

National Nuclear Security Administration Sandia Site Office P. O. Box 5400 Albuquerque, NM 87185



## JUL JU ZUIZ

#### CERTIFIED MAIL-RETURN RECEIPT REQUESTED

Mr. John E. Kieling Chief Hazardous Waste Bureau New Mexico Environment Department 2905 Rodeo Park Drive East, Bldg. 1 Santa Fe, NM 87505

Subject: Department of Energy/National Nuclear Security Administration Sandia National Laboratories Environmental Restoration Operations Consolidated Quarterly Report, July 2012

Dear Mr. Kieling:

Enclosed is the Environmental Restoration Operations Consolidated Quarterly Report, July 2012 for the Department of Energy, National Nuclear Security Administration, Sandia Corporation that addresses all quarterly reporting (January through March 2012) required under the Hazardous and Solid Waste Amendments Module of the Resource Conservation and Recovery Act Permit, the Compliance Order on Consent and the Chemical Waste Landfill Closure Plan for Sandia National Laboratories/New Mexico, Environmental Protection Agency identification number NM5890110518.

If you have questions please contact John Weckerle of my staff at (505) 845-6026.

Sincerely,

Geoffrey L. Beausoleil

Manager

Enclosure

cc: See Page 2 cc w/enclosure (Certified Mail): William Moats, NMED-HWB 5500 San Antonio Dr., NE Albuquerque, NM 87109

Laurie King, EPA, Region 6 1445 Ross Ave., Ste. 1200 Dallas, TX 75202

cc w/enclosure: Thomas Skibitski, NMED-OB, MS-1396 SNL ES&H Records Center, SNL/NM, MS-0718 Zimmerman Library, UNM MSC05 3020 1 University of New Mexico

Albuquerque, NM 87101-0001

cc w/o enclosure: Steven R. Black, NA-173, NNSA/ABQ Joanna Serra, NA-173, HQ/FORS Amy Blumberg, SNL/NM, MS-0141 Andrew Orrell, SNL/NM, MS-0711 David Miller, SNL/NM, MS-0718 John Cochran, SNL/NM, MS-0719 Sarah Summers, SNL/NM, MS-0727 Jeanette Norte SSO/FP, MS-0184 Daniel Pellegrino, NNSA/SSO, MS-0184 Joe Estrada, SSO/FP, MS-0184 John Weckerle, SSO/FP, MS-0184 12-315-454356



Sandia National Laboratories, New Mexico

# **Environmental Restoration Operations**

A U.S. Department of Energy Environmental Cleanup Program

# **Consolidated Quarterly Report**

January – March 2012



July 2012



United States Department of Energy Sandia Site Office

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

## **CONSOLIDATED QUARTERLY REPORT**

#### July 2012

#### SANDIA NATIONAL LABORATORIES, NEW MEXICO

#### ENVIRONMENTAL RESTORATION OPERATIONS

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

#### NUMBER OF POTENTIAL RELEASE SITES SUBJECT TO THIS PERMIT: 36

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

#### **REPORTING PERIOD: January – March 2012**

#### **OVERVIEW**

This Sandia National Laboratories, New Mexico (SNL/NM) 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 SNL/NM Resource Conservation and Recovery Act Permit, the Compliance Order on Consent, and the Chemical Waste Landfill Post-Closure Care Permit. The 36 potential release sites that require corrective action under the Permit and Compliance Order on Consent consist of 27 Solid Waste Management Units, including the Mixed Waste Landfill. The remaining potential release sites are nine Areas of Concern (AOCs), including eight 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:

<u>SECTION I</u> :	Environmental Restoration Operations Consolidated Quarterly Report, January – March 2012
<u>SECTION II</u> :	Perchlorate Screening of Groundwater Quarterly Monitoring Report, January – March 2012
SECTION III:	Solid Waste Management Units 149 and 154 Quarterly Groundwater Monitoring Report, January – March 2012
SECTION IV:	Solid Waste Management Units 8/58 and 68 Quarterly Groundwater Monitoring Report, January – March 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
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	evapotranspirative
FB	field blank
FOP	Field Operating Procedure
GEL	GEL Laboratories LLC
HE	high explosive(s)
HWHF	Hazardous Waste Handling Facility
LTES	Long-Term Environmental Stewardship
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
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
PQL	practical quantitation limit
QC	quality control
RCRA	Resource Conservation and Recovery Act
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
ТА	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, JANUARY – MARCH 2012

#### 1.0 Introduction

This Environmental Restoration Operations (ER) Consolidated Quarterly Report (subsequently referred to as the ER Quarterly Report) provides the status of ongoing corrective actions being implemented by Sandia National Laboratories, New Mexico (SNL/NM) ER for the January, February, and March 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

On March 26, 2012, the revised MWL Long-Term Monitoring and Maintenance Plan (LTMMP; SNL/NM March 2012a) was submitted to the New Mexico Environment Department (NMED), as required by the NMED in its approval letter dated October 14, 2011, for the MWL Corrective Measures Implementation Report (SNL/NM January 2010 and Kieling October 2011). During draft preparation of the plans, the NMED, SNL/NM, and Sandia Site Office finalized the discussion of LTMMP issues in January 2012, including final trigger levels, the evaluation process, monitoring parameters and frequencies, and scope of the Five-Year Reevaluation Report.

Initial soil characterization field sampling was completed at the MWL Borrow Pit in Technical Area (TA)-III to support closure of the National Pollution Discharge Elimination System Construction Permit. A closure plan is being developed to define the scope of work required to adequately stabilize the site and close the permit.

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

No supplemental watering activities were performed for the MWL Evapotranspirative (ET) Cover during this reporting period. Future watering activities will be planned as needed to supplement natural precipitation and establish a healthy, self-sustaining native plant population.

A comprehensive summary report of all supplemental watering is provided in the revised MWL LTMMP (SNL/NM March 2012a).

#### 2.1.2 MWL Evapotranspirative Cover Maintenance Activities

No cover maintenance activities were performed during this reporting period at the MWL. A comprehensive summary report of all cover maintenance activities is presented in the revised MWL LTMMP (SNL/NM March 2012a).

On March 29, 2012, informal approval was received from the NMED for small-scale herbicide testing at the MWL. Testing will involve pre-emergent and post-emergent herbicide application on small (less than 200-square-foot) test plots to determine its effectiveness in controlling Russian thistle and other common invasive annual weed species. The pre-emergent and post-emergent herbicides will be applied during the next reporting period.

#### 2.2 **Project Management and Site Closure**

ER sites currently undergoing regulatory and administrative closure activities are addressed in this section. The two permit modification requests in progress 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

Twenty-six 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 MWL is addressed in Sections I.2.1 and I.2.3.4 of this ER Quarterly Report. The groundwater investigation sites are addressed in Sections I.2.3.1, I.2.3.2, and I.2.3.3, respectively, of this ER Quarterly Report. 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 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
  - 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 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 the seven SWMUs will be discussed in the SNL/NM Calendar Year (CY) 2012 Annual Groundwater Monitoring Report (anticipated submittal to the NMED in summer 2013).

Perchlorate analysis and results for groundwater samples collected from the seven SWMUs are 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 January 2012 groundwater sampling event conducted at SWMUs 8/58 and 68 are presented in Section IV of this ER Quarterly Report.

Analytical results for the March 2012 groundwater sampling event conducted at SWMUs 149 and 154 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 February and March 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 was submitted to the NMED in January 2012 (SNL/NM January 2012).

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

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

#### 2.3.3 Tijeras Arroyo Groundwater

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

#### 2.3.4 Mixed Waste Landfill Groundwater

Annual MWL groundwater monitoring activities were performed in February and March 2012.

#### 2.3.5 Chemical Waste Landfill Groundwater

Semiannual CWL groundwater monitoring activities were performed in January 2012.

#### 2.3.6 SWMUs 8/58 Groundwater

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

#### 2.3.7 SWMU 68 Groundwater

Groundwater sampling for SWMU 68 was conducted in January 2012.

#### 2.3.8 SWMU 49 Groundwater

Groundwater sampling for SWMU 49 was conducted in January 2012.

#### 2.3.9 SWMU 116 Groundwater

Groundwater sampling for SWMU 116 was conducted in February 2012.

#### 2.3.10 SWMU 149 Groundwater

Groundwater sampling for SWMU 149 was conducted in March 2012.

#### 2.3.11 SWMU 154 Groundwater

Groundwater sampling for SWMU 154 was conducted in March 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).
- SWMUs 8/58 and 68 Groundwater Monitoring Well Installation Report submitted to the NMED on November 29, 2011 (SNL/NM November 2011).
- MWL Groundwater Monitoring Report for CY 2010 submitted to the NMED on September 30, 2011 (SNL/NM September 2011).
- Summary Report for BSG Characterization Field Program: Installation of Groundwater Monitoring Wells and Collection of Subsurface Soil Samples submitted to the NMED on January 30, 2012 (SNL/NM January 2012).
- Monitoring Well Plug and Abandonment Plan and Well Construction Plan for the BSG study area submitted to the NMED on February 3, 2012 (SNL/NM February 2012).
- MWL LTMMP submitted to the NMED on March 26, 2012 (SNL/NM March 2012a).

## 3.0 Environmental Restoration Operations/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 as follows in this section of the 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).

• On February 20, 2012, the NMED approved the "Request for Modifications to Hazardous Waste Post-Closure Care Permit for Sandia National Laboratories," submitted by DOE/Sandia in November 2011 (Wagner November 2011). The 37 operational and informational changes affect Attachments 1 through 6 of the CWL permit and were approved as Class 1 modifications (Kieling February 2012).

- The CWL Annual Post-Closure Care Report for CY 2011 was submitted to the NMED on March 26, 2012 (SNL/NM March 2012b).
- Quarterly inspections of the CWL ET cover surface, storm-water diversion structures, and security fence were performed in March 2012. Following the inspection, no maintenance or repairs were required.
- The first semiannual groundwater monitoring and annual soil-gas monitoring events for CY 2012 were performed in January 2012. All wells were inspected and no maintenance or repairs were required.
- In January 2012, the sampling port, at a depth of 440 feet below ground surface, in soilgas well CWL-D2 was clogged and did not yield a sample. After discussions with the NMED on March 5, 2012, an approach to open the sampling port using pressurized nitrogen was agreed upon and implemented on March 22, 2012. The CY 2012 environmental sample for this port was collected on March 29, 2012.
- Installation of passive soil-gas venting devices (i.e., Baroballs<sup>™</sup>) on all groundwater and soil-gas monitoring wells was discussed with the NMED and completed in March 2012.
- Cover maintenance was performed on the CWL ET cover in February to remove four-wing saltbush, Russian thistle, and other undesirable weedy species. The plants were pulled by hand and clipped at the ground surface using hand pruners, followed by light raking. Vegetation caught in the perimeter fence was also removed. A total of five pickup truckloads (approximately 15 cubic yards of plant material) were removed from the CWL and disposed of at the Kirtland Air Force Base Landfill.

#### 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 (January through March 2012) include the following:

- Follow-up activities to the December 2011 quarterly inspection are as follows:
  - On January 19, 2012, six four-wing saltbush plants were removed.
  - On January 23, 2012, a missing warning sign on the north perimeter fence was replaced.

- Quarterly monitoring of the Vadose Zone Monitoring System was conducted in March 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 January 4 and March 14, 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 of this ER Quarterly Report.
- Weekly inspections of the RCRA less-than-90-day accumulation area were conducted.
- Quarterly inspection of the site was performed on March 12 and March 29, 2012, which included the containment cell cover, storm-water diversion structures, security fences, gates, signs, and benchmarks. The inspection findings are as follows:
  - Eight four-wing saltbush plants were identified growing on the containment cell vegetative cover (Figure I-1). 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.
  - Plastic protective caps for rebar stakes marking the four benchmarks were noted as deteriorating and were replaced on March 22, 2012.



Figure I-1 Current State of Corrective Action Management Unit Vegetative Cover

#### 3.2.1 CAMU Waste Management Activities

Waste management data for the CAMU are reported in this section for the reporting period of January through March 2012. Estimated 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 January 1, 2012:
  - o 74 gallons of leachate
- Leachate and rinsate waste generated on site during the reporting period:
  - o 126 gallons of leachate
  - 5 gallons of rinsate
- Leachate and rinsate waste removed from the site by Hazardous Waste Handling Facility (HWHF) personnel on January 16, 2012:
  - o 91 gallons of leachate
  - o 2 gallons of rinsate
- Leachate and rinsate waste removed from the site by HWHF personnel on March 19, 2012:
  - o 92 gallons of leachate
  - o 3 gallons of rinsate
- Leachate and rinsate waste remaining on site at the end of this reporting period:
  - o 17 gallons of leachate
  - o 0 gallons of rinsate

#### 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).

#### 4.0 **References**

Brandwein, S. (New Mexico Environment Department), December 2009a. "Re: LWDS tanks status," e-mail correspondence to M. Sanders (Sandia National Laboratories, New Mexico), December 14, 2009.

Brandwein, S. (New Mexico Environment Department), December 2009b. "RE: LWDS holding tanks in TA-V (ER Site 52)," e-mail correspondence to J. Cochran (Sandia National Laboratories, New Mexico), December 17, 2009.

Kieling, J.E. (New Mexico Environment Department), June 2011. Letter to P. Wagner (U.S. Department of Energy NNSA/Sandia Site Office) and S.A. Orrell (Sandia National Laboratories, New Mexico), "Approval, Closure of Chemical Waste Landfill and Post-Closure Care Permit in Effect, Sandia National Laboratories, EPA ID# NM5890110518, HWB SNL-10-013," June 2, 2011.

Kieling, J.E. (New Mexico Environment Department), October 2011. Letter to P. Wagner (U.S. Department of Energy NNSA/Sandia Site Office) and S.A. Orrell (Sandia National Laboratories/New Mexico), "Notice of Approval, Mixed Waste Landfill Corrective Measures Implementation Report, January 2010, Sandia National Laboratories, EPA ID# NM5890110518 HWB-SNL-10-005," October 14, 2011.

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## SECTION II PERCHLORATE SCREENING OF GROUNDWATER QUARTERLY MONITORING REPORT, JANUARY–MARCH 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 Environmental Restoration Operations Consolidated Quarterly Report summarizes the perchlorate screening groundwater monitoring completed during the First Quarter of Calendar Year (CY) 2012 (January, February, and March) 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 in 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 Consolidated 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-fifth to be submitted since the November 2005 letter report; the previous reports were submitted for Fourth Quarter of CY 2005 through the Fourth Quarter of CY 2011 (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, and April 2012).

Groundwater at BSG monitoring well CYN-MW5 has been sampled six times; Coyote Test Field (CTF) well CTF-MW1 has been sampled twice and wells CTF-MW2 and CTF-MW3 have been sampled five times; Solid Waste Management Unit (SWMU) 8/58 wells CCBA-MW1 and CCBA-MW2 have been sampled two times; and SWMU 68 wells OBS-MW1, OBS-MW2, and OBS-MW3 have been sampled two 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 of groundwater analytical results for the First Quarter of CY 2012 (January, February, and March) 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 ( $\mu$ g/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, as 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 nine 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 Second Quarter, Fiscal Year 2012" (SNL/NM December 2011a)
- "SWMU 68 Groundwater Monitoring, Mini-SAP for Second Quarter, Fiscal Year 2012" (SNL/NM December 2011b)
- "SWMU 149 Groundwater Monitoring, Mini-SAP for Second Quarter, Fiscal Year 2012" (SNL/NM February 2012a).
- "SWMU 154 Groundwater Monitoring, Mini-SAP for Second Quarter, Fiscal Year 2012" (SNL/NM February 2012b).
- "SWMU 49 and 116 Groundwater Monitoring, Mini-SAP for Fiscal Year 2012 Annual Sampling" (SNL/NM January 2012b).

As described in the Mini-SAPs, groundwater sampling was performed in accordance with current SNL/NM Environmental Management, Long-Term Environmental Stewardship (LTES) Project Field Operating Procedures (FOPs). A portable Bennett<sup>™</sup> 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, "LTES Groundwater Monitoring Equipment Decontamination" (SNL/NM January 2012c). Each well was purged a minimum of one saturated screen volume before sampling in accordance with FOP 05-01, "LTES Groundwater Monitoring Well Sampling and Field Analytical Measurements" (SNL/NM January 2012d).

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<sup>™</sup> Model 6920 water quality meter. Turbidity was measured with a HACH<sup>™</sup> 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 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, results of quality control (QC) analyses, and data validation findings (Appendix B), has 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  $4 \mu g/L$  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  $4 \mu g/L$  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  $4 \mu g/L$ , DOE/Sandia will evaluate the nature and extent of perchlorate contamination, based on a screening level/MDL of  $4 \mu g/L$ , 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 or the environment.

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 First 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-MW1, CTF-MW2, CTF-MW3, CYN-MW5, OBS-MW1, OBS-MW2, or OBS-MW3.

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 field activities or field conditions from requirements in the groundwater monitoring Mini-SAPs (SNL/NM December 2011a, December 2011b, January 2012b, February 2012a, and February 2012b) were identified during the First 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-MW1, CTF-MW2, CTF-MW3, CYN-MW5, 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. This monitoring well is sampled semiannually and was not scheduled for sampling during the First Quarter of CY 2012.

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

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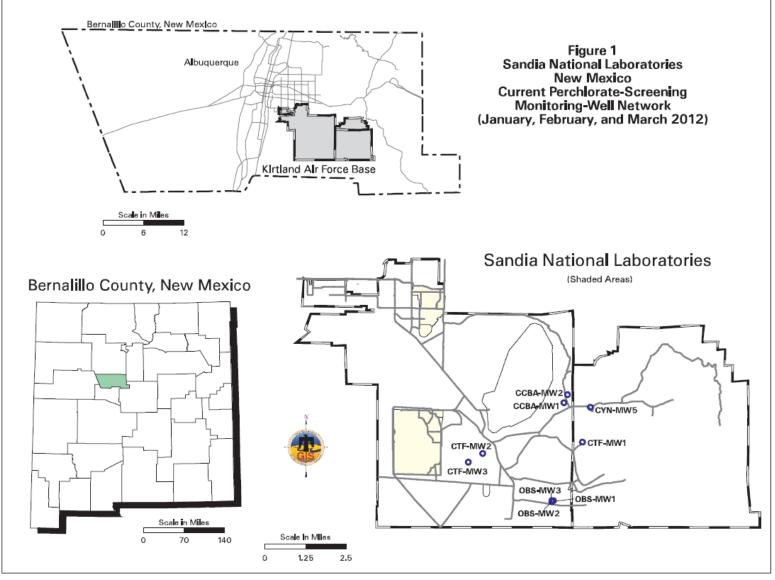
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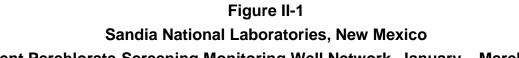
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# Figures





Current Perchlorate-Screening Monitoring Well Network, January – March 2012

# Tables

### Table II-1 Current Perchlorate Screening Monitoring Well Network First Quarter, CY 2012 (January – March 2012)

Well	Date Sampled	Number of Consecutive Sampling Events <sup>a</sup>	Remaining Number of Sampling Events <sup>b</sup>	Sampling Equipment
CCBA-MW1	16-Jan-12	2	6	Bennett <sup>™</sup> Pump
CCBA-MW2	12-Jan-12	2	6	Bennett <sup>™</sup> Pump
CTF-MW1	01-Feb-12	2	NA <sup>c</sup>	Bennett <sup>™</sup> Pump
CTF-MW2	30-Mar-12	5	3	Bennett <sup>™</sup> Pump
CTF-MW3	26-Mar-12	5	3	Bennett <sup>™</sup> Pump
CYN-MW5	31-Jan-12	6	NA <sup>c</sup>	Bennett <sup>™</sup> Pump
OBS-MW1	09-Jan-12	2	6	Bennett <sup>™</sup> Pump
OBS-MW2	10-Jan-12	2	6	Bennett <sup>™</sup> Pump
OBS-MW3	11-Jan-12	2	6	Bennett <sup>™</sup> Pump

#### Notes

<sup>a</sup>Includes this sampling event.

<sup>b</sup>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. If perchlorate is detected above the screening level/MDL in a specific well, monitoring will continue at that well at a frequency negotiated with the NMED.

<sup>c</sup>NA = Not Applicable. This well monitors a Solid Waste Management Unit that is subject to groundwater monitoring controls and will be sampled annually per NMED requirements (NMED April 2010).

μg/L = Microgram(s) per liter.

CCBA = Coyote Canyon Blast Area.

CTF = Coyote Test Field.

CY = Calendar Year.

CYN = Canyons (Burn Site).

MDL = Method detection limit.

MW = Monitoring well.

NMED = New Mexico Environment Department.

OBS = Old Burn Site.

#### Table II-2

#### Sample Details for First Quarter, CY 2012 Perchlorate Sampling

Well	Sample Identification	AR/COC Number	Associated Groundwater Investigation
CCBA-MW1	091615-020 091616-020	613958	SWMUs 8/58
CCBA-MW2	091610-020	613956	SWMUs 8/58
CTF-MW1	091700-020 091701-020	613981	SWMU 116
CTF-MW2	091949-020 091950-020	614055	SWMU 154
CTF-MW3	091943-020 091944-020	614053	SWMU 149
CYN-MW5	091692-020	613979	SWMU 49
OBS-MW1	091600-020	613952	SWMU 68
OBS-MW2	091604-020 091605-020	613954	SWMU 68
OBS-MW3	091607-020	613955	SWMU 68

#### Notes

CYN MW OBS

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

SWMU

#### Table II-3

### Summary of Perchlorate Screening Analytical Results for the Current Monitoring Well Network as of First Quarter, CY 2012

Well ID	Sample Date	AR/COC Number	Sample Number	Perchlorate Result <sup>a</sup> (μg/L)	MDL <sup>♭</sup> (µg/L)	PQL <sup>c</sup> (µg/L)	MCL <sup>d</sup> (µg/L)	Laboratory Qualifier <sup>e</sup>	Validation Qualifier <sup>f</sup>	Analytical Method <sup>9</sup>	Comments
	31-Oct-11	613883	091345-020	ŇD	4.0	12	NE	U		EPA 314.0	
CCBA-MW1	40 1	040050	091615-020	ND	4.0	12	NE	U		EPA 314.0	
	16-Jan-12	613958	091616-020	ND	4.0	12	NE	U		EPA 314.0	Duplicate sample
		040005	091349-020	ND	4.0	12	NE	U		EPA 314.0	
CCBA-MW2	01-Nov-11	613885	091350-020	ND	4.0	12	NE	U		EPA 314.0	Duplicate sample
	12-Jan-12	613956	091610-020	ND	4.0	12	NE	Ŭ		EPA 314.0	
	07-Mar-11	613444	090227-020	ND	4.0	12	NE	U		EPA 314.0	
CTF-MW1			091700-020	ND	4.0	12	NE	U		EPA 314.0	
-	01-Feb-12	613981	091701-020	ND	4.0	12	NE	Ŭ		EPA 314.0	Duplicate sample
			090237-020	ND	4.0	12	NE	U		EPA 314.0	
	08-Mar-11	613448	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	
CTF-MW2	29-Sep-11	613855	091259-020	ND	4.0	12	NE	Ŭ		EPA 314.0	
	09-Dec-11	613929	091525-020	ND	4.0	12	NE	Ŭ		EPA 314.0	
			091949-020	ND	4.0	12	NE	U		EPA 314.0	
	30-Mar-12	614055	091950-020	ND	4.0	12	NE	U		EPA 314.0	Duplicate sample
			090243-020	ND	4.0	12	NE	Ŭ		EPA 314.0	
	09-Mar-11	613450	090244-020	ND	4.0	12	NE	Ŭ		EPA 314.0	Duplicate sample
	03-Jun-11	613579	090672-020	ND	4.0	12	NE	Ŭ		EPA 314.0	
CTF-MW3	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	Ŭ		EPA 314.0	
			091943-020	ND	4.0	12	NE	Ŭ		EPA 314.0	
	26-Mar-12	614053	091944-020	ND	4.0	12	NE	Ŭ		EPA 314.0	Duplicate sample
	26-May-04	607546	065032-044	ND	4.0	12	NE	U		EPA 314.0	
	16-Sep-04	607811	065738-016	ND	4.0	12	NE	U		EPA 314.0	Duplicate sample
	16-Nov-04	608047	066427-020	ND	4.0	12	NE	U		EPA 314.0	
CYN-MW5	22-Feb-05	608285	067442-020	ND	4.0	12	NE	U		EPA 314.0	
	40.04		090232-020	ND	4.0	12	NE	U		EPA 314.0	
	10-Mar-11	613446	090232-020	ND	4.0	12	NE	U		EPA 314.0	Duplicate sample
	31-Jan-12	613979	091692-020	ND	4.0	12	NE	U		EPA 314.0	
000 0004	25-Oct-11	613879	091335-020	ND	4.0	12	NE	Ŭ		EPA 314.0	
OBS-MW1	09-Jan-12	613952	091600-020	ND	4.0	12	NE	U		EPA 314.0	
	26-Oct-11	613880	091337-020	ND	4.0	12	NE	U		EPA 314.0	
OBS-MW2			091604-020	ND	4.0	12	NE	U		EPA 314.0	
-	10-Jan-12	613954	091605-020	ND	4.0	12	NE	U		EPA 314.0	Duplicate sample
		040000	091342-020	ND	4.0	12	NE	U		EPA 314.0	,
OBS-MW3	24-Oct-11	613882	091343-020	ND	4.0	12	NE	U		EPA 314.0	Duplicate sample
	11-Jan-12	613955	091607-020	ND	4.0	12	NE	Ŭ		EPA 314.0	

# Table II-3 (Concluded)Summary of Perchlorate Screening Analytical Results for theCurrent Monitoring-Well Network, as of First Quarter, CY 2012

#### 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.

#### <sup>a</sup>Result

- ND = Not detected (at MDL).
- $\mu g/L$  = Micrograms per liter.

#### <sup>▶</sup>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.

#### °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.

#### ₫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.

#### <sup>e</sup>Laboratory Qualifier

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

#### <sup>f</sup>Validation Qualifier

If cell is blank, then all quality control samples meet acceptance criteria with respect to submitted samples and no qualifier was assigned.

#### <sup>g</sup>Analytical Method

EPA 314.0: EPA, November 1999, "Perchlorate in Drinking Water Using Ion Chromatography," EPA 815/R-00-014 (EPA November 1999).

#### Table II-4

### Perchlorate Screening Groundwater Monitoring Field Water Quality Measurements<sup>a</sup>, First Quarter, CY 2012

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmhos/cm)	Oxidation- Reduction Potential (mV)	рН	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
CCBA-MW1	16-Jan-12	14.03	567	416.7	6.49	0.20	27.3	2.82
CCBA-MW2	12-Jan-12	14.45	686	383.1	7.39	1.24	57.6	5.88
CTF-MW1	01-Feb-12	16.25	735	396.7	7.01	0.19	72.2	7.06
CTF-MW2	30-Mar-12	17.40	3540	10.4	6.17	2.36	1.4	0.14
CTF-MW3	26-Mar-12	20.34	1632	120.0	7.21	0.32	79.3	7.14
CYN-MW5	31-Jan-12	15.23	418	460.2	5.71	0.38	49.5	4.96
OBS-MW1	09-Jan-12	15.44	597	388.0	7.23	0.37	36.8	3.68
OBS-MW2	10-Jan-12	17.01	602	386.9	7.24	0.36	41.1	3.96
OBS-MW3	11-Jan-12	16.28	600	371.9	7.26	0.86	42.9	4.20

#### Notes

<sup>a</sup>Field measurements obtained immediately before the groundwater sample was collected.

°C = Degrees Celsius.

- % Sat = Percent saturation.
- $\mu$ mhos/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 SF 2001-COC (7/00)

### CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

CCBA-MUL

Internal Lab	1.				₩ <i>I</i> ~%inen f							,001C		CCBA-MUL	age 1 of	2
Batch No. /	//A		SAR/W	'R No.		1	/							AR/COC	6139	58
Dept. No./Mail		6234/0718		Date Sample	s Shipped:	1/16	12	SMO USE	Contrac	t No:		PO 69143	6	Waste Characterization		and the second states of the
Project/Task Mar		Alicia Aragon	,	Carrier/Wayb	ill No.	1			Project/	Task No.	•	98026.01.	13	RCRA Date=		
Project Name:		SWMU 68 GW Char	8/58	Lab Contact:		Edie Kent/8	03-556-817	71	]SMO AI	uthorizatio	on: 🥱	1 44	in	Send:Preliminary/report to_		
Record Center C		ER/1267 074/DAT		Lab Destinati		GEL						, ,	TMO	Validation Required		
Logbook Ref. N	-	ER 049		SMO Contact	t/Phone:	Lorraine Her	rera /505-8	844-3199	585	BATT	a ori	าะส		Released by COC No.:		
Service Order		CFO# 0263-12	· · · ·	Send Report	to SMO:				,	Velle				Bill To: Sandia National Labs	(Accounts Pa	ayable)
Location		Tech Area				·								P.O. Box 5800, MS-0	0154	
Building		Room					erence l					-		Albuquerque, NM.,		
Sample NoFr	raction	ER Sample ID Sample Location I		Beginning		3	. ,	Sample			-	Collection	Sample	Parameter & Metho	od	Lab Sample
Sample NoFi	action		Jetan	Depth (ft)	No.	Colle		Matrix	Туре	Volume	All@4C	Method	Туре	Requested		ID
091615 -0	01	SWMU 8/58-SA1	1	N/A	N/A	10/16/31	9:06	GW	G	3x40ml	HCL	G	SA	TCL VOC (SW846-8260B)		
091615 -0	02	SWMU 8/58-SA1		N/A	N/A	10/16/31	9:07	GW	AG	4x1L	4C	G	SA	TCL SVOC (SW846-82700	C)	
091615 -0	09	SWMU 8/58-SA1		N/A	N/A	10/16/31	9:09	GW	• P -	500 ml	HNO3	G	SA	TAL Metals + Ur (SW846-6010	0/6020/7470)	
091615 -0	16	SWMU 8/58-SA1		N/A	N/A	10/16/31	9:10	GW	Р	125 ml	4C	G	SA	Anions (SW846-9056)		
091615 -0	17	SWMU 8/58-SA1		N/A	N/A	10/16/31	9:11	FGW	P	250 ml	HNO3	G	SA	Cations (SW846-6020)		
091615 -0	18	SWMU 8/58-SA1		N/A	N/A	10/16/31	9:12	GW	Р	125 ml	H2SO4	G	SA	NPN (353.2)		
091615 -0	20	SWMU 8/58-SA1		N/A	N/A	10/16/31	9:13	GW	Р	250 ml	4C	G	SA	Perchlorate (314.0) *		
091615 -0	22	SWMU 8/58-SA1		N/A	N/A	10/16/31	9:14	GW	Р	500 ml	4C	G	SA	Alkalinity (SM2320B)		
<u>091615 -0</u>	24	SWMU 8/58-SA1		N/A	N/A	10/16/31	9:15	GW	AG	4x1L	4C	G	SA	HE (SW846-8321A)		
091615 -0	27	SWMU 8/58-SA1		N/A	N/A	10/16/31	9:17	GW	Р	250 ml		G	SA	Total Cyanide (SW846-901	12)	
RMMA		Yes 🗹 No	Ref.		A CONTRACTOR OF THE OWNER OF	Sample Tra	e la destruction de l	des andre andre and	SMO Us	se	Special	Instructio		· · · · · · · · · · · · · · · · · · ·	bnormal Co	nditions
Sample Disp		Return to Client	D	isposal by la	ıb	Date Entere	d(mm/dd/y	<u>y)</u>			EDD		✓ Yes		n Receipt	
Turnaround	Time	7 Day *	15 Da	iy* 🗸	30 Day	Entered by:					Raw Da	ta Packag	Yes	✓ No		
Return Samp	oles B		1		Negotia	ated TAT		QC inits.				-mail repo				
Sample		Name	2	Signature		Init		y/Organiz						0729/ 284-2547		
	- F	Robert Lynch	19	10m		ZL		2/844-401				iltered in fi		icron filter)		
	H	Alfred Santillanes	HU	es sol	26	- ar		2/844-513				Br,Cl,F,SO	,			
	ļ	William J. Gibson 🍏	Vin	where	7h	WHA	SNL/414	2/844-401	3/239-73			(Ca,Mg,K,				
	ļ			<u> </u>								(total,bica				
1 Dolinguished	hu	the	l	0		1 /		~				list as sep				
1.Relinquished		Hospil	<u> </u>	Org. 4142		16/12me	0950			uished by	/		Org.	Date	Time	
1. Received by 2.Relinquished	Concert States	1. Tim		Org. 4142		the state of the second s	0951		4. Recei				Org.	Date	Time	
2. Received by				Org.	Date '	/ Time				uished by	1	out the dispersion of the second state of the second state of the	Org.	Date	Time	
3.Relinquished				Org.	Date	Time Time	1.4 <b>0</b> -1		5. Recei				Org.	Date	Time	
3. Received by				Org. Org.	Date Date	Time				uished by	/	the second s	Org.	Date	Time	
Lo. Received by				oig.	Date	111110			6. Recei	vea by			Org.	Date	Time	

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

### RACT LABORATORY

# Analysis Request And Chain Of Custody (Continuation)

		1						1			na managana ang katang ang katang ang katang ang katang katang katang katang katang katang katang katang katang	AR/COC-	61395
Project Name:	SWMU 68 GW Char	Project/Task M	langer:	Alicia Aragon				Project/Task	: No.:	98026.01.13			
Location	Tech Area												
Building	Room	-						ble at S	MO)				Lab use
Sample No- Fraction	ER Sample ID or Sample Location detail	Beginning Depth (ft)	ER	Date/Tin	( )	Sample		ntainer	Preserv-	Collection	Sample	Parameter & Method	Lab Samp
004045 000				Collec		Matrix	Туре	Volume	ative	Method	Туре	Requested	ID .
091615 -033	SWMU 8/58-SA1	N/A	N/A	10/16/31	9:18	GW	Р	1L	HNO3	G	SA	Gamma spec (short list)(901.0)	
091615 -034	SWMU 8/58-SA1	N/A	N/A	10/16/31	9:19	GW	Р	1L	НNОЗ	G	SA	Gross Alpha/Beta (900.0)	
091615 -035	SWMU 8/58-SA1	N/A	N/A	10/16/31	9:20	GW	Р	1L	HNO3	G	SA	Isotopic Ur (ASTM D3972-09M)	
091616 -001	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:06	GW	G	3x40ml	HCL	G	DU	TCL VOC (SW846-8260B)	
091616 -002	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:07	GW	AG	4x1L	4C	G	DU	TCL SVOC (SW846-8270C)	
091616 -009	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:09	GW	Р	500 ml	HNO3	G	DU	TAL Metals + Ur (SW846-6010/6020/7470)	
091616 -016	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:10	GW	Р	125 ml	4C	G	DU	Anions (SW846-9056)	
091616 -017	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:11	FGW	Р	250 ml	HNO3	G		Cations (SW846-6020)	
091616 -018	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:12	GW	Р	125 ml	H2SO4	G		NPN (353.2)	
091616 -020	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:13	GW	P	250 ml	4C	G		Perchlorate (314.0)	
091616 -022	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:14	GW	Р	500 ml	4C	G		Alkalinity (SM2320B)	
091616 -024	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:15	GW	AG	4x1L	4C	G		HE (SW846-8321A)	
091616 -027	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:17	GW	Р	250 ml	NaOH	G	DU	Total Cyanide (SW846-9012)	
091616 -033	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:18	GW	Р	1L	HNO3	G	DU	Gamma spec (short list)(901.0)	
091616 -034	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:19	GW	Р	1L	HNO3	G		Gross Alpha/Beta (900.0)	
091616 -035	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:20	GW	Р	1L	HNO3	G		Isotopic Ur (ASTM D3972-09M)	
091617 -001	SWMU 8/58-TB3	N/A	N/A	10/16/31	9:06	DIW	G	3x40ml	HCL	G		VOC (SW846-8260B)	
												* If perchlorate detected perform	
			1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -				1					verification analysis SW846-6850M	

Page 2 of 2

#### **GEL LABORATORIES LLC**

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

### **Certificate of Analysis**

Report Date: February 7, 2012

	Company : Address : Contact: Project:	MS-0756, Or 1515 Eubank Albuquerque, Ms. Pamela M	New Mexico 87	123	276			-		·	
	Client Sample ID:	091615-020				Projec	t:	SNLSGWater			
	Sample ID:	294178006			h " .	Client	ID:	SNLS003			
	Matrix:	AQUEOUS									
	Collect Date:	16-JAN-12 09	9:13								
	Receive Date:	17-JAN-12				Client	Desc.:	SWMU 8/58-5	SA1		
	Collector:	Client				Vol. R	ecv.:				
					·····						
Parameter	Quali	fier Result		DL	RL	Units	DF	Analyst Date	Time	Batch 1	Method
Ion Chroma	itography										
EPA 314.0	Perchlorate by IC "A	As Received"									
Perchlorate		U ND	C	0.004	0.012	mg/L	1	MAR1 01/20/12	0832 1	1177129	1
The follow	ing Analytical Meth	ods were perfo	rmed:								
Method	Descri	ption				Anal	lyst Co	mments			
1	EPA 31	4.0 DOE-AL									

