,d)pyrene	0.283 - 0.300	8270C
Carbon disulfide	1.50	8260B	2-Nitrophenol	2.83 - 3.00	8270C	Isophorone	2.83 - 3.00	8270C
Carbon tetrachloride	0.300	8260B	3,3'-Dichlorobenzidine	2.83 - 3.00	8270C	Naphthalene	0.283 - 0.300	8270C
Chlorobenzene	0.300	8260B	3-Nitroaniline	2.83 - 3.00	8270C	Nitro-benzene	2.83 - 3.00	8270C
Chloroethane	0.300	8260B	4-Bromophenyl phenyl ether	2.83 - 3.00	8270C	Pentachlorophenol	2.83 - 3.00	8270C
Chloroform	0.300	8260B	4-Chloro-3-methylphenol	2.83 - 3.00	8270C	Phenanthrene	0.283 - 0.300	8270C
Chloromethane	0.300	8260B	4-Chlorobenzenamine	2.83 - 3.00	8270C	Phenol	2.83 - 3.00	8270C
Dibromochloromethane	0.300	8260B	4-Chlorophenyl phenyl ether	2.83 - 3.00	8270C	Pyrene	0.283 - 0.300	8270C
Ethyl benzene	0.300	8260B	4-Nitroaniline	2.83 - 3.00	8270C	bis(1-Chloroisopropyl)ether	2.83 - 3.00	8270C
Methylene chloride	3.00	8260B	4-Nitrophenol	2.83 - 3.00	8270C	bis(2-Chloroethoxy)methane	2.83 - 3.00	8270C
Styrene	0.300	8260B	Acenaphthene	0.283 - 0.300	8270C	bis(2-Chloroethyl)ether	2.83 - 3.00	8270C
Tetrachloroethene	0.300	8260B	Acenaphthylene	0.283 - 0.300	8270C	bis(2-Ethylhexyl)phthalate	2.83 - 3.00	8270C
Toluene	0.300	8260B	Anthracene	0.283 - 0.300	8270C	m,p-Cresol	2.83 - 3.00	8270C
Trichloroethene	0.300	8260B	Benzo(a)anthracene	0.283 - 0.300	8270C	n-Nitrosodipropylamine	2.83 - 3.00	8270C
Vinyl acetate	1.50	8260B	Benzo(a)pyrene	0.283 - 0.300	8270C	o-Cresol	2.83 - 3.00	8270C
Vinyl chloride	0.300	8260B	Benzo(b)fluoranthene	0.283 - 0.300	8270C			
Xylene	0.300	8260B	Benzo(ghi)perylene	0.283 - 0.300	8270C			
cis-1,2-Dichloroethene	0.300	8260B	Benzo(k)fluoranthene	0.283 - 0.300	8270C			
cis-1,3-Dichloropropene	0.300	8260B	Butylbenzyl phthalate	2.83 - 3.00	8270C			
trans-1,2-Dichloroethene	0.300	8260B	Carbazole	0.283 - 0.300	8270C			
trans-1,3-Dichloropropene	0.300	8260B	Chrysene	0.283 - 0.300	8270C			

Table IV-4 (Concluded)
Method Detection Limits for Volatile and Semivolatile Organic Compounds
Solid Waste Management Units 8/58 and 68 Groundwater Monitoring
Quarterly Assessment, April – June 2012

Notes

[a]U.S. Environmental Protection Agency, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.
U.S. Environmental Protection Agency, 1984, "Methods for Chemical Analysis of Water and Wastes," EPA 600-4-79-020.
µg/L = Micrograms per liter.
MDL = Method detection limit. The minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.
SWMU = Solid Waste Management Unit.

Table IV-5

Method Detection Limits for High Explosive Compounds (EPA Method 8321A)

Solid Waste Management Units 8/58 and 68 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Analyte	MDL (µg/L)	
	SWMUs 8/58	SWMU 68
1,3,5-Trinitrobenzene	0.0833 – 0.0899	0.0833 – 0.0894
1,3-Dinitrobenzene	0.0833 – 0.0899	0.0833 – 0.0894
2,4,6-Trinitrotoluene	0.0833 – 0.0899	0.0833 – 0.0894
2,4-Dinitrotoluene	0.0833 – 0.0899	0.0833 – 0.0894
2,6-Dinitrotoluene	0.0833 – 0.0899	0.0833 – 0.0894
2-Amino-4,6-dinitrotoluene	0.0833 – 0.0899	0.0833 – 0.0894
2-Nitrotoluene	0.0854 – 0.0921	0.0854 – 0.0916
3-Nitrotoluene	0.0833 – 0.0899	0.0833 – 0.0894
4-Amino-2,6-dinitrotoluene	0.0833 – 0.0899	0.0833 – 0.0894
4-Nitrotoluene	0.156 – 0.169	0.1560 – 0.1680
HMX	0.0833 – 0.0899	0.0833 – 0.0894
Nitrobenzene	0.0833 – 0.0899	0.0833 – 0.0894
PETN	0.104 – 0.112	0.1040 – 0.1120
RDX	0.0833 – 0.0899	0.0833 – 0.0894
Tetryl	0.0833 – 0.0899	0.0833 – 0.0894

Notes

µg/L = Micrograms per liter.
EPA = U.S. Environmental Protection Agency.
HMX = Tetrahexamine tetranitramine.
MDL = Method detection limit. The minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.
PETN = Pentaerythritol tetranitrate.
RDX = Hexahydro-trinitro-triazine.
SWMU = Solid Waste Management Unit.
Tetryl = 2,4,6-trinitrophenylmethylnitramine.

Table IV-6

Summary of Nitrate Plus Nitrite Results

Solid Waste Management Units 8/58 and 68 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample Number	Analytical Method[c]
SWMUs 8/58									
CCBA-MW1 23-Apr-12	Nitrate plus nitrite as N	2.17	0.170	0.500	10.0			092291-018	EPA 353.2
CCBA-MW2 24-Apr-12	Nitrate plus nitrite as N	3.72	0.170	0.500	10.0			092296-018	EPA 353.2
CCBA-MW2 (Duplicate) 24-Apr-12	Nitrate plus nitrite as N	3.14	0.170	0.500	10.0			092297-018	EPA 353.2
SWMU 68									
OBS-MW1 18-Apr-12	Nitrate plus nitrite as N	1.80	0.170	0.500	10.0			092022-018	EPA 353.2
OBS-MW1 (Duplicate) 18-Apr-12	Nitrate plus nitrite as N	1.85	0.170	0.500	10.0			092023-018	EPA 353.2
OBS-MW2 19-Apr-12	Nitrate plus nitrite as N	1.43	0.085	0.250	10.0			092025-018	EPA 353.2
OBS-MW3 17-Apr-12	Nitrate plus nitrite as N	1.61	0.170	0.500	10.0			092018-018	EPA 353.2

Notes

CCBA = Coyote Canyon Blast Area.
CFR = Code of Federal Regulations.
EPA = U.S. Environmental Protection Agency.
ID = Identification.
MCL = Maximum contaminant level. Established by the EPA Primary Water Regulations (40 CFR 141.11, Subpart B), National Primary Drinking Water Standards (EPA, 2009).
MDL = Method detection limit. The minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.
mg/L = Milligrams per liter.
MW = Monitoring well.
N = Nitrogen.
OBS = Old Burn Site.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.
SWMU = Solid Waste Management Unit.

Table IV-6 (Concluded)

Summary of Nitrate Plus Nitrite Results

Solid Waste Management Units 8/58 and 68 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Notes (continued)

[a]Laboratory Qualifier

[b]Validation Qualifier
If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

[c]Analytical Method
U.S. Environmental Protection Agency, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.
U.S. Environmental Protection Agency, 1984, "Methods for Chemical Analysis of Water and Wastes," EPA 600-4-79-020.

Table IV-7

Summary of Alkalinity, Anion, and Total Cyanide Results

Solid Waste Management Units 8/58 and 68 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample Number	Analytical Method[c]
SWMUs 8/58									
CCBA-MW1	Bicarbonate Alkalinity	185	0.725	1.00	NE			092291-022	SM2320B
23-Apr-12	Carbonate Alkalinity	ND	0.725	1.00	NE	U		092291-022	SM2320B
	Bromide	0.312	0.067	0.200	NE			092291-016	SW846 9056
	Chloride	24.4	0.335	1.00	NE			092291-016	SW846 9056
	Fluoride	**4.93**	0.033	0.100	4.0			092291-016	SW846 9056
	Sulfate	49.3	0.665	2.00	NE			092291-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	092291-027	SW846 9012
CCBA-MW2	Bicarbonate Alkalinity	180	0.725	1.00	NE			092296-022	SM2320B
24-Apr-12	Carbonate Alkalinity	ND	0.725	1.00	NE	U		092296-022	SM2320B
	Bromide	0.545	0.067	0.200	NE			092296-016	SW846 9056
	Chloride	32.7	0.670	2.00	NE			092296-016	SW846 9056
	Fluoride	1.54	0.033	0.100	4.0			092296-016	SW846 9056
	Sulfate	86.6	1.33	4.00	NE			092296-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	092296-027	SW846 9012
CCBA-MW2	Bicarbonate Alkalinity	183	0.725	1.00	NE			092297-022	SM2320B
(Duplicate)	Carbonate Alkalinity	ND	0.725	1.00	NE	U		092297-022	SM2320B
24-Apr-12	Bromide	0.566	0.067	0.200	NE			092297-016	SW846 9056
	Chloride	34.2	0.670	2.00	NE			092297-016	SW846 9056
	Fluoride	1.54	0.033	0.100	4.0			092297-016	SW846 9056
	Sulfate	90.2	1.33	4.00	NE			092297-016	SW846 9056
	Total Cyanide	0.00441	0.00167	0.005	0.200	J	NJ-	092297-027	SW846 9012

Table IV-7 (Continued)

Summary of Alkalinity, Anion, and Total Cyanide Results

Solid Waste Management Units 8/58 and 68 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample Number	Analytical Method[c]
SWMU 68									
OBS-MW1 18-Apr-12	Bicarbonate Alkalinity	188	0.725	1.00	NE			092022-022	SM2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		092022-022	SM2320B
	Bromide	0.360	0.067	0.200	NE			092022-016	SW846 9056
	Chloride	21.8	0.335	1.00	NE			092022-016	SW846 9056
	Fluoride	1.99	0.033	0.100	4.0			092022-016	SW846 9056
	Sulfate	74.6	0.665	2.00	NE			092022-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	092022-027	SW846 9012
OBS-MW1 (Duplicate) 18-Apr-12	Bicarbonate Alkalinity	188	0.725	1.00	NE			092023-022	SM2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		092023-022	SM2320B
	Bromide	0.336	0.067	0.200	NE			092023-016	SW846 9056
	Chloride	21.7	0.335	1.00	NE			092023-016	SW846 9056
	Fluoride	2.01	0.033	0.100	4.0			092023-016	SW846 9056
	Sulfate	74.7	0.665	2.00	NE			092023-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	092023-027	SW846 9012
OBS-MW2 19-Apr-12	Bicarbonate Alkalinity	178	0.725	1.00	NE			092025-022	SM2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		092025-022	SM2320B
	Bromide	0.335	0.067	0.200	NE			092025-016	SW846 9056
	Chloride	21.1	0.335	1.00	NE			092025-016	SW846 9056
	Fluoride	2.06	0.033	0.100	4.0			092025-016	SW846 9056
	Sulfate	83.6	0.665	2.00	NE			092025-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	092025-027	SW846 9012
OBS-MW3 17-Apr-12	Bicarbonate Alkalinity	178	0.725	1.00	NE			092018-022	SM2320B
	Carbonate Alkalinity	ND	0.725	1.00	NE	U		092018-022	SM2320B
	Bromide	0.335	0.067	0.200	NE			092018-016	SW846 9056
	Chloride	21.9	0.335	1.00	NE			092018-016	SW846 9056
	Fluoride	2.10	0.033	0.100	4.0			092018-016	SW846 9056
	Sulfate	83.4	0.665	2.00	NE			092018-016	SW846 9056
	Total Cyanide	ND	0.00167	0.005	0.200	U	UJ	092018-027	SW846 9012

Table IV-7 (Concluded)

Summary of Alkalinity, Anion, and Total Cyanide Results

Solid Waste Management Units 8/58 and 68 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Notes

CCBA = Coyote Canyon Blast Area.
CFR = Code of Federal Regulations.
EPA = U.S. Environmental Protection Agency.
ID = Identification.
MCL = Maximum contaminant level. Established by the EPA Primary Water Regulations (40 CFR 141.11, Subpart B), National Primary Drinking Water Standards (EPA, 2009).
MDL = Method detection limit. The minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.
mg/L = Milligrams per liter.
MW = Monitoring well.
ND = Not detected (at MDL).
NE = Not established.
OBS = Old Burn Site.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.
SM = Standard Method.
SW = Solid Waste.
SWMU = Solid Waste Management Unit.

[a]Laboratory Qualifier
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
U = Analyte is absent or below the method detection limit.

[b]Validation Qualifier
If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.
NJ- = Presumptive evidence of the presence of the material at an estimated quantity with a suspected negative bias.
UJ = The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

[c]Analytical Method
U.S. Environmental Protection Agency, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.
U.S. Environmental Protection Agency, 1984, "Methods for Chemical Analysis of Water and Wastes," EPA 600-4-79-020, U.S. Environmental Protection Agency, Washington, D.C. or Clesceri, Greenburg, and Eaton, 1998, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., Method 2320B.

Table IV-8

Summary of Perchlorate Results

Solid Waste Management Units 8/58 and 68 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Well ID	Perchlorate Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample Number	Analytical Method[c]
SWMUs 8/58								
CCBA-MW1 23-Apr-12	ND	0.004	0.012	NE	U		092291-020	EPA 314.0
CCBA-MW2 24-Apr-12	ND	0.004	0.012	NE	U		092296-020	EPA 314.0
CCBA-MW2 (Duplicate) 24-Apr-12	ND	0.004	0.012	NE	U		092297-020	EPA 314.0
SWMU 68								
OBS-MW1 18-Apr-12	ND	0.004	0.012	NE	U		092022-020	EPA 314.0
OBS-MW1 (Duplicate) 18-Apr-12	ND	0.004	0.012	NE	U		092023-020	EPA 314.0
OBS-MW2 19-Apr-12	ND	0.004	0.012	NE	U		092025-020	EPA 314.0
OBS-MW3 17-Apr-12	ND	0.004	0.012	NE	U		092018-020	EPA 314.0

Notes

CCBA = Coyote Canyon Blast Area.
CFR = Code of Federal Regulations.
EPA = U.S. Environmental Protection Agency.
ID = Identification.
MCL = Maximum contaminant level. Established by the EPA Primary Water Regulations (40 CFR 141.11, Subpart B), National Primary Drinking Water Standards (EPA, 2009).
MDL = Method detection limit. The minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.
mg/L = Milligrams per liter.
MW = Monitoring well.
ND = Not detected (at MDL).
NE = Not established.
OBS = Old Burn Site.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.
SWMU = Solid Waste Management Unit.

Table IV-8 (Concluded)

Summary of Perchlorate Results

Solid Waste Management Units 8/58 and 68 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Notes (continued)

[a]Laboratory Qualifier
U = Analyte is absent or below the method detection limit.

[b]Validation Qualifier
If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

[c]Analytical Method
U.S. Environmental Protection Agency, 1999 (and updates), *"Perchlorate in Drinking Water Using Ion Chromatography,"* EPA 815/R-00-014.

Table IV-9

Summary of Hexavalent Chromium Results

Solid Waste Management Unit 68 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Well ID	Hexavalent Chromium Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample Number	Analytical Method[c]
OBS-MW1 18-Apr-12	ND	0.0033	0.010	NE	U		092022-014	SW846 7196A
OBS-MW1 (Duplicate) 18-Apr-12	ND	0.0033	0.010	NE	U		092023-014	SW846 7196A
OBS-MW2 19-Apr-12	ND	0.0033	0.010	NE	U		092025-014	SW846 7196A
OBS-MW3 17-Apr-12	ND	0.0033	0.010	NE	U		092018-014	SW846 7196A

Notes

CFR = Code of Federal Regulations.
EPA = U.S. Environmental Protection Agency.
ID = Identification.
MCL = Maximum contaminant level. Established by the EPA Primary Water Regulations (40 CFR 141.11, Subpart B), National Primary Drinking Water Standards (EPA, 2009).
MDL = Method detection limit. The minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.
mg/L = Milligrams per liter.
MW = Monitoring well.
ND = Not detected (at MDL).
NE = Not established.
OBS = Old Burn Site.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

[a]Laboratory Qualifier

U = Analyte is absent or below the method detection limit.

[b]Validation Qualifier
If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

[c]Analytical Method
U.S. Environmental Protection Agency, 1986 (and updates), *"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,"* SW-846, 3rd ed.