#### **GEL LABORATORIES LLC**

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

#### **Certificate of Analysis**

Report Date: February 7, 2012

Analyst Comments

1

Sandia National Laboratories Company : Address : MS-0756, Org. 06765, Bldg. 823/Rm. 4276 1515 Eubank SE Albuquerque, New Mexico 87123 Ms. Pamela M. Puissant Contact: Level C, Groundwater Monitoring Project: SNLSGWater Project: Client Sample ID: 091616-020 Sample ID: Client ID: SNLS003 294178018 AQUEOUS Matrix: 16-JAN-12 09:13 Collect Date: Client Desc.: SWMU 8/58-SA2 Receive Date: 17-JAN-12 Vol. Recv.: Collector: Client Qualifier DF Analyst Date Time Batch Method Units Result DL RL Parameter Ion Chromatography EPA 314.0 Perchlorate by IC "As Received" 0.012 1 MAR1 01/20/12 0851 1177129 mg/L Perchlorate U ND 0.004

The following Analytical Methods were performed: Method Description

EPA 314.0 DOE-AL

1

Internal Lab

### CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

iczA-muz

Page <u>1</u> of 2\_

														ADICOC	6139	)FC
	Batch No. NA	5	SAR/W		te tripsperor se programmi se p		1						-	AR/COC	0133	000
	Dept. No./Mail Stop:	6234/0718		Date Samples		1/12		SMO USE			Support the Designation of the Addition of the Owner, which it is not the owner, the own	PO 691436		Waste Characterization		
	Project/Task Manager:	Alicia Aragon		Carrier/Waybil		13	612	+		Task No.:		98026.01.	12	RCRA Date=	ana ana amin'ny sora dia mandritra amin'ny fanina dia mampika dia man	
	Project Name:	SWMU 8/68 GW Char		Lab Contact:	-	Edie Kent/80	3-556-817	'1	SMO Au	Ithorizatio	nicity	4 5.4	SmO	Send:Preliminary/report to		
		ER/1267 074/DAT		Lab Destinatio	•	GEL							•			
	5	ER 049		SMO Contact/	•	Lorraine Herr	era /505-8	344-3199		SBB	BOTTL	TORPO	R	Bill To: Sandia National Lab	a (Accounte D	aveble)
ŀ	Service Order No.	CFO# 0262-12		Send Report t	o SMO:				L				t his suo pa version di denne versionen	1		ayable)
L L	Location	Tech Area								10540				P.O. Box 5800, MS		
	Building	Room						LOV(ava		at SMC	<u>)</u> Decement	Collection	Cample	Albuquerque, NM. Parameter & Met	construction of the second	Lab Sample
	Sample NoFraction	ER Sample ID o Sample Location De		Beginning Depth (ft)	ER Site No.	Date/Tin Collec	• •	Sample Matrix	Соп Туре		All@4C		Sample Type	Requested	nou	ID
	091610 -001	SWMU 8/58-SA3		N/A	N/A	1/12/12	8:53	GW	G	3x40ml	HCL	G	SA	TCL VOC (SW846-8260E	3)	
	091610 -002	SWMU 8/58-SA3		N/A	N/A	1/12/12	8:55	GW	AG	4x1L	4C	G	SA	TCL SVOC (SW846-8270	)C)	
,	091610 -009	SWMU 8/58-SA3		N/A	N/A	1/12/12	8:56	GW	Р	500 ml	HNO3	G	SA	TAL Metals + Ur (SW846-60	10/6020/7470)	
	091610 -016	SWMU 8/58-SA3		N/A	N/A	1/12/12	8:57	GW	Р	125 ml	4C	G	SA	Anions (SW846-9056)		
,	091610 -017	SWMU 8/58-SA3		N/A	N/A	1/12/12	8:58	FGW	Р	250 ml	HNO3	G	SA	Cations (SW846-6020)		
4	091610 -018	SWMU 8/58-SA3		N/A	N/A	1/12/12	8:59	GW	Р	125 ml	H2SO4	G	SA	NPN (353.2)		
•	091610 -020	SWMU 8/58-SA3		N/A	N/A	1/12/12	9:00	GW	Р	250 ml	4C	G	SA	Perchlorate (314.0) *		
ł	091610 -022	SWMU 8/58-SA3		N/A	N/A	1/12/12	9:01	GW	Р	500 ml	4C	G	SA	Alkalinity (SM2320B)		
	091610 -024	SWMU 8/58-SA3		N/A	N/A	1/12/12	9:03	GW	AG	4x1L	4C	G	SA	HE (SW846-8321A)		
÷	091610 -027	SWMU 8/58-SA3		N/A	N/A	1/12/12	9:04	GW	P	250 ml	NaOH	G	SA	Total Cyanide (SW846-9		
	RMMA	🗌 Yes 🗹 No		No.		Sample Tra			SMO U	se		Instructio			Abnormal C	onations
	Sample Disposal	Return to Client	🗸 D	isposal by la	b	Date Entered	d(mm/dd/y	/y <u>)</u>			EDD		⊡ Yes		on Receipt	
	Turnaround Time	7 Day *	] 15 Da	ay * 🗸	30 Day	Entered by:						ta Packag		✓ No		
	Return Samples E	By:			Negoti	ated TAT		QC inits				-mail repo		0700/004 0547		
	Sample	Name	1	Şignature		Init		iy/Organiz						.0729/ 284-2547		
		Robert Lynch	fer	UT4nc	h	J2L		12/844-40			•	-iltered in fi		licron filter)		
		Alfred Santillanes	ALL	d Box T	44	GA-	SNL/414	12/844-51	30/228-0	710	-	(Br,Cl,F,SO				
		William J. Gibson	Will	in the	<u>.</u>	WA	SNL/414	12/844-40	13/239-7	367	Cations	(Ca,Mg,K,	Na)			
		Gilbert Quintana	13 Mil	2 Kindo	4	Nich 1	SNL/414	12/844-25	)7		Alkalinit	y (total,bica	irbonate,ca	irbonate)		
		10		1		1.1					1	list as sep	And the owner of the owner owne		Time	
	1.Relinquished by	Hugespill		Org. 4147			1040			quished b	У	Martin Contraction of the Contract of the Cont	Org.	Date	Time	
	1. Received by	Bry 9. In	Smy	Org. 4147	2 Datel		104	0	4. Rece				Org.	Date	Time	
	2.Relinquished by			Org.	Date	Time				uished b	у		Org.	Date	Time	WARDOW CONTRACTOR OF THE PARTY
	2. Received by			Org.	Date	Time			5. Rece				Org.	Date	Time	
	3.Relinquished by			Org.	Date	Time		ana an	6.Relind 6. Rece	uished b	У		Org. Org.	Date	Time	Y
	3. Received by			Org.	Date	Time			Jo. Rece	ived by			Jig.	Date		L

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

#### RACT LABORATORY

## Analysis Request And Chain Of Custody (Continuation)

Page 2 of 2

								·				AR/COC-	613956
Project Name:	SWMU 8/68 GW Char	Project/Task M	anger:	Alicia Aragon				Project/Task	No.:	98026.01.12			
Location	Tech Area												
Building	Room			Refer	ence L	OV (av	vailal	ole at S	MO)				Lab use
Sample No- Fraction	ER Sample ID or	Beginning	ER	Date/Tir	ne (hr)	Sample		ntainer	Preserv-	Collection			Lab Sample
	Sample Location detail	Depth (ft)	Site No.	Colle	cted	Matrix	Туре	Volume	ative	Method	Туре	Requested	ID
091610 -033	SWMU 8/58-SA3	N/A	N/A	1/12/12	9:05	GW	P	1 L	HNO3	G	SA	Gamma Spec (short list)(901.0)	
091610 -034	SWMU 8/58-SA3	N/A	·N/A	1/12/12	9:07	GW	P	1 L	HNO3	G	SA	Gross Alpha/Beta (900.0)	
091610 -035	SWMU 8/58-SA3	N/A	N/A	1/12/12	9:08	GW	Р	1 L	HNO3	G	SA	Isotopic Ur (ASTM D3972-09M)	
091611 -001	SWMU 68-TB1	N/A	N/A_	1/12/12	8:53	DIW	G	3x40ml	HCL	G	ТВ	VOC (SW846-8260B)	
091612 -001	SWMU 68-FB1	N/A	N/A	1/12/12	8:46	DIW	G	3x40ml	HCL	G	FB	VOC (SW846-8260B)	
											ļ		
											ļ	* If perchlorate detected, perform	
												verification analysis SW846-6850M	
								1					
						· · ·							
							-						
			<u> </u>										
Abnormal Conditio	ns on Receipt												
Posiniont Initiala													
Recipient Initials													

#### **GEL LABORATORIES LLC**

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

### **Certificate of Analysis**

Report Date: February 7, 2012

	Company : Address : Contact: Project:	MS-0756, C 1515 Euban Albuquerqu Ms. Pamela	onal Laboratorie Org. 06765, Bldg k SE e, New Mexico M. Puissant oundwater Mon	823/Rm. 42 87123	276					
	Client Sample ID:	091610-020				Projec	et:	SNLSGWater		
	Sample ID:	293951006				Client	ID:	SNLS003		
	Matrix:	AQUEOUS								
	Collect Date:	12-JAN-12	09:00							
	Receive Date:	13-JAN-12				Client	Desc.:	SWMU 8/58-5	SA3	
	Collector:	Client				Vol. F	Recv.:			
Parameter	Quali	fier Resul	t	DL	RL	Units	DF	Analyst Date	Time Batch	Method
Ion Chroma	atography						****			
	Perchlorate by IC "A	As Received"								
Perchlorate		U N	D	0.004	0.012	mg/L	1	MAR1 01/20/12	0715 1177129	1
The follow	ing Analytical Meth	ods were per	formed:							
Method	Descri	ption				Ana	lyst Co	omments		
1	EPA 31	4.0 DOE-AL								

#### CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

9													
>													
<b>.</b>													
					\_\IT	- • • •							
								ORATORY					
Internal Lab		AN	IALY	SIS REQU	EST	AND	CHA	IN OF CU	STOD	iΥ		Page 1 of 2	
Batch No. NA				SMO Use							AR/COC	61	3981
Dept. No./Mail Stop:	4142/1126	Date Samp	les Shipr	bed: 2/1/12		Project	t/Task No	146422.10.11.01			Waste Characterization	1	3901
Project/Task Manager:	Don Schofield			137007				on: Down at		SMO	-Send preliminary/copy		
Project Name:	SWMU 49	Lab Contac		Edie Kent/803-556	6-8171		ct # PO 6						
Record Center Code:	NA	Lab Destina		GEL		] ~	in A	He only	<u> </u>		Released by COC No.:		
Logbook Ref. No.: Service Order No.	NA	SMO Contact		Pam Puissant/505		5	ice Os				☑ Validation Required		
	CF 249-12	Send Report	to SMO:	Lorraine Herrera /	505-844-3	3199					Bill To:Sandia National Labs (A	ccounts Payable)	
Location	Tech Area			-							P.O. Box 5800 MS 0154		
Building	Room ER Sample ID or		ER Site	Referen Date/Time(hr)				Charles and the second s	<b>b</b>		Albuquerque, NM 87185-		
Sample NoFraction	Sample Location De		No.	Collected	Sample Matrix	Туре	ontainer Volume	Preserv- ative	Collectio Method		Parameter Reque		La
091700-001	CTF-MW1	261	NA	02/01/12 0924	GW	G	3x40m	HCL	G	SA	TCL VOC (SW846-8260E	3)	
091700-009	CTF-MW1	261	NA	02/01/12 0926	GW	Р	500 ml	HNO3	G	SA	TAL Metals+ Ur (SW846-	-6020/7470)	
091700-016	CTF-MW1	261	NA	02/01/12 0927	GW	Р	125ml	4C	G	SA	Anions (SW846-9056)		
091700-017	CTF-MW1	261	NA	02/01/12 0928	FGW	Р	500ml	4C	G	SA	Cations (SW846-6020/74	170)	2
091700-018	CTF-MW1	261	NA	02/01/12 0929	GW	P	125ml	H2SO4	G	SA	NPN (353.2)	an de la constant de	2
091700-020	CTF-MW1	261	NA	02/01/12 0930	GW	P	250ml	4C	G	SA	Perchlorate (314.0)		
091700-022	CTF-MW1	261	NA	02/01/12 0931	GW	Р	500ml	4C	G	SA	Alkalinity (SM2320B)		
091700-024	CTF-MW1	261	NA	02/01/12 0933	GW	AG	4x1L	4C	G	SA	High Explosive (SW846-8	8321A) Mod.	
091700-027	CTF-MW1	261	NA	02/01/12 0934	GW	P	250ml	NaOH	G	SA	Total Cyanide (SW846-9	012)	
091701-001	CTF-MW1	261	NA	02/01/12 0924	GW	G	3x40ml	HCL	G	DU	TCL VOC (SW846-8260E	3)	
091701-009	CTF-MW1	261	NA	02/01/12 0926	GW	P	500 ml	HNO3	G	DU	TAL Metals+ Ur (SW846-	-6020/7470)	
RMMA		Ref. No.		Sample Tracking		Smo U	se	Special Instruct	tions/QC	Require	ments	Abnormal	
Sample Disposal		Disposal by la		Date Entered(mm/	/dd/yy)	*******		EDD 🖸	Yes 🗌	No		Conditions on	
Turnaround Tim	e 🗌 7 Day 🗌			Entered by:				Level D Packag	Contraction of the local division of the loc	Yes	☑ No	Receipt	
Return Samples By:			· · · · · · · · · · · · · · · · · · ·	ted TAT	QC inits.			*Send report to					
Comula	Name	Signature	Init	Company/Orga			Cellular	Tim Jackson/OI					
Sample	Robert Lynch	GHYNN		SNL/4142/844-401				Alkalinity as tota					La
Team Members				SNL/4142/844-513				7		form ver	ification analysis (SW846-68	50M)	
menubers	William Gibson	Telle Alt	MA	SNL/4142/844-401	13/239-73	867		Anions as Br,Fl,	and a statement of the second		1		
	<u> </u>	V / /			e quadra su da su su su su su su su su su da da da			Cations as Ca,M			<b>6</b> 10 - 1		
1.Relinguished by	4hl Sale	Con LIU	Data	1/12 Time 10	32	A Dalin	quished b	FGW (filtered in	neid with .				
	Votempe			11/12 Time 10	and the second division of the second divisio		quisned by	у		Org. Org.	Date Date		Time
2.Relinquished by				41/12 Time 12			quished b	v		Org. Org.	Date Date		Time Time
2. Received by	He Chu			-2-17 Time 07			eived by	t	Marriel Concerns & Concerns	Org.	Date	an a	Time
3.Relinguished by	1	Org.	Date	Time			quished b	v		Org.	Date		Time

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

Page 2 of 2

Project Name:	SWMU 49	Project/Task M	langer:	Don Schofield		-	Project/Task	No.:	146422.10.11.0	01	AR/COC-	6139
Location Building	Tech Area Room			Reference I	.OV (a	vaila	ble at s	SMO)				Lab use
Sample No- Fraction	ER Sample ID or Sample Location detail	Pump Depth (ft)	ER Site No.	Date/Time (hr) Collected	Sample Matrix		ntainer Volume	Preserv- ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sampl ID
091701-016	CTF-MW1	261	NA	02/01/12 0927	GW	Р	125ml	4C	G	DU	Anions (SW846-9056)	032
091701-017	CTF-MW1	261	NA	02/01/12 0928	FGW	Р	500ml	4C	G	DU	Cations (SW846-6020/7470)	245074
091701-018	CTF-MW1	261	NA	02/01/12 0929	GW	Р	125ml	H2SO4	G	DU	NPN (353.2)	245072
091701-020	CTF-MW1	261	NA	02/01/12 0930	GW	Р	250ml	4C	G	DU	Perchlorate (314.0)	034
091701-022	CTF-MW1	261	NA	02/01/12 0931	GW	Р	500ml	4C	G	DU	Alkalinity (SM2320B)	039
091701-024	CTF-MW1	261	NA	02/01/12 0933	GW	AG	4x1L	4C	G	DU	High Explosive (SW846-8321A) Mod.	036
091701-027	CTF-MW1	261	NA	02/01/12 0934	GW	Р	250ml	NaOH	G	DU	Total Cyanide (SW846-9012)	037
091702-001	CTF-TB3	NA	NA	02/01/12 0924	DIW	G	3x40ml	HCL	G	ТВ	VOC (SW846-8260B)	038
				5								
											Sampling complete for SWMU 49	
											2nd Qtr 2012	
	tions on Receipt			LAB USE								
lecipient Initials												

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

### **Certificate of Analysis**

Report Date: February 27, 2012

	Company :		ia National Laborato							
	Address :		0756, Org. 06765, B Eubank SE	dg. 823/Rm. 42	276					
			querque, New Mexic	87123						
	Contact:		Pamela M. Puissant	0 0/125						
	Project:		l C, Groundwater M	onitoring						
			00-020	onitoring		Droio		SNLSGWater		
	Client Sample ID:					Projec				
	Sample ID:		72026			Client	t ID:	SNLS003		
	Matrix:	AQU	JEOUS							
	Collect Date:	01-F	EB-12 09:30							
	Receive Date:	02-F	EB-12			Client	t Desc.:	CTF-MW1		
	Collector:	Clier	nt			Vol. F	Recv.:			
Parameter	Quali	fier	Result	DL	RL	Units	DF	Analyst Date	Time Batch	Method
			result	DL		Onto	DI	Thatyst Date	Thie Daten	wieniou
Ion Chroma	0 1 0									
EPA 314.0	Perchlorate by IC "A	As Rec	ceived"							
Perchlorate		U	ND	0.004	0.012	mg/L	1	MAR1 02/09/12	2030 1185052	1
The follow	ving Analytical Meth	ods w	ere performed:							
Method	Descri	ption				Ana	ılyst Co	mments		
1	EPA 31	4.0 DO	E-AL							

#### **GEL LABORATORIES LLC**

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

#### **Certificate of Analysis**

Report Date: February 27, 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 Level C, Groundwater Monitoring Project: 091701-020 Project: **SNLSGWater** Client Sample ID: Client ID: SNLS003 Sample ID: 295072034 Matrix: AQUEOUS Collect Date: 01-FEB-12 09:30 Client Desc.: CTF-MW1 Receive Date: 02-FEB-12 Vol. Recv.: Collector: Client Qualifier Result DL RL Units DF Analyst Date Time Batch Method Parameter Ion Chromatography EPA 314.0 Perchlorate by IC "As Received" Perchlorate ND 0.004 0.012 mg/L 1 MAR1 02/09/12 2050 1185052 1 U The following Analytical Methods were performed: Description Analyst Comments Method EPA 314.0 DOE-AL

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300712

Internal Lab

#### CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Page 1 of 2

Internal Lab		AP	ALY	SIS REQU	E217	AND	CHA	IN OF CUS	SIOD	Y		Page 1 of 2	
Batch No. N/7				SMO Use /							AR/COC	614	055
Dept. No./Mail Stop:	6234/MS 0718	Date Samp	les Shipp	ed: 4/3/12	•	Project	Task No.	98026.01.15		**************************************	Waste Characterization		
Project/Task Manager:	Alicia Aragon	Carrier/Way	/bill No.	1391	567		uthorizatio		. 1 .	1	-Send preliminary/copy r		
Project Name:	SWMU 154	Lab Contac	t:	Edie Kent/803-556			t # PO 69		1.6.1	1~	cond preminary copy r	opon to.	
Record Center Code:	NA	Lab Destina	ation:	GEL				29	u - c- f		Released by COC No.:		
Logbook Ref. No.:	NA	SMO Contact	/Phone:	Lorraine Herrera/5	05-844-3	1 199			50		✓ Validation Required		
Service Order No.	CF 251-12	Send Report		Lorraine Herrera /5			9 B	0 00000	OPHOT	7	Bill To:Sandia National Labs (Ac	counte Bouchio)	and the second secon
Location	Tech Area	<u> </u>									P.O. Box 5800 MS 0154	counts Fayable)	
Building	Room	1		Referen		//avail	ahla at	SMO					
<u>~</u>	ER Sample ID or		ER Site	Date/Time(hr)	Sample		ntainer	Preserv-	Collection	Samplo	Albuquerque, NM 87185-0 Parameter 8		li al Oand
Sample NoFraction		Depth (ft)	No.	Collected	Matrix	Туре	Volume	ative	Method		Reques		Lab Sample ID
091949-001 .	CTF-MW2	128	NA	03/30/12 0911,	GW	G	3x40ml	HCL	G	SA	TCL VOC (SW846-8260E	;)	001
091949-002 •	CTF-MW2	128	NA	03/30/12 0913•	GW	AG.	4x1L•	4C	G	SA	TCL SVOC (SW846-8270	C) •	002
091949-009 •	CTF-MW2	128	NA	03/30/12 0914.	GW	Р	500 ml	HNO3	G	SA	TAL Metals+ Ur (SW846-	6020/7470) =	:003
091949-010 .	CTF-MW2	128	NA	03/30/12 0915.	FGW.	Р	500 m <b>լ</b>	HNO3	G	SA	TAL Metals+ Ur (SW846-	6020/7470) •	300968
091949-016 •	CTF-MW2	128	NA	03/30/12 0916.	GW	Р	125ml.	4C	G	SA	Anions (SW846-9056) •		005
091949-018 .	CTF-MW2	128	NA	03/30/12 0917.	GW	P	125ml•	H2SO4	G	SA	NPN (353.2) •		ass
091949-020 •	CTF-MW2	128	NA	03/30/12 0918.	GW	Р	250ml.	4C	G	SA	Perchlorate (314.0)		207
091949-022 •	CTF-MW2	128	NA	03/30/12 0920	GW	Р	500ml	4C	G	SA	Alkalinity (SM2320B) 🖌		008
091949-024 🖌	CTF-MW2	128	NA	03/30/12 0923•	GW	AG.	4x1L•	4C	G	SA	High Explosive (SW846-8	321A) Mod. 🔸	009
091949-033 •	CTF-MW2	128	NA	03/30/12 0924•	GW	Р	1 Liter	HNO3	G	SA	Gamma Spec (short list)(	901.0) •	010
	CTF-MW2	128	NA	03/30/12 0926.	GW	Р	1 Liter.	НNO3	G	SA	Gross Alpha/Beta (900.0)	-	04
RMMA	□ Yes ☑ No Ref.			Sample Tracking		Smo Us	se	Special Instruct	tions/QC F	Requirer	nents	Abnormal	
Sample Disposal		isposal by la	b	Date Entered(mm/	dd/yy)			EDD 🗹	Yes 🗌	No		Conditions on	
Turnaround Tim	e 🗌 7 Day 🗌 15 D	)ay 🖸 3	0 Day	Entered by:				Level D Packag	е	⊡Yes	🗹 No	Receipt	
Return Samples By:			Negotia	ted TAT	QC inits.			*Send report to:				•	
	Name Si	gnature	Init	Company/Orga	nization/I	Phone/C	ellular	Tim Jackson/OI	RG.4142/N	IS.0729/	284-2547		
Sample	Robert Lynch	tach	R	SNL/4142/844-401	3/250-70	90					fication analysis(SW846-685	∩M)	Lab Use
Team		Stille		SNL/4142/844-513			<b>1919 R</b>	Alkalinity as total				<u></u>	
Members		1/1 / 1	IAR	SNL/4142/844-401				Anions as Br.Fl.		are and C	aivonate		
	Aller	paper	MA		0.200-10	~	······································	FGW (filtered in	Comment of the second of the s	45 min-	e Elter)		
			·					f			( Inter)		
1.Relinguished by	Untratil in	000 414	2 Data 2	1/3/17 ime /1	42	1 Poline	uichod b	*Please list as s	and an owned that the second		Data		7.
111	Ret a l	Ora 4442	Date ú	12 11 Time 11:	5	4. Rece		y	Contraction of the local data	Org. Org.	Date Date		Time
				3/12 Time 0				v/		Org. Org.	Date		Time Time
2. Received by	Michalla	Org. (21_	- Date	4-1-Time O	955	5 Rece	ived hv		the state of the second se	Org.	Date		Time
3.Relinquished by	1 - perma	Org.	Date 7	Time			uished by	/	the state of the s	Org.	Date		Time
3. Received by		Org.	Date	Time		6. Rece	A DESCRIPTION OF THE OWNER OWNER OF THE OWNER OWNER OF THE OWNER	1		Org.	Date		Time
		¥-		Ster Landau and Landau					and the second	ory.	Daic		111116

Page 2 of 2

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

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	Torrest and the second s										AR/COC-	614055
Project Name: Location	SWMU 154	Project/Task M	langer:	Alicia Aragon			Project/Task	No.:	98026.01.15			
	Tech Area			- <i>.</i> .								
Building	Room			Reference L					<b>1</b>			Lab use
Sample No- Fraction	ER Sample ID or Sample Location detail	Pump Depth (ft)	ER Site No		Sample		ntainer	Preserv-	Collection			Lab Sample
			Sile NU.	Collected	Matrix	Туре	Volume	ative	Method	Туре	Requested	ID
091949-035.	CTF-MW2	128	NA	03/30/12 0927.	GW	P	1 Liter.	HNO3	G	SA	Isotopic Ur (ASTM D3972-09M) •	212
091950-001 •	CTF-MW2	128	NA	03/30/12 0911	GW	G	3x40ml,	HCL	G	DU	TCL VOC (SW846-8260B)	013
091950-002	CTF-MW2	128	NA	03/30/12 0913	GW	AG	4x1L•	4C	G	DU	TCL SVOC (SW846-8270C) •	.014
091950-009.	CTF-MW2	128	NA	03/30/12 0914.	GW	Р	500 ml.	HNO3	G	DU	TAL Metals+ Ur (SW846-6020/7470) .	014
091950-010,	CTF-MW2	128	NA	03/30/12 0915,	FGW.	Р	500 ml	HNO3	G	DU	TAL Metals+ Ur (SW846-6020/7470) •	3009.08
091950-016	CTF-MW2	128	NA	03/30/12 0916.	GW	Р	125ml	4C	G	DU	Anions (SW846-9056) •	0/7
091950-018+	CTF-MW2	128	NA	03/30/12 0917	GW	Р	125ml•	H2SO4	G	DU	NPN (353.2) •	D12
091950-020	CTF-MW2	128	NA	03/30/12 0918.	GW	Р	250ml.	4C	G	DU	Perchlorate (314.0) •	- D14
091950-022.	CTF-MW2	128	NA	03/30/12 0920•	GW	Р	500ml	4C	G	DU	Alkalinity (SM2320B) .	020
091950-024.	CTF-MW2	128	NA	03/30/12 0923.	GW	AG.	4x1L •	4C	G	DU	High Explosive (SW846-8321A) Mod. •	<u>c.;i</u>
091950-033•	CTF-MW2	128	NA	03/30/12 0924	GW	P	1 Liter	HNO3.	G	DU	Gamma Spec (short list)(901.0) .	022
091950-034	CTF-MW2	128	NA	03/30/12 0926.	GW	Р	1 Liter	HNO3	G		Gross Alpha/Beta (900.0) •	2.2
091950-035*	CTF-MW2	128	NA	03/30/12 0927.	GW	P	1 Liten	HNO3	G	2 SA	Isotopic Ur (ASTM D3972-09M) •	<u></u>
091951-001,	SWMU-TB4	NA	NA	03/30/12 0911.	DIW	G	3x40ml	HCL	G	ТВ	VOC (SW846-8260B) •	325
091952-001 •	SWMU-FB2	NA	NA	03/30/12 0905*	DIW	G	3x40ml	HCL	G	FB	VOC (SW846-8260B) •	1024
	1			an an tha a tha a tha an								
											Sampling complete for SWMU 154	
											2nd Qtr 2012	1
Abnormal Condi	tions on Receipt	L		LAB USE	I	I	I	l		L		
Recipient Initials	ML											
weenprenn mittals												

#### **GEL LABORATORIES LLC**

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

#### **Certificate of Analysis**

Report Date: April 27, 2012 Company : Sandia National Laboratories MS-0756, Org. 06765, Bldg. 823/Rm. 4276 Address : 1515 Eubank SE Albuquerque, New Mexico 87123 Ms. Pamela M. Puissant Contact: Project: Level C, Groundwater Monitoring Client Sample ID: 091949-020 Project: **SNLSGWater** Client ID: SNLS003 Sample ID: 300712007 Matrix: AQUEOUS Collect Date: 30-MAR-12 09:18 Client Desc.: CTF-MW2 Receive Date: 04-APR-12 Collector: Client Vol. Recv.: Qualifier Result RL Units DL DF Analyst Date Time Batch Method Parameter Ion Chromatography EPA 314.0 Perchlorate by IC "As Received" 1 MAR1 04/13/12 0255 1199385 0.012 mg/L 0.004 1 Perchlorate U ND The following Analytical Methods were performed: Description Analyst Comments Method EPA 314.0 DOE-AL

1

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### **Certificate of Analysis**

			Certificate	01 / 1114	1,9313		Rep	ort Da	ite:	April 2'	7,2012
	Company : Address : Contact: Project:	Sandia National Labor MS-0756, Org. 06765, 1515 Eubank SE Albuquerque, New Mo Ms. Pamela M. Puissa Level C, Groundwater	, Bldg. 823/Rm. 42 exico 87123 nt	76							
	Client Sample ID:	091950-020			Projec	et:	SNLSG	Water			
	Sample ID:	300712019			Client	ID:	SNLS00	3			
	Matrix:	AQUEOUS									
	Collect Date:	30-MAR-12 09:18									
	Receive Date:	04-APR-12			Client	Desc.:	CTF-MV	W2			
	Collector:	Client			Vol. F	Recv.:					
Parameter	Quali	fier Result	DL	RL	Units	DF	Analyst	Date	Time	e Batch	Method
Ion Chrom	atography										
	Perchlorate by IC "	As Received"									
Perchlorate	2	U ND	0.004	0.012	mg/L	1	MAR1 04/	/13/12	0314	1199385	1
The follow	ving Analytical Meth	ods were performed:									
Method 1	Descri EPA 31	ption 4.0 DOE-AL			Ana	lyst Cc	mments				

Page 5 of 1294

### CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Page 1 of 2         Batch No.       SMO Use       AR/COC       6         Dept. No./Mail Stop:       6234/MS 0718       Date Samples Shipped:       3/26//2       Project/Task No.98026.01.14       Waste Characterization         Project/Task Manager:       Alicia Aragon       Carrier/Waybill No.       //39//36       SMO Authorization:       Junct # PO 691436       Send preliminary/copy report to:         Project Name:       SWMU-149       Lab Contact:       Edie Kent/803-556-8171       Contract # PO 691436       Released by COC No.:         Logbook Ref. No.:       NA       SMO Contact/Phone:       Lorraine Herrera/505-844-3199       Set Bo Hile Soft & Stop Hile Soft       Validation Required         Bill To:Sandia National Labs (Accounts Payable)       P.O. Box 5800 MS 0154       P.O. Box 5800 MS 0154	<b>14053</b> - 298265
Dept. No./Mail Stop:       6234/MS 0718       Date Samples Shipped:       3/26//2       Project/Task No.98026.01.14       Waste Characterization         Project/Task Manager:       Alicia Aragon       Carrier/Waybill No.       /39/36       SMO Authorization:       SMO Authorization:       SMO Authorization:       SMO Authorization:       Send preliminary/copy report to:         Project/Task Manager:       SWMU-149       Lab Contact:       Edie Kent/803-556-8171       Contract # PO 691436       Send preliminary/copy report to:         Record Center Code:       NA       Lab Destination:       GEL       Released by COC No.:       Send Report to SMO:       Send Report to SMO:       Lorraine Herrera/505-844-3199       Set & Shot & S	
Project/Task Manager:       Alicia Aragon       Carrier/Waybill No.       / 39 / 36       SMO Authorization:       Description:       Send preliminary/copy report to:         Project Name:       SWMU-149       Lab Contact:       Edie Kent/803-556-8171       Contract # PO 691436       -Send preliminary/copy report to:         Record Center Code:       NA       Lab Destination:       GEL       Released by COC No.:       -         Logbook Ref. No.:       NA       SMO Contact/Phone:       Lorraine Herrera/505-844-3199       Set & S. + He & Method       Validation Required         Service Order No.       CF 250-12       Send Report to SMO:       Lorraine Herrera /505-844-3199       Bill To:Sandia National Labs (Accounts Payable)	298265
Project Name:       SWMU-149       Lab Contact:       Edie Kent/803-556-8171       Contract # PO 691436         Record Center Code:       NA       Lab Destination:       GEL         Logbook Ref. No.:       NA       SMO Contact/Phone:       Lorraine Herrera/505-844-3199       See Bot Here       Validation Required         Service Order No.       CF 250-12       Send Report to SMO:       Lorraine Herrera /505-844-3199       Bill To:Sandia National Labs (Accounts Payable)	298265
Logbook Ref. No.:       NA       SMO Contact/Phone:       Lorraine Herrera/505-844-3199       See Bo Hie or change       Image: Contact/Phone:       Image: Contact/Phone:       Lorraine Herrera/505-844-3199         Service Order No.       CF 250-12       Send Report to SMO:       Lorraine Herrera/505-844-3199       See Bo Hie or change       Image: Contact/Phone:       Image: Contact/Phone	298265
Logbook Ref. No.:       NA       SMO Contact/Phone:       Lorraine Herrera/505-844-3199       See Bo Hile or dual       Validation Required         Service Order No.       CF 250-12       Send Report to SMO:       Lorraine Herrera /505-844-3199       Bill To:Sandia National Labs (Accounts Payable)         Location       Tech Area	298265
Service Order No. CF 250-12 Send Report to SMO: Lorraine Herrera /505-844-3199 Bill To:Sandia National Labs (Accounts Payable)	298265
	298265
	298265
Building Room Reference LOV(available at SMO)	
ER Sample ID or ER Site Date/Time(hr) Sample Container Preserv Collection/Sample Preserve Preserve Collection/Sample Preserve Pre	Lab Sample
Sample NoFraction Sample Location Detail Depth (ft) No. Collected Matrix Type Volume ative Method Type Requested	ID
091943-001 CTF-MW3 360 NA 03/26/12 0957 GW G 3x40ml HCL G SA TCL VOC (SW846-8260B)	001
V 091943-009 CTF-MW3 360 NA 03/26/12 0958 GW P 500 ml HNO3 G SA TAL Metals (SW846-6020/7470)	003
091943-010 CTF-MW3 360 NA 03/26/12 0959 FGW P 500 ml HNO3 G SA TAL Metals (SW846-6020/7470)	298275
091943-016 CTF-MW3 360 NA 03/26/12 1001 GW P 125 ml 4C G SA Anions (SW846-9056)	299265 003
V 091943-018 CTF-MW3 360 NA 03/26/12 1002 GW P 125 ml H2SO4 G SA NPN (353.2)	004
091943-020 CTF-MW3 360 NA 03/26/12 1003 GW P 250 ml 4C G SA Perchlorate (314.0)	005
4C G SA Alkalinity (SM2320B)	006
- 091944-001 CTF-MW3 360 NA 03/26/12 0957 GW G 3x40ml HCL G DU TCL VOC (SW846-8260B)	007
091944-009 CTF-MW3 360 NA 03/26/12 0958 GW P 500 ml HNO3 G DU TAL Metals (SW846-6020/7470)	1
091944-010 CTF-MW3 360 NA 03/26/12 0959 FGW P 500 ml HNO3 G DU TAL Metals (SW846-6020/7470)	008 298275 002
U 091944-016 CTF-MW3 360 NA 03/26/12 1001 GW P 125 ml 4C G DU Anions (SW846-9056)	298265
RMMA Yes No Ref. No. Sample Tracking Smo Use Special Instructions/QC Requirements Abnormal	
Sample Disposal Return to Client Disposal by lab Date Entered (mm/dd/yy) EDD Ves No Conditions of	n -
Turnaround Time 7 Day 15 Day 30 Day Entered by:	
Return Samples By: Negotiated TAT QC inits. *Send report to:	
Name Signature Init Company/Organization/Phone/Cellular Tim Jackson/ORG.4142/MS.0729/ 284-2547	
Sample Robert Lynch With I'L SNL/4142/844-4013/250-7090 If perchlorate detected perform verification analysis(SW846-6850M)	Lab Use
I eam Alfred Santillanes Alfred Santillanes Alfred Santillanes SNL/4142/844-5130/228-0710 Alkalinity as total bicarbonate and carbonate	
Members William Gibson William Gibso	
FGW (filtered in field with .45 micron filter)	
*Please list as separate report.	
1. Relinquished by // Bol Solution Org. 4/4/2 Date 3/2/1/2 Time / 0.'4/4 4. Relinquished by Org. Date	Time
1. Received by Abrahlum Org. 4/142 Date 3/26/12 Time 13:44 4. Received by Org. Date	Time
2. Received by Why K Company Org. (147 Date 3/26/12 Time /200 5. Relinquished by Org. Date	Time
3 Relinguished by Org. Date	Time
3 Received by Org. Date Time Orkeninguistied by Org. Date	Time
S. Received by Org. Date Time 6. Received by Org. Date	Time

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

Page 2 of 2

Project Name:	SWMU-149	IDesignation to be									AR/COC-	614053
Location	Tech Area	Project/Task M	langer.	Alicia Aragon			Project/Task	No.:	98026.01.14			Constant of the party of the pa
Building	Room			Reference L	OV G	availe	able at '					
Sample No-	ER Sample ID or	Pump	ER		Sample	Ivane I Cc	intainer	Preserv-	Collection	Isample	Doromotos 9 Mathad	Lab use
Fraction	Sample Location detail	Depth (ft)	1		Matrix			ative	Method	Type	Parameter & Method Requested	Lab Sample ID
091944-018	CTF-MW3	360	NA	03/26/12 1002	GW	P	125 ml	H2SO4	G	T	NPN (353.2)	010
091944-020	CTF-MW3	360	NA	03/26/12 1003	GW	Р	250 ml	4C	G	DU	Perchlorate (314.0)	011
091944-022	CTF-MW3	360	NA	03/26/12 1004	GW	Р	500 ml	4C	G	DU	Alkalinity (SM2320B)	012
091945-001	SWMU-TB2	NA	NA	03/26/12 0957	DIW	G	3x40ml	HCL	G	тв	VOC (SW846-8260B)	013
091946-001	SWMU-FB1	NA	NA	03/26/12 0946	DIW	G	3x40ml	HCL	G	FB	VOC (SW846-8260B)	014
and the second secon												
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1.04/1010-01-01-01-01-01-01-01-01-01-01-01-01												
an a suit de la color a color de la												
				<u> </u>								
į												
	tions on Receipt			LAB USE								
Recipient Initials	_MK											
											그는 물건이 가슴다. 것이 가슴을 알 물건이 많이 있는 것	승규는 승규는 것이다.