Table IV-10

Summary of Unfiltered Total Metal Results

Solid Waste Management Units 8/58 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample Number	Analytical Method[c]
CCBA-MW1	Aluminum	0.0307	0.015	0.050	NE	J		092291-009	SW846 6020
23-Apr-12	Antimony	ND	0.001	0.003	0.006	U		092291-009	SW846 6020
	Arsenic	0.00186	0.0017	0.005	0.010	J		092291-009	SW846 6020
	Barium	0.00425	0.0006	0.002	2.00			092291-009	SW846 6020
	Beryllium	0.00049	0.0002	0.0005	0.004	J		092291-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		092291-009	SW846 6020
	Calcium	41.8	0.060	0.200	NE	B	J	092291-009	SW846 6020
	Chromium	0.00369	0.002	0.010	0.100	B, J	0.01885U	092291-009	SW846 6020
	Cobalt	0.000149	0.0001	0.001	NE	J		092291-009	SW846 6020
	Copper	0.000704	0.00035	0.001	NE	J		092291-009	SW846 6020
	Iron	0.163	0.033	0.100	NE			092291-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		092291-009	SW846 6020
	Magnesium	9.64	0.010	0.030	NE			092291-009	SW846 6020
	Manganese	0.00714	0.001	0.005	NE			092291-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	092291-009	SW846 7470
	Nickel	0.00117	0.0005	0.002	NE	J		092291-009	SW846 6020
	Potassium	4.22	0.080	0.300	NE			092291-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		092291-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		092291-009	SW846 6020
	Sodium	67.0	0.400	1.25	NE			092291-009	SW846 6020
	Thallium	0.000674	0.00045	0.002	0.002	J	0.0038U	092291-009	SW846 6020
	Uranium	0.002	0.000067	0.0002	0.03			092291-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		092291-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		092291-009	SW846 6020

Table IV-10 (Continued)

Summary of Unfiltered Total Metal Results

Solid Waste Management Units 8/58 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample Number	Analytical Method[c]
CCBA-MW2	Aluminum	ND	0.015	0.050	NE	U		092296-009	SW846 6020
24-Apr-12	Antimony	ND	0.001	0.003	0.006	U		092296-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		092296-009	SW846 6020
	Barium	0.0452	0.0006	0.002	2.00			092296-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		092296-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		092296-009	SW846 6020
	Calcium	73.4	0.300	1.00	NE	B	J	092296-009	SW846 6020
	Chromium	0.00355	0.002	0.010	0.100	B, J	0.01885U	092296-009	SW846 6020
	Cobalt	0.000131	0.0001	0.001	NE	J		092296-009	SW846 6020
	Copper	0.00118	0.00035	0.001	NE		0.00555U	092296-009	SW846 6020
	Iron	0.286	0.033	0.100	NE			092296-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		092296-009	SW846 6020
	Magnesium	14.8	0.010	0.030	NE			092296-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		092296-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	092296-009	SW846 7470
	Nickel	0.00134	0.0005	0.002	NE	J		092296-009	SW846 6020
	Potassium	1.37	0.080	0.300	NE			092296-009	SW846 6020
	Selenium	0.00269	0.0015	0.005	0.050	J		092296-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		092296-009	SW846 6020
	Sodium	42.9	0.080	0.250	NE			092296-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		092296-009	SW846 6020
	Uranium	0.00565	0.000067	0.0002	0.03			092296-009	SW846 6020
	Vanadium	0.00939	0.001	0.005	NE			092296-009	SW846 6010
	Zinc	0.00714	0.0035	0.010	NE	J		092296-009	SW846 6020

Table IV-10 (Continued)

Summary of Unfiltered Total Metal Results

Solid Waste Management Units 8/58 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample Number	Analytical Method[c]
CCBA-MW2 (Duplicate) 24-Apr-12	Aluminum	ND	0.015	0.050	NE	U		092297-009	SW846 6020
	Antimony	0.0011	0.001	0.003	0.006	J		092297-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		092297-009	SW846 6020
	Barium	0.0461	0.0006	0.002	2.00			092297-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		092297-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		092297-009	SW846 6020
	Calcium	71.8	0.300	1.00	NE	B	J	092297-009	SW846 6020
	Chromium	0.00415	0.002	0.010	0.100	B, J	0.01885U	092297-009	SW846 6020
	Cobalt	0.000139	0.0001	0.001	NE	J		092297-009	SW846 6020
	Copper	0.00122	0.00035	0.001	NE		0.00555U	092297-009	SW846 6020
	Iron	0.294	0.033	0.100	NE			092297-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		092297-009	SW846 6020
	Magnesium	14.6	0.010	0.030	NE			092297-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		092297-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	092297-009	SW846 7470
	Nickel	0.0013	0.0005	0.002	NE	J		092297-009	SW846 6020
	Potassium	1.49	0.080	0.300	NE			092297-009	SW846 6020
	Selenium	0.00245	0.0015	0.005	0.050	J		092297-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		092297-009	SW846 6020
	Sodium	43.4	0.080	0.250	NE			092297-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		092297-009	SW846 6020
	Uranium	0.00579	0.000067	0.0002	0.03			092297-009	SW846 6020
	Vanadium	0.00955	0.001	0.005	NE			092297-009	SW846 6010
	Zinc	0.00647	0.0035	0.010	NE	J		092297-009	SW846 6020

Table IV-10 (Concluded)

Summary of Unfiltered Total Metal Results

Solid Waste Management Units 8/58 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Notes

CCBA = Coyote Canyon Blast Area.
CFR = Code of Federal Regulations.
EPA = U.S. Environmental Protection Agency.
ID = Identification.
MCL = Maximum contaminant level. Established by the EPA Primary Water Regulations (40 CFR 141.11, Subpart B), National Primary Drinking Water Standards (EPA, 2009).
MDL = Method detection limit. The minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.
mg/L = Milligrams per liter.
MW = Monitoring well.
ND = Not detected (at MDL).
NE = Not established.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

[a]Laboratory Qualifier
B = The analyte was detected in the blank above the effective method detection limit (MDL).
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
U = Analyte is absent or below the method detection limit.

[b]Validation Qualifier
If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.
J = The associated value is an estimated quantity.
U = The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.
UJ = The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

[c]Analytical Method
U.S. Environmental Protection Agency, 1986 (and updates), *"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,"* SW-846, 3rd ed.

Table IV-11

Summary of Unfiltered Total Metal Results

Solid Waste Management Unit 68 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample Number	Analytical Method[c]
OBS-MW1	Aluminum	0.028	0.015	0.050	NE	J		092022-009	SW846 6020
18-Apr-12	Antimony	ND	0.001	0.003	0.006	U		092022-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		092022-009	SW846 6020
	Barium	0.0202	0.0006	0.002	2.00			092022-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		092022-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		092022-009	SW846 6020
	Calcium	77.5	0.300	1.00	NE			092022-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		092022-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		092022-009	SW846 6020
	Copper	0.000517	0.00035	0.001	NE	J	0.0065U	092022-009	SW846 6020
	Iron	0.120	0.033	0.100	NE			092022-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		092022-009	SW846 6020
	Magnesium	16.1	0.010	0.030	NE			092022-009	SW846 6020
	Manganese	0.00114	0.001	0.005	NE	J		092022-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	092022-009	SW846 7470
	Nickel	0.000961	0.0005	0.002	NE	J		092022-009	SW846 6020
	Potassium	1.71	0.080	0.300	NE			092022-009	SW846 6020
	Selenium	0.00272	0.0015	0.005	0.050	J		092022-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		092022-009	SW846 6020
	Sodium	22.9	0.080	0.250	NE			092022-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		092022-009	SW846 6020
	Uranium	0.0104	0.000067	0.0002	0.03			092022-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		092022-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		092022-009	SW846 6020

Table IV-11 (Continued)

Summary of Unfiltered Total Metal Results

Solid Waste Management Unit 68 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample Number	Analytical Method[c]
OBS-MW1 (Duplicate) 18-Apr-12	Aluminum	ND	0.015	0.050	NE	U		092023-009	SW846 6020
	Antimony	0.0013	0.001	0.003	0.006	J	0.0064U	092023-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		092023-009	SW846 6020
	Barium	0.0193	0.0006	0.002	2.00			092023-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		092023-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		092023-009	SW846 6020
	Calcium	78.7	0.300	1.00	NE			092023-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		092023-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		092023-009	SW846 6020
	Copper	0.000514	0.00035	0.001	NE	J	0.0065U	092023-009	SW846 6020
	Iron	0.132	0.033	0.100	NE			092023-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		092023-009	SW846 6020
	Magnesium	16.6	0.010	0.030	NE			092023-009	SW846 6020
	Manganese	0.00111	0.001	0.005	NE	J		092023-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	092023-009	SW846 7470
	Nickel	0.000945	0.0005	0.002	NE	J		092023-009	SW846 6020
	Potassium	1.85	0.080	0.300	NE			092023-009	SW846 6020
	Selenium	0.00278	0.0015	0.005	0.050	J		092023-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		092023-009	SW846 6020
	Sodium	23.3	0.080	0.250	NE			092023-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		092023-009	SW846 6020
	Uranium	0.0106	0.000067	0.0002	0.03			092023-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		092023-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		092023-009	SW846 6020

Table IV-11 (Continued)

Summary of Unfiltered Total Metal Results

Solid Waste Management Unit 68 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample Number	Analytical Method[c]
OBS-MW2 19-Apr-12	Aluminum	ND	0.015	0.050	NE	U		092025-009	SW846 6020
	Antimony	ND	0.001	0.003	0.006	U		092025-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		092025-009	SW846 6020
	Barium	0.0222	0.0006	0.002	2.00			092025-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		092025-009	SW846 6020
	Cadmium	0.000133	0.00011	0.001	0.005	B, J	U	092025-009	SW846 6020
	Calcium	81.5	0.600	2.00	NE			092025-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		092025-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		092025-009	SW846 6020
	Copper	0.000369	0.00035	0.001	NE	J		092025-009	SW846 6020
	Iron	0.138	0.033	0.100	NE			092025-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		092025-009	SW846 6020
	Magnesium	20.0	0.100	0.300	NE			092025-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		092025-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	092025-009	SW846 7470
	Nickel	0.000929	0.0005	0.002	NE	J		092025-009	SW846 6020
	Potassium	1.78	0.080	0.300	NE			092025-009	SW846 6020
	Selenium	0.00324	0.0015	0.005	0.050	J		092025-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		092025-009	SW846 6020
	Sodium	29.0	0.800	2.50	NE			092025-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		092025-009	SW846 6020
	Uranium	0.0141	0.000067	0.0002	0.03			092025-009	SW846 6020
	Vanadium	0.00126	0.001	0.005	NE	J		092025-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		092025-009	SW846 6020

Table IV-11 (Continued)

Summary of Unfiltered Total Metal Results

Solid Waste Management Unit 68 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample Number	Analytical Method[c]
OBS-MW3 17-Apr-12	Aluminum	ND	0.015	0.050	NE	U		092018-009	SW846 6020
	Antimony	ND	0.001	0.003	0.006	U		092018-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		092018-009	SW846 6020
	Barium	0.0259	0.0006	0.002	2.00			092018-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		092018-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		092018-009	SW846 6020
	Calcium	78.7	0.300	1.00	NE	B		092018-009	SW846 6020
	Chromium	0.00219	0.002	0.010	0.100	B, J	0.0109U	092018-009	SW846 6020
	Cobalt	0.000154	0.0001	0.001	NE	J		092018-009	SW846 6020
	Copper	0.00101	0.00035	0.001	NE			092018-009	SW846 6020
	Iron	0.258	0.033	0.100	NE			092018-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		092018-009	SW846 6020
	Magnesium	16.2	0.010	0.030	NE		J	092018-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		092018-009	SW846 6020
	Mercury	ND	0.000067	0.0002	0.002	U	UJ	092018-009	SW846 7470
	Nickel	0.00143	0.0005	0.002	NE	J		092018-009	SW846 6020
	Potassium	1.69	0.080	0.300	NE			092018-009	SW846 6020
	Selenium	0.00286	0.0015	0.005	0.050	J		092018-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		092018-009	SW846 6020
	Sodium	22.4	0.080	0.250	NE			092018-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		092018-009	SW846 6020
	Uranium	0.0116	0.000067	0.0002	0.03			092018-009	SW846 6020
	Vanadium	0.00128	0.001	0.005	NE	J		092018-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		092018-009	SW846 6020

Table IV-11 (Concluded)

Summary of Unfiltered Total Metal Results

Solid Waste Management Unit 68 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Notes

CFR = Code of Federal Regulations.
EPA = U.S. Environmental Protection Agency.
ID = Identification.
MCL = Maximum contaminant level. Established by the EPA Primary Water Regulations (40 CFR 141.11, Subpart B), National Primary Drinking Water Standards (EPA, 2009).
MDL = Method detection limit. The minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.
mg/L = Milligrams per liter.
MW = Monitoring well.
ND = Not detected (at MDL).
NE = Not established.
OBS = Old Burn Site.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

[a]Laboratory Qualifier
B = The analyte was detected in the blank above the effective method detection limit (MDL).
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
U = Analyte is absent or below the method detection limit.

[b]Validation Qualifier
If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.
J = The associated value is an estimated quantity.
U = The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.
UJ = The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

[c]Analytical Method
U.S. Environmental Protection Agency, 1986 (and updates), *"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,"* SW-846, 3rd ed.

Table IV-12

Summary of Filtered Cation Results

Solid Waste Management Units 8/58 and 68 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample Number	Analytical Method[c]
SWMUs 8/58									
CCBA-MW1	Calcium	40.9	0.060	0.200	NE	B	J	092291-017	SW846 6020
23-Apr-12	Magnesium	8.61	0.010	0.030	NE			092291-017	SW846 6020
	Potassium	4.19	0.080	0.300	NE			092291-017	SW846 6020
	Sodium	61.3	0.400	1.25	NE			092291-017	SW846 6020
CCBA-MW2	Calcium	76.0	0.300	1.00	NE	B	J	092296-017	SW846 6020
24-Apr-12	Magnesium	13.2	0.010	0.030	NE			092296-017	SW846 6020
	Potassium	1.30	0.080	0.300	NE			092296-017	SW846 6020
	Sodium	44.5	0.080	0.250	NE			092296-017	SW846 6020
CCBA-MW2	Calcium	74.1	0.300	1.00	NE	B	J	092297-017	SW846 6020
(Duplicate)	Magnesium	13.4	0.010	0.030	NE			092297-017	SW846 6020
24-Apr-12	Potassium	1.41	0.080	0.300	NE			092297-017	SW846 6020
	Sodium	47.6	0.080	0.250	NE			092297-017	SW846 6020
SWMU 68									
OBS-MW1	Calcium	83.8	0.300	1.00	NE			092022-017	SW846 6020
18-Apr-12	Magnesium	17.1	0.010	0.030	NE			092022-017	SW846 6020
	Potassium	1.88	0.080	0.300	NE			092022-017	SW846 6020
	Sodium	24.4	0.080	0.250	NE			092022-017	SW846 6020
OBS-MW1	Calcium	80.0	0.300	1.00	NE			092023-017	SW846 6020
(Duplicate)	Magnesium	16.7	0.010	0.030	NE			092023-017	SW846 6020
18-Apr-12	Potassium	1.75	0.080	0.300	NE			092023-017	SW846 6020
	Sodium	22.5	0.080	0.250	NE			092023-017	SW846 6020
OBS-MW2	Calcium	90.2	0.600	2.00	NE			092025-017	SW846 6020
19-Apr-12	Magnesium	20.6	0.100	0.300	NE			092025-017	SW846 6020
	Potassium	1.73	0.080	0.300	NE			092025-017	SW846 6020
	Sodium	28.4	0.800	2.50	NE			092025-017	SW846 6020
OBS-MW3	Calcium	79.5	0.300	1.00	NE	B		092018-017	SW846 6020
17-Apr-12	Magnesium	17.2	0.010	0.030	NE		J	092018-017	SW846 6020
	Potassium	1.69	0.080	0.300	NE			092018-017	SW846 6020
	Sodium	23.0	0.080	0.250	NE			092018-017	SW846 6020

Table IV-12 (Concluded)

Summary of Filtered Cation Results

Solid Waste Management Units 8/58 and 68 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Notes

CCBA = Coyote Canyon Blast Area.
CFR = Code of Federal Regulations.
EPA = U.S. Environmental Protection Agency.
ID = Identification.
MCL = Maximum contaminant level. Established by the EPA Primary Water Regulations (40 CFR 141.11, Subpart B), National Primary Drinking Water Standards (EPA, 2009).
MDL = Method detection limit. The minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.
mg/L = Milligrams per liter.
MW = Monitoring well.
NE = Not established.
OBS = Old Burn Site.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.
SW = Solid Waste.
SWMU = Solid Waste Management Unit.

[a]**Laboratory Qualifier**
B = The analyte was detected in the blank above the effective MDL.

[b]**Validation Qualifier**
If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.
J = The associated value is an estimated quantity.

[c]**Analytical Method**
U.S. Environmental Protection Agency, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3rd ed.

Table IV-13

Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results

Solid Waste Management Units 8/58 and 68 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Well ID	Analyte	Activity[a] (pCi/L)	MDA (pCi/L)	Critical Level[b] (pCi/L)	MCL	Laboratory Qualifier[c]	Validation Qualifier[d]	Sample Number	Analytical Method[e]
SWMUs 8/58									
CCBA-MW1	Americium-241	-3.18 ± 16.1	23.6	11.6	NE	U	BD	092291-033	EPA 901.1
23-Apr-12	Cesium-137	-0.851 ± 3.13	4.48	2.18	NE	U	BD	092291-033	EPA 901.1
	Cobalt-60	0.875 ± 2.54	4.54	2.18	NE	U	BD	092291-033	EPA 901.1
	Potassium-40	97.0 ± 41.1	40.9	19.5	NE	X	R	092291-033	EPA 901.1
	Gross Alpha	-0.42	NA	NA	15 **pCi/L**	NA	None	092291-034	EPA 900.0
	Gross Beta	4.93 ± 1.11	0.942	0.449	4mrem/yr			092291-034	EPA 900.0
	Uranium-233/234	1.74 ± 0.280	0.0805	0.0343	NE			092291-035	HASL-300
	Uranium-235/236	0.0382 ± 0.0358	0.0571	0.0211	NE	U	BD	092291-035	HASL-300
	Uranium-238	0.561 ± 0.123	0.0402	0.0141	NE			092291-035	HASL-300
CCBA-MW2	Americium-241	0.557 ± 6.16	10.6	5.20	NE	U	BD	092296-033	EPA 901.1
24-Apr-12	Cesium-137	2.51 ± 2.35	3.37	1.63	NE	U	BD	092296-033	EPA 901.1
	Cobalt-60	-2.58 ± 3.17	3.62	1.73	NE	U	BD	092296-033	EPA 901.1
	Potassium-40	33.4 ± 45.4	28.7	13.5	NE	X	R	092296-033	EPA 901.1
	Gross Alpha	5.18	NA	NA	15 **pCi/L**	NA	None	092296-034	EPA 900.0
	Gross Beta	2.17 ± 1.25	1.94	0.946	4mrem/yr		J	092296-034	EPA 900.0
	Uranium-233/234	7.15 ± 0.906	0.045	0.0192	NE			092296-035	HASL-300
	Uranium-235/236	0.0764 ± 0.0325	0.0319	0.0118	NE		J	092296-035	HASL-300
	Uranium-238	1.69 ± 0.241	0.0225	0.00789	NE			092296-035	HASL-300
CCBA-MW2 (Duplicate)	Americium-241	7.53 ± 5.44	7.54	3.35	NE	U	BD	092297-033	EPA 901.1
24-Apr-12	Cesium-137	-1.72 ± 6.12	6.27	3.07	NE	U	BD	092297-033	EPA 901.1
	Cobalt-60	2.93 ± 2.88	4.73	2.26	NE	U	BD	092297-033	EPA 901.1
	Potassium-40	-6.38 ± 43.4	51.7	24.8	NE	U	BD	092297-033	EPA 901.1
	Gross Alpha	2.13	NA	NA	15 **pCi/L**	NA	None	092297-034	EPA 900.0
	Gross Beta	1.94 ± 0.739	0.982	0.468	4mrem/yr		J	092297-034	EPA 900.0
	Uranium-233/234	6.87 ± 0.923	0.0659	0.028	NE			092297-035	HASL-300
	Uranium-235/236	0.0894 ± 0.0426	0.0467	0.0173	NE		J	092297-035	HASL-300
	Uranium-238	1.71 ± 0.266	0.0329	0.0115	NE			092297-035	HASL-300

Table IV-13 (Continued)

Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results

Solid Waste Management Units 8/58 and 68 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Well ID	Analyte	Activity[a] (pCi/L)	MDA (pCi/L)	Critical Level[b] (pCi/L)	MCL	Laboratory Qualifier[c]	Validation Qualifier[d]	Sample Number	Analytical Method[e]
SWMU 68									
OBS-MW1	Americium-241	3.89 ± 14.8	21.8	10.7	NE	U	BD	092022-033	EPA 901.1
18-Apr-12	Cesium-137	1.73 ± 3.01	4.39	2.13	NE	U	BD	092022-033	EPA 901.1
	Cobalt-60	-1.1 ± 2.38	4.06	1.94	NE	U	BD	092022-033	EPA 901.1
	Potassium-40	59.5 ± 37.3	59.5	24.0	NE	U	BD	092022-033	EPA 901.1
	Gross Alpha	1.78	NA	NA	15 **pCi/L**	NA	None	092022-034	EPA 900.0
	Gross Beta	3.12 ± 1.15	1.49	0.713	4mrem/yr		J	092022-034	EPA 900.0
	Uranium-233/234	17.9 ± 2.37	0.139	0.0618	NE			092022-035	HASL-300
	Uranium-235/236	0.226 ± 0.0879	0.0803	0.0306	NE		J	092022-035	HASL-300
	Uranium-238	3.29 ± 0.499	0.0893	0.0369	NE			092022-035	HASL-300
OBS-MW1 (Duplicate)	Americium-241	8.25 ± 9.66	14.1	6.93	NE	U	BD	092023-033	EPA 901.1
18-Apr-12	Cesium-137	1.17 ± 2.00	3.34	1.62	NE	U	BD	092023-033	EPA 901.1
	Cobalt-60	2.52 ± 2.34	3.77	1.80	NE	U	BD	092023-033	EPA 901.1
	Potassium-40	41.6 ± 42.3	32.0	15.1	NE	X	R	092023-033	EPA 901.1
	Gross Alpha	1.07	NA	NA	15 **pCi/L**	NA	None	092023-034	EPA 900.0
	Gross Beta	3.53 ± 1.32	1.75	0.844	4mrem/yr		J	092023-034	EPA 900.0
	Uranium-233/234	16.6 ± 2.12	0.0792	0.0352	NE			092023-035	HASL-300
	Uranium-235/236	0.197 ± 0.0604	0.0457	0.0174	NE			092023-035	HASL-300
	Uranium-238	3.13 ± 0.438	0.0509	0.021	NE			092023-035	HASL-300
OBS-MW2	Americium-241	-1.31 ± 28.3	41.0	20.2	NE	U	BD	092025-033	EPA 901.1
19-Apr-12	Cesium-137	2.54 ± 3.20	4.68	2.28	NE	U	BD	092025-033	EPA 901.1
	Cobalt-60	-2.36 ± 3.21	5.09	2.45	NE	U	BD	092025-033	EPA 901.1
	Potassium-40	92.2 ± 49.6	50.4	24.2	NE	X	BD	092025-033	EPA 901.1
	Gross Alpha	-0.95	NA	NA	15 **pCi/L**	NA	None	092025-034	EPA 900.0
	Gross Beta	3.97 ± 1.57	2.16	1.05	4mrem/yr		J	092025-034	EPA 900.0
	Uranium-233/234	20.1 ± 2.58	0.0825	0.0366	NE			092025-035	HASL-300
	Uranium-235/236	0.272 ± 0.0745	0.0476	0.0181	NE			092025-035	HASL-300
	Uranium-238	3.88 ± 0.536	0.053	0.0219	NE			092025-035	HASL-300

Table IV-13 (Continued)

Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results

Solid Waste Management Units 8/58 and 68 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Well ID	Analyte	Activity[a] (pCi/L)	MDA (pCi/L)	Critical Level[b] (pCi/L)	MCL	Laboratory Qualifier[c]	Validation Qualifier[d]	Sample Number	Analytical Method[e]
SWMU 68									
OBS-MW3	Americium-241	4.72 ± 11.0	17.9	8.84	NE	U	BD	092018-033	EPA 901.1
17-Apr-12	Cesium-137	0.685 ± 2.56	3.87	1.87	NE	U	BD	092018-033	EPA 901.1
	Cobalt-60	1.12 ± 2.45	4.32	2.06	NE	U	BD	092018-033	EPA 901.1
	Potassium-40	-27.2 ± 43.1	50.8	24.4	NE	U	BD	092018-033	EPA 901.1
	Gross Alpha	8.08	NA	NA	15 **pCi/L**	NA	None	092018-034	EPA 900.0
	Gross Beta	3.48 ± 1.15	1.34	0.639	4mrem/yr		J	092018-034	EPA 900.0
	Uranium-233/234	20.6 ± 2.66	0.0908	0.0403	NE			092018-035	HASL-300
	Uranium-235/236	0.240 ± 0.073	0.0524	0.020	NE			092018-035	HASL-300
	Uranium-238	3.88 ± 0.545	0.0584	0.0241	NE			092018-035	HASL-300

Notes

CCBA = Coyote Canyon Blast Area.
CFR = Code of Federal Regulations.
EPA = U.S. Environmental Protection Agency.
HASL = Health and Safety Laboratory.
MCL = Maximum contaminant level. The following are the MCLs for gross alpha particles and beta particles in community water systems:
15 pCi/L = Gross alpha particle activity, excluding total uranium (40 CFR Parts 9, 141, and 142, Table I-4)
4 mrem/yr = any combination of beta and/or gamma emitting radionuclides (as dose rate).
MDA = The minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level.
mrem/yr = Millirem per year.
MW = Monitoring well.
NA = Not applicable for gross alpha activities. The MDA or critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.
NE = Not established.
OBS = Old Burn Site.
pCi/L = Picocuries per liter.
SWMU = Solid Waste Management Unit.

[a]Activities of zero or less are considered to be not detected. Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Parts 9, 141, and 142, Table I-4).

[b]The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions. The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.

Table IV-13 (Concluded)

Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Isotopic Uranium Results

Solid Waste Management Units 8/58 and 68 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Notes (continued)

[c]Laboratory Qualifier
NA = Not applicable.
U = Analyte is absent or below the method detection limit.
X = Data rejected due to peak not meeting identification criteria.

[d]Validation Qualifier
If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.
BD = Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J = The associated value is an estimated quantity.
R = The data are unusable, and resampling or reanalysis are necessary for verification.
None = No data validation for corrected gross alpha activity.

[e]Analytical Method
U.S. Environmental Protection Agency, 1980, "*Prescribed Procedures for Measurement of Radioactivity in Drinking Water,"* EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio
U.S. Department of Energy, 1990, *"EML Procedures Manual,"* 27th ed., Vol. 1, Rev. 1992, Environmental Measurements Laboratory HASL-300.

Table IV-14

Summary of Constituents Detected above Established MCLs

Solid Waste Management Units 8/58 and 68 Groundwater Monitoring

Quarterly Assessments through June 2012

Well ID	Date	Analyte	Result	MCL	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample Number	Analytical Method[c]
SWMUs 8/58								
CCBA-MW1	31-Oct-11	Fluoride	5.36 mg/L	4.0 mg/L			091345-016	SW846 9056
CCBA-MW1	16-Jan-12	Fluoride	4.94 mg/L	4.0 mg/L			091615-016	SW846 9056
CCBA-MW1 (Duplicate)	16-Jan-12	Fluoride	4.94 mg/L	4.0 mg/L			091616-016	SW846 9056
CCBA-MW1	23-Apr-12	Fluoride	4.93 mg/L	4.0 mg/L			092291-016	SW846 9056

Notes

CCBA = Coyote Canyon Blast Area.
CFR = Code of Federal Regulations.
EPA = U.S. Environmental Protection Agency.
ID = Identification.
MCL = Maximum contaminant level. Established by the EPA Primary Water Regulations (40 CFR 141.11, Subpart B), National Primary Drinking Water Standards (EPA, 2009).
mg/L = Milligrams per liter.
MW = Monitoring well.
SWMU = Solid Waste Management Unit.

[a]**Laboratory Qualifier**

[b]**Validation Qualifier**
If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

[c]**Analytical Method**
U.S. Environmental Protection Agency, 1986 (and updates), *"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,"* SW-846, 3rd ed.

Table IV-15

Summary of Duplicate Samples

Solid Waste Management Units 8/58 and 68 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Well ID/Parameter	Environmental Sample (R1)	Duplicate Sample (R2)	RPD[a]
	mg/L unless otherwise noted		
CCBA-MW2			
Nitrate plus Nitrite	3.72	3.14	17
Bicarbonate Alkalinity	180	183	2
Bromide	0.545	0.566	4
Chloride	32.7	34.2	4
Fluoride	1.54	1.54	< 1
Sulfate	86.6	90.2	4
Total Cyanide	ND	0.00441	NC
Antimony	ND	0.0011	NC
Barium	0.0452	0.0461	2
Calcium	73.4	71.8	2
Cobalt	0.000131	0.000139	6
Iron	0.286	0.294	3
Magnesium	14.8	14.6	1
Nickel	0.00134	0.0013	3
Potassium	1.37	1.49	8
Selenium	0.00269	0.00245	9
Sodium	42.9	43.4	1
Uranium	0.00565	0.00579	2
Vanadium	0.00939	0.00955	2
Zinc	0.00714	0.00647	10
Filtered Calcium	76.0	74.1	3
Filtered Magnesium	13.2	13.4	2
Filtered Potassium	1.30	1.41	8
Filtered Sodium	44.5	47.6	7
Gross Alpha (pCi/L)	5.18	2.13	NC
Gross Beta (pCi/L)	2.17 ± 1.25	1.94 ± 0.739	NC
Uranium-233/234 (pCi/L)	7.15 ± 0.906	6.87 ± 0.923	NC
Uranium-235/236 (pCi/L)	0.0764 ± 0.0325	0.0894 ± 0.0426	NC
Uranium-238 (pCi/L)	1.69 ± 0.241	1.71 ± 0.266	NC
OBS-MW1			
Nitrate plus Nitrite	1.80	1.85	3
Bicarbonate Alkalinity	188	188	< 1
Bromide	0.360	0.336	7
Chloride	21.8	21.7	< 1
Fluoride	1.99	2.01	1
Sulfate	74.6	74.7	< 1
Aluminum	0.028	ND	NC
Barium	0.0202	0.0193	5
Calcium	77.5	78.7	2
Iron	0.120	0.132	10
Magnesium	16.1	16.6	3
Manganese	0.00114	0.00111	3
Nickel	0.000961	0.000945	2
Potassium	1.71	1.85	8
Selenium	0.00272	0.00278	2
Sodium	22.9	23.3	2

Table IV-15 (Concluded)

Summary of Duplicate Samples

Solid Waste Management Units 8/58 and 68 Groundwater Monitoring

Quarterly Assessment, April – June 2012

Well ID/Parameter	Environmental Sample (R1)	Duplicate Sample (R2)	RPD[a]
	mg/L unless otherwise noted		
OBS-MW1			
Nitrate plus Nitrite	1.80	1.85	3
Bicarbonate Alkalinity	188	188	< 1
Bromide	0.360	0.336	7
Chloride	21.8	21.7	< 1
Fluoride	1.99	2.01	1
Sulfate	74.6	74.7	< 1
Aluminum	0.028	ND	NC
Barium	0.0202	0.0193	5
Calcium	77.5	78.7	2
Iron	0.120	0.132	10
Magnesium	16.1	16.6	3
Manganese	0.00114	0.00111	3
Nickel	0.000961	0.000945	2
Potassium	1.71	1.85	8
Selenium	0.00272	0.00278	2
Sodium	22.9	23.3	2
Uranium	0.0104	0.0106	2
Filtered Calcium	83.8	80.0	5
Filtered Magnesium	17.1	16.7	2
Filtered Potassium	1.88	1.75	7
Filtered Sodium	24.4	22.5	8
Gross Alpha	1.78	1.07	NC
Gross Beta	3.12 ± 1.15	3.53 ± 1.32	NC
Uranium-233/234	17.9 ± 2.37	16.6 ± 2.12	NC
Uranium-235/236	0.226 ± 0.0879	0.197 ± 0.0604	NC
Uranium-238	3.29 ± 0.499	3.13 ± 0.438	NC

Notes

CCBA = Coyote Canyon Blast Area.
ID = Identification.
mg/L = Milligrams per liter.
MW = Monitoring well.
NC = Not calculated.
OBS = Old Burn Site.
pCi/L = Picocuries per liter.