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

### **Certificate of Analysis**

				Certificate		1 9 313		Rej	port Da	ate:	April 20	), 2012
	Company : Address : Contact: Project:	MS- 151: Albu Ms.	dia National Labor 0756, Org. 06765 5 Eubank SE 1querque, New Mo Pamela M. Puissa el C, Groundwater	, Bldg. 823/Rm. 42 <sup>*</sup> exico 87123 nt	76							
	Client Sample ID:	0919	943-020			Projec	t:	SNLSC	Water			
	Sample ID:	2982	265005			Client	ID:	SNLS0	03			
	Matrix:	AQU	JEOUS									
	Collect Date:	26-N	MAR-12 10:03									
	Receive Date:	27-N	/IAR-12			Client	Desc.:	CTF-M	W3			
	Collector:	Clie	nt			Vol. R	lecv.:					
Parameter	Quali	fier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chrom	atography											
EPA 314.0	Perchlorate by IC "A	As Re	ceived"	. ••*	1. p.,							
Perchlorate		U	ND	0.004	0.012	mg/L	1	MAR1 04	4/13/12	0100	1199385	1
The follow	ving Analytical Meth	ods w	vere performed:									
Method	Descri	ption			······	Ana	lyst Co	omments				
1	EPA 31	4.0 DC	DE-AL									

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### **Certificate of Analysis**

			Certificate	or Alla	<u>LY 515</u>	Report Date: April 20, 2012
	Company : Address :	Sandia National Lab MS-0756, Org. 0676 1515 Eubank SE Albuquerque, New M	5, Bldg. 823/Rm. 427	6		
	Contact:	Ms. Pamela M. Puiss Level C, Groundwat				
	Project: Client Sample ID:		or monitoring		Project:	SNLSGWater
	Sample ID:	298265011			Client ID	: SNLS003
	Matrix: Collect Date:	AQUEOUS 26-MAR-12 10:03				
	Receive Date: Collector:	27-MAR-12 Client			Client De Vol. Rec	esc.: CTF-MW3
	Collector.	Chent			voi. Ree	v
Parameter	Quali	ifier Result	DL	RL	Units	DF Analyst Date Time Batch Method
Ion Chrom	atography					
	Perchlorate by IC "A					
Perchlorate		U ND	0.004	0.012	mg/L	1 MAR1 04/13/12 0157 1199385 1
The follow	ving Analytical Meth	nods were performed:				
Method	Descri EPA 31	iption 14.0 DOE-AL			Analys	t Comments

Internal Lab

#### CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Page 1 of 2

										•	Page_1_of		
Batch No. NA				SMO Use							AR/COC	613979	ENGINEERIN (FRANKSKI)
	4142/1126	Date Samp	les Shipp	bed: 1/31/12		Project	/Task No.	146422.10.11.01			Waste Characterization	010010	
Project/Task Manager:	Don Schofield	Carrier/Wa	ybill No.	136959		SMO A	uthorizatio	on: In Id	In-S	nd	-Send preliminary/copy report to:		
Project Name:	SWMU 49	Lab Contac		Edie Kent/803-556	-8171	Contrac	<u>ct # PO 69</u>	91436			certa preminary/copy report to.		
Record Center Code:	NA	Lab Destina	ation:	GEL		1		See Bottle	Dala		Released by COC No.:		
Logbook Ref. No.:	NA	SMO Contact	t/Phone:	Pam Puissant/505	-844-318	5			,		☑ Validation Required		
Service Order No.	CF 249-12	Send Report	to SMO:	Lorraine Herrera /	505-844-3	3199					Bill To:Sandia National Labs (Accounts Payable	e)	
Location	Tech Area										P.O. Box 5800 MS 0154	-)	
Building	Room			Referen	ce LO\	/(avail	able at	SMO)			Albuquerque, NM 87185-0154	-	noria.
	ER Sample ID or		ER Site		Sample		ntainer	Preserv-	Collection	Sample	Parameter & Method		295072 ab Sample
Sample NoFraction	Sample Location Detai	il Depth (ft)	No.	Collected	Matrix	Туре	Volume	ative	Method	Type	Requested	L.	Lau Sample ID
091692-001	CYN-MW5	156	NA	01/31/12 0933	GW	G	3x40ml	HCL	G		TCL VOC (SW846-8260B)		001
091692-009	CYN-MW5	156	NA	01/31/12 0934	GW	Р	500 ml	HNO3	G		TAL Metals+ Ur (SW846-6020/7470)		002
091692-016	CYN-MW5	156	NA	01/31/12 0935	GŴ	Р	125ml	4C	G	SA	Anions (SW846-9056)		003
091692-017	CYN-MW5	156	NA	01/31/12 0936	FGW	Р	500ml	4C	G	SA	Cations (SW846-6020/7470)		295074
091692-018	CYN-MW5	156	NA	01/31/12 0937	GW	Р	125ml	H2SO4	G	SA	NPN (353.2)		29507-
091692-020	CYN-MW5	156	NA	01/31/12 0938	GW	Р	250ml	4C	G		Perchlorate (314.0)		005
091692-022	CYN-MW5	156	NA	01/31/12 0939	GW	Р	500ml	4C	G	SA	Alkalinity (SM2320B)		006
091692-024	CYN-MW5	156	NA	01/31/12 0941	GW	AG	4x1L	4C	G	SA	High Explosive (SW846-8321A) Mod		007
091692-027	CYN-MW5	156	NA	01/31/12 0942	GW	Р	250ml	NaOH	G	SA	Total Cyanide (SW846-9012)		008
091692-033	CYN-MW5	156	NA	01/31/12 0943	GW	Р	1 Liter	HNO3	G	SA	Gamma Spec (short list)(901.0)		009
091692-034	CYN-MW5	156	NA	01/31/12 0945	GW	Р	1 Liter	HNO3	G	SA	Gross Alpha/Beta (900.0)		010
RMMA		ef. No.		Sample Tracking		Smo Us	se	Special Instruc	tions/QC F	Requirer			an Barlinatera anno 1999
Sample Disposal		] Disposal by la	~~~~~~~~~~	Date Entered(mm/	dd/yy)			EDD 🗹	Yes 🗌	No	Condition	s on	
Turnaround Time		15 Day 🗹 🗄	30 Day	Entered by:				Level D Packag	je	Dres	☑ No		
Return Samples By:	T		Negotia	ted TAT	QC inits.			*Send report to	:				
	Name	Signature	Init	Company/Orga	nization/	Phone/C	ellular	Tim Jackson/O	RG.4142/N	IS.0729/	284-2547		
Sample		MANCE	R	SNL/4142/844-401	3/250-70	90		Alkalinity as tota				1	_ab Use
Team	Alfred Santillanes	4-1Satal		SNL/4142/844-513				1			fication analysis (SW846-6850M)	· •	
Members	William Gibson	Mul AITA		SNL/4142/844-401				Anions as Br,FI					
	put	hold	1 Mar					Cations as Ca,M					
	Maria	······						FGW (filtered in		Emine	o fillon)		
1.Relinguished by	the Satille	- Ora KIL	2 Date /	/31/12 Time 1/	17.	1 Poline	uished b						
	huden	Org. 21,6 2	Date	1/3//12 Time 1/	1	4. Rece	***************************************	y		Org.	Date	Time	
1. Received by			* D	TTITTIMO IA	20		uished by	1		Org. Org.	Date	Time	
	Qub & A	Carorg 4/V	/ Date /										
	De E En	Org. G-EL	Date					y		Y	Date	Time	
2.Relinquished by	Le Faitor	Org. <u>4/4</u> Org. <u>C-E (</u> Org.	Date Date Date		1.20	5. Rece				Org. Org. Org.	Date Date Date	Time Time Time	

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

												Page 2 of 2
Project Name:	SWMU 49	Project/Task N				-					AR/COC-	613979
Location	Tech Area	FIDJELUTASKIV	langer:	Don Schofield			Project/Task	No.:	146422.10.11.0	)1		
Building	Room			Reference I	OV	wail	blo of i	CREON				
Sample No-	ER Sample ID or	Pump	ER	Date/Time (hr)	Sample	avana	ntainer	SIVIU)	10-11-11			Lab use
Fraction	Sample Location detail	Depth (ft)	Site No.	Collected	Matrix	Type	Volume	Preserv- ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample
091693-001	CYN-TB1	NA	NA	01/31/12 0933	DIW	G	3x40ml		G	ТВ	VOC (SW846-8260B)	ID
091694-001	CYN-FB1	NA	NA	01/31/12 0915	DIW	G	3x40ml	HÇL	G	FB	VOC (SW846-8260B)	0/2
						1					(01040-02008)	
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				-								
				<b></b>								
										-	· · · · · · · · · · · · · · · · · · ·	
Marcalan												
Abnormal Condi	tions 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: February 27, 2012

	Company :		onal Laboratories	-	74					
	Address :	MS-0756, C 1515 Euban	0rg. 06765, Bldg. k SF	823/Km. 42	/6					
			e, New Mexico	87123						
	Contact:	1 1	M. Puissant	07120						
	Project:	Level C, Gr	oundwater Monit	toring						
	Client Sample ID:	091692-020				Projec	et:	SNLSGWater		
	Sample ID:	295072005				Client	ID:	SNLS003		
	Matrix:	AQUEOUS								
	Collect Date:	31-JAN-12	09:38							
	Receive Date:	01-FEB-12				Client	Desc.:	CYN-MW5		
	Collector:	Client				Vol. F	Recv.:			
Parameter	Quali	fier Resul	t	DL	RL	Units	DF	Analyst Date	Time Batch I	Method
Ion Chrom	atography									
	Perchlorate by IC "	As Received"								
Perchlorate	Teremorate by re-	U N	D	0.004	0.012	mg/L	1	MAR1 02/09/12	1914 1185052	1
The follow	ving Analytical Meth	ods were per	formed:							
Method	Descri	ption				Ana	lyst Co	mments		
1	EPA 31	4.0 DOE-AL								

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### CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

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												00 3-101001		
Internal Lab	A											Pa	age <u>1</u> of <u>2</u>	2
Batch No. N	+ .	SAR/WR No.		1	1 .							AR/COC	6139	952
Dept. No./Mail Stop:	6234/0718	Date Sample	s Shipped	1: 1/9	112	SMO USE	Contrac	ct No:		PO 69143	6	Waste Characterization		
Project/Task Manager:	Alicia Aragon	Carrier/Wayt	oill No.					Task No.		98026.01.		RCRA Date=		
Project Name:	SWMU 68 GWC	Lab Contact:		Edie Kent/80	3-556-817	71	SMO A	uthorizati	on: Q	16 9	P	Send:Preliminary/report to		· · · ·
Record Center Code:	ER/1267 074/DAT	Lab Destinat	ion:	GEL			1					Validation Required		
Logbook Ref. No.:	ER 049	SMO Contac	t/Phone:	Lorraine Herr	era /505-8	844-3199	1				5 MD	Released by COC No.:		
Service Order No.	CFO 263-12	Send Report	to SMO:	-			1					Bill To: Sandia National Labs (	Accounts P	avable)
Location	Tech Area						4	*********				P.O. Box 5800, MS-0		aj abio)
Building	Room			Refe	erence	LOV(av	ailable	at SM0	2)			Albuquerque, NM., 8		
	ER Sample ID		ER Site	Date/Tin		Sample				Collection	Sample	Parameter & Metho		Lab San
Sample NoFraction	Sample Location	Detail Depth (ft)	No.	Collec	ted	Matrix	Туре	Volume	All@4C	Method	Туре	Requested	u	ID
091600001	SWMU 68-SA1	N/A	N/A	1/9/12	9:02	GW	G	3x40m	HCL	G	SA	TCL VOC (SW846-8260B)		
091600002	SWMU 68-SA1	N/A	N/A	1/9/12	9:05	GW	AG	4x1L	4C	G	SA	TCL SVOC (SW846-8270C)	)	
091600009	SWMU 68-SA1	N/A	N/A	1/9/12	9:06	GW	Р	500 ml	ниоз	G	SA	TAL Metals + Ur (SW846-6010	/6020/7470)	)
091600014	SWMU 68-SA1	N/A	N/A	1/9/12	9:07	GW	P	250 ml	4C	G	SA	Hexavalent Chromium (SW846	-7196A)	
091600016	SWMU 68-SA1	N/A	N/A	1/9/12	9:08	GW	Р	125 ml	4C	G	SA	Anions (SW846-9056)	~	관련되는
091600017	SWMU 68-SA1	N/A	N/A	1/9/12	9:09	FGW	P	250 ml	ниоз	G	SA	Cations (SW846-6020)		
091600018	SWMU 68-SA1	N/A	N/A	1/9/12	9:10	GW	Р	125 ml	H2SO4	G	SA	NPN (353.2)		
091600020	SWMU 68-SA1	N/A	N/A	1/9/12	9:11	GW	Р	250 ml	4C	G	SA	Perchlorate (314.0)		
091600022	SWMU 68-SA1	N/A	N/A	1/9/12	9:12	GW	Р	500 ml	4C	G	SA	Alkalinity (SM2320B)		
091600024	SWMU 68-SA1	N/A	N/A	1/9/12	9:14	GW	AG	4x1L	4C	G	SA	HE (SW846-8321A)		
RMMA	Yes No	Ref. No.		Sample Trac	king		SMO U	se	Special	Instructio			onormal Co	ondition
Sample Disposal	Return to Client	Disposal by la	ab	Date Entered	(mm/dd/y	y)			EDD		🗹 Yes	No on	Receipt	
Turnaround Time	🗌 7 Day * 🗌	] 15 Day * 🗹	30 Day	Entered by:					Raw Dat	ta Packag	🗌 Yes	⊠ No		
Return Samples E	Зу:		Negoti	ated TAT		QC inits.			*Send/e	-mail repo	rt to:			
Sample	Name	Signature	1	Init	Company	y/Organiza	ation/Pho	one	Tim Jac	kson/ORG	. 4142/MS	.0729/ 284-2547		
	Robert Lynch	Lattine	L	Ph	SNL/414	2/844-401	3/250-70	090	If Perchl	orate detec	ted,perforr	n verification analysis SW846-68	350M	
	Alfred Santillanes	Hubata	fl_	1000	SNL/414	2/844-513	0/228-07	710	Anions (	CI,SO4)				
	William J. Gibson	Millinnon	W		SNL/414	2/844-401	3/239-73	367	Cations	(Ca,Mg,K,	Na)			
		1 march 1 spice		10 July					1	(total,bica	· ·	rbonate)		
	1						***		-	list as sep		,		
1.Relinquished by	Harlaal	COrg. 4142	Date (	alla Time	1100		4.Relinc	uished b		The second s	Org.	Date	Time	
1. Received by	A.G. F.	5 mg Org. 417	Date	0 117Time	1100		4. Rece	-			Org.	Date	Time	i Verantaria esta parte de este
	the form	Org.	Date /	( Time	11010			uished by	v		Org.	Date	Time	
2.Relinguished by									/					
2.Relinquished by 2. Received by		Ora	Date	Time		1	5 Rece	ived hv			Ora	Date	Time	
	n en	Org. Org.	Date Date	Time Time			5. Rece 6 Reling	ived by uished by	v		Org. Org.	Date Date	Time Time	9959740458565974746820000

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

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### Analysis Request And Chain Of Custody (Continuation)

613952 AR/COC-Project Name: SWMU 68 GWC Project/Task Manger: Alicia Aragon Project/Task No.: 98026.01.13 Location Tech Area Reference LOV (available at SMO) Building Room Lab use Sample No- Fraction ER Sample ID or Beginning Date/Time (hr) ER Sample Container Preserv-Collection Sample Parameter & Method Lab Sample Sample Location detail Depth (ft) Site No. Collected Matrix Type Volume Method ative Туре Requested ID 091600- -027 SWMU 68-SA1 N/A N/A 1/9/12 GW Ρ 250 ml 9:15 NaOH G SA Total Cyanide (SW846-9012) 091600- -033 SWMU 68-SA1 N/A N/A GW Ρ 1/9/12 9:16 1 L HNO3 G SA Gamma Spec (short list)(901.0) 091600- -034 SWMU 68-SA1 N/A N/A 9:17 GW Ρ HNO3 G Gross Alpha/Beta (900.0) 1/9/12 1 L SA 091600- -035 SWMU 68-SA1 N/A N/A GW Ρ 1/9/12 9:18 1LHNO3 G SA Isotopic Ur (ASTM D3972-09M) 091601--001 SWMU 68-TB1 N/A N/A 1/9/12 9:02 DIW G 3x40ml HCL G VOC (SW846-8260B) TΒ Abnormal Conditions on Receipt Recipient Initials

Page 2 of 2

#### **GEL LABORATORIES LLC**

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

#### **Certificate of Analysis**

Report Date: February 6, 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: 091600-020 Project: **SNLSGWater** Sample ID: 293626007 Client ID: SNLS003 Matrix: AQUEOUS 09-JAN-12 09:11 Collect Date: Receive Date: 10-JAN-12 Client Desc.: SWMU 68-SA1 Client Vol. Recv.: Collector: Qualifier Result Parameter 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 01/20/12 0501 1177129 1

Analyst Comments

The following Analytical Methods were performed: Description

- Method 1
  - EPA 314.0 DOE-AL

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### Analysis Request And Chain Of Custody (Continuation)

613954 AR/COC-Project Name: SWMU 68 GW Char Project/Task Manger: Alicia Aragon Project/Task No.: 98026.01.13 Location Tech Area Reference LOV (available at SMO) Building Room Lab use Sample No- Fraction ER Sample ID or Beginning ER Date/Time (hr) Sample Container Preserv-Collection Sample Parameter & Method Lab Sample Sample Location detail Depth (ft) Site No Collected Matrix Type Volume ative Method Type Requested ID 091604 -027 SWMU 68-SA2 N/A N/A 1/10/12 Ρ 9:11 GW 250 ml NaOH G Total Cyanide (SW846-9012) SA 091604 -033 **SWMU 68-SA2** N/A 1/10/12 Ρ N/A 9:13 GW 1L HNO3 G SA Gamma spec (short list)(901.0) 091604 -034 **SWMU 68-SA2** N/A Р N/A 1/10/12 9:14 GW 1L HNO4 G SA Gross Alpha/Beta (900.0) 091604 -035 SWMU 68-SA2 N/A N/A 1/10/12 9:16 GW Ρ 1L HNO5 G SA Isotopic Ur (ASTM D3972-09M) 091605 -001 **SWMU 68-SA3** N/A N/A 1/10/12 8:57 GW G G 3x40ml HCL DU TCL VOC (SW846-8260B) 091605 -002 **SWMU 68-SA3** N/A N/A 1/10/12 9:00 GW AG 4C G 4x1L DU TCL SVOC (SW846-8270C) 091605 -009 SWMU 68-SA3 N/A N/A 1/10/12 9:02 GW Ρ HNO3 G 500 ml DU TAL Metals + Ur (SW846-6020/7470) 091605 -014 SWMU 68-SA3 N/A N/A 1/10/12 9:03 GW Ρ 4C G 250 ml DU Hexavalent Chromium (SW846-719) 091605 -016 SWMU 68-SA3 N/A N/A 1/10/12 9:04 GW Ρ 4C G 125 ml DU Anions (SW846-9056) 091605 -017 SWMU 68-SA3 Р N/A N/A 1/10/12 9:05 FGW 250 ml HNO3 G DU Cations (SW846-6020) 091605 -018 SWMU 68-SA3 N/A N/A 1/10/12 GW Ρ 9:06 H2SO4 G DU NPN (353.2) 125 ml 091605 -020 SWMU 68-SA3 N/A N/A 1/10/12 9:07 GW Ρ 4C G DU Perchlorate (314.0) 250 ml 091605 -022 SWMU 68-SA3 Ρ N/A N/A 1/10/12 9:08 GW 4C G 500 ml DU Alkalinity (SM2320B) 091605 -024 **SWMU 68-SA3** N/A N/A 1/10/12 9:10 GW AG 4x1L 4C G DU HE (SW846-8321A) 091605 -027 SWMU 68-SA3 N/A N/A 1/10/12 9:11 GW Ρ 250 ml NaOH G DU Total Cyanide (SW846-9012) 091605 -033 SWMU 68-SA3 N/A N/A 1/10/12 GW Ρ G 9:13 1L HNO3 DU Gamma spec (short list)(901.0) 091605 -034 SWMU 68-SA3 Р N/A 1/10/12 GW HNO3 G N/A 9:14 1L DU Gross Alpha/Beta (900.0) 091605 -035 SWMU 68-SA3 N/A N/A 1/10/12 9:16 GW Ρ 1L HNO3 G DU Isotopic Ur (ASTM D3972-09M) 091606 -001 G G SWMU 68-TB3 N/A N/A 1/10/12 DIW HCL 8:57 3x40ml ΤB VOC (SW846-8260B) Abnormal Conditions on Receipt Recipient Initials

Page 2 of 2

## CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

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Bath No.       Mile       SARWR No.       Call       Call </th <th></th> <th>Internal Lab</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>,</th> <th></th> <th></th> <th></th> <th>OBS-muz</th> <th></th> <th>. *</th>		Internal Lab									,				OBS-muz		. *
Upper         No.Wail Stop:         Contract No:         PO 06128         Project Task No.         PO 06128         Project Task No.         PO 06128         Project Task No.         Pole No.Wait Contract No.         Pole No.Wait No.         Pole No.Wait Contract No.Wait Conteas No.Wait Contract No.Wait Contract No.Wait Contea			-	SAR/W	/R No.		7	/							procession of the second se		an ann an Anna
Project Pask Amage:         Alicia Aragon         Carles Mygles No.         The Contract Project Task No.         Project No.					Date Sample	s Shipped	1: 1/101	17	SMOLISE	Contrac	t No:	······	DO 60142	2		015:	004
Imperies Name:       SWMU 68 GW/Char       Lab Contract:       Edit Kents003-556-8171       SMM C Authorization       SwmU 64:100					1 1 1 1 1 1 1		-1-1										
Instruction         Control Control         Contro         Control         Control					Lab Contact:		Edie Kent/80	3-556-817	1	SMO A	uthorizati	on:	0002.01.				
Degenome         Description         Derivation         SFU	1				Lab Destinati	on:	GEL			1			myry	Can			
Location         Intervente         Juit To: Sandia National Labe (Accounts Payable)           Building         Recom         Reference LOV(available at SMO)         Po. Box 500, MS-0154           Building         Room         Beginning [ER Site         Depth (ft)         No.         Calection         Sample Dor.Fraction         Sample Location Detail         Po. Box 500, MS-0154           Semple NoFraction         Sample Location Detail         Depth (ft)         No.         Depth (ft)         Depth (ft)         No.         Depth (ft)         Depth (ft)         Depth (ft)         No.         Depth (ft)         Depth (ft) <td></td> <td>0</td> <td></td> <td></td> <td>SMO Contact</td> <td>/Phone:</td> <td>Lorraine Her</td> <td>rera /505-8</td> <td>344-3199</td> <td>1 51</td> <td>TIT R</td> <td>MILE</td> <td>nallara</td> <td>7 @ 480</td> <td></td> <td></td> <td></td>		0			SMO Contact	/Phone:	Lorraine Her	rera /505-8	344-3199	1 51	TIT R	MILE	nallara	7 @ 480			
Building         Reference         LOV(available at SMO)         P.O. Box 5800, MS-0154           Sample NoFraction         Sample Location Detail         Depth (fi)         Non         Container         Fracewolf Collection         Sample         Parameter & Mathoo           091604 -001         SWMU 68-SA2         N/A         N/A         1/10/12         9:00         GW         A         4         G         SA         TCL VOC (SWA64-8280B)         ID           091604 -002         SWMU 68-SA2         N/A         N/A         1/10/12         9:00         GW         AG         4x1L         4C         G         SA         TCL VOC (SWA64-8280B)         ID           091604 -009         SWMU 68-SA2         N/A         N/A         1/10/12         9:00         GW         AG         4x1L         4C         G         SA         TCL VOC (SWA64-8200B)         ID           091604 -014         SWMU 68-SA2         N/A         N/A         1/10/12         9:00         GW         P         250 mi         HNO3         G         SA         Anions (SW846-9026)         ID         ID <tdi< td=""><td>ł</td><td>T</td><td>CFO# 0263-12</td><td></td><td>Send Report</td><td>o SMO:</td><td></td><td></td><td></td><td>1</td><td></td><td>04-0</td><td>UNYUR</td><td></td><td></td><td>Accounte D</td><td>avabla)</td></tdi<>	ł	T	CFO# 0263-12		Send Report	o SMO:				1		04-0	UNYUR			Accounte D	avabla)
Building         Naom         Reference         COV(available at SMO)         Abouteroue NM. 4718-0154           Sample NoFraction         Sample Location Detail         Depth (ft)         No.         Depth (ft)         No.         Contacted         Sample         Contacted         Sample         Preve Volume Allaged         Method         Type         Requested         Ib           091604-001         SWMU 68-SA2         N/A         N/A         1/10/12         8:67         GW         G         SA4/mit         HCL         G         SA         TCL VOC (SW846-8200E)         Ib           091604-002         SWMU 68-SA2         N/A         N/A         1/10/12         9:00         GW         AG         4x1L         4C         G         SA         TCL VOC (SW846-8200C)         Ib           091604-014         SWMU 68-SA2         N/A         N/A         1/10/12         9:00         GW         P         250 ml         HC3         G         SA         TAL Metals + Ur(SW846-8010/00/07/00)         Ib         Ib <td></td> <td>Location</td> <td>Tech Area</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>·····</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>ayable)</td>		Location	Tech Area								·····						ayable)
Sample NoFraction         Sample Lessing Der         Deptint (II)         No.         Container         Pressove Collection         Sample         Parameter & Mathod         Lab Sam           091604 -001         SWMU 68-SA2         N/A         N/A         1/10/12         9:57         GW         G         3x4om         HCL         G         SA         TCL VOC (SW846-82206)         ID           091604 -002         SWMU 68-SA2         N/A         N/A         1/10/12         9:00         GW         AG         4x1L         4C         G         SA         TCL VOC (SW846-82206)         ID           091604 -014         SWMU 68-SA2         N/A         N/A         1/10/12         9:02         GW         P         500 ml         HN03         G         SA         TAL Metals + Ur(SW846-6010/6020/7470)         091604 -014         SWMU 68-SA2         N/A         N/A         1/10/12         9:02         GW         P         250 ml         4C         G         SA         Anions (SW846-9056)         ID         091604 -014         SWMU 68-SA2         N/A         N/A         1/10/12         9:06         GW         P         250 ml         HCD         G         SA         Neito (SW846-9056)         ID         091604 -018         SWMU 68-SA2         N/		Building					Ref	erence l	_OV(av	ailable	at SM	าเ					
Sample NoFraction       Sample Location       Depth (tt)       No.       Collected       Matrix       Type       Volume       Allight       Type       Requested       Lab sample         091604 -001       SWMU 68-SA2       N/A       N/A       1/10/12       8:57       GW       G       3x40ml       HCL       G       SA       TCL VOC (SW846-82200)       Image: Coll of the sample         091604 -002       SWMU 68-SA2       N/A       N/A       1/10/12       9:00       GW       AG       4x1L       4C       G       SA       TCL VOC (SW846-8270C)       Image: Coll of the sample       Image: Coll		<u> </u>			Beginning	ER Site	Date/Tir	ne(hr)					Collection	Sample			
091604-001       SWMU 68-SA2       N/A       N/A       1/10/12       8:57       GW       G       3x40ml       HCL       G       SA       TCL VOC (SW846-8200B)       0         091604-002       SWMU 68-SA2       N/A       N/A       1/10/12       9:00       GW       AG       4x1L       4C       G       SA       TCL VOC (SW846-8270C)       0         091604-009       SWMU 68-SA2       N/A       N/A       1/10/12       9:00       GW       P       500 ml       HNO3       G       SA       TAL Metals + Ur(SW846-6010/6020/7470)         091604-016       SWMU 68-SA2       N/A       N/A       1/10/12       9:02       GW       P       250 ml       4C       G       SA       Anions (SW846-6020)       0       0       0       0       9:001604-017       SWMU 68-SA2       N/A       N/A       1/10/12       9:06       GW       P       125 ml       H2SO d       SA       Anions (SW846-6020)       0       0       9:001604-018       SWMU 68-SA2       N/A       N/A       1/10/12       9:06       GW       P       125 ml       H2SO d       SA       Alkalinity (SM2320E)       0       0       0       0       0       0       0       0       0	⊢	Sample NoFraction	Sample Location [	Detail	Depth (ft)	No.					Volume	]All@4C	Method			a	
Ø       091604 -009       SWMU 68-SA2       N/A       N/A </td <td>e</td> <td>091604 -001</td> <td>SWMU 68-SA2</td> <td></td> <td>N/A</td> <td>N/A</td> <td>1/10/12</td> <td>8:57</td> <td>GW</td> <td>G</td> <td>1</td> <td>1</td> <td></td> <td></td> <td></td> <td>**************************************</td> <td></td>	e	091604 -001	SWMU 68-SA2		N/A	N/A	1/10/12	8:57	GW	G	1	1				**************************************	
0       091604 -009       SWMU 68-SA2       N/A       N/A       1/10/12       9:00       HN03       G       SA       TAL Metals + Ur(SW846-6010/6020/7470)         0       091604 -014       SWMU 68-SA2       N/A       N/A       1/10/12       9:00       GW       P       250 ml       4C       G       SA       Hexavalent Chromium (SW846-6010/6020/7470)         0       091604 -016       SWMU 68-SA2       N/A       N/A       1/10/12       9:00       GW       P       250 ml       4C       G       SA       Hexavalent Chromium (SW846-9056)         0       091604 -016       SWMU 68-SA2       N/A       N/A       1/10/12       9:05       FGW       P       250 ml       HN03       G       SA       Cations (SW846-9026)       Image: Cations (SW846-9026)	0	091604 -002	SWMU 68-SA2		N/A	N/A	1/10/12	9:00	GW	AG	4x1L	4C	G	SA	TCL SVOC (SW846-8270C)		
91804-014       SVMU 68-SA2       N/A       N/A       1/10/12       10:03       GW       P       250 ml       4C       G       SA       Hexavalent Chromium (SW846-7196A)         91804-016       SVMU 68-SA2       N/A       N/A       1/10/12       9:04       GW       P       125 ml       4C       G       SA       Hexavalent Chromium (SW846-7196A)         91604-016       SVMU 68-SA2       N/A       N/A       1/10/12       9:05       FGW       P       250 ml       HNO3       G       SA       Anions (SW846-6020)         91604-018       SVMU 68-SA2       N/A       N/A       1/10/12       9:05       FGW       P       250 ml       HCG       SA       Anions (SW846-6020)         91604-020       SVMU 68-SA2       N/A       N/A       1/10/12       9:07       GW       P       250 ml       4C       G       SA       Alkalinity (SM2320B)         91604-022       SVMU 68-SA2       N/A       N/A       1/10/12       9:08       GW       P       500 ml       4C       G       SA       HE (SW846-8321A)         91604-022       SVMU 88-SA2       N/A       N/A       1/10/12       9:08       GW       Ads       4x1       4C       G	0	091604 -009	SWMU 68-SA2		N/A	N/A	1/10/12	9:02	GW	P	500 ml	HNO3	G	SA			470)
9       9       104 </td <td></td> <td>091604 -014</td> <td>SWMU 68-SA2</td> <td></td> <td>N/A</td> <td>N/A</td> <td>1/10/12</td> <td>10:03</td> <td>GW</td> <td>Р</td> <td>250 ml</td> <td>4C</td> <td>G</td> <td>SA</td> <td></td> <td></td> <td></td>		091604 -014	SWMU 68-SA2		N/A	N/A	1/10/12	10:03	GW	Р	250 ml	4C	G	SA			
091604 -018       SWMU 68-SA2       N/A       N/A       1/10/12       9:06       GW       P       250 ml       HXO3       G       SA       Cations (SW846-6020)         091604 -018       SWMU 68-SA2       N/A       N/A       1/10/12       9:06       GW       P       125 ml       H2SO4       G       SA       Cations (SW846-6020)         091604 -022       SWMU 68-SA2       N/A       N/A       1/10/12       9:07       GW       P       250 ml       4C       G       SA       Perchlorate (314.0)         091604 -022       SWMU 68-SA2       N/A       N/A       1/10/12       9:08       GW       P       500 ml       4C       G       SA       Alkalinity (SM2320B)         091604 -022       SWMU 68-SA2       N/A       N/A       1/10/12       9:08       GW       P       500 ml       4C       G       SA       HE (SW846-8321A)         Sample Disposal       Return to Client       Z Disposal by lab       Date Entered (mm/d/y)       EDD       Yes       No       on Receipt         Turnaround Time       7 Day       15 Day       3 0 Day       Entered (mm/d/y)       Sen/Je Aratus       Yes       No       on Receipt         Return Samples By:       Rebet	0	091604 -016	SWMU 68-SA2		N/A	N/A	1/10/12	9:04	GW	P	125 ml	4C -	G	SA	Anions (SW846-9056)		
Output	9	091604 -017	SWMU 68-SA2		N/A	N/A	1/10/12	9:05	FGW	Р	250 ml	HNO3	G	SA	Cations (SW846-6020)		
Construction       Styling operation       N/A       <	8	091604 -018	SWMU 68-SA2		N/A	N/A	1/10/12	9:06	GW	P	125 ml	H2SO4	G	SA	NPN (353.2)		
091604 -024       SWMU 68-SA2       N/A       N/A       1/10/12       9:10       GW       AG       4x1L       4C       G       SA       HE (SW846-8321A)         RMMA       Yes       No       Ref. No.       Sample Tracking       SMO Use       Special Instructions/QC Requirements:       Abnormal Conditions         Sample Disposal       Return to Client       Disposal by lab       Date Entered (mm/dd/yy)       BD       Yes       No       on Receipt         Turnaround Time       7 Day*       15 Day*       30 Day       Entered by:       Raw Data Packagr       Yes       No       on Receipt         Return Samples By:       Image: Signature       Init       Company/Organization/Phone       Tim Jackson/ORG, 4142/MS.0729/ 284-2547       No       on Receipt         Robert Lynch       Martines       Signature       Init       Company/Organization/Phone       Tim Jackson/ORG, 4142/MS.0729/ 284-2547       No       Abnormal Conditions         Alfred Santillanes       Martines       Martines       Signature       Init       Company/Organization/Phone       Tim Jackson/ORG, 4142/MS.0729/ 284-2547       No       Actions ( Ca,MG,K,Na)       Alfalinty ( total,bicatonate, carbonate)       Alfalinty ( total,bicatonate, carbonate)       Alfalinty ( total,bicatonate, carbonate)       Yes a separate report.       Alfalinty	1	091604 -020	SWMU 68-SA2		N/A	N/A	1/10/12	9:07	GW	Р	250 ml	4C	G	SA	Perchlorate (314.0)		
RMMA       Yes       No       Ref. No.       Sample Tracking       SMO Use       SAmple Constructions/QC Requirements:       Abnormal Conditions         Sample Disposal       Return to Client       Disposal by lab       Date Entered(mm/dd/yy)       SMO Use       Special Instructions/QC Requirements:       Abnormal Conditions         Turnaround Time       7 Day*       15 Day*       30 Day       Entered(mm/dd/yy)       Raw Data Packagi       Yes       No       No         Return Samples By:       Negotiated TAT       OC inits.       *Send/e-mail report to:       No       *Send/e-mail report to:       No         Sample       Name       Signature       Init       Company/Organization/Phone       File (struct on filer)       No         Alfred Santillanes       Model Santillanes       Model Santillanes       SNL/4142/844-4013/250-7090       FGW (Filtered in field w/40 micron filter)       If perchlorate detected perform verification analysis SW846-6850M         William J. Gibson       Milliam J. Gibson       Milliam J. J. (Market Santillanes)       SNL/4142/844-4013/239-7367       Cations (Ca,Mg,K,Na)         1.Reclived by       Market Santillanes       Market Santillanes       Market Santillanes       Image: Santillanes       Time         1.Reclived by       Market Santillanes       Market Santillanes       Market Santillanes			·		N/A	N/A	1/10/12	9:08	GW	Р	500 ml	4C	G	SA	Alkalinity (SM2320B)		
Sample Disposal       Return to Client       Disposal by lab       Date Entered (mm/dd/yy)       SNO Ose       Special instructions/dC Requirements:       Abnormal Conditions         Turnaround Time       7 Day *       15 Day *       30 Day       Entered (mm/dd/yy)       EDD       ✓ Yes       No       on Receipt         Return Samples By:       Image: Company/Organization/Phone       Raw Data Packag.       Yes       No       on Receipt         Sample       Name       Signature       Init       Company/Organization/Phone       Tim Jackson/ORG.4142/MS.0729/284-2547       FGW (Filtered in field w/40 micron filter)         Alfred Santillanes       Mate Santillanes       Mate Santillanes       Silf Client       Silf Client <td></td> <td></td> <td></td> <td></td> <td></td> <td>N/A</td> <td></td> <td></td> <td></td> <td></td> <td>l</td> <td>l</td> <td></td> <td></td> <td></td> <td></td> <td></td>						N/A					l	l					
Turnaround Time       7 Day*       15 Day*       30 Day       Entered by:       Raw Data Packag       Yes       No         Return Samples By:       Image: Signature       Init       Company/Organization/Phone       *Send/e-mail report to:       No         Sample       Name       Signature       Init       Company/Organization/Phone       *Send/e-mail report to:       Tim Jackson/ORG. 4142/MS.0729/ 284-2547         Alfred Santillanes       Mume       Signature       Init       Company/Organization/Phone       FGW (Filtered in field w/40 micron filter)         Alfred Santillanes       Mume       SNL/4142/844-4013/250-7090       FGW (Filtered in field w/40 micron filter)       If perchlorate detected perform verification analysis SW846-6850M         William J. Gibson       Mume       SNL/4142/844-4013/239-7367       Cations (Ca,Mg,K,Na)       Alkalinity (total,bicarbonate, carbonate)         1.Relinquished by       Image: Mumore Mumer       Image: Mumore Mumer       Image: Mumore Mumer       Image: Mumore Mumer         1.Received by       Grg.       Grg.       Date       Time       Image: Mumore Mumer       Image: Mumore Mumer         2.Received by       Org.       Date       Time       S.Received by       Org.       Date       Time         2.Received by       Org.       Date       Time       S.	-								and a second first of the second	SMO Us	e	Special	Instruction			normal Co	nditions
Return Samples By:       Negotiated TAT       QC inits.       *Sem/e-mail report to:         Sample       Name       Signature       Init       Company/Organization/Phone       Tim Jackson/ORG. 4142/MS.0729/ 284-2547         Robert Lynch       Mutual Autor       Mutual Autor       Mutual Autor       FGW (Filtered in field w/40 micron filter)         Alfred Santillanes       Mutual Autor       Mutual Autor       SNL/4142/844-4013/250-7090       FGW (Filtered in field w/40 micron filter)         In perchlorate detected perform verification analysis SW846-6850M       Alfred Santillanes       Mutual Autor       SNL/4142/844-4013/239-7367         I. Relinquished by       Milliam J. Gibson       Mutual Autor       SNL/4142/844-4013/239-7367       Alkalinity (total,bicarbonate, carbonate)         *Please list as separate report.       *       *       Please list as separate report.       Time         1. Received by       Grg.       Date       Time       OOZ       4. Received by       Org.       Date       Time         2. Received by       Org.       Date       Time       S. Received by       Org.       Date       Time         1. Received by       Org.       Date       Time       S. Received by       Org.       Date       Time         2. Received by       Org.       Date       <	- F			⊻ Di				(mm/dd/yy	)			EDD		🗹 Yes	□ No on	Receipt	
Sample       Name       Signature       Init       Company/Organization/Phone       Tim Jackson/ORG. 4142/MS.0729/ 284-2547         Robert Lynch       Image: Company/Organization/Phone       Tim Jackson/ORG. 4142/MS.0729/ 284-2547         Alfred Santillanes       Image: Company/Organization/Phone       Tim Jackson/ORG. 4142/MS.0729/ 284-2547         Villiam J. Gibson       Image: Company/Organization/Phone       FGW (Filtered in field w/40 micron filter)         I.Relinquished by       Image: Company/Organization/Phone       If perchlorate detected perform verification analysis SW846-6850M         I.Received by       Image: Company/Organization/Phone       Image: Company/Organization/Phone       Image: Company/Organization/Phone         I.Received by       Image: Company/Organization/Phone       Image: Company/Organization/Phone       FGW (Filtered in field w/40 micron filter)         I.Received by       Image: Company/Organization/Phone       Image: Company/Organization/Phone       If perchlorate detected perform verification analysis SW846-6850M         I.Received by       Image: Company/Organization/Phone       SNL/4142/844-4013/239-7367       Cations (Ca,Mg,K,Na)         I.Received by       Image: Company/Organization/Phone       Image: Company/Organization/Phone       Image: Company/Organization/Phone       Image: Cations (Ca,Mg,K,Na)         I.Received by       Org.       Image: Company/Organi/Price       Image: Company/Organization/Phon	-			] 15 Da	y* ☑ 3	80 Day	Entered by:	1999) 1997 - 1997 1997 - 1997				Raw Dat	a Packag	🗌 Yes	⊡ No		
Robert Lynch       Image: Single of the single	Ľ					Vegotia	ated TAT				14 (M) 14 (M)	*Send/e-	mail repor	t to:	· · · ·		
Alfred Santillanes       Alfred Sa				4								Tim Jacl	kson/ORG.	4142/MS.	0729/ 284-2547		
William J. Gibson       William J. Gibson       SNL/4142/844-4013/239-7367       Cations (Ca,Mg,K,Na )         Alkalinity (total,bicarbonate, carbonate)       Alkalinity (total,bicarbonate, carbonate)         1. Relinquished by       Org. 4/ 47 Date //0/r <sup>T</sup> ime       / 002       4. Relinquished by       Org.       Date       Time         1. Received by       Org.       Org.       1/47 Date //0/r <sup>T</sup> ime       / 002       4. Received by       Org.       Date       Time         2. Received by       Org.       Date       Time       5. Received by       Org.       Date       Time         2. Received by       Org.       Date       Time       5. Received by       Org.       Date       Time         2. Received by       Org.       Date       Time       5. Received by       Org.       Date       Time			Robert Lynch	Ray	yuch	7	RC	SNL/4142	/844-401	3/250-70	90	FGW ( F	iltered in fie	ld w/40 mi	cron filter)		
William J. Gibson       Multiply       SNL/4142/844-4013/239-7367       Cations (Ca,Mg,K,Na )         Alkalinity (total,bicarbonate,carbonate)       Alkalinity (total,bicarbonate,carbonate)         1.Relinquished by       Org. 4/42 Date / 0 / 7 lime       002       4.Relinquished by       Org.       Date       Time         1. Received by       Org.       Org. 4/42 Date / 0 / 7 lime       002       4.Relinquished by       Org.       Date       Time         2. Received by       Org.       Date       Time       5. Relinquished by       Org.       Date       Time         2. Received by       Org.       Date       Time       5. Received by       Org.       Date       Time         2. Received by       Org.       Date       Time       5. Received by       Org.       Date       Time			Alfred Santillanes	Helock	Salat	leg	Ute	SNL/4142	/844-513	0/228-07	10	If perchlo	orate detect	ed perform	verification analysis SW846-68	50M	
1. Relinquished by       0rg. 4/47 Date / 0 r Z       4. Relinquished by       0rg.       Date       Time         1. Received by       0rg.       0rg.       0rg.       Date       Time         2. Received by       0rg.       Date       Time       Time         2. Received by       0rg.       Date       Time       Time			William J. Gibson	Kin	hards	PTH	WND	SNL/4142	/844-401	3/239-73							
*Please list as separate report.         1. Relinquished by       Org. U/Yz_Date // N/Z ime       002       4. Relinquished by       Org.       Date       Time         1. Received by       0/YZ ime       002       4. Received by       Org.       Date       Time         2. Received by       0/YZ ime       002       4. Received by       Org.       Date       Time         2. Received by       0rg.       Date       Time       5. Relinquished by       Org.       Date       Time         2. Received by       0rg.       Date       Time       5. Received by       Org.       Date       Time					11										bonate)		
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\*7 & 15 Day Turnaround Time: ERCL requires prior notification.