[a]RPD
RPD = Relative percent difference is calculated with the following equation and rounded to nearest whole number.

$$RPD = \frac{\left|R_1 - R_2\right|}{[(R_1 + R_2)/2]} \times 100$$

where: R_1 = analysis result
R_2 = duplicate analysis result

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Appendix A
Field Measurement Logs
for SWMUs 8/58 and 68 Groundwater Monitoring Data

FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: SWMU 8 and 58 GWM	Project No.: 146422.10.11.01 / 98026.01.12
Well I.D.: CCBA-MW1	Date: 4/23/12
Well Condition:	Weather Condition:
Method: Portable pump X	Dedicated pump _____ Pump depth: 79'

PURGE MEASUREMENTS

Depth to Water (ft)	Time 24 hr	Vol. (L/gal)	Temp (°C)	SC (µS/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (%)	Comments DO mg/L
48.01	0805	/	START						→
49.14	0820	5	16.38	544	130.1	6.77	0.79	31.5	2.10
49.34	0828	10	16.08	530	124.6	6.82	0.73	22.6	2.24
49.24	0839	15	16.04	513	119.6	6.91	0.63	28.4	2.80
49.25	0850	20	16.12	511	116.9	6.94	0.46	29.5	2.90
49.25	0858	23	16.18	509	115.2	6.95	0.37	29.6	2.91
49.25	0902	25	16.25	510	114.6	6.95	0.40	29.6	2.90
49.25	0906	27	16.31	509	114.1	6.96	0.34	30.1	2.95
49.25	0910	29	16.43	510	113.5	6.96	0.44	29.9	2.92
49.25	0914	31	16.49	511	113.1	6.95	0.37	29.9	2.91
49.24	0918	33	16.51	509	112.5	6.96	0.40	28.8	2.80
	0919	/	SAMPLING						→
									~4.00 gals. purged from tubing
									0812

FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: SWMU 8 and 58 GWM	Project No.: 146422.10.11.01 / 98026.01.12
Well I.D.: CCBA-MW 2	Date: 4/24/12
Well Condition:	Weather Condition:
Method: Portable pump X	Dedicated pump _____ Pump depth: 117'

PURGE MEASUREMENTS

Depth to Water (ft)	Time 24 hr	Vol. (L/gal)	Temp (°C)	SC (µS/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (%)	Comments Do mg/L
71.48	0810		START						
72.01	0827	5	17.40	607	120.1	7.82	2.92	41.4	3.96
72.02	0835	10	17.61	607	114.0	7.84	1.14	43.2	4.12
72.02	0844	15	17.75	606	109.8	7.86	1.07	55.7	5.29
71.91	0853	20	18.01	606	106.8	7.86	0.55	59.3	5.61
71.86	0902	23	18.21	606	105.3	7.86	0.53	61.3	5.77
71.81	0907	25	18.90	608	103.7	7.86	0.46	61.4	5.75
71.79	0915	27	18.65	609	102.2	7.87	0.47	62.5	5.84
71.78	0922	29	18.91	610	102.2	7.87	0.50	63.4	5.88
71.86	0929	31	18.88	610	101.7	7.86	0.54	63.7	5.90
71.85	0937	33	18.90	610	102.0	7.87	0.48	63.5	5.86
	0938		SAMPLING						
									~4.00 gals. purged from tubing
									0818

FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: SWMU 68 GWM	Project No.: 146422.10.11.01 / 98026.01.13
Well I.D.: OBS-MW1	Date: 4/18/12
Well Condition:	Weather Condition:
Method: Portable pump X	Dedicated pump _____ Pump depth: 154'

PURGE MEASUREMENTS

Depth to Water (ft)	Time 24 hr	Vol. (L/gal)	Temp (°C)	SC (µS/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (%)	Comments DO mg/L
72.32	0753	/	START →						
72.36	0811	5	15.49	529	128.2	7.75	1.27	38.4	3.82
72.36	0822	10	16.53	531	119.6	7.75	0.88	38.1	3.71
72.36	0834	15	16.98	531	113.9	7.75	0.57	38.5	3.72
72.35	0847	20	17.16	536	108.4	7.75	0.54	38.7	3.72
72.35	0854	23	17.32	531	105.7	7.75	0.49	38.7	3.71
72.35	0900	25	17.39	531	104.1	7.75	0.41	38.9	3.73
72.35	0906	27	17.49	531	102.9	7.75	0.56	38.9	3.72
72.35	0911	29	17.57	530	101.8	7.75	0.60	38.9	3.71
72.35	0917	31	17.66	531	100.7	7.75	0.45	39.0	3.71
72.35	0923	33	17.70	531	99.5	7.75	0.47	39.0	3.71
	0924	/	SAMPLING →						
									~4.00 gals purged
									from tubing
									0801

FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: SWMU 68 GWM	Project No.: 146422.10.11.01 / 98026.01.13
Well I.D.: OBS-MW2	Date: 4/19/12
Well Condition:	Weather Condition:
Method: Portable pump X	Dedicated pump _____ Pump depth: 253'

PURGE MEASUREMENTS

Depth to Water (ft)	Time 24 hr	Vol. (L/gal)	Temp (°C)	SC (µS/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (%)	Comments DO mg/L
174.44	0745	/	START						
175.37	0804	5	17.36	530	125.8	7.71	0.58	42.7	4.09
175.12	0817	10	17.42	530	121.1	7.72	0.46	41.9	4.01
175.10	0831	15	17.40	530	114.5	7.72	0.45	40.8	3.90
175.05	0845	20	17.40	529	109.9	7.72	0.57	40.3	3.85
175.00	0855	23	17.43	529	107.3	7.72	0.56	39.8	3.81
174.95	0901	25	17.40	530	105.9	7.72	0.69	40.2	3.84
174.95	0909	27	17.54	530	104.3	7.72	0.45	40.2	3.84
174.92	0918	29	17.58	531	102.8	7.73	0.56	40.3	3.84
174.91	0925	31	17.53	530	101.9	7.73	0.43	40.2	3.84
174.87	0933	33	17.54	531	100.7	7.73	0.46	39.2	3.74
	0934	/	SAMPLING						→
									~ 4.00 gals purged
									from tubing
									0755

FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: SWMU 68 GWM	Project No.: 146422.10.11.01 / 98026.01.13
Well I.D.: OBS-MW3	Date: 4/17/12
Well Condition: good	Weather Condition:
Method: Portable pump X	Dedicated pump _____ Pump depth: 209'

PURGE MEASUREMENTS

Depth to Water (ft)	Time 24 hr	Vol. (L/gal)	Temp (°C)	SC (µS/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (%)	Comments DO mg/L
69.43	0742		START						
73.52	0804	5	16.59	528	99.1	7.69	1.50	46.2	4.50
74.51	0815	10	16.31	529	61.4	7.71	1.03	44.7	4.38
75.01	0827	15	16.31	529	48.9	7.73	0.79	44.2	4.33
75.41	0838	20	16.35	529	42.1	7.73	0.66	44.0	4.30
75.55	0845	23	16.34	529	37.2	7.73	0.58	43.7	4.28
75.61	0850	25	16.33	529	34.8	7.74	0.63	43.7	4.27
75.66	0854	27	16.33	531	32.7	7.74	0.51	43.7	4.28
75.91	0859	29	16.34	531	31.3	7.74	0.56	43.6	4.26
75.73	0904	31	16.37	531	29.7	7.74	0.51	43.5	4.26
75.71	0909	33	16.39	531	30.6	7.74	0.52	43.4	4.24
	0910		SAMPLING						
									~4.00 gals purged
									from tubing
									0753

Appendix B
Analytical Laboratory Certificates of Analysis for SWMUs 8/58 and 68 Groundwater Monitoring Data

SMO 2012-ARCOC (4-2012)

AOP 95-16

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab:

Batch No.: NA

ARCOC 614155

SMO Use

Project Name:	SWMU 8/58 GWM	Date Samples Shipped:	4/23/12	SMO Authorization.:	☐ Waste Characterization
Project/Task Manager:	Alicia Aragon	Carrier/Waybill No.	138471	SMO Contact Phone: See Bottle Order	☐ RMMA
Project/Task Number:	98026.01.12	Lab Contact:	Edie Kent	Lorraine Hererra/508-844-3199	☐ Released by COC No.
Service Order:	CF262-12	Lab Destination:	GEL	Send Report to SMO:	☐ 4° Celsius
Tech Area:		Contract No.:	691436	Rita Kavanaugh/505.284.2553	Bill to: Sandia National Laboratories (Accounts Payable); P.O. Box 5800, MS-0154; Albuquerque, NM 87185-0154
Building :	Room:	Operational Site:		303091	

Sample Number	Fraction	Sample Location Detail	Depth (ft)	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Vol	Preservative	Collect Method	Sample Type	Parameter & Method Requested	Lab Sample Id
092291 X	001	CCBA-MW1	79	4/23/12 0919	GW	G	3x40 ml	HCL	G	SA	TCL VOC (SW846-8260B)	
092291 X	002	CCBA-MW1	79	4/23/12 0921	GW	AG	4x1L	None	G	SA	TCL SVOC (SW846-8270C)	
092291 X	009	CCBA-MW1	79	4/23/12 0922	GW	P	500 ml	HNO3	G	SA	TAL Metals+U(SW846-6010/6020/7470)	
092291 X	016	CCBA-MW1	79	4/23/12 0923	GW	P	125 ml	None	G	SA	Anions (SW846-9056)	
092291 X	017	CCBA-MW1	79	4/23/12 0924	FGW	P	250 ml	HNO3	G	SA	Cations (SW846-6020)	
092291 X	018	CCBA-MW1	79	4/23/12 0925	GW	P	125 ml	H2SO4	G	SA	NPN (353.2)	
092291 X	020	CCBA-MW1	79	4/23/12 0926	GW	P	250 ml	None	G	SA	Perchlorate (314.0)	
092291 X	022	CCBA-MW1	79	4/23/12 0927	GW	P	500 ml	None	G	SA	Alkalinity (SM2320B)	
092291 X	024	CCBA-MW1	79	4/23/12 0929	GW	AG	4x1L	None	G	SA	High Explosives (SW846-8321A) Mod.	
092291 X	027	CCBA-MW1	79	4/23/12 0930	GW	P	250 ml	NaOH	G	SA	Total Cyanide (SW846-9012)	

Last Chain:	☐ Yes	Sample Tracking SMO Use	Special Instructions/QC Requirements:
Validation Req'd:	☑ Yes	Date Entered 04/24/12	EDD: Yes ☑ No ☐
Background:	☐ Yes	Entered by: RK	Turnaround Time: ☐ 7 Day* ☐ 15 Day * ☑ 30 Day
Confirmatory:	☐ Yes	QC inits.: WP	Negotiated TAT: ☐
			Sample Disposal: ☐ Return to Client ☑ Disposal by Lab

Abnormal Conditions on Receipt

Sample Team Members	Name	Signature	Init.	Company/Org/Phone/Cell
	William Gibson	William Gibson	WG	SNL/4142/844-4013/239-7367
	Robert Lynch	Robert Lynch	RL	SNL/4142/844-4013/250-7090
	Alfred Santillanes	Alfred Santillanes	AS	SNL/4142/844-5130/228-0710

Return Samples By:

Comments:
If perchlorate detected, then perform verification analysis using SW846-6850. Report anions (as Br,Cl,F,SO4), cations (as Ca,Mg,K,Na), alkalinity (as bicarbonate and carbonate), and gamma spec (short list).

*Please list as separate report.

Lab Use

1. Relinquished by	Alfred Santillanes	Org. 4142	Date 4/23/12	Time 418	3. Relinquished by	Org.	Date	Time
1. Received by		Org. 4142	Date 4/23/12	Time 1118	3. Received by	Org.	Date	Time
2. Relinquished by		Org. 4142	Date 4/23/12	Time 1800	4. Relinquished by	Org.	Date	Time
2. Received by		Org.	Date	Time	4. Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT LABORATORY
Analysis Request And Chain Of Custody (Continuation)

ARCOC- 614155

Project Name:	SWMU 8/58 GWM	Project/Task Manager: Alicia Aragon			Project/Task No.: 98026.01.12							
Tech Area:												Lab use
Building:	Room:											
Sample Number	Fraction	Sample Location Detail	Depth (ft)	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Vol	Preser-vative	Collect Method	Sample Type	Parameter & Method Requested	Lab Sample Id
092291	033	CCBA-MW1	79	4/23/12 0932	GW	P	1L	HNO3	G	SA	Gamma Spec (short list)(901.0)	
092291	034	CCBA-MW1	79	4/23/12 0933	GW	P	1L	HNO3	G	SA	Gross Alpha/Beta (900.0)	
092291	035	CCBA-MW1	79	4/23/12 0934	GW	P	1L	HNO3	G	SA	Isotopic U (ASTM D3972-09M)	
092292	001	CCBA-TB1	na	4/23/12 0919	DIW	G	3x40 ml	HCL	G	TB	TCL VOC (SW846-8260B)	
092293	001	CCBA-FB1	na	4/23/12 0909	DIW	G	3x40 ml	HCL	G	FB	TCL VOC (SW846-8260B)	
Recipient Initials_____												

SMO 2012-ARCOC (4-2012)

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

AOP 95-16

Internal Lab:

Batch No.: NA

SMO Use

ARCOC 614156

Project Name:	SWMU 8/58 GWM	Date Samples Shipped:	4/23/12	SMO Authorization:	☐ Waste Characterization
Project/Task Manager:	Alicia Aragon	Carrier/Waybill No.	138471	SMO Contact Phone: See Bottom	☐ RMMA
Project/Task Number:	98026.01.12	Lab Contact:	Edie Kent	Lorraine Hererra/508-844-3199	☐ Released by COC No.
Service Order:	CF262-12	Lab Destination:	GEL	Send Report to SMO:	☐ 4° Celsius
		Contract No.:	691436	Rita Kavanaugh/505.284.2553	Bill to: Sandia National Laboratories (Accounts Payable); P.O. Box 5800, MS-0154; Albuquerque, NM 87185-0154
Tech Area:					
Building :	Room:	Operational Site:			

Sample Number	Fraction	Sample Location Detail	Depth (ft)	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Vol	Preservative	Collect Method	Sample Type	Parameter & Method Requested	Lab Sample Id
✓ 092294 X	001 ✓	CCBA-EB1	na	4/23/12 1039	DIW	G	3x40 ml	HCL	G	SA	TCL VOC (SW846-8260B)	
✓ 092294 X	002 ✓	CCBA-EB1	na	4/23/12 1040	DIW	AG	4x1L	None	G	SA	TCL SVOC (SW846-8270C)	
✓ 092294 X	009 ✓	CCBA-EB1	na	4/23/12 1042	DIW	P	500 ml	HNO3	G	SA	TAL Metals+U(SW846-6010/6020/7470)	
✓ 092294 X	016 ✓	CCBA-EB1	na	4/23/12 1043	DIW	P	125 ml	None	G	SA	Anions (SW846-9056)	
✓ 092294 X	017 ✓	CCBA-EB1	na	4/23/12 1044	FDIW	P	250 ml	HNO3	G	SA	Cations (SW846-6020)	
✓ 092294 X	018 ✓	CCBA-EB1	na	4/23/12 1045	DIW	P	125 ml	H2SO4	G	SA	NPN (353.2)	
✓ 092294 X	020 ✓	CCBA-EB1	na	4/23/12 1046	DIW	P	250 ml	None	G	SA	Perchlorate (314.0)	
✓ 092294 X	022 ✓	CCBA-EB1	na	4/23/12 1047	DIW	P	500 ml	None	G	SA	Alkalinity (SM2320B)	
✓ 092294 X	024 ✓	CCBA-EB1	na	4/23/12 1048	DIW	AG	4x1L	None	G	SA	High Explosives (SW846-8321A) Mod.	
✓ 092294 X	027 ✓	CCBA-EB1	na	4/23/12 1050	DIW	P	250 ml	NaOH	G	SA	Total Cyanide (SW846-9012)	

Last Chain:	☐ Yes
Validation Req'd:	☑ Yes
Background:	☐ Yes
Confirmatory:	☐ Yes

Sample Tracking SMO Use

Date Entered: 04/24/12

Entered by: RC

QC inits: WP

Special Instructions/QC Requirements:

EDD: Yes ☑ No ☐

Turnaround Time: ☐ 7 Day* ☐ 15 Day * ☑ 30 Day

Negotiated TAT: ☐

Sample Disposal: ☐ Return to Client ☑ Disposal by Lab

Return Samples By:

Comments:
If perchlorate detected, then perform verification analysis using SW846-6850. Report anions (as Br,Cl,F,SO4), cations (as Ca,Mg,K,Na), alkalinity (as bicarbonate and carbonate), and gamma spec (short list).
Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members

Name	Signature	Init.	Company/Org/Phone/Cell
William Gibson		WG	SNL/4142/844-4013/239-7367
Robert Lynch		RC	SNL/4142/844-4013/250-7090
Alfred Santillanes		AS	SNL/4142/844-5130/228-0710

1. Relinquished by		Org. 4142	Date 4/23/12	Time 1134	3. Relinquished by	Org.	Date Time
1. Received by	SM	Org. 4142	Date 4/23/12	Time 1134	3. Received by	Org.	Date Time
2. Relinquished by	SM	Org. 4142	Date 4/23/12	Time 1300	4. Relinquished by	Org.	Date Time
2. Received by		Org.	Date	Time	4. Received by	Org.	Date Time

*Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT LABORATORY

Analysis Request And Chain Of Custody (Continuation)

Page 2 of 2

ARCOC- **614156**

Project Name: SWMU 8/58 GWM
Project/Task Manager: Alicia Aragon
Project/Task No.: 98026.01.12
Tech Area:
Building:
Room:

Sample Number	Fraction	Sample Location Detail	Depth (ft)	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Vol	Preser-vative	Collect Method	Sample Type	Parameter & Method Requested	Lab use Lab Sample Id
✓ 092294 ✗	033 ✓	CCBA-EB1	na	4/23/12 1051	DIW	P	1L	HNO3	G	SA	Gamma Spec (short list)(901.0)	
✓ 092294 ✗	034 ✓	CCBA-EB1	na	4/23/12 1052	DIW	P	1L	HNO3	G	SA	Gross Alpha/Beta (900.0)	
✓ 092294 ✗	035 ✓	CCBA-EB1	na	4/23/12 1053	DIW	P	1L	HNO3	G	SA	Isotopic U (ASTM D3972-09M)	
✓ 092295 ✗	001 ✓	CCBA-TB2	na	4/23/12 1039	DIW	G	3x40 ml	HCL	G	TB	TCL VOC (SW846-8260B)	

Recipient Initials

SMO 2012-ARCOC (4-2012)

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

AOP 95-16

Internal Lab:

Batch No.: NA

SMO Use

ARCOC 614157

Project Name:	SWMU 8/58 GWM	Date Samples Shipped:	4/24/12	SMO Authorization.: Don Walenpaugh	☐ Waste Characterization
Project/Task Manager:	Alicia Aragon	Carrier/Waybill No.	140209	SMO Contact Phone: see Bottle order	☐ RMMA
Project/Task Number:	98026.01.12	Lab Contact:	Edie Kent	Lorraine Hererra/508-844-3199	☐ Released by COC No.
Service Order:	CF262-12	Lab Destination:	GEL	Send Report to SMO:	☐ 4° Celsius
		Contract No.:	691436	Rita Kavanaugh/505.284.2553	Bill to: Sandia National Laboratories (Accounts Payable); P.O. Box 5800, MS-0154; Albuquerque, NM 87185-0154
Tech Area:					
Building :	Room:	Operational Site:			

Sample Number	Fraction	Sample Location Detail	Depth (ft)	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Vol	Preservative	Collect Method	Sample Type	Parameter & Method Requested	Lab Sample Id
092296	001	CCBA-MW2	117	4-24-12/0938	GW	G	3x40 ml	HCL	G	SA	TCL VOC (SW846-8260B)	
092296	002	CCBA-MW2	117	4-24-12/0940	GW	AG	4x1L	None	G	SA	TCL SVOC (SW846-8270C)	
092296	009	CCBA-MW2	117	4-24-12/0944	GW	P	500 ml	HNO3	G	SA	TAL Metals+U(SW846-6010/6020/7470)	
092296	016	CCBA-MW2	117	4-24-12/0946	GW	P	125 ml	None	G	SA	Anions (SW846-9056)	
092296	017	CCBA-MW2	117	4-24-12/0947	FGW	P	250 ml	HNO3	G	SA	Cations (SW846-6020)	
092296	018	CCBA-MW2	117	4-24-12/0949	GW	P	125 ml	H2SO4	G	SA	NPN (353.2)	
092296	020	CCBA-MW2	117	4-24-12/0950	GW	P	250 ml	None	G	SA	Perchlorate (314.0)	
092296	022	CCBA-MW2	117	4-24-12/0951	GW	P	500 ml	None	G	SA	Alkalinity (SM2320B)	
092296	024	CCBA-MW2	117	4-24-12/0952	GW	AG	4x1L	None	G	SA	High Explosives (SW846-8321A) Mod.	
092296	027	CCBA-MW2	117	4-24-12/0956	GW	P	250 ml	NaOH	G	SA	Total Cyanide (SW846-9012)	

Last Chain:	☐ Yes	Sample Tracking	SMO Use
Validation Req'd:	☑ Yes	Date Entered:	04/25/12
Background:	☐ Yes	Entered by:	RLC
Confirmatory:	☐ Yes	QC inits.:	WP

Special Instructions/QC Requirements:

EDD: Yes ☑ No ☐

Turnaround Time: ☐ 7 Day* ☐ 15 Day * ☑ 30 Day

Negotiated TAT: ☐

Sample Disposal: ☐ Return to Client ☑ Disposal by Lab

Return Samples By:

Comments:
If perchlorate detected, then perform verification analysis using SW846-6850. Report anions (as Br,Cl,F,SO4), cations (as Ca,Mg,K,Na), alkalinity (as bicarbonate and carbonate), and gamma spec (short list).

***Please list as separate report.**

Abnormal Conditions on Receipt

Lab Use

Sample Team Members	Name	Signature	Init.	Company/Org/Phone/Cell
WJG	William Gibson	William J Gibson Jr	WJG	SNL/4142/844-4013/239-7367
RCL	Robert Lynch	Robert Lynch	RCL	SNL/4142/844-4013/250-7090
	~~Alfred Santillanes~~			~~SNL/4142/844-5130/228-0710~~

1. Relinquished by	William J Gibson Jr	Org. 4142	Date 4/24/12	Time 1045	3. Relinquished by	Org.	Date	Time
1. Received by	Don Walenpaugh	Org. 4142	Date 4/24/12	Time 1045	3. Received by	Org.	Date	Time
2. Relinquished by	Don Walenpaugh	Org. 4142	Date 4/24/12	Time 1130	4. Relinquished by	Org.	Date	Time
2. Received by		Org.	Date	Time	4. Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT LABORATORY
Analysis Request And Chain Of Custody (Continuation)

ARCOC- 614157

Project Name:	SWMU 8/58 GWM	Project/Task Manager: Alicia Aragon			Project/Task No.: 98026.01.12							
Tech Area:												
Building:	Room:											Lab use
Sample Number	Fraction	Sample Location Detail	Depth (ft)	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Vol	Preser-vative	Collect Method	Sample Type	Parameter & Method Requested	Lab Sample Id
092296	033	CCBA-MW2	117	4-24-12/0957	GW	P	1L	HNO3	G	SA	Gamma Spec (short list)(901.0)	
092296	034	CCBA-MW2	117	4-24-12/0959	GW	P	1L	HNO3	G	SA	Gross Alpha/Beta (900.0)	
092296	035	CCBA-MW2	117	4-24-12/1000	GW	P	1L	HNO3	G	SA	Isotopic U (ASTM D3972-09M)	
092297	001	CCBA-MW2	117	4-24-12/0938	GW	G	3x40 ml	HCL	G	DU	TCL VOC (SW846-8260B)	
092297	002	CCBA-MW2	117	4-24-12/0940	GW	AG	4x1L	None	G	DU	TCL SVOC (SW846-8270C)	
092297	009	CCBA-MW2	117	4-24-12/0944	GW	P	500 ml	HNO3	G	DU	TAL Metals+U(SW846-6010/6020/7470)	
092297	016	CCBA-MW2	117	4-24-12/0946	GW	P	125 ml	None	G	DU	Anions (SW846-9056)	
092297	017	CCBA-MW2	117	4-24-12/0947	FGW	P	250 ml	HNO3	G	DU	Cations (SW846-6020)	
092297	018	CCBA-MW2	117	4-24-12/0949	GW	P	125 ml	H2SO4	G	DU	NPN (353.2)	
092297	020	CCBA-MW2	117	4-24-12/0950	GW	P	250 ml	None	G	DU	Perchlorate (314.0)	
092297	022	CCBA-MW2	117	4-24-12/0951	GW	P	500 ml	None	G	DU	Alkalinity (SM2320B)	
092297	024	CCBA-MW2	117	4-24-12/0952	GW	AG	4x1L	None	G	DU	High Explosives (SW846-8321A) Mod.	
092297	027	CCBA-MW2	117	4-24-12/0956	GW	P	250 ml	NaOH	G	DU	Total Cyanide (SW846-9012)	
092297	033	CCBA-MW2	117	4-24-12/0957	GW	P	1L	HNO3	G	DU	Gamma Spec (short list)(901.0)	
092297	034	CCBA-MW2	117	4-24-12/0959	GW	P	1L	HNO3	G	DU	Gross Alpha/Beta (900.0)	
092297	035	CCBA-MW2	117	4-24-12/1000	GW	P	1L	HNO3	G	DU	Isotopic U (ASTM D3972-09M)	
092298	001	CCBA-TB3	na	4-24-12/0938	DIW	G	3x40 ml	HCL	G	TB	TCL VOC (SW846-8260B)	

Recipient Initials _____

SMO 2012-ARCOC (4-2012)

AOP 95-1

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. NA

SMO Use

AR/COC 614081

Project Name:	SWMU 68 GW Char	Date Samples Shipped:	4/18/12	SMO Authorization:	Don Watenpaugh SMO
Project/Task Manager:	Alicia Aragon	Carrier/Waybill No.	140138	SMO Contact Phone:	
Project/Task Number:	98026/01.13	Lab Contact:	Edie Kent/803.556.8171		See Bottle order
Service Order:	CF 263-12	Lab Destination:	GEL	Send Report to SMO:	
		Contract No.:	PO 691436		Rita Kavanaugh/505.284.2553
Tech Area:					
Building:	Room:	Operational Site:			

☐ Waste Characterization
☐ RMMA
☐ Released by COC No.
☐ 4° Celsius

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

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
✓ 092022	-001	OBS-MW1	154	4/18/12 9:24	GW	G	3x40ml	HCL	G	SA	TCL VOC (SW846-8260B)	
✓ 092022	-002	OBS-MW1	154	4/18/12 9:30	GW	AG	4x1L	None	G	SA	TCL SVOC (SW846-8270C)	
✓ 092022	-009	OBS-MW1	154	4/18/12 9:31	GW	P	500 ml	HNO3	G	SA	TAL Metals+U(SW846-6010/6020/7470)	
✓ 092022	-014	OBS-MW1	154	4/18/12 9:33	GW	P	250 ml	None	G	SA	Hexavalent Chromium (SW846-7196A)	
✓ 092022	-016	OBS-MW1	154	4/18/12 9:34	GW	P	125 ml	None	G	SA	Anions (SW846-9056)	
✓ 092022	-017	OBS-MW1	154	4/18/12 9:35	FGW	P	250 ml	HNO3	G	SA	Cations (SW846-6020)	
✓ 092022	-018	OBS-MW1	154	4/18/12 9:36	GW	P	125 ml	H2SO4	G	SA	NPN (353.2)	
✓ 092022	-020	OBS-MW1	154	4/18/12 9:37	GW	P	250 ml	None	G	SA	Perchlorate (314.0)	
✓ 092022	-022	OBS-MW1	154	4/18/12 9:38	GW	P	500 ml	None	G	SA	Alkalinity (SM2320B)	
✓ 092022	-024	OBS-MW1	154	4/18/12 9:40	GW	AG	4x1L	None	G	SA	HE (SW846-8321A)	

Last Chain:	☐ Yes	Sample Tracking	SMO Use
Validation Req'd:	☑ Yes	Date Entered:	
Background:	☐ Yes	Entered by:	
Confirmatory:	☐ Yes	QC inits.:	

Special Instructions/QC Requirements:

EDD ☑ Yes ☐ No

Turnaround Time ☐ 7 Day* ☐ 15 Day* ☑ Day

Negotiated TAT ☐

Sample Disposal ☐ Return to Client ☑ Disposal by Lab

Return Samples By:

Comments:

If perchorate detected, then perform verification analysis using SW846-6850. Report anions (as Br, Cl, F, SO4),cations (as Ca, Mg, K, Na), alkalinity (as bicarbonate and carbonate), and gamma spec (short list isotopes).

Conditions on Receipt

Lab Use

Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell
	Robert Lynch	Robert Lynch	RL	SNL/4142/844-4013/250-7090
	Gilbert Quintana	Gilbert Quintana	GQ	SNL/4142/844-5130/228-0710
	Tim Jackson	T. Jackson	TJ	SNL/4142/284-2547

1.Relinquished by	T. Jackson	Org. 4142	Date 4-18-12	Time 1035	3.Relinquished by	Org.	Date	Time
1. Received by	Don Watenpaugh	Org. 4142	Date 4/18/12	Time 1035	3. Received by	Org.	Date	Time
2.Relinquished by		Org.	Date	Time	4.Relinquished by	Org.	Date	Time
2. Received by		Org.	Date	Time	4. Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

AR/COC 614081

Project Name:	SWMU 68 GW Char	Project/Task Manager:	Alicia Aragon	Project/Task No.:	98026/01.13	Lab use
Tech Area:						
Building:	Room:					

	Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
✓	092022	-027	OBS-MW1	154	4/18/12 9:42	GW	P	250 ml	NaOH	G	SA	Total Cyanide (SW846-9012)	
✓	092022	-033	OBS-MW1	154	4/18/12 9:43	GW	P	1 L	HNO3	G	SA	Gamma Spec (short list)(901.0)	
✓	092022	-034	OBS-MW1	154	4/18/12 9:44	GW	P	1 L	HNO3	G	SA	Gross Alpha/Beta (900.0)	
✓	092022	-035	OBS-MW1	154	4/18/12 9:45	GW	P	1 L	HNO3	G	SA	Isotopic U (ASTM D3972-09M)	
✓	092023	-001	OBS-MW1	154	4/18/12 9:24	GW	G	3x40ml	HCL	G	DU	TCL VOC (SW846-8260B)	
✓	092023	-002	OBS-MW1	154	4/18/12 9:30	GW	AG	4x1L	None	G	DU	TCL SVOC (SW846-8270C)	
✓	092023	-009	OBS-MW1	154	4/18/12 9:31	GW	P	500 ml	HNO3	G	DU	TAL Metals + U (SW846-6020/7470)	
✓	092023	-014	OBS-MW1	154	4/18/12 9:33	GW	P	250 ml	None	G	DU	Hexavalent Chromium (SW846-719)	
✓	092023	-016	OBS-MW1	154	4/18/12 9:34	GW	P	125 ml	None	G	DU	Anions (SW846-9056)	
✓	092023	-017	OBS-MW1	154	4/18/12 9:35	FGW	P	250 ml	HNO3	G	DU	Cations (SW846-6020)	
✓	092023	-018	OBS-MW1	154	4/18/12 9:36	GW	P	125 ml	H2SO4	G	DU	NPN (353.2)	
✓	092023	-020	OBS-MW1	154	4/18/12 9:37	GW	P	250 ml	None	G	DU	Perchlorate (314.0)	
✓	092023	-022	OBS-MW1	154	4/18/12 9:38	GW	P	500 ml	None	G	DU	Alkalinity (SM2320B)	
✓	092023	-024	OBS-MW1	154	4/18/12 9:40	GW	AG	4x1L	None	G	DU	HE (SW846-8321A)	
✓	092023	-027	OBS-MW1	154	4/18/12 9:42	GW	P	250 ml	NaOH	G	DU	Total Cyanide (SW846-9012)	
✓	092023	-033	OBS-MW1	154	4/18/12 9:43	GW	P	1 L	HNO3	G	DU	Gamma Spec (short list)(901.0)	
✓	092023	-034	OBS-MW1	154	4/18/12 9:44	GW	P	1 L	HNO3	G	DU	Gross Alpha/Beta (900.0)	
✓	092023	-035	OBS-MW1	154	4/18/12 9:45	GW	P	1 L	HNO3	G	DU	Isotopic U (ASTM D3972-09M)	
✓	092024	-001	OBS-TB3	N/A	4/18/12 9:24	DIW	G	3x40ml	HCL	G	TB	TCL VOC (SW846-8260B)	

Recipient Initials_____

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. NA

SMO Use

AR/COC 614082

Project Name:	SWMU 68 GW Char	Date Samples Shipped:		SMO Authorization: Don Watkins/SMO	☐ Waste Characterization
Project/Task Manager:	Alicia Aragon	Carrier/Waybill No.		SMO Contact Phone:	☐ RMMA
Project/Task Number:	98026/01.13	Lab Contact:	Edie Kent/803.556.8171	See Bottle Order	☐ Released by COC No.
Service Order:	CF 0263-12	Lab Destination:	GEL	Send Report to SMO:	☑ 4° Celsius
		Contract No.:	PO 691436	Rita Kavanaugh/505.284.2553	Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154
Tech Area:					
Building:	Room:	Operational Site:			

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
092025	-001	OBS-MW2	253	4/19/12 9:34	GW	G	3x40ml	HCL	G	SA	TCL VOC (SW846-8260B)	
092025	-002	OBS-MW2	253	4/19/12 9:37	GW	AG	4x1L	None	G	SA	TCL SVOC (SW846-8270C)	
092025	-009	OBS-MW2	253	4/19/12 9:38	GW	P	500 ml	HNO3	G	SA	TAL Metals+U(SW846-6010/6020/7470)	
092025	-014	OBS-MW2	253	4/19/12 9:39	GW	P	250 ml	None	G	SA	Hexavalent Chromium (SW846-7196A)	
092025	-016	OBS-MW2	253	4/19/12 9:40	GW	P	125 ml	None	G	SA	Anions (SW846-9056)	
092025	-017	OBS-MW2	253	4/19/12 9:41	FGW	P	250 ml	HNO3	G	SA	Cations (SW846-6020)	
092025	-018	OBS-MW2	253	4/19/12 9:42	GW	P	125 ml	H2SO4	G	SA	NPN (353.2)	
092025	-020	OBS-MW2	253	4/19/12 9:43	GW	P	250 ml	None	G	SA	Perchlorate (314.0)	
092025	-022	OBS-MW2	253	4/19/12 9:44	GW	P	500 ml	None	G	SA	Alkalinity (SM2320B)	
092025	-024	OBS-MW2	253	4/19/12 9:47	GW	AG	4x1L	None	G	SA	HE (SW846-8321A)	