### **GEL LABORATORIES LLC**

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

# **Certificate of Analysis**

Report Date: February 6, 2012

	Company : Address : Contact: Project:	Sandia National Labora MS-0756, Org. 06765, 1515 Eubank SE Albuquerque, New Me Ms. Pamela M. Puissan Level C, Groundwater	Bldg. 823/Rm. 42 xico 87123 tt	76					
	Client Sample ID:	091604-020			Projec	et:	SNLSGWater		
	Sample ID:	293716007			Client	ID:	SNLS003		
	Matrix:	AQUEOUS	a	d a st					
	Collect Date:	10-JAN-12 09:07							
	Receive Date:	11-JAN-12			Client	Desc.:	SWMU 68-SA	42	
	Collector:	Client			Vol. F	Recv.:			
Parameter	Quali	fier Result	DL	RL	Units	DF	Analyst Date	Time Batch	Method
Ion Chroma	itography								
EPA 314.0	Perchlorate by IC "A	As Received"							
Perchlorate	-	U ND	0.004	0.012	mg/L	1	MAR1 01/20/12	0618 1177129	1
The follow	ing Analytical Meth	ods were performed:							
Method	Descri	ption			Ana	lyst Co	omments		Particular and a second state of a second stat
1	EPA 31	4.0 DOE-AL							

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# **Certificate of Analysis**

Report Date: February 6, 2012 Sandia National Laboratories Company : MS-0756, Org. 06765, Bldg. 823/Rm. 4276 Address : 1515 Eubank SE Albuquerque, New Mexico 87123 Ms. Pamela M. Puissant Contact: Project: Level C, Groundwater Monitoring Client Sample ID: 091605-020 Project: SNLSGWater Client ID: Sample ID: 293716020 SNLS003 Matrix: AQUEOUS Collect Date: 10-JAN-12 09:07 11-JAN-12 Client Desc.: SWMU 68-SA3 Receive Date: Vol. Recv.: Client Collector: Qualifier Result Parameter 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 01/20/12 0637 1177129 1 The following Analytical Methods were performed: Method Description Analyst Comments EPA 314.0 DOE-AL

1

### CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

OBS-mw3

Internal Lab														Page 1 of	2
Batch No. NA		SAR/W	R No.										AR/COC	6139	955
Dept. No./Mail Stop:	6234/0718		Date Sample	s Shipped	=101	2	SMO USE	Contrac	t No:		PO 69143	6	Waste Characterization		
Project/Task Manager:	Alicia Aragon		Carrier/Wayb	ill No.		030			Task No.	-	98026.01.		RCRA Date=		
Project Name:	SWMU 68 GW Char		Lab Contact:		Edie Kent/80			SMO AI	uthorizati		1. 6 ,		Send:Preliminary/report to		
Record Center Code:	ER/1267 074/DAT		Lab Destinati	on:	GEL					zy,	1-1-6	<u></u>	Validation Required		
Logbook Ref. No.:	ER 049		SMO Contact	t/Phone:	Lorraine Her	rera /505-8	344-3199	· ·			9	мO	Released by COC No.:		
Service Order No.	CFO# 0263-12		Send Report					55.	5 607	TUS	ORDOR	,	Bill To: Sandia National Lab	s (Accounte P	avable)
Location	Tech Area					57511261 (Alternative Action of the Constant)		L					7		ayable)
Building	Room				Dof	erence l	01/01/	allahla	-+	~			P.O. Box 5800, MS		
	ER Sample ID	or	Beginning	ER Site			Sample			/	Callastian	Consula	Albuquerque, NM		l
Sample NoFraction			Depth (ft)	No.	Collec		Matrix		Volume		Collection Method	Sample Type	Parameter & Met Requested	hod	Lab Sample ID
									1						
091607 -001	SWMU 68-SA4		N/A	N/A	1/11/12	8:54	GW	G	3x40ml	HCL	G	SA	TCL VOC (SW846-8260E	3)	
091607 -002	SWMU 68-SA4		N/A	N/A	1/11/12	8:56	GW	AG	4x1L	4C	G	SA	TCL SVOC (SW846-8270	)C)	
091607 -009	SWMU 68-SA4		N/A	N/A	1/11/12	8:58	GW	Р	500 ml	ниоз	G	SA	TAL Metals + Ur(SW846-607	10/6020/7470)	
091607 -014	SWMU 68-SA4		N/A	N/A	1/11/12	8:59	GW	Р	250 ml	4C	G	SA	Hexavalent Chromium (S	W846-7196A	€
091607 -016	SWMU 68-SA4		N/A	N/A	1/11/12	9:00	GW	P	125 ml	4C	G	SA	Anions (SW846-9056)		
091607 -017	SWMU 68-SA4		N/A	N/A	1/11/12	9:01	FGW	Р	250 ml	ниоз	G	SA	Cations (SW846-6020)		
091607 -018	SWMU 68-SA4		N/A	N/A	1/11/12	9:03	GW	Р	125 ml	H2SO4	G	SA	NPN (353.2)		
091607 -020	SWMU 68-SA4		N/A	N/A	1/11/12	9:04	GW	P	250 ml	4C	G	SA	Perchlorate (314.0) *		
091607 -022	SWMU 68-SA4		N/A	N/A	1/11/12	9:05	GW	Р	500 ml	4C	G	SA	Alkalinity (SM2320B)		
091607 -024	SWMU 68-SA4		N/A	N/A	1/11/12	9:06	GW	AG	4x1L	4C	G	SA	HE (SW846-8321A)		
RMMA	☐ Yes ☑ No	Ref.	No.		Sample Tra	cking		SMO Us	se	Special	Instructio	ns/QC Red	uirements:	Abnormal Co	onditions
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Return Samples E	Sy: Name		And the second sec	Negoti	ated TAT	0	QC inits	terror and sold on		1	-mail repo		0700/004 0547		
Sample			Signature		Init	Company							.0729/ 284-2547		가는 것이 같아.
	Robert Lynch	40	VTLIN	en	PL		2/844-401				iltered in fi	eld w/40 m	icron filter)		
	Alfred Santillanes	Hefer	Espl	<u>ze</u>	- The	SNL/414	2/844-513	30/228-07	710	Anions (	CI,SO4)				
	William J. Gibson	WUL	uthe	11	WYZ	SNL/414	2/844-401	3/239-73	367	Cations	(Ca,Mg,K,	Na)			and the second s
	Gilbert Quintana	14 245	2 Aug to	1	whit	SNL/414	2/844-250	)7		Alkalinit	y (total,bica	rbonate,ca	irbonate)		이 같은 것이 같이 같이 같이 같이 같이 같이 같이 않는 것이 같이 않는 것이 같이 않는 것이 같이 많이 했다. 말했는 것이 같이 많이
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\*7 & 15 Day Turnaround Time: ERCL requires prior notification.

### RACT LABORATORY

# Analysis Request And Chain Of Custody (Continuation)

		[						1				AR/COC-	613955
Project Name:	SWMU 68 GW Char	Project/Task M	anger:	Alicia Aragon				Project/Task	No.:	98026.01.13			
Location	Tech Area												
Building	Room			Refere	ence L	OV (av	vailal	ole at S	MO)				Lab use
Sample No- Fraction	ER Sample ID or Sample Location detail	Beginning Depth (ft)	ER Site No.	Date/Tin Collec	ne (hr)	Sample Matrix	Co	ntainer	Preserv- ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
091607 -027	SWMU 68-SA4	N/A	N/A	1/11/12	9:07	GW	Р	250 ml	NaOH	G	1	Total Cyanide (SW846-9012)	
091607 -033	SWMU 68-SA4	N/A	N/A	1/11/12	9:08	GW	Р	1 L	HNO3	G	1	Gamma Spec (short list)(901.0)	
091607 -034	SWMU 68-SA4	N/A	N/A	1/11/12	9:09	GW	Р	1 L	НNОЗ	G		Gross Alpha/Beta (900.0)	
091607 -035	SWMU 68-SA4	N/A	N/A	1/11/12	9:10	GW	Р	1 L	НNОЗ	G	SA	Isotopic Ur (ASTM D3972-09M)	
091608 -001	SWMU 68-TB4	N/A	N/A	1/11/12	8:54	DIW	G	3x40ml	HCL	G	ТВ	VOC (SW846-8260B)	
091609001	SWMU 68-FB1	N/A	N/A	1/11/12	are - 8:50	DIW	G	3x40ml	HCL	G	FB	VOC (SW846-8260B)	
					0848								
												* if perchlorate detected use verificat	ion
												analysis.SW846-6850M	
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Abnormal Condition	is on Receipt							······,					- <b>.</b>
Recipient Initials													

Page 2 of 2

### **GEL LABORATORIES LLC**

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### **Certificate of Analysis**

Report Date: February 6, 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: 091607-020 Project: SNLSGWater Sample ID: 293838007 Client ID: SNLS003 Matrix: AQUEOUS Collect Date: 11-JAN-12 09:04 Receive Date: 12-JAN-12 Client Desc.: SWMU 68-SA4 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 0.012 1 MAR1 01/20/12 0656 1177129 U ND 0.004 mg/L 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



AR/COC: 613958

a - 1		Analyta Nama (CAS#)	Qualifier, RC
Analytical Method	Sample ID	Analyte Name (CAS#)	Quanner, KC
DOE EML HASL-300, U-02-RC	091615-035/SWMU 8/58-SA1	Uranium-235/236 (13982-70-2)	BD, FR3
	091616-035/SWMU 8/58-SA2	Uranium-233/234 (N/A)	J+, IS2
	091616-035/SWMU 8/58-SA2	Uranium-235/236 (13982-70-2)	BD, FR3
	091616-035/SWMU 8/58-SA2	Uranium-238 (7440-61-1)	J+, IS2
EPA 901.1			
	091615-033/SWMU 8/58-SA1	Americium-241 (14596-10-2)	BD, FR3
	091615-033/SWMU 8/58-SA1	Cesium-137 (10045-97-3)	BD, FR3
	091615-033/SWMU 8/58-SA1	Cobalt-60 (10198-40-0)	BD, FR3
	091615-033/SWMU 8/58-SA1	Potassium-40 (13966-00-2)	BD, FR3
	091616-033/SWMU 8/58-SA2	Americium-241 (14596-10-2)	BD, FR3
	091616-033/SWMU 8/58-SA2	Cesium-137 (10045-97-3)	BD, FR3
	091616-033/SWMU 8/58-SA2	Cobalt-60 (10198-40-0)	BD, FR3
	091616-033/SWMU 8/58-SA2	Potassium-40 (13966-00-2)	BD, FR3
SW846 3005/6020 DOE-AL			
	091615-009/SWMU 8/58-SA1	Nickel (7440-02-0)	UJ, B4
	091615-009/SWMU 8/58-SA1	Thallium (7440-28-0)	0.0032U, B3
	091616-009/SWMU 8/58-SA2	Nickel (7440-02-0)	UJ, B4
SW846 3535/8321A Modifie	d		
	091615-024/SWMU 8/58-SA1	Tetryl (479-45-8)	UJ, MS3,MS5,L3
	091616-024/SWMU 8/58-SA2	Tetryl (479-45-8)	UJ, MS3,MS5,L3
SW846 9012B	091615-027/SWMU 8/58-SA1	Cyanide, Total (57-12-5)	UJ, B4
	091616-027/SWMU 8/58-SA2	Cyanide, Total (57-12-5)	UJ, B4



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### Memorandum

Date: February 21, 2012

To: File

From: Kevin Lambert

Subject: Inorganic Data Review and Validation – SNL Site: SWMU 8 and 58 GW Characterization AR/COC: 613958 SDG: 294178 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**

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

1. Total Cyanide:

Total cyanide was detected in the ICB/CCB at negative concentrations with an absolute value > the MDL but  $\leq$  the PQL. The associated sample results were NDs 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 analyzed within the prescribed holding times and properly preserved.

### **Calibration**

All initial and continuing calibration met QC acceptance criteria.

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### <u>Blanks</u>

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

### Nitrate/Nitrite:

Nitrate/Nitrite was detected in the MB at a concentration > the MDL but  $\leq$  the PQL. The associated sample results were detects >5X the MB and will not be qualified.

### Anions:

In the EB, sample 293963-006 from another SNL SDG, associated with samples 294178-004 and - 016 chloride was detected at a concentration > the PQL. The associated sample results were detects >5X the EB and will not be qualified.

### Alkalinity:

In the EB, sample 293963-007 from another SNL SDG, associated with samples 294178-007 and -019 total and bicarbonate alkalinity were detected at concentrations > the PQL. However, blanks are not applicable for alkalinity and are not assessed for data validation. No sample data will be qualified as a result.

### Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria.

### Matrix Spike (MS)

All MS recoveries met QC acceptance criteria.

Anions, Nitrate/Nitrite, Perchlorate, and Alkalinity:

It should be noted that the MS analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

### Laboratory Replicate

The replicate met all QC acceptance criteria.

<u>Anions, Nitrate/Nitrite, Perchlorate, and Alkalinity</u>: It should be noted that the replicate analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

### **Detection Limits/Dilutions**

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

### Nitrate/Nitrite:

The samples were diluted 5X due to matrix interference.

### Anions:

The samples were diluted 2X for chloride and sulfate due to high concentration for this analysis.

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

### Other QC

Field duplicate pairs 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. It should be noted that the EBs are from another SNL SDG on AR/COC# 613957.

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No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey

Date: 02/21/12



AR/COC: 613956

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Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
DOE EML HASL-300, U-02-RC			
	091610-035/SWMU 8/58-SA3	Uranium-235/236 (13982-70-2)	J, FR7
EPA 900.0/SW846 9310			
	091610-034/SWMU 8/58-SA3	BETA (12587-47-2)	J, FR7
EPA 901.1			
	091610-033/SWMU 8/58-SA3	Americium-241 (14596-10-2)	BD, FR3
	091610-033/SWMU 8/58-SA3	Cesium-137 (10045-97-3)	BD, FR3
	091610-033/SWMU 8/58-SA3	Cobalt-60 (10198-40-0)	BD, FR3
	091610-033/SWMU 8/58-SA3	Potassium-40 (13966-00-2)	BD, FR3
SW846 3005/6020 DOE-AL			
	091610-009/SWMU 8/58-SA3	Aluminum (7429-90-5)	0.29UJ, B
	091610-009/SWMU 8/58-SA3	Nickel (7440-02-0)	UJ, B4
	091610-009/SWMU 8/58-SA3	Sodium (7440-23-5)	J, D1
	091610-009/SWMU 8/58-SA3	Thallium (7440-28-0)	0.0030U, B3
	091610-017/SWMU 8/58-SA3	Sodium (7440-23-5)	J, D1
SW846 3535/8321A Modifier	d		
	091610-024/SWMU 8/58-SA3	Tetryl (479-45-8)	UJ, L3
SW846 8270C			
	091610-002/SWMU 8/58-SA3	4-Nitrophenol (100-02-7)	UJ, MS3,MS5,L3
	091610-002/SWMU 8/58-SA3	bis(1-Chloroisopropyl)ether (108- 60-1)	UJ, C3
	091610-002/SWMU 8/58-SA3	p-Nitroaniline (100-01-6)	UJ, MS5
	091610-002/SWMU 8/58-SA3	Pyrene (129-00-0)	UJ, MS5



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### Memorandum

Date: February 23, 2012

To: File

From: Kevin Lambert

Subject: Inorganic Data Review and Validation – SNL Site: SWMU 8 and 58 GW Characterization AR/COC: 613956 SDG: 293951 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**

One sample was prepared and analyzed with accepted procedures using methods EPA 9056 (anions by ion chromatography), EPA 353.2 (nitrate/nitrite by Cd reduction), EPA 314.0 (perchlorate), SM 2320B (alkalinity), and EPA 9012B (total cyanide). Data were reported for all required analytes. No problems were identified with the data package that results 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 analyzed within the prescribed holding times and properly preserved.

### **Calibration**

All initial and continuing calibration met QC acceptance criteria.

### **Blanks**

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

Nitrate/Nitrite:

Nitrate/Nitrite was detected in the MB at a concentration > the MDL but  $\leq$  the PQL. The associated sample result was an ND and 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.

<u>Nitrate/Nitrite, Perchlorate, and Total Cyanide</u>: It should be noted that the MS analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

### Laboratory Replicate

The replicate met all QC acceptance criteria.

<u>Nitrate/Nitrite, Perchlorate, and Total Cyanide</u>: It should be noted that the replicate analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

### **Detection Limits/Dilutions**

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

Anions:

Sample 293951-004 was diluted 5X due to high concentration for this analysis.

Nitrate/Nitrite:

Sample -005 was diluted 5X for chloride and sulfate due to high concentrations for this analysis.

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

### Other QC

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey

Date: 02/23/12

### AR/COC: 614055

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Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 901.1			
	091949-033/CTF-MW2	Americium-241 (14596-10-2)	BD, FR3
	091949-033/CTF-MW2	Cesium-137 (10045-97-3)	BD, FR3
	091949-033/CTF-MW2	Cobalt-60 (10198-40-0)	BD, FR3
	091949-033/CTF-MW2	Potassium-40 (13966-00-2)	BD, FR3
	091950-033/CTF-MW2	Americium-241 (14596-10-2)	BD, FR3
	091950-033/CTF-MW2	Cesium-137 (10045-97-3)	BD, FR3
	091950-033/CTF-MW2	Cobalt-60 (10198-40-0)	BD, FR3
	091950-033/CTF-MW2	Potassium-40 (13966-00-2)	J, FR7
SW846 3005/6020 DOE-AL			
	091949-009/CTF-MW2	Aluminum (7429-90-5)	J-, DL2
	091949-009/CTF-MW2	Copper (7440-50-8)	0.00316U, B2
	091949-010/CTF-MW2	Aluminum (7429-90-5)	J-, DL2
	091950-009/CTF-MW2	Aluminum (7429-90-5)	J-, DL2
	091950-009/CTF-MW2	Copper (7440-50-8)	0.00316U, B2
	091950-010/CTF-MW2	Aluminum (7429-90-5)	J-, DL2
SW846 7470A			
	091949-009/CTF-MW2	Mercury (7439-97-6)	UJ, B4
	091949-010/CTF-MW2	Mercury (7439-97-6)	UJ, B4
	091950-009/CTF-MW2	Mercury (7439-97-6)	UJ, B4
	091950-010/CTF-MW2	Mercury (7439-97-6)	UJ, B4
SW846 8260B DOE-AL			
	091952-001/SWMU-FB2	Bromodichloromethane (75-27-4)	3.75U, B2
	091952-001/SWMU-FB2	Chloroform (67-66-3)	10.20U, B2
	091952-001/SWMU-FB2	Dibromochloromethane (124-48-1)	0.300U, B2

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

# ngs Summary





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### Memorandum

Date:May 16, 2012To:FileFrom:Marcia HilcheySubject:Inorganic Data Review and Validation – SNL<br/>Site: SWMU 154 GWM<br/>AR/COC: 614055<br/>SDG: 300712<br/>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**

Two samples were prepared and analyzed with accepted procedures using methods EPA 9056 (anions by ion chromatography), EPA 353.2 (nitrate/nitrite by Cd reduction), EPA 314.0 (perchlorate by IC), and SM 2320B (alkalinity). Data were reported for all required analytes. No problems were identified with the data package that results 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.  $\cdot$ 

### **Holding Times and Preservation**

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

### **Calibration**

All initial and continuing calibration met QC acceptance criteria.

### **Blanks**

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

### Anions:

Chloride was detected in the EB from COC 614054 associated with this COC. The chloride result was U qualified due to MB contamination, and will not be applied to associated results in this COC.

### Laboratory Control Sample (LCS):

All LCS acceptance criteria were met.

### Matrix Spike (MS)

All MS/PS recoveries met QC acceptance criteria.

### Perchlorate:

It should be noted that the sample used for MS analyses was from another SNL SDG. No sample results will be qualified as a result.

### Laboratory Replicate

The replicate analyses met all QC acceptance criteria.

### Perchlorate:

It should be noted that the sample used for replicate analysis was from another SNL SDG. No sample results will be qualified as a result.

### **Detection Limits/Dilutions**

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

Anions:

Both samples were diluted 10X for bromide and 100X for chloride and sulfate.

### Nitrate/Nitrite:

Sample -006 was diluted 25X, and sample -018 was diluted 5X.

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

### Other QC

EBs associated with this COC was submitted on COC 614054. Field duplicates were submitted on this COC. 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.

### AR/COC: 614052, 614053

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
SW846 3005/6020 DOE-AL			
	091941-009/SWMU-EB1	Iron (7439-89-6)	0.1745U, B
	091941-010/SWMU-EB1	Cobalt (7440-48-4)	0.00051U, B
	091941-010/SWMU-EB1	Iron (7439-89-6)	0.1745U, B
	091943-009/CTF-MW3	Cobalt (7440-48-4)	0.00061U, B, B3
	091943-009/CTF-MW3	Copper (7440-50-8)	0.0041U, B2
	091943-009/CTF-MW3	Zinc (7440-66-6)	0.0182U, B2
	091943-010/CTF-MW3	Cobalt (7440-48-4)	0.00051U, B
	091943-010/CTF-MW3	Copper (7440-50-8)	0.00351U, B2
	091944-009/CTF-MW3	Cobalt (7440-48-4)	0.00061U, B, B3
	091944-009/CTF-MW3	Copper (7440-50-8)	0.0041U, B2
	091944-009/CTF-MW3	Zinc (7440-66-6)	0.0182U, B2
	091944-010/CTF-MW3	Cobalt (7440-48-4)	0.00051U, B
	091944-010/CTF-MW3	Copper (7440-50-8)	0.00351U, B2
SW846 7470A			
	091941-009/SWMU-EB1	Mercury (7439-97-6)	UJ, B4
	091941-010/SWMU-EB1	Mercury (7439-97-6)	UJ, B4
	091943-009/CTF-MW3	Mercury (7439-97-6)	UJ, B4
	091943-010/CTF-MW3	Mercury (7439-97-6)	UJ, B4
	091944-009/CTF-MW3	Mercury (7439-97-6)	UJ, B4
	091944-010/CTF-MW3	Mercury (7439-97-6)	UJ, B4
SW846 8260B DOE-AL			
	091941-001/SWMU-EB1	Acetone (67-64-1)	J+, C2
	091941-001/SWMU-EB1	Bromoform (75-25-2)	UJ, MS3

Methylene chloride (75-09-2)

UJ, I3, L3

091941-001/SWMU-EB1



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Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	091942-001/SWMU-TB1	Bromoform (75-25-2)	UJ, MS3
	091942-001/SWMU-TB1	Methylene chloride (75-09-2)	UJ, 13, L3
	091943-001/CTF-MW3	Bromodichloromethane (75-27-4)	1.00U, B2
	091943-001/CTF-MW3	Bromoform (75-25-2)	UJ, MS3
	091943-001/CTF-MW3	Chloroform (67-66-3)	1.00U, B2
	091943-001/CTF-MW3	Dibromochloromethane (124-48-1)	1.00U, B2
	091943-001/CTF-MW3	Methylene chloride (75-09-2)	UJ, 13, L3
	091944-001/CTF-MW3	Bromodichloromethane (75-27-4)	1.00U, B2
	091944-001/CTF-MW3	Bromoform (75-25-2)	UJ, MS3
	091944-001/CTF-MW3	Chloroform (67-66-3)	1.00U, B2
	091944-001/CTF-MW3	Dibromochloromethane (124-48-1)	1.00U, B2
	091944-001/CTF-MW3	Methylene chloride (75-09-2)	UJ, 13, L3
	091945-001/SWMU-TB2	Bromoform (75-25-2)	UJ, MS3
	091945-001/SWMU-TB2	Methylene chloride (75-09-2)	UJ, I3, L3
	091946-001/SWMU-FB1	Bromodichloromethane (75-27-4)	4.05U, B2
	091946-001/SWMU-FB1	Bromoform (75-25-2)	UJ, MS3
	091946-001/SWMU-FB1	Chloroform (67-66-3)	16.7U, B2
	091946-001/SWMU-FB1	Dibromochloromethane (124-48-1)	1.00U, B2
	091946-001/SWMU-FB1	Methylene chloride (75-09-2)	UJ, I3, L3



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### Memorandum

Date: May 2, 2012

To: File

From: Marcia Hilchey

Subject: Inorganic Data Review and Validation – SNL Site: SWMU 149 GWM AR/COC: 614052, -053 SDG: 298650 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**

Three samples were prepared and analyzed with accepted procedures using methods EPA 9056 (anions by ion chromatography), EPA 353.2 (nitrate/nitrite by Cd reduction), EPA 314.0 (perchlorate by IC), and SM 2320B (alkalinity). Data were reported for all required analytes. No problems were identified with the data package that results 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**

All initial and continuing calibration met QC acceptance criteria.

### <u>Blanks</u>

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

### Anions:

Chloride was reported in the EB at a concentration > MDL an d< PQL. All associated sample results were ND and will not be qualified.

Nitrate/Nitrite:

Nitrate/nitrite was reported in the MB at a concentration > MDL and < PQL. All associated sample results were ND or > 5X the MB concentration and will not be qualified.

### Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria.

### 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.

<u>Anions:</u> Samples -003 and -009 were diluted 50X for chloride and sulfate.

<u>Nitrate/Nitrite</u>: Samples -004 and -010 were diluted 25X. Sample -018 was diluted 5X.

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

# Other QC

EBs and field duplicate samples were submitted with AR/COC. 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.

### AR/COC: 613979, 613980, 613981

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 900.0/SW846 9310			
	091692-034/CYN-MW5	ALPHA (12587-46-1)	J, FR7
EPA 901.1			
	091692-033/CYN-MW5	Americium-241 (14596-10-2)	BD, FR3
	091692-033/CYN-MW5	Cesium-137 (10045-97-3)	BD, FR3
	091692-033/CYN-MW5	Cobalt-60 (10198-40-0)	BD, FR3
	091692-033/CYN-MW5	Potassium-40 (13966-00-2)	BD, FR3
SW846 3005/6020 DOE-AL			
	091692-009/CYN-MW5	Barium (7440-39-3)	J, MS3
	091692-009/CYN-MW5	Iron (7439-89-6)	0.17U, B
	091692-009/CYN-MW5	Sodium (7440-23-5)	J, D1
	091692-017/CYN-MW5	Sodium (7440-23-5)	J, D1
	091695-009/CTF-EB1	Barium (7440-39-3)	UJ, MS3
	091695-009/CTF-EB1	Calcium (7440-70-2)	0.70U, B
	091695-009/CTF-EB1	Sodium (7440-23-5)	UJ, D1
	091695-017/CTF-EB1	Calcium (7440-70-2)	0.70U, B
	091695-017/CTF-EB1	Sodium (7440-23-5)	UJ, D1
	091700-009/CTF-MW1	Barium (7440-39-3)	J, MS3
	091700-009/CTF-MW1	Copper (7440-50-8)	0.0040U, B2
	091700-009/CTF-MW1	Sodium (7440-23-5)	J, D1
	091700-017/CTF-MW1	Sodium (7440-23-5)	J, D1
	091701-009/CTF-MW1	Barium (7440-39-3)	J, MS3
	091701-009/CTF-MW1	Copper (7440-50-8)	0.0040U, B2

091701-009/CTF-MW1

091701-017/CTF-MW1

Sodium (7440-23-5)

Sodium (7440-23-5)

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SW846 9012B



J, D1

J, D1

### AR/COC: 613979, 613980, 613981

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	091692-027/CYN-MW5	Cyanide, Total (57-12-5)	UJ, B4
	091695-027/CTF-EB1	Cyanide, Total (57-12-5)	UJ, B4
	091700-027/CTF-MW1	Cyanide, Total (57-12-5)	UJ, B4
	091701-027/CTF-MW1	Cyanide, Total (57-12-5)	UJ, B4



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Memorandum

Date: March 9, 2012

To: File

From: Kevin Lambert

Subject: Inorganic Data Review and Validation – SNL Site: SWMU 49 and 116 GWM AR/COC: 613979, 613980, and 613981 SDG: 295072 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**

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

1. Total Cyanide:

Total cyanide was detected in the CCB at a negative concentrations with an absolute value > the MDL but  $\leq$  the PQL. The associated sample results were NDs 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 analyzed within the prescribed holding times and properly preserved.

### **Calibration**

All initial and continuing calibration met QC acceptance criteria.

### <u>Blanks</u>

1

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

#### Anions:

In the CCB, associated with sample 295072-003, chloride was detected at a concentration > the PQL. The associated sample result was a detect >5X the CCB and will not be qualified.

In the EB, sample -015, associated with samples -024 and -032 chloride was detected at a concentration > the PQL. The associated sample results were detects >5X the EB and 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.

#### Alkalinity:

It should be noted that the MS analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

### Laboratory Replicate

The replicate met all QC acceptance criteria.

### Alkalinity:

It should be noted that the replicate analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

#### **Detection Limits/Dilutions**

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

### Nitrate/Nitrite:

Samples were diluted 10X due to high concentrations for this analysis or due to matrix interference.

#### Anions:

Samples -024 and -032 were diluted 5X for chloride and sulfate due to high concentration for this analysis.

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

### Other QC

EBs and field duplicate pairs 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. It should be noted that the EBs on AR/COC# 613980 are associated with the samples on AR/COC# 613981.