Last Chain:	☒ Yes	Sample Tracking SMO Use	Special Instructions/QC Requirements:
Validation Req'd:	☑ Yes	Date Entered:	EDD ☑ Yes ☐ No
Background:	☐ Yes	Entered by:	Turnaround Time ☐ 7 Day* ☐ 15 Day* ☑ Day
Confirmatory:	☐ Yes	QC inits.:	Negotiated TAT ☐

Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell
	Robert Lynch	Robert Lynch	RL	SNL/4142/844-4013/250-7090
	Gilbert Quintana	Gilbert Quintana	GQ	SNL/4143/844-2507/850-8524
	Tim Jackson	Tim Jackson	TJ	SNL/4142/284-2547

Sample Disposal ☐ Return to Client ☑ Disposal by Lab

Return Samples By:

Comments: Send report to Tim Jackson/4142/MS 0729/284-2547
2 TB vials received with headspace

If perchlorate detected, then perform verification analysis using SW846-6850. Report anions (as Br, Cl, F, SO4), cations (as Ca, Mg, K, Na), alkalinity (as bicarbonate and carbonate), and gamma spectroscopy (short list isotopes)

Conditions on Receipt

Lab Use

1.Relinquished by	Tim Jackson	Org. 4142	Date 4-19-12	Time 1030	3.Relinquished by	Org.	Date	Time
1. Received by	Don Watkins	Org. 4142	Date 4/19/12	Time 1030	3. Received by	Org.	Date	Time
2.Relinquished by		Org.	Date	Time	4.Relinquished by	Org.	Date	Time
2. Received by		Org.	Date	Time	4. Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

AR/COC 614082

Project Name:	SWMU 68 GW Char	Project/Task Manager:	Alicia Aragon	Project/Task No.:	98026/01.13		Lab use
Tech Area:							
Building:	Room:						

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
092025	-027	OBS-MW2	253	4/19/12 9:48	GW	P	250 ml	NaOH	G	SA	Total Cyanide (SW846-9012)	
092025	-033	OBS-MW2	253	4/19/12 9:49	GW	P	1 L	HNO3	G	SA	Gamma Spec (short list)(901.0)	
092025	-034	OBS-MW2	253	4/19/12 9:50	GW	P	1 L	HNO3	G	SA	Gross Alpha/Beta (900.0)	
092025	-035	OBS-MW2	253	4/19/12 9:51	GW	P	1 L	HNO3	G	SA	Isotopic Ur (ASTM D3972-09M)	
092026	-001	OBS-TB4	N/A	4/19/12 9:25	DIW	G	3x40ml	HCL	G	TB	VOC (SW846-8260B)	
092027	-001	OBS-FB1	N/A	4/19/12 9:25	DIW	G	3x40ml	HCL	G	FB	VOC (SW846-8260B)	

Recipient Initials_____

SMO 2012-ARCOC (4-2012)

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

AOP 95-

Internal Lab

Batch No. NA

SMO Use

AR/COC 614079

Project Name:	SWMU 68 GW Char	Date Samples Shipped:	4/17/12	SMO Authorization:	Don Wakeman SMO
Project/Task Manager:	Alicia Aragon	Carrier/Waybill No.		SMO Contact Phone:	
Project/Task Number:	98026/01.13	Lab Contact:	Edie Kent/803.556.8171	☐ Waste Characterization	
Service Order:	CF 263-12	Lab Destination:	GEL	☐ RMMA	
		Contract No.:	PO 691436	☐ Released by COC No.	
				Send Report to SMO:	Rita Kavanaugh/505.284.2553
				☑ 4° Celsius	
Tech Area:				Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154	
Building:	Room:	Operational Site:			

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
✓ 092018	-001	OBS-MW3	209	4/17/12 9:10	GW	G	3x40ml	HCL	G	SA	TCL VOC (SW846-8260B)	
✓ 092018	-002	OBS-MW3	209	4/17/12 9:12	GW	AG	4x1L	4C	G	SA	TCL SVOC (SW846-8270C)	
✓ 092018	-009	OBS-MW3	209	4/17/12 9:13	GW	P	500 ml	HNO3	G	SA	TAL Metals+U(SW846-6010/6020/7470)	
✓ 092018	-014	OBS-MW3	209	4/17/12 9:14	GW	P	250 ml	4C	G	SA	Hexavalent Chromium (SW846-7196A)	
✓ 092018	-016	OBS-MW3	209	4/17/12 9:15	GW	P	125 ml	4C	G	SA	Anions (SW846-9056)	
✓ 092018	-017	OBS-MW3	209	4/17/12 9:16	FGW	P	250 ml	HNO3	G	SA	Cations (SW846-6020)	
✓ 092018	-018	OBS-MW3	209	4/17/12 9:17	GW	P	125 ml	H2SO4	G	SA	NPN (353.2)	
✓ 092018	-020	OBS-MW3	209	4/17/12 9:18	GW	P	250 ml	4C	G	SA	Perchlorate (314.0)	
✓ 092018	-022	OBS-MW3	209	4/17/12 9:19	GW	P	500 ml	4C	G	SA	Alkalinity (SM2320B)	
✓ 092018	-024	OBS-MW3	209	4/17/12 9:21	GW	AG	4x1L	4C	G	SA	HE (SW846-8321A)	

Last Chain:	☐ Yes	Sample Tracking	SMO Use
Validation Req'd:	☑ Yes	Date Entered:	
Background:	☐ Yes	Entered by:	
Confirmatory:	☐ Yes	QC inits.:	

Special Instructions/QC Requirements:

EDD	☑ Yes	☐ No		
Turnaround Time	☐ 7 Day*	☐ 15 Day*	☑ Day	
Negotiated TAT	☐			
Sample Disposal	☐ Return to Client	☑ Disposal by Lab		

Return Samples By:

Comments: Send report to Tim Jackson/4142/MS 0729/284-2547

FGW (Filtered in field w/40 micron filter), Anions (Cl,SO4), Cations (Ca,Mg,K,Na). If perchlorate detected, then perform verification analysis
Alkalinity (total,bicarbonate,carbonate)

Conditions on Receipt

Lab Use

Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell
	Robert Lynch	Robert Lynch	RL	SNL/4142/844-4013/250-7090
	Gilbert Quintana	Gilbert R Quintana	GRQ	SNL/4143/844-2507/850-8524
	Tim Jackson	T A Jackson	TJ	SNL/4142/284-2547

1.Relinquished by	T A Jackson	Org. 4142	Date 4-17-12	Time 1055	3.Relinquished by	Org.	Date	Time
1. Received by	Don Wakeman SMO	Org. 4142	Date 4/17/12	Time 1055	3. Received by	Org.	Date	Time
2.Relinquished by		Org.	Date	Time	4.Relinquished by	Org.	Date	Time
2. Received by		Org.	Date	Time	4. Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

AR/COC 614079

Project Name:	SWMU 68 GW Char	Project/Task Manager:	Alicia Aragon	Project/Task No.:	98026/01.13		Lab use
Tech Area:							
Building:	Room:						

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
092018	-027	OBS-MW3	209	4/17/12 9:22	GW	P	250 ml	NaOH	G	SA	Total Cyanide (SW846-9012)	
092018	-033	OBS-MW3	209	4/17/12 9:23	GW	P	1 L	HNO3	G	SA	Gamma Spec (short list)(901.0)	
092018	-034	OBS-MW3	209	4/17/12 9:24	GW	P	1 L	HNO3	G	SA	Gross Alpha/Beta (900.0)	
092018	-035	OBS-MW3	209	4/17/12 9:25	GW	P	1 L	HNO3	G	SA	Isotopic Ur (ASTM D3972-09M)	
092019	-001	OBS-TB1	N/A	4/17/12 9:10	DIW	G	3x40ml	HCL	G	TB	VOC (SW846-8260B)	

Recipient Initials_____

SMO 2012-ARCOC (4-2012)

AOP 95-1

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Prior to OBS-MW1

Internal Lab

Batch No. NA

SMO Use

AR/COC 614080

Project Name:	SWMU 68 GW Char	Date Samples Shipped:	4/17/12	SMO Authorization:	Don Watenpaugh/SMO
Project/Task Manager:	Alicia Aragon	Carrier/Waybill No.		SMO Contact Phone:	
Project/Task Number:	98026/01.13	Lab Contact:	Edie Kent/803.556.8171		
Service Order:	CF 0263-12	Lab Destination:	GEL	Send Report to SMO:	
		Contract No.:	PO 691436	Rita Kavanaugh/505.284.2553	
Tech Area:					
Building:	Room:	Operational Site:			

☐ Waste Characterization
☐ RMMA
☐ Released by COC No.
☑ 4° Celsius

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

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
092020	-001	OBS-EB1	N/A	4/17/12 10:20	DIW	G	3x40ml	HCL	G	EB	TCL VOC (SW846-8260B)	
092020	-002	OBS-EB1	N/A	4/17/12 10:24	DIW	AG	4x1L	NONE	G	EB	TCL SVOC (SW846-8270C)	
092020	-009	OBS-EB1	N/A	4/17/12 10:25	DIW	P	500 ml	HNO3	G	EB	TAL Metals+U(SW846-6010/6020/7470)	
092020	-014	OBS-EB1	N/A	4/17/12 10:26	DIW	P	250 ml	None	G	EB	Hexavalent Chromium (SW846-7196A)	
092020	-016	OBS-EB1	N/A	4/17/12 10:27	DIW	P	125 ml	None	G	EB	Anions (SW846-9056)	
092020	-017	OBS-EB1	N/A	4/17/12 10:28	FDIW	P	250 ml	HNO3	G	EB	Cations (SW846-6020)	
092020	-018	OBS-EB1	N/A	4/17/12 10:29	DIW	P	125 ml	H2SO4	G	EB	NPN (353.2)	
092020	-020	OBS-EB1	N/A	4/17/12 10:30	DIW	P	250 ml	None	G	EB	Perchlorate (314.0)	
092020	-022	OBS-EB1	N/A	4/17/12 10:31	DIW	P	500 ml	None	G	EB	Alkalinity (SM2320B)	
092020	-024	OBS-EB1	N/A	4/17/12 10:35	DIW	AG	4x1L	None	G	EB	HE (SW846-8321A)	

Last Chain:	☐ Yes	Sample Tracking	SMO Use
Validation Req'd:	☑ Yes	Date Entered:	
Background:	☐ Yes	Entered by:	
Confirmatory:	☐ Yes	QC inits.:	

Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell
	Robert Lynch	Robert Lynch	RL	SNL/4142/844-4013/250-7090
	Gilbert Quintana	Gilbert Quintana	GMQ	SNL/4143/844-2507/850-8524
	Tim Jackson	T Jackson	TJ	SNL/4142/284-2547

Special Instructions/QC Requirements:

EDD ☑ Yes ☐ No

Turnaround Time ☐ 7 Day* ☐ 15 Day* ☑ Day

Negotiated TAT ☐

Sample Disposal ☐ Return to Client ☑ Disposal by Lab

Return Samples By:

Comments: Send report to Tim Jackson/4142/MS 0729/284-2547

All trip blanks received with headspace.

If perchlorate detected perform verification analysis using SW846-6850 Alkalinity (total,bicarbonate,carbonate)

Conditions on Receipt

Lab Use

1.Relinquished by	T Jackson	Org. 4142	Date 4-17-12	Time 1100	3.Relinquished by	Org.	Date	Time
1. Received by	Don Watenpaugh	Org. 4142	Date 4-17-12	Time 1100	3. Received by	Org.	Date	Time
2.Relinquished by		Org.	Date	Time	4.Relinquished by	Org.	Date	Time
2. Received by		Org.	Date	Time	4. Received by	Org.	Date	Time

*Prior confirmation with SMO required for 7 and 15 day TAT

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

AR/COC 614080

Project Name:	SWMU 68 GW Char	Project/Task Manager:	Alicia Aragon	Project/Task No.:	98026/01.13		Lab use
Tech Area:							
Building:	Room:						

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
092020	-027	OBS-EB1	N/A	4/17/12 10:36	DIW	P	250 ml	NaOH	G	EB	Total Cyanide (SW846-9012)	
092020	-033	OBS-EB1	N/A	4/17/12 10:37	DIW	P	1 L	HNO3	G	EB	Gamma Spec (short list)(901.0)	
092020	-034	OBS-EB1	N/A	4/17/12 10:38	DIW	P	1 L	HNO3	G	EB	Gross Alpha/Beta (900.0)	
092020	-035	OBS-EB1	N/A	4/17/12 10:39	DIW	P	1 L	HNO3	G	EB	Isotopic Ur (ASTM D3972-09M)	
092021	-001	OBS-TB2	N/A	4/17/12 10:20	DIW	G	3x40ml	HCL	G	TB	VOC (SW846-8260B)	

Recipient Initials_____

Appendix C
Data Validation Sample Findings Summary Sheets for SWMUs 8/58 and 68 Groundwater Monitoring Data

Sample Findings Summary

AR/COC: 614155, 614156, 614157

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
DOE EML HASL-300, U-02-RC			
	092291-035/CCBA-MW1	Uranium-235/236 (13982-70-2)	BD, FR3
	092294-035/CCBA-EB1	Uranium-233/234 (N/A)	BD, FR3
	092294-035/CCBA-EB1	Uranium-235/236 (13982-70-2)	BD, FR3
	092294-035/CCBA-EB1	Uranium-238 (7440-61-1)	BD, FR3
	092296-035/CCBA-MW2	Uranium-235/236 (13982-70-2)	J, FR7
	092297-035/CCBA-MW2	Uranium-235/236 (13982-70-2)	J, FR7
EPA 900.0/SW846 9310			
	092291-034/CCBA-MW1	ALPHA (12587-46-1)	J, FR7
	092294-034/CCBA-EB1	ALPHA (12587-46-1)	BD, FR3
	092294-034/CCBA-EB1	BETA (12587-47-2)	BD, FR3
	092296-034/CCBA-MW2	BETA (12587-47-2)	J, FR7
	092297-034/CCBA-MW2	BETA (12587-47-2)	J, FR7
EPA 901.1			
	092291-033/CCBA-MW1	Americium-241 (14596-10-2)	BD, FR3
	092291-033/CCBA-MW1	Cesium-137 (10045-97-3)	BD, FR3
	092291-033/CCBA-MW1	Cobalt-60 (10198-40-0)	BD, FR3
	092291-033/CCBA-MW1	Potassium-40 (13966-00-2)	R, Z2
	092294-033/CCBA-EB1	Americium-241 (14596-10-2)	BD, FR3
	092294-033/CCBA-EB1	Cesium-137 (10045-97-3)	BD, FR3
	092294-033/CCBA-EB1	Cobalt-60 (10198-40-0)	BD, FR3
	092294-033/CCBA-EB1	Potassium-40 (13966-00-2)	BD, FR3
	092296-033/CCBA-MW2	Americium-241 (14596-10-2)	BD, FR3
	092296-033/CCBA-MW2	Cesium-137 (10045-97-3)	BD, FR3
	092296-033/CCBA-MW2	Cobalt-60 (10198-40-0)	BD, FR3
	092296-033/CCBA-MW2	Potassium-40 (13966-00-2)	R, Z2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	092297-033/CCBA-MW2	Americium-241 (14596-10-2)	BD, Z2
	092297-033/CCBA-MW2	Cesium-137 (10045-97-3)	BD, FR3
	092297-033/CCBA-MW2	Cobalt-60 (10198-40-0)	BD, FR3
	092297-033/CCBA-MW2	Potassium-40 (13966-00-2)	BD, FR3
SW846 3005/6020 DOE-AL			
	092291-009/CCBA-MW1	Calcium (7440-70-2)	J, D1
	092291-009/CCBA-MW1	Chromium (7440-47-3)	0.01885U, B
	092291-009/CCBA-MW1	Thallium (7440-28-0)	0.0038U, B3
	092291-017/CCBA-MW1	Calcium (7440-70-2)	J, D1
	092294-009/CCBA-EB1	Calcium (7440-70-2)	0.03695UJ, B,D1
	092294-009/CCBA-EB1	Chromium (7440-47-3)	0.01885U, B
	092294-017/CCBA-EB1	Calcium (7440-70-2)	0.398UJ, B,D1
	092296-009/CCBA-MW2	Calcium (7440-70-2)	J, D1
	092296-009/CCBA-MW2	Chromium (7440-47-3)	0.01885U, B
	092296-009/CCBA-MW2	Copper (7440-50-8)	0.00555U, B2
	092296-017/CCBA-MW2	Calcium (7440-70-2)	J, D1
	092297-009/CCBA-MW2	Calcium (7440-70-2)	J, D1
	092297-009/CCBA-MW2	Chromium (7440-47-3)	0.01885U, B
	092297-009/CCBA-MW2	Copper (7440-50-8)	0.00555U, B2
	092297-017/CCBA-MW2	Calcium (7440-70-2)	J, D1
SW846 3535/8321A Modified			
	092291-024/CCBA-MW1	2,6-Dinitrotoluene (606-20-2)	UJ, L3
	092291-024/CCBA-MW1	4-Amino-2,6-dinitrotoluene (19406-51-0)	UJ, L3
	092291-024/CCBA-MW1	m-Nitrotoluene (99-08-1)	UJ, I4
	092291-024/CCBA-MW1	o-Nitrotoluene (88-72-2)	UJ, I4
	092291-024/CCBA-MW1	p-Nitrotoluene (99-99-0)	UJ, I4
	092294-024/CCBA-EB1	2,6-Dinitrotoluene (606-20-2)	UJ, L3

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	092294-024/CCBA-EB1	4-Amino-2,6-dinitrotoluene (19406-51-0)	UJ, L3
	092294-024/CCBA-EB1	m-Nitrotoluene (99-08-1)	UJ, I4
	092294-024/CCBA-EB1	o-Nitrotoluene (88-72-2)	UJ, I4
	092294-024/CCBA-EB1	p-Nitrotoluene (99-99-0)	UJ, I4
	092296-024/CCBA-MW2	2,6-Dinitrotoluene (606-20-2)	UJ, L3
	092296-024/CCBA-MW2	4-Amino-2,6-dinitrotoluene (19406-51-0)	UJ, L3
	092296-024/CCBA-MW2	m-Nitrotoluene (99-08-1)	UJ, I4
	092296-024/CCBA-MW2	o-Nitrotoluene (88-72-2)	UJ, I4
	092296-024/CCBA-MW2	p-Nitrotoluene (99-99-0)	UJ, I4
	092297-024/CCBA-MW2	2,6-Dinitrotoluene (606-20-2)	UJ, L3
	092297-024/CCBA-MW2	4-Amino-2,6-dinitrotoluene (19406-51-0)	UJ, L3
	092297-024/CCBA-MW2	m-Nitrotoluene (99-08-1)	UJ, I4
	092297-024/CCBA-MW2	o-Nitrotoluene (88-72-2)	UJ, I4
	092297-024/CCBA-MW2	p-Nitrotoluene (99-99-0)	UJ, I4
SW846 7470A			
	092291-009/CCBA-MW1	Mercury (7439-97-6)	UJ, B4
	092294-009/CCBA-EB1	Mercury (7439-97-6)	UJ, B4
	092296-009/CCBA-MW2	Mercury (7439-97-6)	UJ, B4
	092297-009/CCBA-MW2	Mercury (7439-97-6)	UJ, B4
SW846 9012B			
	092291-027/CCBA-MW1	Cyanide, Total (57-12-5)	UJ, I5,B4
	092294-027/CCBA-EB1	Cyanide, Total (57-12-5)	UJ, I5,B4
	092296-027/CCBA-MW2	Cyanide, Total (57-12-5)	UJ, I5,B4
	092297-027/CCBA-MW2	Cyanide, Total (57-12-5)	NJ-, I5,B4
SW846 9056			
	092294-016/CCBA-EB1	Chloride (16887-00-6)	J+, I5

All other analyses met QC acceptance criteria; no further data should be qualified.

ANALYTICAL QUALITY ASSOCIATES, IN

PO Box 2198
Albuquerque, NM 8715
1-888-678-544
www.aqainc.ne

Memorandum

Date: June 23, 2012

To: File

From: Marcia Hilchey

Subject: Inorganic Data Review and Validation – SNL
Site: SWMU 8/58 GWM
AR/COC: 614155, -156, -157
SDG: 303091
Laboratory: GEL
Project/Task: 98026.01.12
Analysis: General Chemistry

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 3.

Summary

Four samples were prepared and analyzed with accepted procedures using methods EPA 9056 (anions by ion chromatography); EPA 9012A (total cyanide); EPA 314.0 (perchlorate by IC); SM 2320B (alkalinity); and EPA 353.2 (nitrate/nitrite by Cd reduction). Data were reported for all required analytes. Problems were identified with the data package that results in the qualification of data.

Anions:
The ICAL intercept for chloride was positive and > the MDL. The associated result for sample 303091-018 was a detect < 3X the intercept value and will be **qualified J+, I5**.

Total cyanide:
The ICAL intercept for total cyanide was negative, with an absolute value > MDL but ≤2X the PQL. Also, total cyanide was detected in ICB and CCB at a negative value with absolute value > MDL. The total cyanide result for sample -048 was a detect < 5X the MDL and < 3X the absolute value of the intercept and will be **qualified NJ-, I5, B4**. The total cyanide results for samples -009, -023, and -036 were ND and will be **qualified UJ, I5, B4**.

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

Holding Times and Preservation

The samples were prepared and analyzed within the prescribed holding times and properly preserved.

Calibration

All initial and continuing calibration met QC acceptance criteria except as noted above in the Summary section and as follows.

Anions:
The ICAL intercepts for fluoride and chloride were positive and > the MDL. Associated sample results that are ND or > 3X the intercept value will not be qualified.

Blanks

No target analytes were detected in the blanks except as noted above in the Summary section and as follows.

Anions:
Chloride was detected in the EB. Associated sample results were > 5X the EB concentration and will not be qualified.

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

All LCS/LCSD acceptance criteria were met.

Matrix Spike (MS)

All MS/PS recoveries met QC acceptance criteria.

Laboratory Replicate

The replicate analyses met all QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported. No samples were diluted except as follows.

Nitrate/Nitrite:
Samples -005, -032, and -044 were diluted 10X, and sample -019 was diluted 5X.

Anions:
Sample -004 was diluted 5X for chloride and sulfate; samples -031 and -043 were diluted 10X for chloride and sulfate.

All associated batch QC samples were analyzed at dilution factors that resulted in relative dilution factors to the sample that were ≤5X. No sample data will be qualified as a result.

Other QC

EBs and field duplicates were submitted on the AR/COC(s). There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result. No other specific issues that affect data quality were identified.

Reviewed By: Ken Salaz **Date: 06/26/12**

ANALYTICAL QUALITY ASSOCIATES, INC.

616 Maxine NE
Albuquerque, NM 87123
505-299-5201
www.aqainc.net

Memorandum

Date: June 22, 2012

To: File

From: Marcia Hilchey

Subject: LC/MS/MS Organic Data Review and Validation – SNL
Site: SWMU 8/58 GWM
AR/COC: 614155, -156, -157
SDG: 303091
Laboratory: GEL
Project/Task: 98026.01.12
Analysis: High Explosives (HE) by LCMSMS

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 3.

Summary

Four samples were prepared and analyzed with accepted procedures using method EPA 8321A Mod (HE by LCMSMS). All compounds were successfully analyzed. Problems were identified with the data package that result in the qualification of data.

1) M-nitrotoluene, o-nitrotoluene, and p-nitrotoluene had initial calibration response factors of < 0.05 but > 0.01. All associated sample results were ND and should be **qualified UJ, I4**.
2) LCS recoveries for 4-amino-2,6-dinitrotoluene and 2,6-dinitrotoluene were < the LAL but >10%. All associated sample results were ND and should be **qualified UJ, L3**.

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

Holding Times

The samples were extracted and analyzed within the prescribed holding times and properly preserved.

Calibration

All initial and continuing calibration met QC acceptance criteria except as noted above in the Summary section.

Reporting Limit Verification

All CRI recoveries met QC acceptance criteria.

Blanks

No target analytes were detected in the blanks.

Surrogates

All surrogate recoveries met QC acceptance criteria.

Internal Standards

All internal standards met QC acceptance criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS/MSD analyses met QC acceptance criteria.

It should be noted that MS/MSD analyses were performed on an SNL sample from another SDG. No sample data will be qualified as a result.

Laboratory Control Sample (LCS)

All LCS QC acceptance criteria were met except as noted above in the Summary section.

Detection Limits/Dilutions

All detection limits were properly reported. According to laboratory procedure, all sample and QC extracts were diluted 2X with HPLC grade water.

Other QC

An EB and a field duplicate were submitted with 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 that affect data quality were identified.

Reviewed By: Ken Salaz **Date: 06/26/12**

ANALYTICAL QUALITY ASSOCIATES, IN

PO Box 2198
Albuquerque, NM 8715
1-888-678-544
www.aqainc.ne

Memorandum

Date: June 22, 2012

To: File

From: Marcia Hilchey

Subject: Inorganic Data Review and Validation – SNL
Site: SWMU 8/58 GWM
AR/COC: 614155, -156, -157
SDG: 303091 and 303092
Laboratory: GEL
Project/Task: 98026.01.13
Analysis: Metals

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 3.

Summary

Four samples were prepared and analyzed with approved procedures using methods EPA 6020 (ICP-MS metals), EPA 6010B (ICP-AES), and EPA 7470A (CVAA mercury). Four samples were prepared and analyzed with approved procedures using method EPA 6020 (ICP-MS anions). Data were reported for all required analytes. Problems were identified with the data package that resulted in the qualification of data.

ICP-MS SDG 303091:

1) Tl was detected in the CCBs at < PQL. The associated result for sample 303091 -003 was a detect < 5X the CCB value and will be **qualified "0.0038U, B3"** at 5X the CCB value.
2) Ca and Cr were detected in the MB at < PQL. The Ca result for sample -017 was > MDL and < 5X the MB concentration and will be **qualified "0.03695U, B"** at 5X the MB value. The Cr results for samples -003, -017, -030, and -042 were > MDL and < 5X the MB concentration and will be **qualified "0.01885U, B"** at 5X the MB value.
3) Cu was detected in the EB associated with samples -030 and -042. Associated sample results were > MDL and < 5X the EB concentration and will be **qualified "0.00555U, B2"** at 5X the EB value.
4) The serial dilution %D was > 10% for Ca. The associated results for samples -003, -030, and -042 were detects and will be **qualified "J, D1"**. The associated result for sample -017 was a qualified ND (see item 1 above) and will be **qualified "0.03695UJ, B, D1"**.

ICP-MS SDG 303092:

1) Ca was detected in the MB at < PQL. The serial dilution %D was > 10% for Ca. The associated result for sample 303092-002 was a detect < 5X the MB concentration and will be **qualified 0.398UJ, B, D1"**. The

associated results for samples -001, -003, and -004 were detects > 5X the MB concentration and will be **qualified "J, D1"**.

CVAA:

1) Hg was detected in CCBs associated with all samples at negative concentrations > MDL and < PQL. The associated sample results were ND and will be **qualified "UJ, B4."**

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

Holding Times and Preservation

The samples were prepared and analyzed within the prescribed holding times and properly preserved.

ICP-MS Instrument Tune

All instrument tune requirements were met.

Calibration

All initial and continuing calibration met QC acceptance criteria.

Reporting Limit Verification

All CRA/CRI recoveries 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:
U and Tl were detected in associated CCBs at <PQL. Ca was detected in the MBs at < PQL. All associated sample results that were ND or > 5X the associated blank concentration will not be qualified.

Ca, Cr, Cu, and Na were detected in one or both EBs associated with field samples in this data package. All associated sample results that were ND or > 5X the associated EB concentration will not be qualified. It should be noted that several results in the EB samples (303091-017 and 303092-002) were qualified U due to MB and CCB contamination and, therefore, will not be applied to associated sample results (see Summary section above).

ICP -MS Internal Standards

All internal standards met QC acceptance criteria.

Matrix Spike (MS)

All MS recoveries met QC acceptance criteria.

Laboratory Replicate

All replicates met QC acceptance criteria.

Laboratory Control Sample (LCS)

All LCS QC acceptance criteria were met.

Detection Limits/Dilutions

All detection limits were properly reported. No samples were diluted except as follows.

ICP-MS:
Samples 303291-003, -030, and -042 and 303092-001, -003, and -004 were diluted 5X for Na.

ICP Interference Check Sample (ICS A and AB)

Results of the ICS A and AB analyses were not evaluated because the concentrations of Al, Ca, Fe, and Mg in the samples were < those in the ICS solutions. No sample data will be qualified as a result.

ICP Serial Dilution

The serial dilution analyses met all QC acceptance criteria except as noted in the Summary section above.

Other QC

EBs and field duplicates were submitted on the AR/COC(s). There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result. No other specific issues that affect data quality were identified.

Reviewed By: Ken Salaz **Date: 06/26/12**

ANALYTICAL QUALITY ASSOCIATES, IN

PO Box 2198
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Memorandum

Date: June 23, 2012

To: File

From: Marcia Hilchey

Subject: Radiochemical Data Review and Validation – SNL
Site: SWMU 8/58 GWM
AR/COC: 614155, -156, -157
SDG: 303091
Laboratory: GEL
Project/Task: 98026.01.12
Analysis: RAD

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 3.

Summary

Four samples were prepared and analyzed with approved procedures using methods EPA 901.1 (gamma spec – short list), EPA 900.0 (gross alpha/beta), and HASL 300, U-02-RC Mod (Alpha Spec U). Problems were identified with the data package that result in the qualification of data.

Gamma Spec, Iso-U; Gross Alpha/Beta:

1) All sample results which were either < the associated 2-sigma TPU or < the associated MDA will be **qualified "BD, FR3."**
2) All sample results which were > MDA but <3X the associated MDA will be **qualified "J, FR7."**

Gamma Spec:

1) The K-40 results for samples 303091-010 and -037 were X-flagged by the laboratory due to the peak not meeting identification criteria and will be **qualified "R, Z2."**
2) According to the case narrative, no peaks were identified for Am-241 in sample -049. The associated sample result is considered a ND at the calculated MDA and will be **qualified "BD, Z2."**

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

Holding Times and Preservation

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

Quantification

All quantification criteria were met except as noted above in the Summary section.

Calibration

The case narratives stated that the instruments used were properly calibrated.

Blanks

No target analytes were detected in the blanks at concentrations > the MDA and 2-sigma TPU.

Tracer/Carrier Recovery

All tracer/carrier recoveries met QC acceptance criteria.

Matrix Spike (MS)

All MS recoveries met QC acceptance criteria.

Laboratory Replicate

All replicate error ratio acceptance criteria were met except as follows.

Gamma Spec:
The RER for K-40 was > 1 and < 3. The parent sample result was X-qualified by the laboratory, therefore the associated RER was not applied to sample results.

Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria.

Detection Limits/Dilutions

All required detection limits were met. No dilutions were required.

Other QC

EBs and field duplicates were submitted on the AR/COC(s). There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result. No other specific issues that affect data quality were identified.

Reviewed By: Ken Salaz **Date: 06/26/12**

ANALYTICAL QUALITY ASSOCIATES, INC.

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Albuquerque, NM 87123
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Memorandum

Date: June 22, 2012

To: File

From: Marcia Hilchey

Subject: GC/MS Organic Data Review and Validation – SNL
Site: SWMU 8/58 GWM
AR/COC: 614155, -156, -157
SDG: 303091
Laboratory: GEL
Project/Task: 98026.01.12
Analysis: SVOCs

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 3.

Summary

Four samples were prepared and analyzed with accepted procedures using method EPA 8270C (SVOCs). All compounds were successfully analyzed. No problems were identified with the data package that resulted 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

The samples were prepared and analyzed within the prescribed holding times and properly preserved.

Instrument Tune

All instrument tune requirements were met.

Calibration

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

The ICAL intercepts for 2,4-dinitrophenol; p-nitroaniline; and 2-methyl-4,6-dinitrophenol were > the MDL. However, the associated sample results were all NDs and, therefore, will not be qualified.

The CCV %D for bis(2-chloroisopropyl) ether was >20% but <40% with negative bias. The associated sample results were ND, with no other calibration infractions, and should not be qualified.

Blanks

No target analytes were detected in the blanks.

Surrogates

All surrogate recoveries met QC acceptance criteria.

Internal Standards

All internal standards met QC acceptance criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

All MS/MSD acceptance criteria were met.

Laboratory Control Sample (LCS)

All LCS acceptance criteria were met with the following exception. The LCS %R for pyrene was > the UAL. All associated sample results were ND and should not be qualified.

Detection Limits/Dilutions

All detection limits were properly reported. The samples were not diluted.

Tentatively Identified Compounds (TICs)

TIC reports were not required.

Other QC

An EB was submitted on the AR/COC(s). No other specific issues that affect data quality were identified.

Reviewed By: Ken Salaz **Date: 06/26/12**

ANALYTICAL QUALITY ASSOCIATES, IN

PO Box 2198
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Memorandum

Date: June 22, 2012

To: File

From: Marcia Hilchey

Subject: GC/MS Organic Data Review and Validation – SNL
Site: SWMU 8/58 GWM
AR/COC: 614155, -156, -157
SDG: 303091
Laboratory: GEL
Project/Task: 98026.01.12
Analysis: VOCs

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 3.

Summary

Eight samples were prepared and analyzed with accepted procedures using method EPA 8260B (VOCs). All compounds were successfully analyzed. No problems were identified with the data package that resulted 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

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

Instrument Tune

All instrument tune requirements were met.