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey

**Date**: 03/12/12

### AR/COC: 613952, 613953

### Page 1 of 2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
DOE EML HASL-300, U-02-RC			
	091600-035/SWMU 68-SA1	Uranium-235/236 (13982-70-2)	J, FR7
	091602-035/SWMU 68-EB1	Uranium-233/234 (N/A)	BD, FR3
	091602-035/SWMU 68-EB1	Uranium-235/236 (13982-70-2)	BD, FR3
	091602-035/SWMU 68-EB1	Uranium-238 (7440-61-1)	BD, FR3
EPA 353.2			
	091600-018/SWMU 68-SA1	Nitrogen, Nitrate/Nitrite (N/A)	J, MS1,RP1
	091602-018/SWMU 68-EB1	Nitrogen, Nitrate/Nitrite (N/A)	UJ, MS1,RP1
EPA 900.0/SW846 9310			
	091602-034/SWMU 68-EB1	ALPHA (12587-46-1)	BD, FR3
	091602-034/SWMU 68-EB1	BETA (12587-47-2)	BD, FR3
EPA 901.1			
	091600-033/SWMU 68-SA1	Americium-241 (14596-10-2)	BD, FR3
	091600-033/SWMU 68-SA1	Cesium-137 (10045-97-3)	BD, FR3
	091600-033/SWMU 68-SA1	Cobalt-60 (10198-40-0)	BD, FR3
	091600-033/SWMU 68-SA1	Potassium-40 (13966-00-2)	BD, FR3
	091602-033/SWMU 68-EB1	Americium-241 (14596-10-2)	BD, FR3
	091602-033/SWMU 68-EB1	Cesium-137 (10045-97-3)	BD, FR3
	091602-033/SWMU 68-EB1	Cobalt-60 (10198-40-0)	BD, FR3
	091602-033/SWMU 68-EB1	Potassium-40 (13966-00-2)	BD, FR3
SW846 3005/6020 DOE-AL			
	091602-009/SWMU 68-EB1	Calcium (7440-70-2)	0.68U, B
	091602-017/SWMU 68-EB1	Calcium (7440-70-2)	0.68U, B
SW846 3535/8321A Modifie	d		
	091600-024/SWMU 68-SA1	HMX (2691-41-0)	UJ, MS5
	091600-024/SWMU 68-SA1	Tetryl (479-45-8)	UJ, L3
	091602-024/SWMU 68-EB1	HMX (2691-41-0)	UJ, MS5



Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC	
	091602-024/SWMU 68-EB1	Tetryl (479-45-8)	UJ, L3	



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### Memorandum

Date: February 24, 2012

To: File

From: Kevin Lambert

Subject: Inorganic Data Review and Validation – SNL Site: SWMU 68 GW Characterization AR/COC: 613952 and 613953 SDG: 293626 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 EPA 7196A (hexavalent chromium), EPA 9056 (anions by ion chromatography), EPA 353.2 (nitrate/nitrite by Cd reduction), EPA 314.0 (perchlorate), SM 2320B (alkalinity), and EPA 9012B (total cyanide). Data were reported for all required analytes. Problems were identified with the data package that results in the qualification of data.

1. Nitrate/Nitrite:

The relative dilution factor between samples 293626-006 and -010 and the QC sample was >5. The nitrate/nitrite result for sample -006 was a detect and will be **qualified "J,MS1,RP1"** due to lack of matrix-specific accuracy and precision data. The nitrate/nitrite result for sample -010 was an ND and will be **qualified "UJ,MS1,RP1"** due to lack of matrix-specific accuracy and precision 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**

All initial and continuing calibration met QC acceptance criteria.

### <u>Blanks</u>

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

### Alkalinity:

In the MB, total and bicarbonate alkalinity were detected at concentrations > the PQL. However, blanks are not applicable for alkalinity and are not assessed for data validation. No sample data will be qualified as a result.

### Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria.

### Matrix Spike (MS)

All MS recoveries met QC acceptance criteria.

### Nitrate/Nitrite:

It should be noted that the MS analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

### Laboratory Replicate

The replicate met all QC acceptance criteria.

### Nitrate/Nitrite:

It should be noted that the replicate analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

### **Detection Limits/Dilutions**

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

### Anions:

Sample -005 was diluted 5X for chloride and sulfate due to high concentrations for this analysis.

### Nitrate/Nitrite:

Sample -006 was diluted 5X due to high concentration for this analysis and sample -020 was diluted 5X due to matrix interference.

All associated batch QC samples, except as noted above in the summary section, were analyzed at dilution factors that resulted in relative dilution factors to the sample that were  $\leq 5X$ . No sample data will be qualified as a result.

### Other QC

EBs were submitted on the AR/COC(s). It should be noted that the EBs on AR/COC# 613953 are associated with the samples on AR/COC# 613954 in another SDG.

No other specific issues that affect data quality were identified.

AR/COC: 613954

Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 353.2			
	091604-018/SWMU 68-SA2	Nitrogen, Nitrate/Nitrite (N/A)	J, MS1,RP1
	091605-018/SWMU 68-SA3	Nitrogen, Nitrate/Nitrite (N/A)	J, MS1,RP1
EPA 901.1			
	091604-033/SWMU 68-SA2	Americium-241 (14596-10-2)	BD, FR3
	091604-033/SWMU 68-SA2	Cesium-137 (10045-97-3)	BD, FR3
	091604-033/SWMU 68-SA2	Cobalt-60 (10198-40-0)	BD, FR3
	091604-033/SWMU 68-SA2	Potassium-40 (13966-00-2)	BD, FR3
	091605-033/SWMU 68-SA3	Americium-241 (14596-10-2)	BD, FR3
	091605-033/SWMU 68-SA3	Cesium-137 (10045-97-3)	BD, FR3
	091605-033/SWMU 68-SA3	Cobalt-60 (10198-40-0)	BD, FR3
	091605-033/SWMU 68-SA3	Potassium-40 (13966-00-2)	BD, FR3
SW846 3005/6020 DOE-AL			
	091604-009/SWMU 68-SA2	Copper (7440-50-8)	0.0028U, B2
	091605-009/SWMU 68-SA3	Copper (7440-50-8)	0.0028U, B2
SW846 3535/8321A Modified			
	091604-024/SWMU 68-SA2	Tetryl (479-45-8)	UJ, MS3,MS5,L3
	091605-024/SWMU 68-SA3	Tetryl (479-45-8)	UJ, MS3,MS5,L3





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### Memorandum

Date: February 24, 2012

To: File

From: Kevin Lambert

Subject: Inorganic Data Review and Validation – SNL Site: SWMU 68 GW Characterization AR/COC: 613954 SDG: 293716 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 EPA 7196A (hexavalent chromium), EPA 9056 (anions by ion chromatography), EPA 353.2 (nitrate/nitrite by Cd reduction), EPA 314.0 (perchlorate), SM 2320B (alkalinity), and EPA 9012B (total cyanide). Data were reported for all required analytes. Problems were identified with the data package that results in the qualification of data.

1. <u>Nitrate/Nitrite</u>:

The relative dilution factor between samples 293716-006 and -019 and the QC sample was >5. The associated sample results were detects and will be **qualified "J,MS1,RP1"** due to lack of matrix-specific accuracy and precision 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**

All initial and continuing calibration met QC acceptance criteria.

### <u>Blanks</u>

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.

<u>Anions, Nitrate/Nitrite, Perchlorate, Total Cyanide</u>: It should be noted that the MS analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

### Laboratory Replicate

The replicate met all QC acceptance criteria.

<u>Anions, Nitrate/Nitrite, Perchlorate, Total Cyanide</u>: It should be noted that the replicate analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

### **Detection Limits/Dilutions**

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

Anions:

Samples were diluted 5X for chloride and sulfate due to high concentrations for this analysis.

Nitrate/Nitrite:

Samples were diluted 5X due to matrix interference.

All associated batch QC samples, except as noted above in the summary section, were analyzed at dilution factors that resulted in relative dilution factors to the sample that were  $\leq 5X$ . No sample data will be qualified as a result.

### Other QC

A field duplicate pair was submitted on the AR/COC(s). There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result. It should be noted that the EBs are from another SNL SDG on AR/COC# 613953.

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey

Date: 02/25/12



### AR/COC: 613955

### Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 901.1			
	091607-033/SWMU 68-SA4	Americium-241 (14596-10-2)	BD, Z2
	091607-033/SWMU 68-SA4	Cesium-137 (10045-97-3)	R, FR4
	091607-033/SWMU 68-SA4	Cobalt-60 (10198-40-0)	BD, FR3
	091607-033/SWMU 68-SA4	Potassium-40 (13966-00-2)	J, FR7
SW846 3535/8321A Mo	dified		
	091607-024/SWMU 68-SA4	Tetryl (479-45-8)	UJ, L3
SW846 8270C			
	091607-002/SWMU 68-SA4	4-Nitrophenol (100-02-7)	UJ, MS3,L3
	091607-002/SWMU 68-SA4	bis(1-Chloroisopropyl)ether (108- 60-1)	UJ, C3
SW846 9012B			
	091607-027/SWMU 68-SA4	Cyanide, Total (57-12-5)	UJ, B4



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### Memorandum

Date: February 17, 2012

To: File

From: Kevin Lambert

Subject: Inorganic Data Review and Validation – SNL Site: SWMU 68 GW Characterization AR/COC: 613955 SDG: 293838 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 EPA 7196A (hexavalent chromium), EPA 9056 (anions by ion chromatography), EPA 353.2 (nitrate/nitrite by Cd reduction), EPA 314.0 (perchlorate), SM 2320B (alkalinity), and EPA 9012B (total cyanide). Data were reported for all required analytes. Problems were identified with the data package that results in the qualification of data.

1. Total Cyanide:

Total cyanide was detected in the CCB at a negative concentration with an absolute value > the MDL but  $\leq$  the PQL. The associated sample result was an 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 sample was analyzed within the prescribed holding times and properly preserved.

### **Calibration**

All initial and continuing calibration met QC acceptance criteria.

#### <u>Blanks</u>

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

Nitrate/Nitrite:

Nitrate/Nitrite was detected in the MB at a concentration > the MDL but  $\leq$  the PQL. The associated sample result was a detect >5X the MB and 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.

#### Anions and Perchlorate:

It should be noted that the MS analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

#### Laboratory Replicate

The replicate met all QC acceptance criteria.

#### Anions and Perchlorate:

It should be noted that the replicate analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

#### **Detection Limits/Dilutions**

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

#### Anions:

The sample was diluted 5X for chloride and sulfate due to high concentrations for this analysis.

#### Nitrate/Nitrite:

The sample was diluted 5X due to matrix interference.

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

#### Other QC

No other specific issues that affect data quality were identified.

#### Reviewed by: Marcia Hilchey

**Date**: 02/20/12

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# SECTION III SOLID WASTE MANAGEMENT UNITS 149 AND 154 QUARTERLY GROUNDWATER MONITORING REPORT, JANUARY – MARCH 2012

## 1.0 Introduction

This Quarterly Groundwater Monitoring 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 below.

Monitoring wells CTF-MW2 and CTF-MW3 were installed in August 2001. Prior to this sampling event, CTF-MW2 and CTF-MW3 had been sampled 16 and 15 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 fifth 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 report correspond to the reporting period of January through March 2012. Monitoring wells CTF-MW3 and CTF-MW2 were sampled on March 26 and March 30, 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, and radionuclides by gamma spectroscopy.

Analytical results for the March 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 0.0498 mg/L in the unfiltered sample and 0.0498 mg/L in the filtered sample. The concentrations reported for arsenic in the CTF-MW2 duplicate groundwater sample are 0.0559 mg/L in the unfiltered sample and 0.0521 mg/L in the filtered sample. These values are comparable to historical values. The elevated concentrations of arsenic in the groundwater samples is most likely attributable to background because monitoring well CTF-MW2 is screened in a fault-gouge zone in the Precambrian granite.

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 fifth of eight supplemental quarterly events for monitoring wells CTF-MW3 and CTF-MW2. The sixth of the eight supplemental quarterly groundwater sampling events will be conducted during the upcoming quarter (April to June 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 First Quarter of Calendar Year (CY) 2012.

## 2.1 Equipment Decontamination

A portable Bennett<sup>™</sup> groundwater sampling system was used to collect the groundwater samples from both wells. The Bennett<sup>™</sup> 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, "Long-Term Environmental Stewardship (LTES) Groundwater Monitoring Equipment Decontamination" (SNL/NM January 2012a).

## 2.2 Well Evacuation

In accordance with procedures described in SNL/NM FOP 05-01, "LTES 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<sup>™</sup> Model 6920 water quality meter. Turbidity was measured with a HACH<sup>™</sup> 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 (PQLs), 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). 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 laboratory MDLs, except bromodichloromethane, chloroform, and dibromochloromethane. These compounds were detected below the laboratory PQL in the sample, with concentrations of 0.540, 0.720, and 0.360 micrograms per liter ( $\mu$ g/L), respectively. The duplicate environmental sample also contained concentrations below the laboratory PQL, with values of 0.520, 0.700, and 0.330  $\mu$ g/L, respectively. No MCLs are established for these compounds. Table III-4 summarizes detected VOCs in environmental groundwater samples, and Table III-5 lists the MDLs for associated VOCs analyzed.

**SWMU 154, CTF-MW2.** No VOCs were detected at concentrations above established MCLs in the CTF-MW2 environmental sample. Table III-4 summarizes VOCs detected in environmental groundwater samples from well CTF-MW2, and Table III-6 lists the MDLs for associated VOCs analyzed.

## 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. Table III-6 lists the MDLs for associated SVOCs analyzed.

## 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 CTF-MW2 groundwater samples at concentrations above laboratory MDLs, except RDX [hexahydro-trinitro-triazine]. RDX was detected in the primary and duplicate environmental samples collected from CTF-MW2 at concentrations of 0.147 and 0.179  $\mu$ g/L, respectively. Table III-4 summarizes HE compounds detected in environmental groundwater samples, and Table III-7 lists the MDLs for the associated HE compounds analyzed.

## 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. NPN was not detected above the nitrate MCL. The result for NPN was reported at a concentration of 6.03 mg/L in the CTF-MW3 environmental sample and 6.05 mg/L in the duplicate environmental sample.

**SWMU 154, CTF-MW2.** Table III-8 summarizes NPN results for CTF-MW2. No detections of NPN above the laboratory MDL were reported for the CTF-MW2 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 (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  $\mu$ g/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  $\mu$ g/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 Environmental Restoration Operations Consolidated 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 0.0498 mg/L, and dissolved arsenic at 0.0498 mg/L. The elevated concentrations of arsenic in the groundwater sample is most likely attributable to background because monitoring well CTF-MW2 is screened in a fault-gouge zone in the Precambrian granite. Unfiltered and filtered metal results for CTF-MW2 are summarized in Tables III-13 and III-14, respectively. In addition, arsenic concentrations since July 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 gammaemitting 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 III-15. Gamma spectroscopy activities for short-list radionuclides are less than the associated MDAs, except for the duplicate environmental sample that contained potassium-40 values of  $48.5 \pm 41.6$  picocuries per liter (pCi/L); the result was qualified as an estimated value during data validation because the result is less than three times the associated MDA.

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 reported is below the MCL of 15 pCi/L at 6.73 pCi/L. The results reported for isotopic uranium are as follows: uranium-233/234 at 60.7  $\pm$  8.48 pCi/L; uranium-235/236 at 0.502  $\pm$  0.169 pCi/L; and uranium-238 at 9.37  $\pm$  1.42 pCi/L. The results for the duplicate environmental sample are as follows: uranium-233/234 at 61.3  $\pm$  8.72 pCi/L; uranium-235/236 at 0.686  $\pm$  0.183 pCi/L; and uranium-238 at 8.62  $\pm$  1.31 pCi/L. In this region, groundwater contacts the Precambrian bedrock, which contains naturally occurring 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 duplicate environmental, TB, field blank (FB), and equipment blank (EB) samples. The field QC samples were submitted for analysis along with the groundwater samples in accordance with QC procedures specified in the SAPs for SWMUs 149 and 154 (SNL/NM June 2010, Attachments 1 and 2).

## 4.1.1 **Duplicate Environmental Samples**

Duplicate environmental samples were collected 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. The duplicate environmental samples were analyzed for all analytical parameters.

Relative percent difference (RPD) calculations between duplicate environmental samples were performed for detected analytes. Table III-17 summarizes the results for duplicate environmental sample analyses and calculated RPD values. The duplicate environmental sampling results show good correlation (low RPD values of less than 20 for organic compounds and less than 35 for inorganic analytes) for all calculated parameters.

## 4.1.2 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-milliliter (mL) volatile organic analysis vials prepared by the analytical laboratory, which accompany the empty sample containers supplied by the laboratory. TB samples were brought to the field and accompanied each sample shipment.

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

## 4.1.3 Field Blank Samples

FB samples were collected for VOCs to assess whether contamination of the samples had resulted from ambient field conditions. The FB samples were prepared by pouring deionized (DI) water into sample containers at the sampling point to simulate the transfer of environmental samples from the sampling system to the sample container. The compounds detected in the FB samples include bromodichloromethane, chloroform, and

dibromochloromethane. No corrective action was applied during data validation for CTF-MW3 sample results, as these compounds were also reported in the EB sample. These compounds are common by-products of water disinfection associated with the DI water process. No corrective action was applied during data validation for CTF-MW2 sample results, as these compounds were not detected in the environmental samples.

## 4.1.4 Equipment Blank Samples

A portable Bennett<sup>™</sup> 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 "LTES Groundwater Monitoring Equipment Decontamination," (SNL/NM January 2012a). In accordance with SNL/NM FOP 05-03 (SNL/NM January 2012a), the following solutions were pumped through the sampling system: 5 gallons of DI water mixed with 20 mL nonphosphate laboratory detergent; 5 gallons of DI water; 5 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 and submitted for all analyses.

**SWMU 149, CTF-MW3.** Acetone, aluminum, bromodichloromethane, calcium, chloride, chloroform, copper, dibromochloromethane, magnesium, and zinc were detected in the EB sample. No corrective action was required for acetone, aluminum, calcium, chloride, magnesium, or zinc as these parameters either were not detected in environmental samples or the reported values are greater than five times the EB concentration. The results for bromodichloromethane, chloroform, copper, and dibromochloromethane were qualified as not detected during data validation because the associated sample results are less than five times the EB value.

**SWMU 154, CTF-MW2.** Bromodichloromethane, chloride, chloroform, copper, and dibromochloromethane were detected in the EB sample. No corrective action was required for bromodichloromethane, chloride, chloroform, or dibromochloromethane as these parameters either were not detected in the environmental samples or the reported values are greater than five times the EB concentration. The result for copper was qualified as not detected during data validation because the sample results are less than five times the EB value.

## 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). The data are acceptable, and reported QC measures are adequate. No significant data quality problems were noted during the data validation process. The data validation sample findings summary sheets are provided in Appendix C.

## 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) or project-specific issues were identified during the March 2012 sampling activities at CTF-MW3 and CTF-MW2.

## 5.0 Summary

During the First Quarter of CY 2012, samples were collected from monitoring well CTF-MW3, located near SWMU 149, and CTF-MW2, located near SWMU 154. 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 historical values.

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 samples at concentrations of 0.0498 mg/L in the unfiltered and 0.0498 mg/L in the filtered samples and at concentrations of 0.0559 mg/L in the unfiltered and 0.0521 mg/L in the filtered duplicate environmental 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 historical values.

## 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.

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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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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.

U.S. Environmental Protection Agency (EPA), 1984, "Methods for Chemical Analysis of Water and Wastes," EPA 600-4-79-020, U.S. Environmental Protection Agency, Washington, D.C.

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.

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# Figures

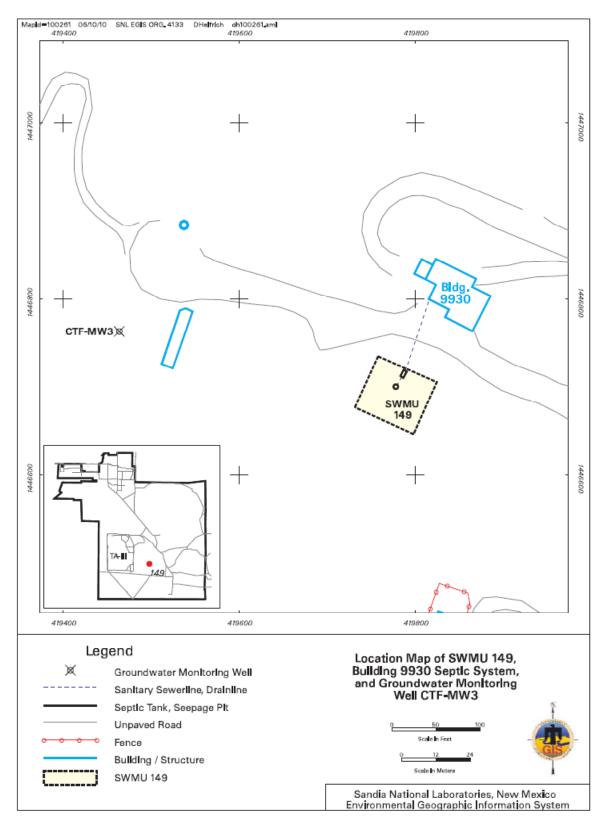


Figure III-1 Location of Monitoring Well CTF-MW3 near SWMU 149

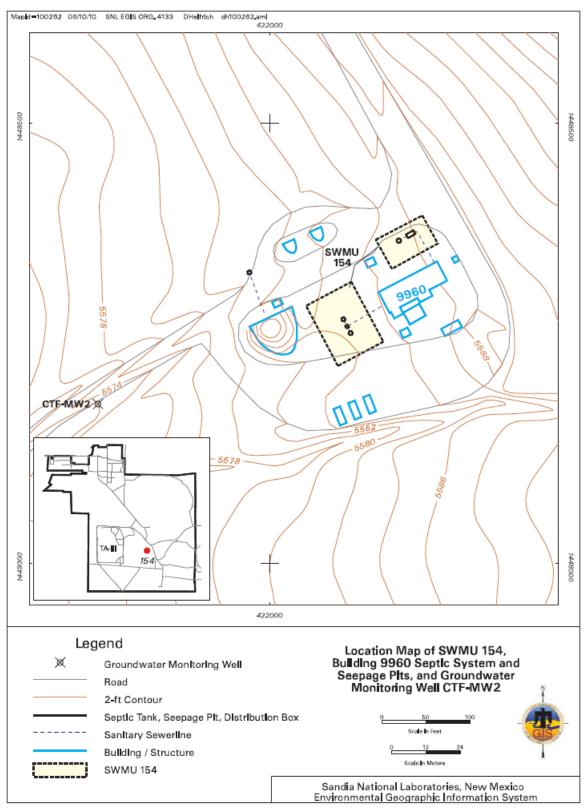
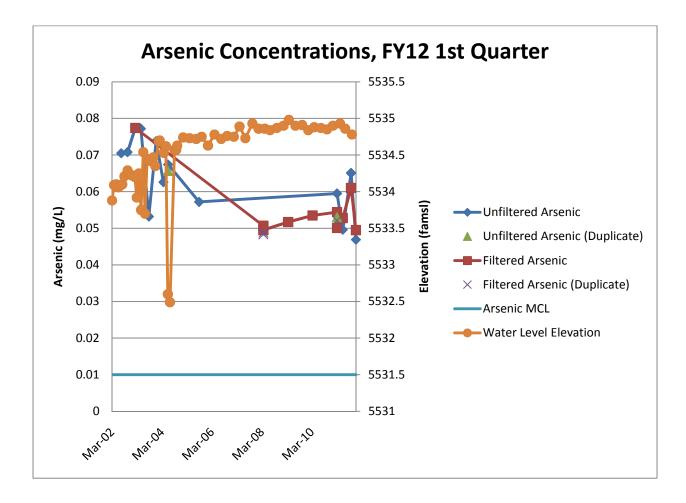
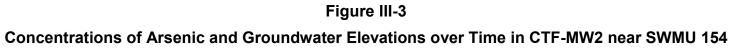


Figure III-2

Location of Monitoring Well CTF-MW2 near SWMU 154





# Tables

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

Analysis	Analytical Method <sup>a</sup>	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 <sup>b</sup>	EPA 6020/7470	1 x 500-mL polyethylene, HNO <sub>3</sub> , 4°C
Perchlorate	EPA 314.0	1 x 250-mL polyethylene, 4°C
Major Anions and Cations <sup>c</sup>	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 <sub>2</sub> SO <sub>4</sub> , 4°C
Gross Alpha/Beta	EPA 900.0	1 x 1-L polyethylene, HNO <sub>3</sub> , 4°C
Gamma Spectroscopy <sup>d</sup>	EPA 901.0	1 x 1-L polyethylene, HNO <sub>3</sub> , 4°C

#### Notes

<sup>a</sup>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*, 20<sup>th</sup> 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.

<sup>b</sup>Metals = filtered and unfiltered samples, TAL metals including barium, calcium, magnesium, potassium, and sodium, plus uranium.

<sup>c</sup>Major anions include bromide, chloride, fluoride, and sulfate.

<sup>d</sup>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.
- HCI = Hydrochloric acid.
- $HNO_3$  = Nitric acid.
- L = Liter
- mL = Milliliter(s).
- SM = Standard Method.
- SWMU = Solid Waste Management Unit.
- TAL = Target Analyte List.

# Sample Details for First Quarter, CY 2012 Groundwater Sampling Solid Waste Management Units 149 and 154 Groundwater Monitoring Quarterly Assessment January – March 2012

Well	Sample Identification	AR/COC Number	Associated Groundwater Investigation
CTF-MW3	091943	614053	SWMU 149
CTF-MW3 (Duplicate)	091944	614053	SWMU 149
CTF-MW2	091949	614055	SWMU 154
CTF-MW2 (Duplicate)	091950	614055	SWMU 154

#### Notes

= Analysis Request/Chain of Custody. = Coyote Test Field. AR/COC

CTF

CY = Calendar Year

MW = Monitoring well.

SWMU = Solid Waste Management Unit.

## Summary of Field Water Quality Measurements<sup>a</sup>

## Solid Waste Management Units 149 and 154 Groundwater Monitoring

#### Quarterly Assessment, January– March 2012

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmhos/cm)	Oxidation Reduction Potential (mV)	рН	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
SWMU 149								
CTF-MW3	26-Mar-12	20.34	1632	120.0	7.21	0.32	79.3	7.14
SWMU 154	•						•	
CTF-MW2	30-Mar-12	17.40	3540	10.4	6.17	2.36	1.4	0.14

#### Notes

<sup>a</sup>Field measurements collected prior to sampling.

- °C
- Degrees Celsius.
   Percent saturation. % Sat
- $\mu$ mhos/cm = Micromhos per centimeter.
- = Coyote Test Field. CTF
- ID
- Identification.Milligrams per liter. mg/L
- mŽ = Millivolts.
- = Monitoring well. MW
- NTU = Nephelometric turbidity units.
- = Potential of hydrogen (negative logarithm of the hydrogen ion concentration). pН
- = Solid Waste Management Unit. SWMU

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

#### Solid Waste Management Units 149 and 154 Groundwater Monitoring

#### Quarterly Assessment, January – March 2012

Well ID	Analyte	Result (μg/L)	MDL (µg/L)	PQL (µg/L)	MCL (µg/L)	Laboratory Qualifier <sup>a</sup>	Validation Qualifier <sup>b</sup>	Sample Number	Analytical Method <sup>c</sup>
SWMU 149	·								
	Bromodichloromethane	0.540	0.300	1.00	NE	J	1.00U	091943-001	SW846-8260B
<b>CTF-MW3</b> 26-Mar-12	Chloroform	0.720	0.300	1.00	NE	J	1.00U	091943-001	SW846-8260B
20-10101-12	Dibromochloromethane	0.360	0.300	1.00	NE	J	1.00U	091943-001	SW846-8260B
	Bromodichloromethane	0.520	0.300	1.00	NE	J	1.00U	091944-001	SW846-8260B
CTF-MW3 (Duplicate) 26-Mar-12	Chloroform	0.700	0.300	1.00	NE	J	1.00U	091944-001	SW846-8260B
20-11101-12	Dibromochloromethane	0.330	0.300	1.00	NE	J	1.00U	091944-001	SW846-8260B
SWMU 154	·	•			•				
<b>CTF-MW2</b> 30-Mar-12	RDX	0.147	0.087	0.272	NE	J		091949-024	SW846-8321A
<b>CTF-MW2</b> (Duplicate) 30-Mar-12	RDX	0.179	0.0874	0.273	NE	J		091950-024	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.

#### <sup>a</sup>Laboratory Qualifier

J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.

#### <sup>b</sup>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 was not detected. The associated numerical value is the sample quantitation limit.

#### <sup>c</sup>Analytical Method

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

# Method Detection Limits for Volatile Organic Compounds (EPA Method 8260) Solid Waste Management Unit 149 Groundwater Monitoring Quarterly Assessment, January – March 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

- $\mu$ g/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, January – March 2012

Analyte	MDL (µg/L)	Analytical Method <sup>a</sup>	Analyte	MDL (µg/L)	Analytical Method <sup>ª</sup>	Analyte	MDL (µg/L)	Analytical Method <sup>ª</sup>
1.1.1-Trichloroethane	0.300	8260B	1,2,4-Trichlorobenzene	6.00 – 6.38	8270C	Di-n-butyl phthalate	6.00 – 6.38	8270C
1,1,2,2-Tetrachloroethane	0.300	8260B	1.2-Dichlorobenzene	6.00 - 6.38	8270C	Di-n-octyl phthalate	6.00 - 6.38	8270C
1,1,2-Trichloroethane	0.300	8260B	1.3-Dichlorobenzene	6.00 - 6.38	8270C	Dibenz[a,h]anthracene	0.600 - 0.638	8270C
1,1-Dichloroethane	0.300	8260B	1,4-Dichlorobenzene	6.00 - 6.38	8270C	Dibenzofuran	6.00 - 6.38	8270C
1.1-Dichloroethene	0.300	8260B	2,4,5-Trichlorophenol	6.00 - 6.38	8270C	Diethylphthalate	6.00 - 6.38	8270C
1,2-Dichloroethane	0.300	8260B	2,4,6-Trichlorophenol	6.00 - 6.38	8270C	Dimethylphthalate	6.00 - 6.38	8270C
1,2-Dichloropropane	0.300	8260B	2,4-Dichlorophenol	6.00 - 6.38	8270C	Dinitro-o-cresol	6.00 - 6.38	8270C
2-Butanone	2.00	8260B	2,4-Dimethylphenol	6.00 - 6.38	8270C	Diphenyl amine	6.00 - 6.38	8270C
2-Hexanone	2.20	8260B	2,4-Dinitrophenol	10.0 - 10.6	8270C	Fluoranthene	0.600 - 0.638	8270C
4-methyl-, 2-Pentanone	1.50	8260B	2,4-Dinitrotoluene	6.00 - 6.38	8270C	Fluorene	0.600 - 0.638	8270C
Acetone	3.00	8260B	2,6-Dinitrotoluene	6.00 - 6.38	8270C	Hexachlorobenzene	6.00 - 6.38	8270C
Benzene	0.300	8260B	2-Chloronaphthalene	0.600 - 0.638	8270C	Hexachlorobutadiene	6.00 - 6.38	8270C
Bromodichloromethane	0.300	8260B	2-Chlorophenol	6.00 - 6.38	8270C	Hexachlorocyclopentadiene	6.00 - 6.38	8270C
Bromoform	0.300	8260B	2-Methylnaphthalene	0.600 - 0.638	8270C	Hexachloroethane	6.00 - 6.38	8270C
Bromomethane	0.300	8260B	2-Nitroaniline	6.00 - 6.38	8270C	Indeno(1,2,3-c,d)pyrene	0.600 - 0.638	8270C
Carbon disulfide	1.50	8260B	2-Nitrophenol	6.00 - 6.38	8270C	Isophorone	6.00 - 6.38	8270C
Carbon tetrachloride	0.300	8260B	3,3'-Dichlorobenzidine	6.00 - 6.38	8270C	Naphthalene	0.600 - 0.638	8270C
Chlorobenzene	0.300	8260B	3-Nitroaniline	6.00 - 6.38	8270C	Nitro-benzene	6.00 - 6.38	8270C
Chloroethane	0.300	8260B	4-Bromophenyl phenyl ether	6.00 - 6.38	8270C	Pentachlorophenol	6.00 - 6.38	8270C
Chloroform	0.300	8260B	4-Chloro-3-methylphenol	6.00 - 6.38	8270C	Phenanthrene	0.600 - 0.638	8270C
Chloromethane	0.300	8260B	4-Chlorobenzenamine	6.00 - 6.38	8270C	Phenol	6.00 - 6.38	8270C
Dibromochloromethane	0.300	8260B	4-Chlorophenyl phenyl ether	6.00 - 6.38	8270C	Pyrene	0.600 - 0.638	8270C
Ethyl benzene	0.300	8260B	4-Nitroaniline	6.00 - 6.38	8270C	bis(2-Chloroethoxy)methane	6.00 - 6.38	8270C
Methylene chloride	3.00	8260B	4-Nitrophenol	6.00 - 6.38	8270C	bis(2-Chloroethyl)ether	6.00 - 6.38	8270C
Styrene	0.300	8260B	Acenaphthene	0.600 - 0.638	8270C	bis(2-Chloroisopropyl)ether	6.00 - 6.38	8270C
Tetrachloroethene	0.300	8260B	Acenaphthylene	0.600 - 0.638	8270C	bis(2-Ethylhexyl)phthalate	6.00 - 6.38	8270C
Toluene	0.300	8260B	Anthracene	0.600 - 0.638	8270C	m,p-Cresol	6.00 – 6.38	8270C
Trichloroethene	0.300	8260B	Benzo(a)anthracene	0.600 - 0.638	8270C	n-Nitrosodipropylamine	6.00 – 6.38	8270C
Vinyl acetate	1.50	8260B	Benzo(a)pyrene	0.600 - 0.638	8270C	o-Cresol	6.00 - 6.38	8270C
Vinyl chloride	0.300	8260B	Benzo(b)fluoranthene	0.600 - 0.638	8270C			
Xylene	0.300	8260B	Benzo(ghi)perylene	0.600 - 0.638	8270C			
cis-1,2-Dichloroethene	0.300	8260B	Benzo(k)fluoranthene	0.600 - 0.638	8270C			
cis-1,3-Dichloropropene	0.300	8260B	Butylbenzyl phthalate	6.00 - 6.38	8270C			
trans-1,2-Dichloroethene	0.300	8260B	Carbazole	0.600 - 0.638	8270C			
trans-1,3-Dichloropropene	0.300	8260B	Chrysene	0.600 – 0.638	8270C			

#### Notes

<sup>a</sup>U.S. Environmental Protection Agency, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3<sup>rd</sup> 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.

# Method Detection Limits for High Explosive Compounds (EPA Method 8321A) Solid Waste Management Unit 154 Groundwater Monitoring Quarterly Assessment, January – March 2012

Analyte	MDL (μg/L)
1,3,5-Trinitrobenzene	0.0870 - 0.0874
1,3-Dinitrobenzene	0.0870 - 0.0874
2,4,6-Trinitrotoluene	0.0870 - 0.0874
2,4-Dinitrotoluene	0.0870 - 0.0874
2,6-Dinitrotoluene	0.0870 - 0.0874
2-Amino-4,6-dinitrotoluene	0.0870 - 0.0874
2-Nitrotoluene	0.0891 – 0.0896
3-Nitrotoluene	0.0870 - 0.0874
4-Amino-2,6-dinitrotoluene	0.0870 - 0.0874
4-Nitrotoluene	0.163 – 0.164
HMX	0.0870 - 0.0874
Nitro-benzene	0.0870 - 0.0874
Pentaerythritol tetranitrate	0.109
RDX	0.147 – 0.179
Tetryl	0.0870 - 0.0874

#### 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.

#### **Summary of Nitrate Plus Nitrite Results**

#### Solid Waste Management Units 149 and 154 Groundwater Monitoring

#### Quarterly Assessment, January – March 2012

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier <sup>a</sup>	Validation Qualifier⁵	Sample Number	Analytical Method <sup>°</sup>
SWMU 149									
<b>CTF-MW3</b> 26-Mar-12	Nitrate plus nitrite as N	6.03	0.250	1.25	10.0	В		091943-018	EPA 353.2
CTF-MW3 (Duplicate) 26-Mar-12	Nitrate plus nitrite as N	6.05	0.250	1.25	10.0	В		091944-018	EPA 353.2
SWMU 154									
<b>CTF-MW2</b> 30-Mar-12	Nitrate plus nitrite as N	ND	0.425	1.25	10.0	U		091949-018	EPA 353.2
<b>CTF-MW2</b> (Duplicate) 30-Mar-12	Nitrate plus nitrite as N	ND	0.085	0.250	10.0	U		091950-018	EPA 353.2

#### Notes

- CFR = Code of Federal Regulations.
- CTF = Coyote Test Field.
- EPA = U.Ś. 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.
- ND = Not detected (at MDL).

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.

#### <sup>a</sup>Laboratory Qualifier

- B = The analyte was detected in the blank above the effective method detection limit (MDL).
- U = Analyte is absent or below the method detection limit.