Calibration

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

The initial calibration RSD for bromoform was > 15% and < 40%. There were no other associated calibration infractions. Associated ND sample results will not be qualified.

The ICV %Ds for chloromethane and bromomethane were > 20% but < 40% with negative bias. The CCV %Ds for carbon disulfide, vinyl acetate, 2-butanone, and 2-hexanone were > 20% but < 40% with positive bias. All associated sample results were ND, with no other associated calibration infractions, and will not be qualified.

Blanks

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

Bromodichloromethane, chloroform, and dichloromethane were detected in the FB and EB associated with some samples in this SDG. The associated sample results were ND and should not be qualified.

Surrogates

All surrogate recoveries met QC acceptance criteria.

Internal Standards

All internal standards met QC acceptance criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

All MS/MSD acceptance criteria were met.

It should be noted that MS/MSD analyses were performed on an SNL sample of similar matrix from another SDG. No sample data will be qualified as a result.

Laboratory Control Sample (LCS)

All LCS acceptance criteria were met.

Detection Limits/Dilutions

All detection limits were properly reported. The samples were not diluted.

Tentatively Identified Compounds (TICs)

TIC reports were not required.

Other QC

TBs, FB, EB, and field duplicates were submitted on the AR/COC(s). There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed By: Ken Salaz **Date: 06/26/12**

Sample Findings Summary

AR/COC: 614081

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
DOE EML HASL-300, U-02-RC			
	092022-035/OBS-MW1	Uranium-235/236 (13982-70-2)	J, FR7
EPA 900.0/SW846 9310			
	092022-034/OBS-MW1	BETA (12587-47-2)	J, FR7
	092023-034/OBS-MW1	BETA (12587-47-2)	J, FR7
EPA 901.1			
	092022-033/OBS-MW1	Americium-241 (14596-10-2)	BD, FR3
	092022-033/OBS-MW1	Cesium-137 (10045-97-3)	BD, FR3
	092022-033/OBS-MW1	Cobalt-60 (10198-40-0)	BD, FR3
	092022-033/OBS-MW1	Potassium-40 (13966-00-2)	BD, Z2
	092023-033/OBS-MW1	Americium-241 (14596-10-2)	BD, FR3
	092023-033/OBS-MW1	Cesium-137 (10045-97-3)	BD, FR3
	092023-033/OBS-MW1	Cobalt-60 (10198-40-0)	BD, FR3
	092023-033/OBS-MW1	Potassium-40 (13966-00-2)	R, Z2
SW846 3005/6020 DOE-AL			
	092022-009/OBS-MW1	Copper (7440-50-8)	0.0065U, B2
	092023-009/OBS-MW1	Antimony (7440-36-0)	0.0064U, B2
	092023-009/OBS-MW1	Copper (7440-50-8)	0.0065U, B2
SW846 3535/8321A Modified			
	092022-024/OBS-MW1	m-Nitrotoluene (99-08-1)	UJ, I4
	092022-024/OBS-MW1	o-Nitrotoluene (88-72-2)	UJ, I4
	092022-024/OBS-MW1	p-Nitrotoluene (99-99-0)	UJ, I4
	092023-024/OBS-MW1	m-Nitrotoluene (99-08-1)	UJ, I4
	092023-024/OBS-MW1	o-Nitrotoluene (88-72-2)	UJ, I4
	092023-024/OBS-MW1	p-Nitrotoluene (99-99-0)	UJ, I4
SW846 7470A			
	092022-009/OBS-MW1	Mercury (7439-97-6)	UJ, I5, B4

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	092023-009/OBS-MW1	Mercury (7439-97-6)	UJ, I5, B4
SW846 9012B			
	092022-027/OBS-MW1	Cyanide, Total (57-12-5)	UJ, I5, B4
	092023-027/OBS-MW1	Cyanide, Total (57-12-5)	UJ, I5, B4

All other analyses met QC acceptance criteria; no further data should be qualified.

ANALYTICAL QUALITY ASSOCIATES, IN

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Memorandum

Date: June 19, 2012

To: File

From: Ken Salaz

Subject: Inorganic Data Review and Validation – SNL
Site: SWMU 68 GWM (ER)
AR/COC: 614081
SDG: 302859
Laboratory: GEL
Project/Task: 98026.01.13
Analysis: General Chemistry

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 3.

Summary

Two samples were prepared and analyzed with accepted procedures using methods EPA9012A (Total CN), EPA314.0 (Perchlorate), EPA9056 (Anions), EPA353.2 (nitrate/nitrite as nitrogen), EPA7196A (Cr+6), and SM2320B (Alkalinity). Data were reported for all required analytes. Problems were identified with the data package that result in the qualification of data.

Total CN:

1. The ICAL intercept was negative with an absolute value > the MDL but < 3X the MDL. Also, Total CN was detected in the ICB and CCB at negative concentrations with absolute values > the MDL but < the PQL. The associated sample results were all NDs and, therefore, will be **qualified UJ, I5, B4**.

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

Holding Times and Preservation

The samples were prepared and analyzed within the prescribed holding times and properly preserved.

Calibration

The initial and continuing calibrations met QC acceptance criteria except as noted above in the Summary Section and the following.

Anions:
The ICAL intercepts for fluoride, chloride, and sulfate were > the MDL. However, the associated sample results were all >3X the intercept and, therefore, will not be qualified.

Blanks

No target analytes were detected in any of the blanks except for the following.

Anions:
In EB sample 302788-019 from COC 614080, chloride was detected. However, this sample result was qualified U due to blank contamination and, therefore, will not be applied to sample results.

Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria.

Matrix Spike (MS)

All MS recoveries met QC acceptance criteria.

Total cyanide, Anions, Perchlorate, & Nitrate/Nitrite as Nitrogen:
It should be noted that the MS analyses were performed on SNL samples of similar matrix from other SDGs. No sample data will be qualified as a result.

Laboratory Replicate

The replicate analyses met all QC acceptance criteria.

Total cyanide, Anions, Perchlorate, Total CN, & Nitrate/Nitrite as Nitrogen:
It should be noted that the Replicate analyses were performed on SNL samples of similar matrix from other SDGs. No sample data will be qualified as a result.

Detection Limits/Dilutions

All detection limits were properly reported. No samples were diluted with the following exceptions.

Anions & Nitrate/Nitrite as Nitrogen:
The samples were diluted 5X for chloride & sulfate and 10X for nitrate/nitrite as nitrogen due to high concentrations. All associated matrix QC samples were analyzed at relative dilution factors ≤5X those of the samples.

Other QC

A field duplicate pair was submitted on the COC. There are no "required" review criteria for field duplicate analyses comparability. No sample data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey **Date:** 6/25/12

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Memorandum

Date: June 19, 2012

To: File

From: Ken Salaz

Subject: Organic Data Review and Validation – SNL
Site: SWMU 68 GWM (ER)
AR/COC: 614081
SDG: 302859
Laboratory: GEL
Project/Task: 98026.01.13
Analysis: High Explosives (HE)

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 3.

Summary

Two samples were prepared and analyzed with accepted procedures using method EPA 8321A Mod (HE by LCMSMS). All compounds were successfully analyzed. Problems were identified with the data package that result in the qualification of data.

1. The ICAL RFs for p-nitrotoluene, o-nitrotoluene, and m-nitrotoluene were <0.05 but >0.01. The associated sample results were all NDs and, therefore, will be **qualified UJ, I4**.

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

Holding Times

The samples were extracted and analyzed within the prescribed holding times and properly preserved.

Instrument Tune

All instrument tune requirements were met.

Calibration

All initial and continuing calibrations met QC acceptance criteria except as noted above in the Summary section.

Reporting Limit Verification

All CRI recoveries met QC acceptance criteria.

Blanks

No target analytes were detected in any of the blanks.

Surrogates

All surrogate recoveries met QC acceptance criteria.

Internal Standards

The internal standards met all QC acceptance criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS/MSD analyses met all QC acceptance criteria. It should be noted that the MS/MSD analyses were performed on an SNL sample of similar matrix from another SDG.

Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported. According to laboratory procedure, all sample and QC extracts were diluted 2X with HPLC grade water.

Other QC

One EB, sample 302788-024, was submitted on COC 614080. A field duplicate pair was submitted on the COC. There are no "required" review criteria for field duplicate analyses comparability. No sample data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey **Date:** 6/25/12

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Memorandum

Date: June 19, 2012

To: File

From: Ken Salaz

Subject: Inorganic Data Review and Validation – SNL
Site: SWMU 68 GWM (ER)
AR/COC: 614081
SDG: 302859, 302861
Laboratory: GEL
Project/Task: 98026.01.13
Analysis: Metals

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 3.

Summary

Two samples were prepared and analyzed with approved procedures using methods EPA 6010B (ICP-AES), EPA6020 (ICP-MS), and EPA 7470A (CVAA mercury). Two samples were prepared and analyzed with approved procedures using method EPA 6020 (ICP-MS metals/anions). Data were reported for all required analytes. Problems were identified with the data package that results in the qualification of data.

CVAA:

1. The ICAL intercept for Hg was negative with an absolute value > the MDL but < 3X the MDL. Also, Hg was detected in the ICB and CCB at negative concentrations with absolute values > the MDL but < the PQL. The associated sample results were all NDs and, therefore, will be **qualified UJ, I5, B4.**

ICP-MS:

1. In EB sample 302788-017 from COC 614080, Cu and Sb were detected. All Cu sample results and the Sb result of sample 302859-16 were detects <5X the blank concentration and, therefore, will be **qualified 0.0065U, B2 and 0.0064U, B2**, respectively.

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

Holding Times and Preservation

The samples were prepared and analyzed within the prescribed holding times and properly preserved.

ICP-MS Instrument Tune

The instrument tunes met all QC requirements.

Calibration

The initial and continuing calibrations met all QC acceptance criteria except as noted above in the Summary Section.

Reporting Limit Verification

All CRA/CRI recoveries met QC acceptance criteria.

Blanks

No target analytes were detected in the blanks except as noted above in the Summary section and the following.

ICP-MS:
In EB sample 302788-017 from COC 614080, Cr and Ca were detected. However, these sample results were qualified U due to blank contamination and, therefore, will not be applied to sample results.

ICP -MS Internal Standards

All internal standards met QC acceptance criteria.

Matrix Spike (MS)

All MS recoveries met QC acceptance criteria.

ICP-MS:
The parent sample concentrations for Ca, Mg, and Na were >4X the spike. However, an MS analysis is not required for Ca, Mg, and Na. Therefore, no sample data will be qualified.

Laboratory Replicate

The replicate analyses met all QC acceptance criteria.

Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported. No samples were diluted with the following exception.

ICP-MS:
All samples were diluted 5X for Ca due to over-range concentrations. All associated matrix QC samples were analyzed at relative dilution factors ≤5X those of the samples.

ICP Interference Check Sample (ICS A and AB)

Results of the ICS A and AB analyses were not evaluated because the concentrations of Al, Ca, Fe, and Mg in the samples were < those in the ICS solutions. No sample data will be qualified as a result.

ICP Serial Dilution

All serial dilution %Ds met QC acceptance criteria.

Other QC

A field duplicate pair was submitted on the COC. There are no "required" review criteria for field duplicate analyses comparability. No sample data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey **Date:** 6/25/12

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Memorandum

Date: June 19, 2012

To: File

From: Ken Salaz

Subject: Radiochemical Data Review and Validation – SNL
Site: SWMU 68 GWM (ER)
AR/COC: 614081
SDG: 302859
Laboratory: GEL
Project/Task: 98026.01.13
Analysis: RAD

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 3.

Summary

Two samples were prepared and analyzed with approved procedures using methods EPA 901.1 (gamma spec), EPA 900.0 (gross alpha/beta), and HASL 300 (Iso- U). Problems were identified with the data package that result in the qualification of data.

Gamma Spec:

1. No peaks were detected for K-40 in sample 302859-024 and, therefore, it will be **qualified BD, Z2**.
2. The K-40 result of sample -011 did not meet peak identification criteria and, therefore, will be **qualified R, Z2**.
3. All other gamma spec sample results were either < the associated 2-sigma TPU or < the associated MDA and, therefore, will be **qualified BD, FR3.**

Gross Alpha/Beta & Iso-U:

1. The U-235/236 result of sample 302859-013 and all gross beta sample results were > but <3X the MDA and, therefore, will be **qualified J, FR7.**

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

Holding Times and Preservation

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

Quantification

Quantification criteria were met except as noted above in the Summary section.

Calibration

The case narratives stated that the instruments used were properly calibrated.

Blanks

No target analytes were detected in the blanks at concentrations > the MDA and 2-sigma TPU.

Tracer/Carrier Recovery

All tracer/carrier recoveries met QC acceptance criteria.

Matrix Spike (MS)

All MS recoveries met QC acceptance criteria.

Gross Alpha/Beta:
It should be noted that the MS analyses were performed on SNL samples of similar matrix from other SDGs. No sample data will be qualified as a result.

Laboratory Replicate

All replicate error ratios met QC acceptance criteria.

Gross Alpha/Beta:
It should be noted that the Replicate analyses were performed on SNL samples of similar matrix from other SDGs. No sample data will be qualified as a result.

Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria.

Detection Limits/Dilutions

All required detection limits were met. The samples were not diluted.

Other QC

One EB, samples 302788-025 to -027, was submitted on COC 614080. A field duplicate pair was submitted on the COC. There are no "required" review criteria for field duplicate analyses comparability. No sample data will be qualified as a result.

No other specific issues that affect data quality were identified except as noted above in the Summary section.

Reviewed by: Marcia Hilchey **Date:** 6/25/12

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Memorandum

Date: June 19, 2012

To: File

From: Ken Salaz

Subject: GC/MS Organic Data Review and Validation – SNL
Site: SWMU 68 GWM (ER)
AR/COC: 614081
SDG: 302859
Laboratory: GEL
Project/Task: 98026.01.13
Analysis: SVOCs

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 3.

Summary

Two samples were prepared and analyzed with accepted procedures using method EPA 8270B (SVOCs). 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

The samples were prepared and analyzed within the prescribed holding time and properly preserved.

Instrument Tune

All instrument tune requirements were met.

Calibration

All initial and continuing calibration QC acceptance criteria were met except for the following.

The ICV %Ds for pentachlorophenol and 2,4-dinitrophenol were >20% but <40% with negative bias, and the ICV %D for isophorone was >20% but <40% with positive bias. However, the associated sample

results were NDs, and no other calibration infractions occurred for these analytes. Therefore, sample data will not be qualified.

Blanks

No target analytes were detected in the blanks.

Surrogates

All surrogate recoveries met QC acceptance criteria except for the following. The 2-fluorophenol surrogate %R for the MS sample was < the QC acceptance limit. Since this is a QC sample, no sample data will be qualified.

Internal Standards

The internal standards met all QC acceptance criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS/MSD analyses met QC acceptance criteria. It should be noted that the MS/MSD analyses were performed on an SNL sample of similar matrix from another SDG.

Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported. The samples were not diluted.

Tentatively Identified Compounds (TICs)

TIC reports were not required.

Other QC

One EB, sample 302788-016, was submitted on COC 614080. A field duplicate pair was submitted on the COC. There are no "required" review criteria for field duplicate analyses comparability. No sample data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey **Date:** 6/25/12

ANALYTICAL QUALITY ASSOCIATES, IN

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Memorandum

Date: June 19, 2012

To: File

From: Ken Salaz

Subject: GC/MS Organic Data Review and Validation – SNL
Site: SWMU 68 GWM (ER)
AR/COC: 614081
SDG: 302859
Laboratory: GEL
Project/Task: 98026.01.13
Analysis: VOCs

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 3.

Summary

Three samples were prepared and analyzed with accepted procedures using method EPA 8260B (VOCs). 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

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

Instrument Tune

All instrument tune requirements were met.

Calibration

All initial and continuing calibration QC acceptance criteria were met with the following exceptions.

The initial calibration %RSD for bromoform was >15% but <40%, the ICV %Ds for chloromethane and bromomethane were >20% but <40% with negative bias, and the CCV %Ds for carbon disulfide, vinyl acetate, 2-butanone, and 2-hexanone were >20% with positive bias. However, the associated sample results were non-detects, and no other calibration infractions occurred for these analytes. Therefore, sample data will not be qualified.

Blanks

No target analytes were detected in the blanks, except for the following. Bromodichloromethane, chloroform, and dibromochloromethane were detected in the EB. However, the associated sample results were all NDs and, therefore, will not be qualified.

Surrogates

All surrogate recoveries met QC acceptance criteria.

Internal Standards

The internal standards met all QC acceptance criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS/MSD analyses met all QC acceptance criteria.

Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported. The samples were not diluted.

Tentatively Identified Compounds (TICs)

TIC reports were not required.

Other QC

One EB, sample 302788-015, was submitted on COC 614080. A field duplicate pair was submitted on the COC. There are no "required" review criteria for field duplicate analyses comparability. No sample data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey **Date:** 6/25/12