#### <sup>b</sup>Validation Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

#### <sup>c</sup>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.

#### **Summary of Anion and Alkalinity Results**

#### Solid Waste Management Units 149 and 154 Groundwater Monitoring

#### Quarterly Assessment, January – March 2012

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier <sup>a</sup>	Validation Qualifier <sup>b</sup>	Sample Number	Analytical Method <sup>c</sup>
SWMU 149	÷								
CTF-MW3	Bicarbonate Alkalinity	336	0.725	1.00	NE	В		091943-022	SM2320B
26-Mar-12	Carbonate Alkalinity	ND	0.725	1.00	NE	U		091943-022	SM2320B
	Bromide	1.15	0.066	0.200	NE			091943-016	SW846 9056
	Chloride	112	3.30	10.0	NE			091943-016	SW846 9056
	Fluoride	2.37	0.033	0.100	4.0			091943-016	SW846 9056
	Sulfate	448	5.00	20.0	NE			091943-016	SW846 9056
CTF-MW3 (Duplicate)	Bicarbonate Alkalinity	334	0.725	1.00	NE	В		091944-022	SM2320B
26-Mar-12 ´ ´	Carbonate Alkalinity	ND	0.725	1.00	NE	U		091944-022	SM2320B
	Bromide	1.18	0.066	0.200	NE			091944-016	SW846 9056
	Chloride	115	3.30	10.0	NE			091944-016	SW846 9056
	Fluoride	2.37	0.033	0.100	4.0			091944-016	SW846 9056
	Sulfate	462	5.00	20.0	NE			091944-016	SW846 9056
SWMU 154									
CTF-MW2	Total Alkalinity	1580	0.725	1.00	NE			091949-022	SM2320B
30-Mar-12	Bromide	1.77	0.670	2.00	NE	J		091949-016	SW846 9056
	Chloride	435	6.70	20.0	NE			091949-016	SW846 9056
	Fluoride	2.27	0.033	0.100	4.0			091949-016	SW846 9056
	Sulfate	162	13.3	40.0	NE			091949-016	SW846 9056
CTF-MW2 (Duplicate)	Total Alkalinity	1600	0.725	1.00	NE			091950-022	SM2320B
30-Mar-12	Bromide	1.75	0.670	2.00	NE	J		091950-016	SW846 9056
	Chloride	433	6.70	20.0	NE			091950-016	SW846 9056
	Fluoride	2.25	0.033	0.100	4.0			091950-016	SW846 9056
	Sulfate	162	13.3	40.0	NE			091950-016	SW846 9056

#### Notes

CFR = Code of Federal Regulations.

= Coyote Test Field. CTF

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).

= 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. MDL

mg/L MW = Milligrams per liter.

= Monitoring well.

= Not detected (at MDL). ND

NE = Not established.

#### Table III-9 (Concluded)

#### **Summary of Anion and Alkalinity Results**

## Solid Waste Management Units 149 and 154 Groundwater Monitoring

#### Quarterly Assessment, January 2012 – March 2012

#### Notes (continued)

- 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.

#### <sup>a</sup>Laboratory Qualifier

- B = The analyte was detected in the blank above the effective MDL.
- U = Analyte is absent or below the method detection limit.

#### <sup>b</sup>Validation Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

#### <sup>c</sup>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*, 20<sup>th</sup> ed., Method 2320B.

#### **Summary of Perchlorate Results**

#### Solid Waste Management Units 149 and 154 Groundwater Monitoring

#### Quarterly Assessment, January – March 2012

Well ID	Perchlorate Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier <sup>a</sup>	Validation Qualifier <sup>b</sup>	Sample Number	Analytical Method <sup>c</sup>	
SWMU 149									
<b>CTF-MW3</b> 26-Mar-12	ND	0.004	0.012	NE	U		091943-020	EPA 314.0	
<b>CTF-MW3</b> (Duplicate) 26-Mar-12	ND	0.004	0.012	NE	U		091944-020	EPA 314.0	
SWMU 154									
<b>CTF-MW2</b> 30-Mar-12	ND	0.004	0.012	NE	U		091949-020	EPA 314.0	
<b>CTF-MW2</b> (Duplicate) 30-Mar-12	ND	0.004	0.012	NE	U		091950-020	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.

#### <sup>a</sup>Laboratory Qualifier

- B = The analyte was detected in the blank above the effective 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.

#### <sup>b</sup>Validation Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

#### <sup>c</sup>Analytical Method

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

## Summary of Unfiltered Total Metal Results

## Solid Waste Management Unit 149 Groundwater Monitoring

## Quarterly Assessment, January – March 2012

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier <sup>a</sup>	Validation Qualifier <sup>b</sup>	Sample Number	Analytical Method <sup>c</sup>
CTF-MW3	Aluminum	ND	0.015	0.050	NE	U		091943-009	SW846 6020
6-Mar-12	Antimony	ND	0.001	0.003	0.006	U		091943-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		091943-009	SW846 6020
	Barium	0.0326	0.0006	0.002	2.00			091943-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		091943-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		091943-009	SW846 6020
	Calcium	187	0.300	1.00	NE			091943-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		091943-009	SW846 6020
	Cobalt	0.000367	0.0001	0.001	NE	B, J	0.00061U	091943-009	SW846 6020
	Copper	0.00223	0.00035	0.001	NE		0.0041U	091943-009	SW846 6020
	Iron	0.761	0.033	0.100	NE	В		091943-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		091943-009	SW846 6020
	Magnesium	49.1	0.050	0.150	NE			091943-009	SW846 6020
	Manganese	0.00109	0.001	0.005	NE	J		091943-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U	UJ	091943-009	SW846 7470
	Nickel	0.00297	0.0005	0.002	NE			091943-009	SW846 6020
	Potassium	11.5	0.080	0.300	NE			091943-009	SW846 6020
	Selenium	0.0282	0.0015	0.005	0.050			091943-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		091943-009	SW846 6020
	Sodium	171	0.400	1.25	NE			091943-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		091943-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		091943-009	SW846 6010
	Zinc	0.00654	0.0035	0.010	NE	J	0.0182U	091943-009	SW846 6020

## Table III-11 (Continued)

# Summary of Unfiltered Total Metal Results

## Solid Waste Management Unit 149 Groundwater Monitoring

Well ID	Analyte	Result	MDL	PQL	MCL	Laboratory	Validation	Sample	Analytical
Weil ID	Analyte	(mg/L)	(mg/L)	(mg/L)	(mg/L)	Qualifier <sup>a</sup>	Qualifier <sup>b</sup>	Number	Method <sup>c</sup>
CTF-MW3 (Duplicate)	Aluminum	ND	0.015	0.050	NE	U		091944-009	SW846 6020
26-Mar-12	Antimony	ND	0.001	0.003	0.006	U		091944-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		091944-009	SW846 6020
	Barium	0.0321	0.0006	0.002	2.00			091944-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		091944-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		091944-009	SW846 6020
	Calcium	192	0.300	1.00	NE			091944-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		091944-009	SW846 6020
	Cobalt	0.000354	0.0001	0.001	NE	B, J	0.00061U	091944-009	SW846 6020
	Copper	0.00233	0.00035	0.001	NE		0.0041U	091944-009	SW846 6020
	Iron	0.769	0.033	0.100	NE	В		091944-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		091944-009	SW846 6020
	Magnesium	52.1	0.050	0.150	NE			091944-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		091944-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U	UJ	091944-009	SW846 7470
	Nickel	0.003	0.0005	0.002	NE			091944-009	SW846 6020
	Potassium	10.7	0.080	0.300	NE			091944-009	SW846 6020
	Selenium	0.0289	0.0015	0.005	0.050			091944-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		091944-009	SW846 6020
	Sodium	165	0.400	1.25	NE			091944-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		091944-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		091944-009	SW846 6010
	Zinc	0.00535	0.0035	0.010	NE	J	0.0182U	091944-009	SW846 6020

#### Table III-11 (Concluded)

#### **Summary of Unfiltered Total Metal Results**

#### Solid Waste Management Unit 149 Groundwater Monitoring

#### Quarterly Assessment, January – March 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.

#### <sup>a</sup>Laboratory Qualifier

- B = Analyte is detected in associated laboratory method blank.
- 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.

#### <sup>b</sup>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 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.

#### <sup>c</sup>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

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier <sup>a</sup>	Validation Qualifier <sup>b</sup>	Sample Number	Analytical Method <sup>c</sup>
CTF-MW3	Aluminum	ND	0.015	0.050	NE	U		091943-010	SW846 6020
26-Mar-12	Antimony	ND	0.001	0.003	0.006	U		091943-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		091943-010	SW846 6020
	Barium	0.0324	0.0006	0.002	2.00			091943-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		091943-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		091943-010	SW846 6020
	Calcium	179	0.300	1.00	NE			091943-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		091943-010	SW846 6020
	Cobalt	0.000387	0.0001	0.001	NE	B, J	0.00051U	091943-010	SW846 6020
	Copper	0.00222	0.00035	0.001	NE		0.00351U	091943-010	SW846 6020
	Iron	0.776	0.033	0.100	NE	В		091943-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		091943-010	SW846 6020
	Magnesium	46.9	0.050	0.150	NE			091943-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		091943-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U	UJ	091943-010	SW846 7470
	Nickel	0.00293	0.0005	0.002	NE			091943-010	SW846 6020
	Potassium	11.5	0.080	0.300	NE			091943-010	SW846 6020
	Selenium	0.0288	0.0015	0.005	0.050			091943-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		091943-010	SW846 6020
	Sodium	157	0.400	1.25	NE			091943-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		091943-010	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		091943-010	SW846 6010
	Zinc	0.00572	0.0035	0.010	NE	J		091943-010	SW846 6020

## Table III-12 (Continued)

# Summary of Filtered Total Metal Results

## Solid Waste Management Unit 149 Groundwater Monitoring

Well ID	Analyte	Result <sup>a</sup> (mg/L)	MDL <sup>ь</sup> (mg/L)	PQL <sup>c</sup> (mg/L)	MCL <sup>d</sup> (mg/L)	Laboratory Qualifier <sup>e</sup>	Validation Qualifier <sup>f</sup>	Sample Number	Analytical Method <sup>9</sup>
CTF-MW3 (Duplicate)	Aluminum	ND	0.015	0.050	NE	U		091944-010	SW846 6020
26-Mar-12	Antimony	ND	0.001	0.003	0.006	U		091944-010	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		091944-010	SW846 6020
	Barium	0.0322	0.0006	0.002	2.00			091944-010	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		091944-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		091944-010	SW846 6020
	Calcium	182	0.300	1.00	NE			091944-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		091944-010	SW846 6020
	Cobalt	0.000405	0.0001	0.001	NE	B, J	0.00051U	091944-010	SW846 6020
	Copper	0.00224	0.00035	0.001	NE		0.00351U	091944-010	SW846 6020
	Iron	0.827	0.033	0.100	NE	В		091944-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		091944-010	SW846 6020
	Magnesium	45.5	0.010	0.030	NE			091944-010	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		091944-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U	UJ	091944-010	SW846 7470
	Nickel	0.00308	0.0005	0.002	NE			091944-010	SW846 6020
	Potassium	11.3	0.080	0.300	NE			091944-010	SW846 6020
	Selenium	0.0293	0.0015	0.005	0.050			091944-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		091944-010	SW846 6020
	Sodium	155	0.400	1.25	NE			091944-010	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		091944-010	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		091944-010	SW846 6010
	Zinc	0.00509	0.0035	0.010	NE	J		091944-010	SW846 6020

#### Table III-12 (Concluded)

#### Summary of Filtered Total Metal Results

#### Solid Waste Management Unit 149 Groundwater Monitoring

#### Quarterly Assessment, January – March 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.

#### <sup>a</sup>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.

#### <sup>b</sup>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 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.

#### <sup>c</sup>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

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier <sup>a</sup>	Validation Qualifier <sup>b</sup>	Sample Number	Analytical Method <sup>c</sup>
CTF-MW2	Aluminum	0.108	0.015	0.050	NE		J-	091949-009	SW846 6020
30-Mar-12	Antimony	ND	0.001	0.003	0.006	U		091949-009	SW846 6020
	Arsenic	0.0498	0.0017	0.005	0.010			091949-009	SW846 6020
	Barium	0.0805	0.0006	0.002	2.00			091949-009	SW846 6020
	Beryllium	0.00294	0.0002	0.0005	0.004			091949-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		091949-009	SW846 6020
	Calcium	384	1.20	4.00	NE			091949-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		091949-009	SW846 6020
	Cobalt	0.00954	0.0001	0.001	NE			091949-009	SW846 6020
	Copper	0.00189	0.00035	0.001	NE		0.00316U	091949-009	SW846 6020
	Iron	2.63	0.033	0.100	NE			091949-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		091949-009	SW846 6020
	Magnesium	84.4	0.200	0.600	NE			091949-009	SW846 6020
	Manganese	3.07	0.020	0.100	NE			091949-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U	UJ	091949-009	SW846 7470
	Nickel	0.0175	0.0005	0.002	NE			091949-009	SW846 6020
	Potassium	51.4	1.60	6.00	NE			091949-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		091949-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		091949-009	SW846 6020
	Sodium	479	1.60	5.00	NE			091949-009	SW846 6020
	Thallium	0.00123	0.00045	0.002	0.002	J		091949-009	SW846 6020
	Uranium	0.0257	0.000067	0.0002	0.03			091949-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		091949-009	SW846 6010
	Zinc	0.267	0.0035	0.010	NE	В		091949-009	SW846 6020

## Table III-13 (Continued)

## Summary of Unfiltered Total Metal Results

## Solid Waste Management Unit 154 Groundwater Monitoring

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier <sup>a</sup>	Validation Qualifier <sup>b</sup>	Sample Number	Analytical Method <sup>c</sup>
CTF-MW2 (Duplicate)	Aluminum	0.120	0.015	0.050	NE		J-	091950-009	SW846 6020
30-Mar-12	Antimony	ND	0.001	0.003	0.006	U		091950-009	SW846 6020
	Arsenic	0.0559	0.0017	0.005	0.010			091950-009	SW846 6020
	Barium	0.0811	0.0006	0.002	2.00			091950-009	SW846 6020
	Beryllium	0.0031	0.0002	0.0005	0.004			091950-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		091950-009	SW846 6020
	Calcium	391	1.20	4.00	NE			091950-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		091950-009	SW846 6020
	Cobalt	0.00986	0.0001	0.001	NE			091950-009	SW846 6020
	Copper	0.0017	0.00035	0.001	NE		0.00316U	091950-009	SW846 6020
	Iron	2.71	0.033	0.100	NE			091950-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		091950-009	SW846 6020
	Magnesium	86.0	0.200	0.600	NE			091950-009	SW846 6020
	Manganese	3.10	0.020	0.100	NE			091950-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U	UJ	091950-009	SW846 7470
	Nickel	0.0183	0.0005	0.002	NE			091950-009	SW846 6020
	Potassium	52.3	1.60	6.00	NE			091950-009	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		091950-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		091950-009	SW846 6020
	Sodium	487	1.60	5.00	NE			091950-009	SW846 6020
	Thallium	0.00126	0.00045	0.002	0.002	J		091950-009	SW846 6020
	Uranium	0.0257	0.000067	0.0002	0.03			091950-009	SW846 6020
	Vanadium	0.00109	0.001	0.005	NE	J		091950-009	SW846 6010
	Zinc	0.268	0.0035	0.010	NE	В		091950-009	SW846 6020

#### Table III-13 (Concluded)

#### Summary of Unfiltered Total Metal Results

#### Solid Waste Management Unit 154 Groundwater Monitoring

#### Quarterly Assessment, January – March 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.

#### <sup>a</sup>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.

#### <sup>b</sup>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.
- 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.

#### <sup>c</sup>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

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier <sup>a</sup>	Validation Qualifier <sup>b</sup>	Sample Number	Analytical Method <sup>c</sup>
CTF-MW2	Aluminum	0.115	0.015	0.050	NE		J-	091949-010	SW846 6020
30-Mar-12	Antimony	ND	0.001	0.003	0.006	U		091949-010	SW846 6020
	Arsenic	0.0498	0.0017	0.005	0.010			091949-010	SW846 6020
	Barium	0.0818	0.0006	0.002	2.00			091949-010	SW846 6020
	Beryllium	0.00327	0.0002	0.0005	0.004			091949-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		091949-010	SW846 6020
	Calcium	385	1.20	4.00	NE			091949-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		091949-010	SW846 6020
	Cobalt	0.00989	0.0001	0.001	NE			091949-010	SW846 6020
	Copper	0.00176	0.00035	0.001	NE			091949-010	SW846 6020
	Iron	2.70	0.033	0.100	NE			091949-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		091949-010	SW846 6020
	Magnesium	84.6	0.200	0.600	NE			091949-010	SW846 6020
	Manganese	3.05	0.020	0.100	NE			091949-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U	UJ	091949-010	SW846 7470
	Nickel	0.0185	0.0005	0.002	NE			091949-010	SW846 6020
	Potassium	51.8	1.60	6.00	NE			091949-010	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		091949-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		091949-010	SW846 6020
	Sodium	482	1.60	5.00	NE			091949-010	SW846 6020
	Thallium	0.00124	0.00045	0.002	0.002	J		091949-010	SW846 6020
	Uranium	0.0262	0.000067	0.0002	0.03			091949-010	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		091949-010	SW846 6010
	Zinc	0.317	0.0035	0.010	NE	В		091949-010	SW846 6020

## Table III-14 (Continued)

# Summary of Filtered Total Metal Results

## Solid Waste Management Unit 154 Groundwater Monitoring

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier <sup>a</sup>	Validation Qualifier <sup>b</sup>	Sample Number	Analytical Method <sup>c</sup>
CTF-MW2 (Duplicate)	Aluminum	0.103	0.015	0.050	NE		J-	091950-010	SW846 6020
30-Mar-12	Antimony	ND	0.001	0.003	0.006	U		091950-010	SW846 6020
	Arsenic	0.0521	0.0017	0.005	0.010			091950-010	SW846 6020
	Barium	0.0843	0.0006	0.002	2.00			091950-010	SW846 6020
	Beryllium	0.00321	0.0002	0.0005	0.004			091950-010	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		091950-010	SW846 6020
	Calcium	396	1.20	4.00	NE			091950-010	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		091950-010	SW846 6020
	Cobalt	0.010	0.0001	0.001	NE			091950-010	SW846 6020
	Copper	0.00213	0.00035	0.001	NE			091950-010	SW846 6020
	Iron	2.78	0.033	0.100	NE			091950-010	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		091950-010	SW846 6020
	Magnesium	87.6	0.200	0.600	NE			091950-010	SW846 6020
	Manganese	3.14	0.020	0.100	NE			091950-010	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U	UJ	091950-010	SW846 7470
	Nickel	0.0187	0.0005	0.002	NE			091950-010	SW846 6020
	Potassium	53.2	1.60	6.00	NE			091950-010	SW846 6020
	Selenium	ND	0.0015	0.005	0.050	U		091950-010	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		091950-010	SW846 6020
	Sodium	495	1.60	5.00	NE			091950-010	SW846 6020
	Thallium	0.00123	0.00045	0.002	0.002	J		091950-010	SW846 6020
	Uranium	0.0266	0.000067	0.0002	0.03			091950-010	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		091950-010	SW846 6010
	Zinc	0.348	0.0035	0.010	NE	В		091950-010	SW846 6020

#### Table III-14 (Concluded)

#### Summary of Filtered Total Metal Results

#### Solid Waste Management Unit 154 Groundwater Monitoring

#### Quarterly Assessment, January – March 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.

#### <sup>a</sup>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.

#### <sup>b</sup>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.
- UJ = The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

#### <sup>c</sup>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

Well ID	Analyte	Activity <sup>a</sup> (pCi/L)	MDA (pCi/L)	Critical Level <sup>b</sup> (pCi/L)	MCL (pCi/L)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>d</sup>	Sample Number	Analytical Method <sup>e</sup>
CTF-MW2	Americium-241	-21.7 ± 14.6	16.7	8.19	NE	U	BD	091949-033	EPA 901.1
30-Mar-12	Cesium-137	$0.00687 \pm 1.90$	3.26	1.58	NE	U	BD	091949-033	EPA 901.1
	Cobalt-60	$0.274 \pm 1.80$	3.19	1.51	NE	U	BD	091949-033	EPA 901.1
	Potassium-40	$27.8\pm41.6$	29.5	13.9	NE	U	BD	091949-033	EPA 901.1
	Gross Alpha	6.73	NA	NA	15	NA	None	091949-034	EPA 900.0
	Gross Beta	$60.3\pm20.1$	17.8	7.54	4mrem/yr			091949-034	EPA 900.0
	Uranium-233/234	$60.7\pm8.48$	0.205	0.0896	NE			091949-035	HASL-300
	Uranium-235/236	$0.502 \pm 0.169$	0.121	0.0443	NE			091949-035	HASL-300
	Uranium-238	9.37 ± 1.42	0.133	0.0536	NE			091949-035	HASL-300
CTF-MW2 (Duplicate)	Americium-241	$2.39\pm6.50$	10.1	4.95	NE	U	BD	091950-033	EPA 901.1
30-Mar-12	Cesium-137	-0.892 ± 1.67	2.68	1.29	NE	U	BD	091950-033	EPA 901.1
	Cobalt-60	-3.41 ± 3.08	2.99	1.41	NE	U	BD	091950-033	EPA 901.1
	Potassium-40	$48.5\pm41.6$	27.1	12.7	NE		J	091950-033	EPA 901.1
	Gross Alpha	1.49	NA	NA	15	NA	None	091950-034	EPA 900.0
	Gross Beta	$59.5\pm11.9$	8.16	3.95	4mrem/yr			091950-034	EPA 900.0
	Uranium-233/234	$61.3\pm8.72$	0.154	0.0672	NE			091950-035	HASL-300
	Uranium-235/236	$0.686 \pm 0.183$	0.0905	0.0333	NE			091950-035	HASL-300
	Uranium-238	$8.62 \pm 1.31$	0.0998	0.0402	NE			091950-035	HASL-300

#### 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, January – March 2012

#### 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.

<sup>a</sup>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).

<sup>b</sup>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.

#### <sup>c</sup>Laboratory Qualifier

- NA = Not applicable.
- U = Analyte is absent or below the method detection limit.

#### <sup>d</sup>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.

#### <sup>e</sup>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 March 2012**

Well ID	Date	Analyte	Result	MCL	Laboratory Qualifier <sup>a</sup>	Validation Qualifier <sup>b</sup>	Sample Number	Analytical Method <sup>c</sup>
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	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	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.

#### <sup>a</sup>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 March 2012**

#### Notes (continued)

#### <sup>b</sup>Validation Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

#### <sup>c</sup>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.

# Table III-17

## Summary of Detected Duplicate Parameters

# Solid Waste Management Units 149 and 154 Groundwater Monitoring

Well ID/Parameter	Environmental Sample (R1)	Duplicate Sample (R2)	RPD
	mg/L unless oth	nerwise noted	
SWMU 149, CTF-MW3			
Nitrate plus Nitrite	6.03	6.05	< 1
Bicarbonate Alkalinity	336	334	1
Bromide	1.15	1.18	3
Chloride	112	115	3
Fluoride	2.37	2.37	< 1
Sulfate	448	462	3
Barium	0.0326	0.0321	2
Calcium	187	192	3
Iron	0.761	0.769	1
Magnesium	49.1	52.1	6
Manganese	0.00109	ND	NC
Nickel	0.00297	0.003	1
Potassium	11.5	10.7	7
Selenium	0.0282	0.0289	2
Sodium	171	165	4
Filtered Barium	0.0324	0.0322	1
Filtered Calcium	179	182	2
Filtered Iron	0.776	0.827	6
Filtered Magnesium	46.9	45.5	3
Filtered Nickel	0.00293	0.00308	5
Filtered Potassium	11.5	11.3	2
Filtered Selenium	0.0288	0.0293	2
Filtered Sodium	157	155	1
Filtered Zinc	0.00572	0.00509	12

# Table III-17 (Continued)

# Summary of Detected Duplicate Parameters

# Solid Waste Management Units 149 and 154 Groundwater Monitoring

Well ID/Parameter	Environmental Sample (R1)	Duplicate Sample (R2)	RPD
	mg/L unless oth	erwise noted	
SWMU 154, CTF-MW2			
RDX (µg/L)	0.147	0.179	20
Total Alkalinity	1580	1600	1
Bromide	1.77	1.75	1
Chloride	435	433	< 1
Fluoride	2.27	2.25	1
Sulfate	162	162	< 1
Aluminum	0.108	0.120	11
Arsenic	0.0498	0.0559	12
Barium	0.0805	0.0811	1
Beryllium	0.00294	0.00310	5
Calcium	384	391	2
Cobalt	0.00954	0.00986	3
Iron	2.63	2.71	3
Magnesium	84.4	86.0	2
Manganese	3.07	3.10	1
Nickel	0.0175	0.0183	4
Potassium	51.4	52.3	2
Sodium	479	487	2
Thallium	0.00123	0.00126	2
Uranium	0.0257	0.0257	<1
Vanadium	ND	0.00109	NC
Zinc	0.267	0.268	< 1
Filtered Aluminum	0.115	0.103	11
Filtered Arsenic	0.0498	0.0521	5
Filtered Barium	0.0818	0.0843	3
Filtered Beryllium	0.00327	0.00321	2
Filtered Calcium	385	396	3
Filtered Cobalt	0.00989	0.010	1
Filtered Copper	0.00176	0.00213	19
Filtered Iron	2.70	2.78	3
Filtered Magnesium	84.6	87.6	3
Filtered Manganese	3.05	3.14	3
Filtered Nickel	0.0185	0.0187	1
Filtered Potassium	51.8	53.2	3
Filtered Sodium	482	495	3
Filtered Thallium	0.00124	0.00123	1
Filtered Uranium	0.0262	0.0266	2
Filtered Zinc	0.317	0.348	9
Potassium-40 (pCi/L)	ND	48.5 ± 41.6	NC
Gross Alpha (pCi/L)	6.73	1.49	NC
Gross Beta (pCi/L)	60.3 ± 20.1	59.5 ± 11.9	NC
Uranium-233/234 (pCi/L)	60.7 ± 8.48	61.3 ± 8.72	NC
			NC
Uranium-235/236 (pCi/L)	0.502 ± 0.169	0.686 ± 0.183	
Uranium-238 (pCi/L)	9.37 ± 1.42	8.62 ± 1.31	NC

# Table III-17 (Concluded)

# Summary of Detected Duplicate Parameters

# Solid Waste Management Units 149 and 154 Groundwater Monitoring

## Quarterly Assessment, January – March 2012

Notes

RPD = Relative percent difference is calculated with the following equation and rounded to nearest whole number.

$$RPD = \frac{|R_1 - R_2|}{[(R_1 + R_2)/2]} \times 100$$

where:	R₁ R₂ NC	= analysis result = duplicate analysis result = not calculated
<	= Less	than.
µg/L	= Micro	params per liter.
CTF	= Coyo	te Test Field.
ID	= Ident	ification.
MDL		od detection limit. The minimum concentration that can be measured and reported with 99% confidence he analyte is greater than zero; analyte is matrix-specific.
mg/L	= Millig	rams per liter.
MŴ	= Moni	toring well.
ND	= Not o	letected (at MDL).
pCi/L	= Pico	curies per liter.
RDX	= Hexa	hydro-trinitro-triazine.
		Maste Management Linit

SWMU = Solid Waste Management Unit.

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

#### FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: SWMU 149 GW	M	Project No.: 146422,10.11.0	01 / 98026.01.14
Well I.D.: CTF-MW3		Date: 03/26/12	
Well Condition:		Weather Condition:	
Method: Portable pump	X	Dedicated pump	Pump depth: 360

Start

#### PURGE MEASUREMENTS

307.04	0818		Ċ.	PURGE	MEAS	UREMI	ENTS		
Depth to	Time 24	Vol.	Temp	SC	ORP	pН	Turbidity	DO	Comments
Water	hr	(L(gal)	(°C)	(µS/cm)	(mV)	1	(NTU)	(%)	Dr /
(ft)	0839							-	Domy/L
313.58	COLULE .	5	18:36	15E7	139.4	7.19	0.56	77.2	7.19
316.83	08.51	10	18.77	1593	1:33.7	7.21	0.38	71.0	6.59
		15	19.03	1602	129.6	7.22	0.39	78.8	7.25
321.84	0914	20	19,57		126.5	7.21	0.34	78.4	7.14
302.79	0922	23	19.80		125.1	7.21	0.33	79.9	7.68
323.47	0927	25	19,96	1622	124.1	7,21	0.33	\$2.8	7.47
324.01	0933	27	19.99	1623	123.1	7.21	0.24	\$1.4	7.38
324.41	0938	29	20.16	1631	122.4	7.21	0.34	83:1	7.51
3:24:74	0944	31	20.23	1632	121.5	7.21	8.36	\$3,5	7.53
325,00	0950	33	2037	1631	120.1	7,20	0.31	79.2	7,12
325,52	0956	35	20,34	1632	120.0	7.21	0.32	79.3	7.14
	09.57		SA	mplin	6				
					0				-
						£			
									0827
								~	~4.00 gals purged
									from tubing
		1							0

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#### FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: SWMU 154 GWM	Project No.: 146422,10.11.0	Project No.: 146422,10.11.01 / 98026.01.15						
Well I.D.: CTF-MW2	Date: 03/30/18							
Well Condition:	Weather Condition:							
Method: Portable pump X	Dedicated pump	Pump depth: 128						

Depth to	Time 24	Vol. (L/gal))	Temp (°C)	SC (µS/cm)	ORP (mV)	pН	Turbidity (NTU)	DO (%)	Comments
Water (ft)	hr	(L/gui)		(µ3/0m)				(70)	DOmg/L
43.80	6759		STA	PRJ-					>
47.17	0813	5	14.57	3193	76,7	4.24	4.56	6.3	0.62
48.07	0820	10	15.63		59.6	6.20	3.32	4.0	0.39
48.52	0828	15	16.31	3369	17.2	6.16	1.39	3.0	0.29
48.73	0835	20	16.70	3451	-46.8	6.16	1.25	2.3	あってつ
48.89	0843	20 25	16.91	3.515	-28.3	6.17	1.10	2.0	0.19
48.99	0852	30	17.11	3526	-12.8	6.17	1.89	1.8	0.17
49.05	0856	33	17.20	3530	-4.0	6.17	2.25	1.7	0.16
49.09	0900	3.5	17.27	3541	1.1	6.17	2.45	1.7	0.16
	0903	37	17.31	3535	4.9	6.17	2.14	1.6	0.15
49.14	0906	39	17.36		9.5	6.17	2.31	1.5	0.14
49.18	0910	41	17.40	3540	10.4	6.17	2.36	1.4	0.14
	0911		50	Mplind	3				~>
				1	7				
								,	~ 4100 gals, nurged
									~ 4100 gals, purged from tubing
									0805

# PURGE MEASUREMENTS

IMPORTANT NOTICE: A printed copy of this document may not be the document currently in effect. The official version is located on the Sandia Restricted Network (SRN), department home page Appendix B Analytical Laboratory Certificates of Analysis for Monitoring Wells CTF-MW3 and CTF-MW2 Groundwater Data

#### Internal Lab M 614052 AR/COC Batch No. SMO Use Waste Characterization Project/Task No.98026.01.14 6234/MS 0718 Date Samples Shipped: Dept. No./Mail Stop: -Send preliminary/copy report to: SMO Authorization: Dourse Project/Task Manager: Carrier/Waybill No. Alicia Aragon Contract # PO 691436 Project Name: **SWMU-149** Lab Contact: Edie Kent/803-556-8171 Released by COC No .: GEL Record Center Code: NA Lab Destination: Validation Required See Rottle anen Lorraine Herrera/505-844-3199 Logbook Ref. No .: NA SMO Contact/Phone: Lorraine Herrera /505-844-3199 Bill To:Sandia National Labs (Accounts Payable) CF 250-12 Send Report to SMO: Service Order No. Location P.O. Box 5800 MS 0154 Tech Area Reference LOV(available at SMO) Albuquerque, NM 87185-0154 Building Room ER Site Collection Sample Parameter & Method Lab Sample ER Sample ID or Date/Time(hr) Sample Container Preserv-Method Sample Location Detail Depth (ft) Collected Matrix Type Volume ative Type Requested ID Sample No.-Fraction No. TCL VOC (SW846-8260B) 03/26/12 0730 DIW G 3x40ml HCL G EB 091941-001 SWMU-EB1 NA NA P 500 ml HNO3 G EB TAL Metals (SW846-6020/7470) 091941-009 SWMU-EB1 NA NA 03/26/12 0731 DIW FDIW Ρ 500 ml HNO3 G EB TAL Metals (SW846-6020/7470) 091941-010 SWMU-EB1 NA NA 03/26/12 0733 P 4C G EB 091941-016 SWMU-EB1 NA NA 03/26/12 0734 DIW 125 ml Anions (SW846-9056) DIW P H2SO4 G EB NPN (353.2) 091941-018 SWMU-EB1 NA NA 03/26/12 0735 125 ml NA DIW P 250 ml 4C G EB Perchlorate (314.0) 091941-020 SWMU-EB1 NA 03/26/12 0736 NA P 4C G 091941-022 SWMU-EB1 NA 03/26/12 0737 DIW 500 ml EB Alkalinity (SM2320B) G 091942-001 SWMU-TB1 NA NA 03/26/12 0730 DIW G 3x40ml HCL TB VOC (SW846-8260B) RMMA Yes V No Ref. No. Special Instructions/QC Requirements Abnormal Sample Tracking Smo Use EDD 1 Yes No Conditions on ✓ Disposal by lab Sample Disposal Return to Client Date Entered(mm/dd/yy) V No les Turnaround Time 7 Day 15 Day ✓ 30 Day Entered by: Level D Package Receipt **Negotiated TAT** QC inits. \*Send report to: Return Samples By: Signature / Init Company/Organization/Phone/Cellular Name Tim Jackson/ORG.4142/MS.0729/ 284-2547 Lall Hach Rel Sample Lab Use SNL/4142/844-4013/250-7090 Robert Lynch If perchlorate detected perform verification analysis(SW846-6850M) 10 Team Alfred Santillanes HINGTO SNL/4142/844-5130/228-0710 Alkalinity as total bicarbonate and carbonate Members William Gibson Illus Helds VH SNL/4142/844-4013/239-7367 Anions as Br.FI.CI.SO4 11 FDIW (filtered in field with .45 micron filter) \*Please list as separate report. Hadsstill Org. 4/42 Date 3/26/12 Time /038 1.Relinguished by 4. Relinguished by Org. Date Time addags 1. Received by Org.4/41 Date 3/26/19 Time 10.38 4. Received by Org. Date Time 2.Relinguished by Org. Date Time 5.Relinguished by Org. Date Time 2. Received by Org. Date Time 5. Received by Org. Date Time 3. Relinguished by Date Time 6.Relinguished by Org. Date Time Org. 3. Received by Org. Time 6. Received by Date Org. Date Time

## CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Page 1 of 1

					C	ONTE	RACT	LABC	RATORY					
Internal Lab			AN	ALY	SIS REQU	EST	AND	CHA	IN OF CU	STOD	γ		Page 1 of 2	
Batch No.	NA				SMO Use							AR/COC	61405	3 1
Dept. No./Mail Stop:	6234/MS 0718		Date Sampl	les Shipp	oed:		Project	Task No.9	98026.01.14	-	-	Waste Characterizatio	on	
Project/Task Manager:	Alicia Aragon		Carrier/Way	bill No.	a Shedre adda		SMO A	uthorizatio	on: Dowell	ingi	São	-Send preliminary/copy	report to:	53
Project Name:	SWMU-149		Lab Contac		Edie Kent/803-556	-8171		t # PO 69						
Record Center Code:	NA		Lab Destina	ation:	GEL		1					Released by COC No.:		
Logbook Ref. No.:	NA		SMO Contact	t/Phone:	Lorraine Herrera/5	05-844-3	199	Co	a Bottle a	2ne	- 1	✓ Validation Required		
Service Order No.	CF 250-12		Send Report		Lorraine Herrera /5		-	Ve				Bill To:Sandia National Labs (	Accounts Payable)	
Location	Tech Area								1-11-11-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-			P.O. Box 5800 MS 015		
Building	Room		1		Referen	ce LOV	/(avail	able at	SMO)			Albuquerque, NM 8718	5-0154	
Building	ER Sample ID	or		ER Site		Sample		ntainer	Preserv-	Collection	Sample		& Method	Lab Sample
Sample NoFraction	Sample Location I		Depth (ft)	No.	Collected	Matrix	Туре	Volume	ative	Method	Туре	Requ	ested	ID
091943-001	CTF-MW3		360	NA	03/26/12 0957	GW	G	3x40ml	HCL	G	SA	TCL VOC (SW846-8260		2 States
091943-009	CTF-MW3		360	NA	03/26/12 0958	GW	Р	500 ml	HNO3	G	SA	TAL Metals (SW846-602		Sile (S
091943-010	CTF-MW3		360	NA	03/26/12 0959	FGW	Р	500 ml	HNO3	G	SA	TAL Metals (SW846-602	20/7470)	
091943-016	CTF-MW3		360	NA	03/26/12 1001	GW	Р	125 ml	4C	G	SA	Anions (SW846-9056)		
091943-018	CTF-MW3		360	NA	03/26/12 1002	GW	Р	125 ml	H2SO4	G	SA	NPN (353.2)		
091943-020	CTF-MW3		360	NA	03/26/12 1003	GW	Р	250 ml	4C	G	SA	Perchlorate (314.0)		
091943-022	CTF-MW3		360	NA	03/26/12 1004	GW	Р	500 mÌ	4C	G	SA	Alkalinity (SM2320B)		
091944-001	CTF-MW3		360	NA	03/26/12 0957	GW	G	3x40ml	HCL	G	DU	TCL VOC (SW846-8260	)B)	
091944-009	CTF-MW3		360	NA	03/26/12 0958	GW	Р	500 ml	HNO3	G	DU	TAL Metals (SW846-602	20/7470)	
091944-010	CTF-MW3		360	NA	03/26/12 0959	FGW	Р	500 ml	HNO3	G	DU	TAL Metals (SW846-602	20/7470)	
091944-016	CTF-MW3		360	NA	03/26/12 1001	GW	Р	125 ml	4C	G	DU	Anions (SW846-9056)		
RMMA	🗌 Yes 🗹 No	Ref.	No.		Sample Tracking		Smo U	se	Special Instruc	tions/QC	Require	ments	Abnormal	
Sample Disposal	Return to Client	1 D	isposal by la	ıb	Date Entered(mm/	dd/yy)			EDD 🗹	Yes	No		Conditions on	
<b>Turnaround Tim</b>	e 7 Day [	15 D	ay 🗸 3	0 Day	Entered by:				Level D Packag	je	les	✓ No	Receipt	
Return Samples By:					ted TAT	QC inits			*Send report to	):				
	Name	1 Si	gnature /	Init	Company/Orga			Cellular	Tim Jackson/O		VIS.0729	/ 284-2547		
Sample	Robert Lynch		Linch		SNL/4142/844-401					and the second		ification analysis(SW846-68	350M)	Lab Use
Team		Flike	111	110	SNL/4142/844-513				Alkalinity as tota			전 전 것 같은 것 같은 것 같은 것 같아요. 이 같은 것 같아요. 같은 것 같아요.	1 	200 000
Members	William Gibson	1.17	Abilh	WA	SNL/4142/844-401	and the second second			Anions as Br,FI	Second States and		Jarbonate		
Members	William Gibson	pun	man	WM	SINL/4 142/044-401	51259-10	507			27-3-72-41 Caler	4E mine	(In Eller)		
			11				1.000		FGW (filtered in	and the second sec	10 1	<u>on miler)</u>		
I.Relinquished by	1615 7:00		000 11110	Data	2/2/112 Time 10	11.1	A Dalia	quished b	*Please list as	separate i		Date	Tim	<u>an ann achd e</u>
I. Received by	- Sance		Org. 7142	Date C	3/26/12 Time / 0. 3/26/12 Time / 0.	74		eived by	у		Org.	Date	Tim	
2.Relinquished by	rulen		Org.	Date	3/26/12 Time 72. Time	17		quished by	V		Org. Org.	Date	Tim	
2. Received by			Org.	Date	Time		_	eived by	у			Date	Tim	
3. Relinguished by			Org.	Date	Time			quished by	N		Org.	Date	Tim	
3. Received by			Org.	Date	Time			eived by	у		Org.	Date	Tim	
. Received by			org.	Date	Time		lo. Red	sived by			Org.	Date	TIM	3

# CONTRACT LABORATORY

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

											AR/COC-	614053
Project Name:	SWMU-149	Project/Task N	langer:	Alicia Aragon			Project/Task	No.:	98026.01.14			
Location	Tech Area			25 N2 1 1			1979) 1979)					
Building	Room			Reference I								Lab use
Sample No- Fraction	ER Sample ID or Sample Location detail	Pump Depth (ft)	ER Site No	Date/Time (hr) Collected	Sample Matrix		ntainer Volume	Preserv- ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
091944-018	CTF-MW3	360	NA	03/26/12 1002	GW	P	125 ml	H2SO4	G		NPN (353.2)	
091944-020	CTF-MW3	360	NA	03/26/12 1003	GW	P	250 ml	4C	G		Perchlorate (314.0)	
091944-022	CTF-MW3	360	NA	03/26/12 1004	GW	P	500 ml	4C	G		Alkalinity (SM2320B)	
091945-001	SWMU-TB2	NA	NA	03/26/12 0957	DIW	G	3x40ml	HCL	G	ТВ	VOC (SW846-8260B)	
091946-001	SWMU-FB1	NA	NA	03/26/12 0946	DIW	G	3x40ml	HCL	G	FB	VOC (SW846-8260B)	
												4
		1										
1.0		1										
Abnormal Cond Recipient Initial	itions on Receipt	•		LAB USE								

Page 2 of 2

#### CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY Page 1 of 2 Internal Lab Batch No. N/A 614054 AR/COC SMO Use / Date Samples Shipped: 3/29/12 Dept. No./Mail \$top: 6234/MS 0718 Project/Task No.98026.01.15 Waste Characterization SMO Authorization: Project/Task Manager: Alicia Aragon Carrier/Waybill No. -Send preliminary/copy report to: SMO Contract # PO 691436 Project Name: **SWMU 154** Lab Contact: Edie Kent/803-556-8171 Released by COC No.: Record Center Code: NA Lab Destination: GEL SEE BOTLE ORDER ☑ Validation Required Logbook Ref. No .: NA Lorraine Herrera/505-844-3199 SMO Contact/Phone: Bill To:Sandia National Labs (Accounts Pavable) Service Order No. CF 251-12 Send Report to SMO: Lorraine Herrera /505-844-3199 Location Tech Area P.O. Box 5800 MS 0154 Reference LOV(available at SMO) Building Room Albuquerque, NM 87185-0154 Container Collection Sample Parameter & Method Lab Sample ER Sample ID or ER Site Date/Time(hr) Sample Preserv-Method Requested Collected Matrix Type | Volume ative Type ID Sample No.-Fraction Sample Location Detail Depth (ft) No. TCL VOC (SW846-8260B) 091947-001 SWMU-EB2 NA NA 03/28/12 1030 DIW G 3x40ml HCL G EB AG 4C G TCL SVOC (SW846-8270C) 091947-002 SWMU-EB2 NA NA 03/28/12 1031 DIW 4x1L EB DIW P 500 ml HNO3 G TAL Metals+ Ur (SW846-6020/7470) 091947-009 SWMU-EB2 NA NA 03/28/12 1033 EB P G 091947-010 SWMU-EB2 NA NA 03/28/12 1034 FDIW 500 ml HNO3 EB TAL Metals+ Ur (SW846-6020/7470) 091947-016 SWMU-EB2 NA NA 03/28/12 1035 DIW P 125 ml 4C G FB Anions (SW846-9056) P H2SO4 G DIW 125 ml EB NPN (353.2) 091947-018 SWMU-EB2 NA NA 03/28/12 1036 SWMU-EB2 NA NA 03/28/12 1037 DIW P 250 ml 4C G EB Perchlorate (314.0) 091947-020 Ρ 500 ml 4C G EB Alkalinity (SM2320B) SWMU-EB2 NA 03/28/12 1038 DIW 091947-022 NA 4C G EB High Explosive (SW846-8321A) Mod. 091947-024 SWMU-EB2 NA NA 03/28/12 1039 DIW AG 4x1L DIW P 1 Liter HNO3 G EB Gamma Spec (short list)(901.0) SWMU-EB2 NA NA 03/28/12 1041 091947-033 Ρ HNO3 G EB Gross Alpha/Beta (900.0) 03/28/12 1042 DIW 1 Liter 091947-034 SWMU-EB2 NA NA Abnormal Special Instructions/QC Requirements RMMA □ Yes ☑ No Ref. No. Sample Tracking Smo Use Conditions on 1 Yes No Sample Disposal Return to Client Disposal by lab Date Entered(mm/dd/yy) EDD No No Receipt Turnaround Time 15 Day 30 Day Entered by: Level D Package Ves 7 Day \*Send report to: **Negotiated TAT** QC inits. Return Samples By: Init Company/Organization/Phone/Cellular Tim Jackson/ORG.4142/MS.0729/ 284-2547 Name 2 Signature Lab Use 2h If Perchlorate detected perform verification analysis(SW846-6850M) Sample YM SNL/4142/844-4013/250-7090 Robert Lynch Alkalinity as total bicarbonate and carbonate Team Alfred Santillanes 11 SNL/4142/844-5130/228-0710 Members William Gibson SNL/4142/844-4013/239-7367 Anions as Br.FI.CI,SO4 FDIW (filtered in field with .45 micron filter) 0 \*Please list as separate report. Org. 9197 Date 3/39/17 Time Time IPPY 4.Relinquished by Org. Date 1.Relinguished by KSizt Time 1004 4. Received by Org. Date 1. Received by GMO Org. 4192 Date 3/29/12 Time Time Date Org. Time 5.Relinguished by Org. 2.Relinguished by Date Time Date 5. Received by Org. 2. Received by Org. Date Time Date Time 6.Relinguished by Ora. 3.Relinguished by Date Time Org. Time 6. Received by Org. Date 3. Received by Org. Date Time

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

Page 2 of 2

614054

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Project Name:	SWMU 154	Project/Task M	anger:	Alicia Aragon			Project/Task	No.:	98026.01.15			
Location	Tech Area											
Building	Room			Reference L	-OV (a	vaila	ble at s	SMO)				Lab use
Sample No- Fraction	ER Sample ID or Sample Location detail	Pump Depth (ft)	ER Site No.	Date/Time (hr) Collected	Sample Matrix	Со Туре	ntainer Volume	Preserv- ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
091947-035	SWMU-EB2	NA	NA	03/28/13 1043	DIW	Р	1 Liter	HNO3	G	EB	Isotopic Ur (ASTM D3972-09M)	
091948-001	SWMU-TB3	NA	NA	03/28/12 1030	DIW	G	3x40ml	HCL	G	ТВ	VOC (SW846-8260B)	
Antonio en el composicio de la composicio d												
				-								
						-						
Abnormal Cond	itions on Receipt			LAB USE								
	nono on Necelpi			240 032								
Recipient Initials	s											

Internal Lab

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Page 1 of 2

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Batch No.				SMO Use							AR/COC	614055	
		Date Sample		and the second se				.98026.01.15		,	Waste Characterization		
	Alicia Aragon	Carrier/Wayl	-			-	Authorizatio			'	-Send preliminary/copy re	report to:	
Project Name:	SWMU 154	Lab Contact		Edie Kent/803-556-	-8171 ا	Contrar	act # PO 691	11436		'	1		
Record Center Code:	NA	Lab Destinat	10 100 00 00 00 00 00 00 00 00 00 00 00	GEL	'	1				,	Released by COC No.:_		
Logbook Ref. No.:	NA	SMO Contact/	129-16-26-26	Lorraine Herrera/50							☑ Validation Required		
	CF 251-12	Send Report to	to SMO:	Lorraine Herrera /5	505-844-?	3199				,	Bill To:Sandia National Labs (Ac	ccounts Payable)	
Location	Tech Area									,	P.O. Box 5800 MS 0154	4	
Building	Room	1					lable at S	SMO)		,	Albuquerque, NM 87185-0	-0154	
Sample NoFraction	ER Sample ID or Sample Location Detail	Depth (ft)	ER Site No.		Sample Matrix	e Cor	ontainer	Preserv-	Collectior Method			& Method	Lab Sample ID
091949-001 ,	CTF-MW2	128	NA	03/30/12 0911 <sub>t</sub>	, GW		3x40ml.	I. HCL	G	SA	TCL VOC (SW846-8260B	в)	
091949-002 •	CTF-MW2	128	NA	03/30/12 0913•	GW	AG.	• 4x1L•	4C	G	SA	TCL SVOC (SW846-8270	0C) •	
091949-009 •	CTF-MW2	128	NA	03/30/12 0914.	GW	Р	500 ml	HNO3	G	SA	TAL Metals+ Ur (SW846-	-6020/7470) -	
091949-010 🔺	CTF-MW2	128	NA	03/30/12 0915,	FGW	P	500 ml,	L HNO3	G	SA	TAL Metals+ Ur (SW846-	-6020/7470) +	
091949-016 •	CTF-MW2	128	NA	03/30/12 0916.	• GW	Р	125ml_	4C	G	SA	Anions (SW846-9056) ·	<u>.</u>	
091949-018 .	CTF-MW2	128	NA	03/30/12 0917.	GW	Р	125ml•	H2SO4	G	SA	NPN (353.2) •		
091949-020 #	CTF-MW2	128	NA	03/30/12 0918.	• GW	Р	250ml.	• 4C	G	SA	Perchlorate (314.0)		
091949-022 •	CTF-MW2	128	NA	03/30/12 0920.	e GW	Р	500ml		G	SA	Alkalinity (SM2320B)		
091949-024 ¢	CTF-MW2	128	NA	03/30/12 0923		AG.	4x1Le	4C	G	SA	High Explosive (SW846-8		
091949-033 •	CTF-MW2	128	NA	03/30/12 0924.		Р	.∎1 Liter	HNO3	G	SA	Gamma Spec (short list)(	(901.0) •	5.4
091949-034。	CTF-MW2	128	NA	03/30/12 0926,	-	Р	1 Liter.		G	1 U.S.S. V.L.	Gross Alpha/Beta (900.0)		
RMMA		f. No.		Sample Tracking		Smo Us	/se /	Special Instruct			ments	Abnormal	
Sample Disposal		Disposal by la		Date Entered(mm/	./dd/yy)		′	EDD 🗹	Yes 🗆			Conditions on	
Turnaround Tim	ne 🗌 7 Day 🗌 15 🛛		100 N / 100 N / 100 N	Entered by:		(	6 1 1 Y	Level D Packag		□Yes	s 🗹 No	Receipt	
Return Samples By:	:		Negotia	iated TAT	QC inits.	<i>s</i> .		*Send report to:	<b>s</b> :				
	Name Si	Signature	Init	Company/Orga	anization/	/Phone/	Cellular	Tim Jackson/Of	JRG.4142/	MS.0729	1 284-2547		
Sample		4nch	R					If Perchlorate dr	etected pe	erform ve	erification analysis(SW846-685	50M)	Lab Use
Team				SNL/4142/844-513			· · · · · · · · · · · · · · · · · · ·	Alkalinity as total	al bicarbor	nate and	carbonate		
Members		1 1/1 /10	- A-	SNL/4142/844-401				Anions as Br,Fl,					
Inomore	William Groot	Thank	Print		10122	<i>.</i>		FGW (filtered in	and a state of the second	45 micr	on filter)	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
		<u> </u>	<u> </u>					*Please list as s	and the second second second	the second second	<u>III III III III III III III III III II</u>	1 1 2 7	
1 Relinquished by	Mostile	Ora. 414	12 Date	4/3/17 ime /1	1:42	4.Relir	nquished by		Sepa	Org.	Date	·	Time
	1900 - Wenner	Org. 4WHL	- Date	41/11 Time 11:	1.42		ceived by			Org.	Date		Time
2.Relinquished by		Org.	Date				inquished by	av		Org.	Date		Time
2. Received by		Org.	Date			the second se	ceived by			Org.	Date		Time
3.Relinquished by		Org.	Date			_	inquished by	av		Org.	Date		Time
3. Received by		Org.	Date				ceived by			Org.	Date	· · · · · · · · · · · · · · · · · · ·	Time

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

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											AR/COC-	614055
	SWMU 154	Project/Task M	Manger:	Alicia Aragon	_		Project/Task I	No.:	98026.01.15			
Location	Tech Area											
Building	Room			Reference L								Lab use
Sample No- Fraction	ER Sample ID or Sample Location detail	Pump Depth (ft)	ER Site No.	Date/Time (hr) Collected	Sample Matrix	Сог Туре	ntainer Volume	Preserv- ative	Collection S Method	Sample Type	Parameter & Method Requested	Lab Sample ID
091949-035.	CTF-MW2	128	NA	03/30/12 0927.	GW	Р	1 Liter.	HNO3	G	SA	Isotopic Ur (ASTM D3972-09M) •	
091950-001 •	CTF-MW2	128	NA	03/30/12 0911	GW	G	3x40ml,	HCL	G	DU	TCL VOC (SW846-8260B)	
091950-002	CTF-MW2	128	NA	03/30/12 0913	GW	AG	4x1L。	4C	G	DU	TCL SVOC (SW846-8270C) •	
091950-009.	CTF-MW2	128	NA	03/30/12 0914.	GW	Р	500 ml.	HNO3	G	DU	TAL Metals+ Ur (SW846-6020/7470) .	
091950-010	CTF-MW2	128	NA	03/30/12 0915	FGW.	Р	500 ml	HNO3	G	DU	TAL Metals+ Ur (SW846-6020/7470) •	
091950-016	CTF-MW2	128	NA	03/30/12 0916.	GW	Р	125ml	4C	G	DU	Anions (SW846-9056) =	
091950-018.	CTF-MW2	128	NA	03/30/12 0917	GW	Р	125ml.	H2SO4	G	DU	NPN (353.2) *	
091950-020 "	CTF-MW2	128	NA	03/30/12 0918.	GW	Р	250ml-	4C	G	DU	Perchlorate (314.0) •	
091950-022.	CTF-MW2	128	NA	03/30/12 0920•	GW	Р	500ml	4C	G	DU	Alkalinity (SM2320B) .	
091950-024,	CTF-MW2	128	NA	03/30/12 0923.	GW	AG.	4x1L •	4C	G	DU	High Explosive (SW846-8321A) Mod. •	
091950-033•	CTF-MW2	128	NA	03/30/12 0924	GW	P	1 Liter	HNO3.	G	DU	Gamma Spec (short list)(901.0) 6	
091950-034.	CTF-MW2	128	NA	03/30/12 0926.	GW	P	1 Liter	HNO3	G	DU	Gross Alpha/Beta (900.0) •	
091950-035*	CTF-MW2	128	NA	03/30/12 0927+	GW	Р	1 Liten	HNO3	G	SA	Isotopic Ur (ASTM D3972-09M) •	
091951-001,	SWMU-TB4	NA	NA	03/30/12 0911.	DIW	G	3x40ml	HCL	G	ТВ	VOC (SW846-8260B) •	
091952-001 •	SWMU-FB2	NA	NA	03/30/12 0905°	DIW	G	3x40ml	HCL	G	FB	VOC (SW846-8260B) •	
											Sampling complete for SWMU 154	
											2nd Qtr 2012	
							<u> </u>	<u> </u>				
Abnormal Condi	Itions on Receipt			LAB USE	-							
Recipient Initials	s											

Internal Lab

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Page 1 of 1

Batch No.				SMO Use							AR/COC	614	056
Dept. No./Mail Stop:	6234/MS 0718	Date Samp	les Shipp	ed:		Project	Task No.	98026.01.15			Waste Characterization	n	
Project/Task Manager:	Alicia Aragon	Carrier/Wa			Constanting of the second	SMO A	uthorizatio	on:			-Send preliminary/copy	report to: Tim Jackso	on
Project Name:	SWMU 154	Lab Contac	st:	Edie Kent/803-556	6-8171	Contrac	ct # PO 69	91436					
Record Center Code:	NA	Lab Destin	ation:	GEL		1					Released by COC No.:		
Logbook Ref. No.:	NA	SMO Contac	t/Phone:	Lorraine Herrera/5	05-844-3	199					☐ Validation Required		
Service Order No.	CF 251-12	Send Report	to SMO:	Lorraine Herrera /	505-844-3	3199					Bill To:Sandia National Labs (A	ccounts Payable)	
Location	Tech Area										P.O. Box 5800 MS 0154		
Building	Room			Referen	ce LOV	/(avail	able at	SMO)			Albuquerque, NM 87185-	-0154	
Daliding	ER Sample ID or		ER Site	Date/Time(hr)	Sample		ntainer	Preserv-	Collection	Sample			Lab Sample
Sample NoFraction		tail Depth (ft)	No.	Collected	Matrix	Туре	Volume	ative	Method	Туре	Reque	sted	ID
091949-011 •	CTF-MW2 PW	NA	NA	03/30/12 0845,	FPW,	Р	500 ml	HNO3	G	SA	Arsenic (SW846-6020)		
													2 - 9 - F
											-		129.72
										<u> </u>			
										<u> </u>			
								ļ					dia ar
												1	
RMMA	🗆 Yes 🗹 No	Ref. No.		Sample Tracking	1	Smo U	se	Special Instruc			ments	Abnormal	
Sample Disposal	Return to Client	Disposal by I	ab	Date Entered(mm	/dd/yy)	_		EDD 🗹	Yes [	No		Conditions on	
Turnaround Tin	ne 🗌 7 Day 🗌	15 Day 🖸	30 Day	Entered by:			2.0	Level D Packa	ge	⊡′es	s 🗹 No	Receipt	
Return Samples By	:	Π	Negotia	ated TAT	QC inits	1420	HOLES .	*Send report to	0:				
	Name	Signature	Init	Company/Org	anization/	Phone/	Cellular	Tim Jackson/C	DRG.4142/	MS.0729	0/ 284-2547	1	
Sample	Robert Lynch	V.M.Gml	R	SNL/4142/844-40									Lab Use
Team		Undatelle		SNL/4142/844-51				1					
		Mulart						4				1 . A	
Members	William Gibson	margary	AN TH	SNL/4142/844-40	13/239-1	307			Cold with	AE min	an filtar)	1.	
		101	· · ·					FPW (filtered in			on filter)	the product	
	11		h	1/2/10-11	146	1.0.0		*Please list as	separate		Data		Timo
1.Relinquished by 7	Jul Salile			/2/12_Time //				у		Org.	Date		Time
1. Received by	no-	Org.414		4.2.12 Time 1	1-42		eived by			Org.	Date		Time
2.Relinquished by	and the second	Org.	Date	Time			iquished b	у		Org.	Date		Time
2. Received by		Org.	Date	Time			eived by			Org.	Date		Time
3.Relinquished by		Org.	Date	Time			iquished b	у		Org.	Date		Time
3. Received by		Org.	Date	Time		6. Rec	eived by	10.100		Org.	Date		Time

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





# AR/COC: 614052, 614053

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Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
SW846 3005/6020 DOE-AL			
	091941-009/SWMU-EB1	Iron (7439-89-6)	0.1745U, B
	091941-010/SWMU-EB1	Cobalt (7440-48-4)	0.00051U, B
	091941-010/SWMU-EB1	Iron (7439-89-6)	0.1745U, B
	091943-009/CTF-MW3	Cobalt (7440-48-4)	0.00061U, B, B3
	091943-009/CTF-MW3	Copper (7440-50-8)	0.0041U, B2
	091943-009/CTF-MW3	Zinc (7440-66-6)	0.0182U, B2
	091943-010/CTF-MW3	Cobalt (7440-48-4)	0.00051U, B
	091943-010/CTF-MW3	Copper (7440-50-8)	0.00351U, B2
	091944-009/CTF-MW3	Cobalt (7440-48-4)	0.00061U, B, B3
	091944-009/CTF-MW3	Copper (7440-50-8)	0.0041U, B2
	091944-009/CTF-MW3	Zinc (7440-66-6)	0.0182U, B2
	091944-010/CTF-MW3	Cobalt (7440-48-4)	0.00051U, B
	091944-010/CTF-MW3	Copper (7440-50-8)	0.00351U, B2
SW846 7470A			
	091941-009/SWMU-EB1	Mercury (7439-97-6)	UJ, B4
	091941-010/SWMU-EB1	Mercury (7439-97-6)	UJ, B4
	091943-009/CTF-MW3	Mercury (7439-97-6)	UJ, B4
	091943-010/CTF-MW3	Mercury (7439-97-6)	UJ, B4
	091944-009/CTF-MW3	Mercury (7439-97-6)	UJ, B4
	091944-010/CTF-MW3	Mercury (7439-97-6)	UJ, B4
SW846 8260B DOE-AL			
	091941-001/SWMU-EB1	Acetone (67-64-1)	J+, C2
	091941-001/SWMU-EB1	Bromoform (75-25-2)	UJ, MS3
	091941-001/SWMU-EB1	Methylene chloride (75-09-2)	UJ, I3, L3

## AR/COC: 614052, 614053

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	091942-001/SWMU-TB1	Bromoform (75-25-2)	UJ, MS3
	091942-001/SWMU-TB1	Methylene chloride (75-09-2)	UJ, I3, L3
	091943-001/CTF-MW3	Bromodichloromethane (75-27-4)	1.00U, B2
	091943-001/CTF-MW3	Bromoform (75-25-2)	UJ, MS3
	091943-001/CTF-MW3	Chloroform (67-66-3)	1.00U, B2
	091943-001/CTF-MW3	Dibromochloromethane (124-48-1)	1.00U, B2
	091943-001/CTF-MW3	Methylene chloride (75-09-2)	UJ, I3, L3
	091944-001/CTF-MW3	Bromodichloromethane (75-27-4)	1.00U, B2
	091944-001/CTF-MW3	Bromoform (75-25-2)	UJ, MS3
	091944-001/CTF-MW3	Chloroform (67-66-3)	1.00U, B2
	091944-001/CTF-MW3	Dibromochloromethane (124-48-1)	1.00U, B2
	091944-001/CTF-MW3	Methylene chloride (75-09-2)	UJ, I3, L3
	091945-001/SWMU-TB2	Bromoform (75-25-2)	UJ, MS3
	091945-001/SWMU-TB2	Methylene chloride (75-09-2)	UJ, I3, L3
	091946-001/SWMU-FB1	Bromodichloromethane (75-27-4)	4.05U, B2
	091946-001/SWMU-FB1	Bromoform (75-25-2)	UJ, MS3
	091946-001/SWMU-FB1	Chloroform (67-66-3)	16.7U, B2
	091946-001/SWMU-FB1	Dibromochloromethane (124-48-1)	1.00U, B2
	091946-001/SWMU-FB1	Methylene chloride (75-09-2)	UJ, I3, L3

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



616 Maxine NE Albuquerque, NM 87123 505-299-5201

www.aqainc.net

#### Memorandum

Date: May 2, 2012

To: File

From: Marcia Hilchey

Subject: Inorganic Data Review and Validation – SNL Site: SWMU 149 GWM AR/COC: 614052, -053 SDG: 298265 and 298275 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

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

#### ICPMS:

- Co was detected in the MB associated with all samples, and in the CCB associated with samples 298265-002, -008, and -016 at concentrations > the MDL but < the PQL. The associated result of samples 298265-002 and -008 were detects <5X the MB concentration and <5X the CCB concentration and will be **qualified "0.000605U, B, B3"** at 5X the value of the CCB. The associated results for samples 298275-001, -002, and -003 were detects < 5X the MB concentration and will be **qualified "0.00051U, B"** at 5X the value of the MB.
- Fe was detected in the MB associated with all samples at > MDL and < PQL. Associated results for samples 298265-016 and 298275-003 were > MDL and < 5X the MB concentration and will be qualified "0.1745U,B."</li>
- 3) Cu was detected in EB sample 298275-003 associated with samples -001 and -002. The associated sample results were detects < 5X the EB concentration and will be **qualified "0.00351U, B2."**
- Cu and Zn were detected in EB sample 298265-016 associated with samples -002 and-008. The associated sample results were detects < 5X the EB concentration and will be qualified "U, B2" at 5X the EB value.</li>
- 5) Zn was detected in EB sample 298265-016 associated with samples -002 and-008. The associated sample results were detects < 5X the EB concentration and will be **qualified "0.00406U, B2."**

# CVAA:

1) Hg was detected in ICB/CCBs associated with all samples at negative concentrations > MDL and < PQL. All 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 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.

#### <u>Blanks</u>

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

#### ICP-MS:

Co was detected in the MB associated with all samples, and in the CCB associated with samples 298265-002, -008, and -016. All associated ND and qualified ND sample results will not be qualified.

Tl was detected in a CCB associated with samples 298265-002, -008, and -016 at > MDL and < PQL. All associated sample results were ND and will not be qualified.

Fe was detected in the MB associated with all samples at > MDL and < PQL. All associated sample results > 5X the MB concentration and all qualified NDs will not be qualified.

Co, Fe, and Cu were detected in EB sample 298275-003 associated with samples -001 and -002. EB results for Co and Fe were qualified U due to associated MB and CCB results (see Summary section) and therefore did not affect associated field sample results.

Fe, Al, Ca, and Mg were detected in EB sample 298265-016 associated with samples -002 and -008. All associated sample results that were ND or detects > 5X the EB concentrations will not be qualified. The EB result for Fe was qualified U due to associated MB result (see Summary section) and therefore did not affect associated field 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:

It should be noted that MS analysis associated with samples 298265-002, -008, and -016 was performed on a SNL sample from another SDG. No sample data will be qualified as a result.

#### ICP-AES and CVAA:

It should be noted that MS analysis associated with samples 298275-001, -002, and -003 was performed on a SNL sample from another SDG. No sample data will be qualified as a result.

#### Laboratory Replicate

All replicates met QC acceptance criteria.

#### ICP-MS:

It should be noted that replicate analysis associated with samples 298265-002, -008, and -016 was performed on a SNL sample from another SDG. No sample data will be qualified as a result.

#### ICP-AES and CVAA:

It should be noted that replicate analysis associated with samples 298275-001, -002, and -003 was performed on a 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.

#### **Detection Limits/Dilutions**

All detection limits were properly reported. Samples 298265-002 and -008, and sample 298275-001, were diluted 5X for Ca, Mg, and Na. Sample 298275-002 was diluted 5X for Ca and Na.

#### ICP Interference Check Sample (ICS A and AB)

Results of the ICS A and AB analyses were not evaluated because the instrument 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.

#### ICP-MS:

It should be noted that serial dilution analysis associated with samples 298265-002, -008, and -016 was performed on a SNL sample from another SDG. No sample data will be qualified as a result.

# ICP-AES:

It should be noted that serial dilution analysis associated with samples 298275-001, -002, and -003 was performed on a SNL sample from another SDG. No sample data will be qualified as a result.

# Other QC

EBs and 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.



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#### Memorandum

Date: May 2, 2012

To: File

From: Marcia Hilchey

Subject: Inorganic Data Review and Validation – SNL Site: SWMU 149 GWM AR/COC: 614052, -053 SDG: 298650 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

Three samples were prepared and analyzed with accepted procedures using methods EPA 9056 (anions by ion chromatography), EPA 353.2 (nitrate/nitrite by Cd reduction), EPA 314.0 (perchlorate by IC), and SM 2320B (alkalinity). Data were reported for all required analytes. No problems were identified with the data package that results 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**

All initial and continuing calibration met QC acceptance criteria.

#### <u>Blanks</u>

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

#### Anions:

Chloride was reported in the EB at a concentration > MDL an d< PQL. All associated sample results were ND and will not be qualified.

Nitrate/Nitrite:

Nitrate/nitrite was reported in the MB at a concentration > MDL and < PQL. All associated sample results were ND or > 5X the MB concentration and will not be qualified.

# Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria.

# 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.

<u>Anions:</u> Samples -003 and -009 were diluted 50X for chloride and sulfate.

Nitrate/Nitrite:

Samples -004 and -010 were diluted 25X. Sample -018 was diluted 5X.

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

# Other QC

EBs and field duplicate samples were submitted with AR/COC. There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result.



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#### Memorandum

Date: May 2, 2012

To: File

From: Marcia Hilchey

Subject: Inorganic Data Review and Validation – SNL Site: SWMU 149 GWM AR/COC: 614052, -053 SDG: 298265 and 298275 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

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

# ICPMS:

- Co was detected in the MB associated with all samples, and in the CCB associated with samples 298265-002, -008, and -016 at concentrations > the MDL but < the PQL. The associated result of samples 298265-002 and -008 were detects <5X the MB concentration and <5X the CCB concentration and will be **qualified "0.000605U, B, B3"** at 5X the value of the CCB. The associated results for samples 298275-001, -002, and -003 were detects < 5X the MB concentration and will be **qualified "0.00051U, B"** at 5X the value of the MB.
- Fe was detected in the MB associated with all samples at > MDL and < PQL. Associated results for samples 298265-016 and 298275-003 were > MDL and < 5X the MB concentration and will be qualified "0.1745U,B."</li>
- 3) Cu was detected in EB sample 298275-003 associated with samples -001 and -002. The associated sample results were detects < 5X the EB concentration and will be **qualified "0.00351U, B2."**
- Cu and Zn were detected in EB sample 298265-016 associated with samples -002 and-008. The associated sample results were detects < 5X the EB concentration and will be qualified "U, B2" at 5X the EB value.</li>
- 5) Zn was detected in EB sample 298265-016 associated with samples -002 and-008. The associated sample results were detects < 5X the EB concentration and will be **qualified "0.00406U, B2."**

# CVAA:

1) Hg was detected in ICB/CCBs associated with all samples at negative concentrations > MDL and < PQL. All 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 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.

# <u>Blanks</u>

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

# ICP-MS:

Co was detected in the MB associated with all samples, and in the CCB associated with samples 298265-002, -008, and -016. All associated ND and qualified ND sample results will not be qualified.

Tl was detected in a CCB associated with samples 298265-002, -008, and -016 at > MDL and < PQL. All associated sample results were ND and will not be qualified.

Fe was detected in the MB associated with all samples at > MDL and < PQL. All associated sample results > 5X the MB concentration and all qualified NDs will not be qualified.

Co, Fe, and Cu were detected in EB sample 298275-003 associated with samples -001 and -002. EB results for Co and Fe were qualified U due to associated MB and CCB results (see Summary section) and therefore did not affect associated field sample results.

Fe, Al, Ca, and Mg were detected in EB sample 298265-016 associated with samples -002 and -008. All associated sample results that were ND or detects > 5X the EB concentrations will not be qualified. The EB result for Fe was qualified U due to associated MB result (see Summary section) and therefore did not affect associated field 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:

It should be noted that MS analysis associated with samples 298265-002, -008, and -016 was performed on a SNL sample from another SDG. No sample data will be qualified as a result.

# ICP-AES and CVAA:

It should be noted that MS analysis associated with samples 298275-001, -002, and -003 was performed on a SNL sample from another SDG. No sample data will be qualified as a result.

# Laboratory Replicate

All replicates met QC acceptance criteria.

# ICP-MS:

It should be noted that replicate analysis associated with samples 298265-002, -008, and -016 was performed on a SNL sample from another SDG. No sample data will be qualified as a result.

# ICP-AES and CVAA:

It should be noted that replicate analysis associated with samples 298275-001, -002, and -003 was performed on a 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.

# **Detection Limits/Dilutions**

All detection limits were properly reported. Samples 298265-002 and -008, and sample 298275-001, were diluted 5X for Ca, Mg, and Na. Sample 298275-002 was diluted 5X for Ca and Na.

# ICP Interference Check Sample (ICS A and AB)

Results of the ICS A and AB analyses were not evaluated because the instrument 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.

# ICP-MS:

It should be noted that serial dilution analysis associated with samples 298265-002, -008, and -016 was performed on a SNL sample from another SDG. No sample data will be qualified as a result.

# ICP-AES:

It should be noted that serial dilution analysis associated with samples 298275-001, -002, and -003 was performed on a SNL sample from another SDG. No sample data will be qualified as a result.

# Other QC

EBs and 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.



Sample Findings Summary



# AR/COC: 614055

Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 901.1			
	091949-033/CTF-MW2	Americium-241 (14596-10-2)	BD, FR3
	091949-033/CTF-MW2	Cesium-137 (10045-97-3)	BD, FR3
	091949-033/CTF-MW2	Cobalt-60 (10198-40-0)	BD, FR3
	091949-033/CTF-MW2	Potassium-40 (13966-00-2)	BD, FR3
	091950-033/CTF-MW2	Americium-241 (14596-10-2)	BD, FR3
	091950-033/CTF-MW2	Cesium-137 (10045-97-3)	BD, FR3
	091950-033/CTF-MW2	Cobalt-60 (10198-40-0)	BD, FR3
	091950-033/CTF-MW2	Potassium-40 (13966-00-2)	J, FR7
SW846 3005/6020 DOE-AL			
	091949-009/CTF-MW2	Aluminum (7429-90-5)	J-, DL2
	091949-009/CTF-MW2	Copper (7440-50-8)	0.00316U, B2
	091949-010/CTF-MW2	Aluminum (7429-90-5)	J-, DL2
	091950-009/CTF-MW2	Aluminum (7429-90-5)	J-, DL2
	091950-009/CTF-MW2	Copper (7440-50-8)	0.00316U, B2
	091950-010/CTF-MW2	Aluminum (7429-90-5)	J-, DL2
SW846 7470A			
	091949-009/CTF-MW2	Mercury (7439-97-6)	UJ, B4
	091949-010/CTF-MW2	Mercury (7439-97-6)	UJ, B4
	091950-009/CTF-MW2	Mercury (7439-97-6)	UJ, B4
	091950-010/CTF-MW2	Mercury (7439-97-6)	UJ, B4
SW846 8260B DOE-AL			
	091952-001/SWMU-FB2	Bromodichloromethane (75-27-4)	3.75U, B2
	091952-001/SWMU-FB2	Chloroform (67-66-3)	10.20U, B2
	091952-001/SWMU-FB2	Dibromochloromethane (124-48-1)	0.300U, B2

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



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#### Memorandum

Date: May 3, 2012

To: File

From: Marcia Hilchey

Subject: Inorganic Data Review and Validation – SNL Site: SWMU 154 GWM AR/COC: 614054 SDG: 298481 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.

#### <u>Summary</u>

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

#### Anions:

- 1) Chloride was detected in the MB at > PQL. The associated sample result was > MDL and < 5X the MB concentration and will be **qualified "1.015UJ, B."**
- 2) A MS or replicate was not analyzed with this SDG. All associated ND and qualified ND sample results will be **qualified "UJ, MS1."**

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 analyzed within the prescribed holding times and properly preserved.

# **Calibration**

All initial and continuing calibration met QC acceptance criteria.

# <u>Blanks</u>

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

Anions:

Fluoride was reported in the MB at a concentration > MDL and< PQL. The associated sample result was ND 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 except as noted above in the Summary section.

#### Nitrate/Nitrite, Perchlorate, Alkalinity:

It should be noted that the sample used for MS analyses was from another SNL SDG. No sample results will be qualified as a result.

# Laboratory Replicate

The replicate analyses met all QC acceptance criteria.

# Nitrate/Nitrite, Perchlorate, Alkalinity:

It should be noted that the sample used for replicate analysis was from another SNL SDG. No sample results will be qualified as a result.

Anions:

Since an MSD was not analyzed, precision was evaluated based on LCS/LCSD RPD.

# **Detection Limits/Dilutions**

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

<u>Nitrate/Nitrite</u>: The sample was diluted 5X.

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

# Other QC



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# Memorandum

Date: May 3, 2012

To: File

From: Marcia Hilchey

Subject: LC/MS/MS Organic Data Review and Validation – SNL Site: SWMU 154 GWM AR/COC: 614054 SDG: 298481 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.

# <u>Summary</u>

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) A MS or MSD was not analyzed with this SDG. All associated sample results were ND and will be **qualified "UJ, MS1."** 

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 follows.

The CCV %D for 2,4-dinitrotoluene was >20% with a positive bias. The associated sample result was ND and will not be qualified.

# **Reporting Limit Verification**

All CRI recoveries met QC acceptance criteria.

# **Blanks**

No target analytes were detected in the blanks.

# <u>Surrogates</u>

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 except as noted above in the Summary section. Since an MSD was not analyzed, precision was evaluated based on LCS/LCSD RPDs.

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

All LCS/LCSD QC acceptance criteria were met with the following exception. The LCSD %R for m-nitrotoluene and o-nitrotoluene were > acceptance criteria. All associated sample results were ND and will not be qualified.

# **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



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#### Memorandum

Date: May 3, 2012

To: File

From: Marcia Hilchey

Subject: Inorganic Data Review and Validation – SNL Site: SWMU 154 GWM AR/COC: 614054 SDG: 298481 and 298483 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-AES), and EPA 7470A (CVAA mercury). Data were reported for all required analytes. Problems were identified with the data package that resulted in the qualification of data.

# ICPMS and ICP-AES:

1) A MS or MSD was not analyzed with this SDG. All associated ND sample results will be **qualified** "**UJ**, **MS1**"; all associated detected results will be **qualified** "**J**, **MS1**."

# CVAA:

- 1) Hg was detected in ICB/CCBs associated with sample 298483-001 at negative concentrations > MDL and < PQL. The associated sample result was ND and will be **qualified "UJ, B4."**
- 2) A MS, MSD, or replicate was not analyzed with this SDG. All associated ND sample results will be **qualified "UJ, MS1."**

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.

# **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.

# <u>Blanks</u>

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

# **ICP -MS Internal Standards**

All internal standards met QC acceptance criteria.

# Matrix Spike (MS)

All MS recoveries met QC acceptance criteria except as noted above in the Summary section. Since an MSD was not analyzed, precision was evaluated based on LCS/LCSD RPDs.

#### Laboratory Replicate

All replicates met QC acceptance criteria. Since a laboratory replicate was not analyzed, precision was evaluated based on LCS/LCSD RPDs.

# Laboratory Control Sample (LCS)

All LCS QC acceptance criteria were met.

# **Detection Limits/Dilutions**

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

# 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



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#### Memorandum

Date: May 3, 2012

To: File

From: Marcia Hilchey

Subject: Radiochemical Data Review and Validation – SNL Site: SWMU 154 GWM AR/COC: 614054 SDG: 298481 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.

<u>Gamma Spec, Iso-U, Gross Alpha/Beta:</u> All sample results were either < the associated 2-sigma TPU or < the associated MDA and will be **qualified "BD, FR3."** 

Iso-U:

A MS or replicate was not analyzed with this SDG. All associated sample results will be **qualified "J**, **MS1."** 

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 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.

# <u>Blanks</u>

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)

A MS met all QC acceptance criteria except as noted above in the Summary section.

#### Gross Alpha/Beta:

It should be noted that the MS/MSD analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

# Laboratory Replicate

All replicate error ratio acceptance criteria were met except as noted above in the Summary section.

#### Gross Alpha/Beta:

It should be noted that the replicate analyses were performed on a SNL sample from another SDG. 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. No dilutions were required.

# Other QC



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#### Memorandum

Date: May 3, 2012

To: File

From: Marcia Hilchey

Subject: GC/MS Organic Data Review and Validation – SNL Site: SWMU 154 GWM AR/COC: 614054 SDG: 298481 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) A MS or MSD was not analyzed with this SDG. All associated sample results were ND and will be **qualified "UJ, MS1."** 

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 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 CCV %D for hexachlorocyclopentadiene was > acceptance limits with positive bias. The associated sample result was ND and will not be qualified.

# <u>Blanks</u>

No target analytes were detected in the MB.

#### **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. Since an MSD was not analyzed, precision was evaluated based on LCS/LCSD RPDs.

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

All LCS/LCSD acceptance criteria were met.

# **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



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#### Memorandum

Date: May 3, 2012

To: File

From: Marcia Hilchey

Subject: GC/MS Organic Data Review and Validation – SNL Site: SWMU 154 GWM AR/COC: 614054 SDG: 298481 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. Problems were identified with the data package that resulted in the qualification of data.

- The initial calibration RSD for methylene chloride was > 15% and < 40%, and the CCV %D was >20% with negative bias. All associated sample results were ND and will be qualified "UJ, I3."
- 2) The initial calibration RSD for dibromochloromethane was > 15% and < 40%. The associated result for sample 298481-001 was a detect and will be **qualified "J, I3"**.
- 3) LCS %R for methylene chloride was < the acceptance limit. All associated ND sample results will be qualified "UJ, L3."
- 4) MSD %R for methylene chloride was < acceptance criteria. All associated sample results were ND and will be **qualified "UJ, MS3."**

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 RSDs for dibromochloromethane; bromoform; and trans-1,3dichloropropylene were > 15% and < 40%. There were no other associated calibration infractions. Associated ND sample results will not be qualified.

The ICV and/or CCV %Ds for eight target compounds (see GC/MS VOC worksheet) were > acceptance limits with positive bias. All associated sample results were ND and will not be qualified.

# <u>Blanks</u>

No target analytes were detected in the blanks.

# <u>Surrogates</u>

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 and as follows.

MS %R for bromoform was > acceptance criteria. All associated sample results were ND and will not be qualified.

It should be noted that MS/MSD analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

# Laboratory Control Sample (LCS)

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

# **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).



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#### Memorandum

Date: May 16, 2012

To: File

From: Marcia Hilchey

Subject: Inorganic Data Review and Validation – SNL Site: SWMU 154 GWM AR/COC: 614055 SDG: 300712 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

Two samples were prepared and analyzed with accepted procedures using methods EPA 9056 (anions by ion chromatography), EPA 353.2 (nitrate/nitrite by Cd reduction), EPA 314.0 (perchlorate by IC), and SM 2320B (alkalinity). Data were reported for all required analytes. No problems were identified with the data package that results 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**

All initial and continuing calibration met QC acceptance criteria.

#### <u>Blanks</u>

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

#### Anions:

Chloride was detected in the EB from COC 614054 associated with this COC. The chloride result was U qualified due to MB contamination, and will not be applied to associated results in this COC.

# Laboratory Control Sample (LCS):

All LCS acceptance criteria were met.

# Matrix Spike (MS)

All MS/PS recoveries met QC acceptance criteria.

Perchlorate:

It should be noted that the sample used for MS analyses was from another SNL SDG. No sample results will be qualified as a result.

# Laboratory Replicate

The replicate analyses met all QC acceptance criteria.

Perchlorate:

It should be noted that the sample used for replicate analysis was from another SNL SDG. No sample results will be qualified as a result.

# **Detection Limits/Dilutions**

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

<u>Anions:</u> Both samples were diluted 10X for bromide and 100X for chloride and sulfate.

Nitrate/Nitrite:

Sample -006 was diluted 25X, and sample -018 was diluted 5X.

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

# Other QC

EBs associated with this COC was submitted on COC 614054. Field duplicates were submitted on this COC. There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result.



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# Memorandum

Date: May 16, 2012

To: File

From: Marcia Hilchey

Subject: LC/MS/MS Organic Data Review and Validation – SNL Site: SWMU 154 GWM AR/COC: 614055 SDG: 300712 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**

Two samples were prepared and analyzed with accepted procedures using method EPA 8321A Mod (HE by LCMSMS). 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 extracted and analyzed within the prescribed holding times and properly preserved.

# **Calibration**

All initial and continuing calibration met QC acceptance criteria.

# **Reporting Limit Verification**

All CRI recoveries met QC acceptance criteria.

# <u>Blanks</u>

No target analytes were detected in the blanks.

# <u>Surrogates</u>

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 with the following exception.

The MSD %R for o-nitrotoluene was > the upper acceptance limit. All associated sample results were ND and will not be qualified.

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

All LCS/LCSD 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

An EB associated with this COC was submitted on COC 614054. A field duplicate was submitted on this COC. There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result.



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#### Memorandum

Date: May 16, 2012

To: File

From: Marcia Hilchey

Subject: Inorganic Data Review and Validation – SNL Site: SWMU 154 GWM AR/COC: 614055 SDG: 300712 and 300698 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

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). Data were reported for all required analytes. Problems were identified with the data package that resulted in the qualification of data.

# ICPMS:

- 1) The CRI %R for Al was > 130%. All associated sample results were detects < 5X the PQL and will be **qualified "J+, DL."**
- Cu was detected in the EB sample from SDG 614054, which was associated with samples 300712-003 and -015. The associated sample results were > MDL and < 5X the EB concentration and will be **qualified "0.00316U, B2"** at 5X the EB value.

# 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 analyzed within the prescribed holding times and properly preserved with the following exception.

1

Samples 300968-001 and -002, and 300712-015 were received without proper acid preservation. The samples were preserved at the laboratory, per client request. The package included no documentation regarding the length of time the samples were allowed to equilibrate after preservation. No sample results will be qualified as a result.

# **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 except as noted above in the Summary section.

#### **Blanks**

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

Zn was detected in the MB at < PQL. All associated sample results were >5X the MB concentration and will not be qualified.

# **ICP -MS Internal Standards**

All internal standards met QC acceptance criteria.

# Matrix Spike (MS)

All MS recoveries met QC acceptance criteria.

#### ICP-AES, ICP-MS, and CVAA:

SDG 300698 - It should be noted that MS analysis was performed on a SNL sample from another SDG. No sample data will be qualified as a result.

# CVAA:

SDG 300712 - It should be noted that MS analysis was performed on a SNL sample from another SDG. No sample data will be qualified as a result.

#### Laboratory Replicate

All replicates met QC acceptance criteria.

#### ICP-AES, ICP-MS, and CVAA:

SDG 300698 - It should be noted that replicate analysis was performed on a SNL sample from another SDG. No sample data will be qualified as a result.

CVAA:

SDG 300712 - It should be noted that replicate analysis was performed on a 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.

# **Detection Limits/Dilutions**

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

# **ICP Interference Check Sample (ICS A and AB)**

The ICS A and AB results met all QC acceptance criteria.

# **ICP Serial Dilution**

The serial dilution analyses met all QC acceptance criteria.

# ICP-AES and ICP-MS,:

SDG 300698 - It should be noted that serial dilution analysis was performed on a SNL sample from another SDG. No sample data will be qualified as a result.

# Other QC

EBs associated with this COC was submitted on COC 614054. Field duplicates were submitted on this COC. There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result.



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# Memorandum

Date: May 16, 2012

To: File

From: Marcia Hilchey

Subject: Radiochemical Data Review and Validation – SNL Site: SWMU 154 GWM AR/COC: 614055 SDG: 300712 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

Two 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."**
- All sample results which were > MDA but <3X the associated MDA will be qualified "J, FR7."</li>

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.

# <u>Blanks</u>

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

#### Gamma Spec:

It should be noted that the result for K-40 in the MB was flagged "X" by the laboratory because the peak did not meet identification criteria. No sample results will be qualified as a result.

# **Tracer/Carrier Recovery**

All tracer/carrier recoveries met QC acceptance criteria.

# Matrix Spike (MS)

A MS met all QC acceptance criteria.

#### Gamma spec:

It should be noted that the MS/MSD analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

# Laboratory Replicate

All replicate error ratio acceptance criteria were met except as noted above in the Summary section.

# Gamma spec:

It should be noted that the replicate analyses were performed on a SNL sample from another SDG. 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. No dilutions were required.

# Other QC

EBs associated with this COC was submitted on COC 614054. Field duplicates were submitted on this COC. There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result.



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#### Memorandum

Date: May 20, 2012

To: File

From: Marcia Hilchey

Subject: GC/MS Organic Data Review and Validation – SNL Site: SWMU 154 GWM AR/COC: 614055 SDG: 300712 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**

Two 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 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 CCV %Ds for hexachlorocyclopentadiene; m-nitroanaline; and 2,4-dinitrophenol were > acceptance limits with positive and negative bias. The associated sample results were ND, with no other associated calibration infractions. Therefore sample results will not be qualified.

# **Blanks**

No target analytes were detected in the blanks.

# <u>Surrogates</u>

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

An EB sample from COC 614054 in SDG 698481 was associated with samples in this COC. A field duplicate 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.



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#### Memorandum

Date: May 15, 2012

To: File

From: Marcia Hilchey

Subject: GC/MS Organic Data Review and Validation – SNL Site: SWMU 154 GWM AR/COC: 614055 SDG: 300712 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

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

Bromodichloromethane, chloroform, and dibromochloromethane were detected in the EB from SDG 614054. The sample results for bromodichloromethane and chloroform in associated FB sample 300712-026 were detects > PQL and < 5X the EB concentration and will be qualified "U, B2" at 5X the EB value. The result for dibromochloromethane in the FB was > MDL, < PQL, and < 5X the EB concentration and will be qualified "U, B2" at the PQL.</li>

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 RSDs for acetone and bromoform were > 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 > acceptance limits with negative bias. All associated sample results were ND, with no other associated calibration infractions, and will not be qualified.

# <u>Blanks</u>

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

Bromodichloromethane, chloromethane, and dibromochloromethane were detected in the FB. The associated results in the FB were U qualified due to EB contamination (see Summary section), therefore associated sample results will not be qualified due to FB contamination

# **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 a SNL sample from another SDG. No sample data will be qualified as a result.

# Laboratory Control Sample (LCS)

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

# **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, a FB, and a field duplicate 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.

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# APPENDICES

- Appendix A. Field Measurement Logs for SWMUs 8/58 and 68 Groundwater Monitoring Data
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# SECTION IV SOLID WASTE MANAGEMENT UNITS 8/58 AND 68 QUARTERLY GROUNDWATER MONITORING REPORT, JANUARY – MARCH 2012

## 1.0 Introduction

This Quarterly Groundwater Monitoring 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 as follows.

The second of eight quarterly groundwater sampling events 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), occurred in January 2012. Monitoring wells CCBA-MW1, CCBA-MW2, OBS-MW1, OBS-MW2, and OBS-MW3 were installed in August 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 First Quarter, Calendar Year (CY) 2012 reporting period (January – March 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" (SNL/NM September 2010, Attachment B) and "Groundwater Characterization Work Plan for SWMU 68, Old Burn Site" (SNL/NM September 2010, Attachment A). These Work Plans were approved by the NMED in January 2011 (NMED January 2011).

Monitoring wells CCBA-MW1 and CCBA-MW2 were sampled on January 12 and January 16, 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 January 9 to January 11, 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 primary and duplicate environmental samples; both contained a fluoride concentration of 4.94 mg/L. Fluoride in the CCBA-MW2 sample was reported above the method detection limit (MDL) at a concentration of 1.49 mg/L. No analytical results for the SWMU 68 groundwater samples exceed the corresponding MCLs.

Quality control (QC) samples consisting of environmental duplicate, 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 second of eight supplemental quarterly events for the five monitoring wells. The third of the eight supplemental quarterly groundwater sampling events will be conducted during the upcoming quarter (April to June 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 November 2009a and November 2009b). 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 First Quarter, CY 2012.

# 2.1 Equipment Decontamination

A portable Bennett<sup>™</sup> groundwater sampling system was used to collect the groundwater samples from both wells. The Bennett<sup>™</sup> 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, "Long-Term Environmental Stewardship (LTES) Groundwater Monitoring Equipment Decontamination" (SNL/NM November 2009a). 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, "LTES Groundwater Monitoring Well Sampling and Field Analytical Measurements" (SNL/NM November 2009b), 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<sup>™</sup> Model 6920 water quality meter. Turbidity was measured with a HACH<sup>™</sup> 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 (PQLs), 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 SWMU 68 groundwater sample. 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 SWMU 68 groundwater sample. 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 SWMU 68 groundwater sample. 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 2.98 mg/L in the CCBA-MW2 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 1.70 mg/L in the OBS-MW1 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 primary and duplicate environmental samples from CCBA-MW1 at a concentration of 4.94 mg/L. This detection is most likely attributable to the quartzite bedrock in which the well is completed and not associated with SNL/NM testing activities. Fluoride was reported in

the CCBA-MW2 sample at a concentration of 1.49 mg/L, which is below the MCL. No other anions or total cyanide were detected above established MCLs.

**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 ( $\mu$ g/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  $\mu$ g/L (0.004 mg/L) in any SWMU 68 groundwater sample. Table IV-8 presents perchlorate results.

Perchlorate results are discussed in more detail in Section II of this Environmental Restoration Operations Consolidated 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. No metal parameters were detected above established MCLs in any groundwater sample. Metal results for SWMUs 8/58 are summarized in Table IV-10.

**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. 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. 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 gammaemitting 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 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 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  $0.0341 \pm 0.0391$  pCi/L for uranium-235/236 to  $6.92 \pm 0.947$  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. Potassium-40 in the sample from OBS-MW3 was reported at  $92.0 \pm$ 

42.7 pCi/L. The result for cesium-137 activity in the sample from OBS-MW3 was qualified as unusable during data validation because the result was negative with an absolute value greater than twice the MDA.

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  $0.171 \pm 0.0822$  pCi/L for uranium-235/236 to  $22.3 \pm 2.93$  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 samples from SWMUs 8/58. This detection is most likely attributable to the quartzite 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, Attachments A and B).

# 4.1.1 **Duplicate Environmental Samples**

Duplicate environmental samples were collected from CCBA-MW1 and OBS-MW2 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-MW1 and OBS-MW2. 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 most calculated parameters, with exceptions noted as follows.

**SWMUs 8/58, CCBA-MW1.** The RPD for beryllium was calculated at 59, but this is an estimated value as the results reported are less than the PQL.

**SWMU 68, OBS-MW2.** The RPD for NPN was calculated at 94, but this is an estimated value as the samples were diluted greater than five times and matrix-specific accuracy and precision data were not provided by the analytical laboratory.

# 4.1.2 Equipment Blank Samples

A portable Bennett<sup>™</sup> 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 "LTES Groundwater Monitoring Equipment Decontamination," (SNL/NM November 2009a). 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. 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-MW1 and OBS-MW2 and were submitted for all analyses.

**SWMUs 8/58, CCBA-MW1.** Acetone, bicarbonate alkalinity, bromodichloromethane, chloroform, chloride, copper, and dibromochloromethane were detected above the laboratory MDLs. No corrective action was necessary for any detected parameter as these analytes were either not detected in environmental samples or detected at concentrations greater than five times the blank result.

**SWMU 68, OBS-MW2.** Bromodichloromethane, chloroform, and copper were detected above the laboratory MDLs. No corrective action was necessary for bromodichloromethane or chloroform as these compounds were not detected in the environmental samples. Copper was detected in the OBS-MW2 environmental samples at concentrations less than five times the associated EB result, and the result for copper was 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 January 2012 sampling event. No VOCs were detected above associated laboratory MDLs, except bromodichloromethane and chloroform. No corrective action was necessary, as these compounds were not detected in the associated environmental sample.

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

## 4.1.4 Field Blank Samples

An FB sample was collected for VOCs to assess whether contamination of the samples resulted from ambient field conditions. The FB sample was 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-MW2.** No VOCs were detected above associated laboratory MDLs.

**SWMU 68, OBS-MW3.** The VOC compounds bromodichloromethane, chloroform, and dibromochloromethane were detected above 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).

Although some analytical results were qualified during the data validation process, no 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 January 2012 sampling activities, with the exception of the following project-specific issue.

The sample pump did not operate smoothly at low pressure; therefore, flow rates during purging and sampling activities for the First Quarter, CY 2012 event are higher than those reported for the previous sampling event.

# 5.0 Summary

During the First 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 primary and duplicate environmental samples at a concentration of

4.94 mg/L. This detection is most likely attributable to the quartzite 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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# Figures

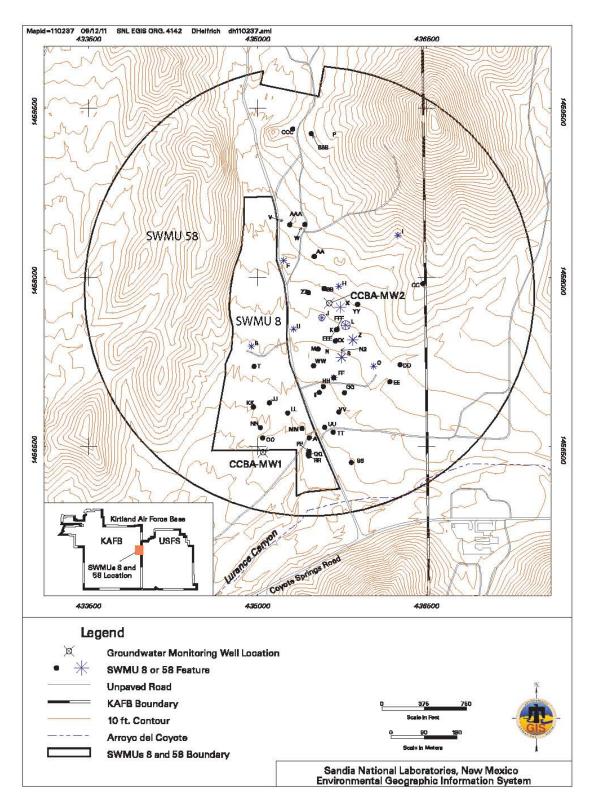


Figure IV-1

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

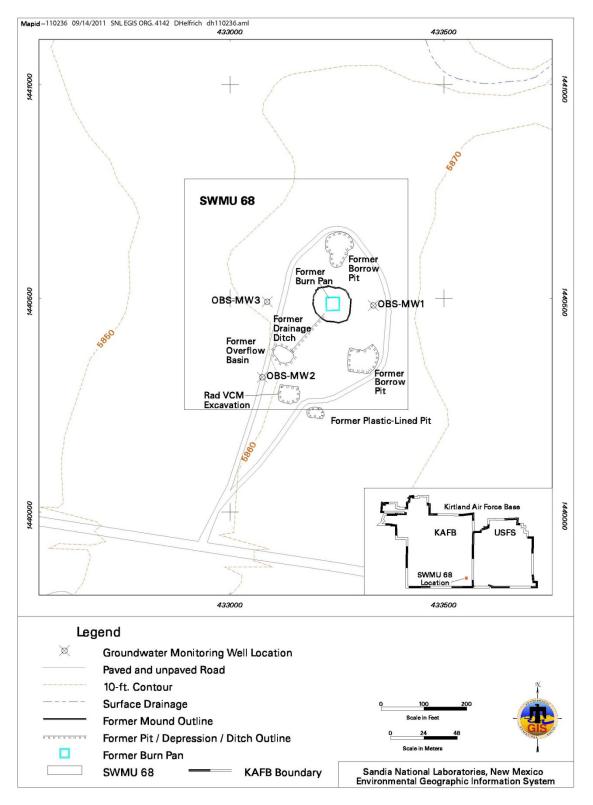


Figure IV-2

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

# Tables

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

Analysis	Analytical Method <sup>a</sup>	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 <sup>b</sup>	EPA 6020/7470	1 x 500-mL polyethylene, HNO <sub>3</sub> , 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 <sup>c</sup>	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
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 <sub>2</sub> SO <sub>4</sub> , 4°C
Gross Alpha/Beta	EPA 900.0	1 x 1-L polyethylene, HNO <sub>3</sub> , 4°C
Gamma Spectroscopy <sup>d</sup>	EPA 901.0	1 x 1-L polyethylene, HNO <sub>3</sub> , 4°C
Isotopic Uranium	HASL-300	1 x 1-L polyethylene, HNO <sub>3</sub> , 4°C

#### Notes

<sup>a</sup>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.

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<sup>b</sup>Metals = TAL metals including barium, calcium, magnesium, potassium, and sodium, plus uranium.

<sup>c</sup>Major anions include bromide, chloride, fluoride, and sulfate.

<sup>d</sup>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.

# Sample Details for First Quarter, CY 2012 Groundwater Sampling Solid Waste Management Units 8/58 and 68 Groundwater Monitoring Quarterly Assessment January – March 2012

Well	Sample Identification	AR/COC Number	Associated Groundwater Investigation
CCBA-MW1	091615	613958	SWMUs 8/58
CCBA-MW1 (dup)	091616	613958	SWMUs 8/58
CCBA-MW2	091610	613956	SWMUs 8/58
OBS-MW1	091600	613952	SWMU 68
OBS-MW2	091604	613954	SWMU 68
OBS-MW2 (dup)	091605	613954	SWMU 68
OBS-MW3	091607	613955	SWMU 68

#### Notes

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

## Summary of Field Water Quality Measurements<sup>a</sup>

## Solid Waste Management Units 8/58 and 68 Groundwater Monitoring

#### Quarterly Assessment, January – March 2012

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmhos/cm)	Oxidation Reduction Potential (mV)	рН	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)	
SWMUs 8/58									
CCBA-MW1	16-Jan-12	14.03	567	416.7	6.49	0.20	27.3	2.84	
CCBA-MW2	12-Jan-12	14.45	686	383.1	7.39	1.24	57.6	5.88	
SWMU 68							•		
OBS-MW1	09-Jan-12	15.44	597	388.0	7.23	0.37	36.8	3.68	
OBS-MW2	10-Jan-12	17.01	602	386.9	7.24	0.36	41.1	3.96	
OBS-MW3	11-Jan-12	16.28	600	371.9	7.26	0.86	42.9	4.20	

#### Notes

<sup>a</sup>Field measurements collected prior to sampling.

°C = Degrees Celsius.

% Sat = Percent saturation.

 $\mu$ mhos/cm = Micromhos per centimeter.

- CCBA = Coyote Canyon Blast Area.
- = Identification. ID

Milligrams per liter.Millivolts. mg/L

- mV
- MW
- Monitoring well.Nephelometric turbidity units. NTU
- OBS = Old Burn Site.
- = Potential of hydrogen (negative logarithm of the hydrogen ion concentration). pН
- SWMU = Solid Waste Management Unit.

# Method Detection Limits for Volatile and Semivolatile Organic Compounds Solid Waste Management Units 8/58 and 68 Groundwater Monitoring Quarterly Assessment, January – March 2012

Analyte	MDL	Analytical	Analyte	MDL	Analytical	Analyte	MDL	Analytical
Analyte	(µg/L)	Method <sup>a</sup>	Analyte	(μg/L)	Method <sup>a</sup>	Analyte	(µg/L)	Method <sup>a</sup>
1,1,1-Trichloroethane	0.325	8260B	1,2,4-Trichlorobenzene	2.83 - 3.00	8270C	Di-n-butyl phthalate	2.83 - 3.00	8270C
1,1,2,2-Tetrachloroethane	0.250	8260B	1,2-Dichlorobenzene	2.83 - 3.00	8270C	Di-n-octyl phthalate	2.83 - 3.00	8270C
1,1,2-Trichloroethane	0.250	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	0.250	8260B	2,4,6-Trichlorophenol	2.83 - 3.00	8270C	Dimethylphthalate	2.83 - 3.00	8270C
1,2-Dichloropropane	0.250	8260B	2,4-Dichlorophenol	2.83 - 3.00	8270C	Dinitro-o-cresol	2.83 - 3.00	8270C
2-Butanone	1.25	8260B	2,4-Dimethylphenol	2.83 - 3.00	8270C	Diphenyl amine	2.83 - 3.00	8270C
2-Hexanone	1.25	8260B	2,4-Dinitrophenol	4.72 - 5.00	8270C	Fluoranthene	0.283 - 0.300	8270C
4-methyl-, 2-Pentanone	1.25	8260B	2,4-Dinitrotoluene	2.83 - 3.00	8270C	Fluorene	0.283 - 0.300	8270C
Acetone	3.50	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	0.250	8260B	2-Chlorophenol	2.83 - 3.00	8270C	Hexachlorocyclopentadiene	2.83 - 3.00	8270C
Bromoform	0.250	8260B	2-Methylnaphthalene	0.283 - 0.300	8270C	Hexachloroethane	2.83 - 3.00	8270C
Bromomethane	0.300	8260B	2-Nitroaniline	2.83 - 3.00	2.83 – 3.00 8270C Indeno(1,2,3-c,d)pyrene		0.283 - 0.300	8270C
Carbon disulfide	1.25	8260B	2-Nitrophenol			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	0.250	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	0.250	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	0.250	8260B	4-Nitroaniline	2.83 - 3.00	8270C	bis(2-Chloroethoxy)methane	2.83 - 3.00	8270C
Methylene chloride	3.00	8260B	4-Nitrophenol	2.83 - 3.00	8270C	bis(2-Chloroethyl)ether	2.83 - 3.00	8270C
Styrene	0.250	8260B	Acenaphthene	0.283 - 0.300	8270C	bis(2-Ethylhexyl)phthalate	2.83 - 3.00	8270C
Tetrachloroethene	0.300	8260B	Acenaphthylene	0.283 - 0.300	8270C	bis-Chloroisopropyl ether	2.83 - 3.00	8270C
Toluene	0.250	8260B	Anthracene	0.283 - 0.300	8270C	m,p-Cresol	2.83 - 3.00	8270C
Trichloroethene	0.250	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	0.500	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	0.250	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	0.250	8260B	Chrysene	0.283 - 0.300	8270C			

#### Notes

<sup>a</sup>U.S. Environmental Protection Agency, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3<sup>rd</sup> 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.

# Method Detection Limits for High Explosive Compounds (EPA Method 8321A) Solid Waste Management Units 8/58 and 68 Groundwater Monitoring Quarterly Assessment, January – March 2012

Analyte	MDL (μg/L)
1,3,5-Trinitrobenzene	0.104
1,3-Dinitrobenzene	0.104
2,4,6-Trinitrotoluene	0.104
2,4-Dinitrotoluene	0.104
2,6-Dinitrotoluene	0.104
2-Amino-4,6-dinitrotoluene	0.104
2-Nitrotoluene	0.106
3-Nitrotoluene	0.104
4-Amino-2,6-dinitrotoluene	0.104
4-Nitrotoluene	0.195
HMX	0.104
Nitrobenzene	0.104
PETN	0.130
RDX	0.104
Tetryl	0.104

#### Notes

EPA	= U.S. Environmental Protection Agency.
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- 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.
- μg/L = Micrograms per liter.
- PETN = Pentaerythritol tetranitrate.
- RDX = Hexahydro-trinitro-triazine.
- Tetryl = 2,4,6-trinitrophenylmethylnitramine.

#### **Summary of Nitrate Plus Nitrite Results**

#### Solid Waste Management Units 8/58 and 68 Groundwater Monitoring

#### Quarterly Assessment, January – March 2012

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier <sup>a</sup>	Validation Qualifier <sup>b</sup>	Sample Number	Analytical Method <sup>c</sup>
SWMUs 8/58									
<b>CCBA-MW1</b> 16-Jan-12	Nitrate plus nitrite as N	1.23	0.050	0.250	10.0	В		091615-018	EPA 353.2
CCBA-MW1 (Duplicate) 16-Jan-12	Nitrate plus nitrite as N	1.20	0.050	0.250	10.0	В		091616-018	EPA 353.2
<b>CCBA-MW2</b> 12-Jan-12	Nitrate plus nitrite as N	2.98	0.050	0.250	10.0	В		091610-018	EPA 353.2
SWMU 68	-		•	•					
<b>OBS-MW1</b> 09-Jan-12	Nitrate plus nitrite as N	1.70	0.050	0.250	10.0		J	091600-018	EPA 353.2
<b>OBS-MW2</b> 10-Jan-12	Nitrate plus nitrite as N	1.49	0.050	0.250	10.0		J	091604-018	EPA 353.2
<b>OBS-MW2</b> (Duplicate) 10-Jan-12	Nitrate plus nitrite as N	0.540	0.050	0.250	10.0		J	091605-018	EPA 353.2
<b>OBS-MW3</b> 11-Jan-12	Nitrate plus nitrite as N	1.33	0.050	0.250	10.0	В		091607-018	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, January – March 2012

#### Notes (continued)

#### <sup>a</sup>Laboratory Qualifier

B = The analyte was detected in the blank above the effective method detection limit (MDL).

#### <sup>b</sup>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.

#### <sup>c</sup>Analytical Method

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

## Summary of Alkalinity, Anion, and Total Cyanide Results

## Solid Waste Management Units 8/58 and 68 Groundwater Monitoring

## Quarterly Assessment, January – March 2012

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier <sup>a</sup>	Validation Qualifier <sup>b</sup>	Sample Number	Analytical Method <sup>c</sup>
SWMUs 8/58	•				• • • •				
CCBA-MW1	Bicarbonate Alkalinity	178	0.725	1.00	NE			091615-022	SM2320B
16-Jan-12	Carbonate Alkalinity	ND	0.725	1.00	NE	U		091615-022	SM2320B
	Bromide	0.320	0.066	0.200	NE			091615-016	SW846 9056
	Chloride	27.4	0.132	0.400	NE			091615-016	SW846 9056
	Fluoride	4.94	0.033	0.100	4.0			091615-016	SW846 9056
	Sulfate	53.6	0.200	0.800	NE			091615-016	SW846 9056
	Total Cyanide	ND	0.0015	0.005	0.200	U	UJ	091615-027	SW846 9012
CCBA-MW1 (Duplicate)	Bicarbonate Alkalinity	179	0.725	1.00	NE			091616-022	SM2320B
16-Jan-12	Carbonate Alkalinity	ND	0.725	1.00	NE	U		091616-022	SM2320B
	Bromide	0.372	0.066	0.200	NE			091616-016	SW846 9056
	Chloride	27.0	0.132	0.400	NE			091616-016	SW846 9056
	Fluoride	4.94	0.033	0.100	4.0			091616-016	SW846 9056
	Sulfate	52.5	0.200	0.800	NE			091616-016	SW846 9056
	Total Cyanide	ND	0.0015	0.005	0.200	U	UJ	091616-027	SW846 9012
CCBA-MW2	Bicarbonate Alkalinity	183	0.725	1.00	NE			091610-022	SM2320B
12-Jan-12	Carbonate Alkalinity	ND	0.725	1.00	NE	U		091610-022	SM2320B
	Bromide	0.580	0.066	0.200	NE			091610-016	SW846 9056
	Chloride	36.6	0.330	1.00	NE			091610-016	SW846 9056
	Fluoride	1.49	0.033	0.100	4.0			091610-016	SW846 9056
	Sulfate	94.0	0.500	2.00	NE			091610-016	SW846 9056
	Total Cyanide	ND	0.0015	0.005	0.200	U		091610-027	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, January – March 2012

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier <sup>a</sup>	Validation Qualifier <sup>b</sup>	Sample Number	Analytical Method <sup>c</sup>
SWMU 68									
OBS-MW1	Bicarbonate Alkalinity	186	0.725	1.00	NE	В		091600-022	SM2320B
09-Jan-12	Carbonate Alkalinity	ND	0.725	1.00	NE	U		091600-022	SM2320B
	Bromide	0.372	0.066	0.200	NE			091600-016	SW846 9056
	Chloride	21.8	0.330	1.00	NE			091600-016	SW846 9056
	Fluoride	2.04	0.033	0.100	4.0			091600-016	SW846 9056
	Sulfate	75.8	0.500	2.00	NE			091600-016	SW846 9056
	Total Cyanide	ND	0.0015	0.005	0.200	U		091600-027	SW846 9012
OBS-MW2	Bicarbonate Alkalinity	176	0.725	1.00	NE			091604-022	SM2320B
10-Jan-12	Carbonate Alkalinity	ND	0.725	1.00	NE	U		091604-022	SM2320B
	Bromide	0.406	0.066	0.200	NE			091604-016	SW846 9056
	Chloride	21.5	0.330	1.00	NE			091604-016	SW846 9056
	Fluoride	2.11	0.033	0.100	4.0			091604-016	SW846 9056
	Sulfate	87.2	0.500	2.00	NE			091604-016	SW846 9056
	Total Cyanide	ND	0.0015	0.005	0.200	U		091604-027	SW846 9012
OBS-MW2 (Duplicate)	Bicarbonate Alkalinity	175	0.725	1.00	NE			091605-022	SM2320B
10-Jan-12	Carbonate Alkalinity	ND	0.725	1.00	NE	U		091605-022	SM2320B
	Bromide	0.349	0.066	0.200	NE			091605-016	SW846 9056
	Chloride	21.4	0.330	1.00	NE			091605-016	SW846 9056
	Fluoride	2.12	0.033	0.100	4.0			091605-016	SW846 9056
	Sulfate	87.0	0.500	2.00	NE			091605-016	SW846 9056
	Total Cyanide	ND	0.0015	0.005	0.200	U		091605-027	SW846 9012
OBS-MW3	Bicarbonate Alkalinity	174	0.725	1.00	NE			091607-022	SM2320B
11-Jan-12	Carbonate Alkalinity	ND	0.725	1.00	NE	U		091607-022	SM2320B
	Bromide	0.363	0.066	0.200	NE			091607-016	SW846 9056
	Chloride	22.4	0.330	1.00	NE			091607-016	SW846 9056
	Fluoride	2.16	0.033	0.100	4.0			091607-016	SW846 9056
	Sulfate	86.8	0.500	2.00	NE			091607-016	SW846 9056
	Total Cyanide	ND	0.0015	0.005	0.200	U	UJ	091607-027	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, January – March 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.

#### <sup>a</sup>Laboratory Qualifier

- B = The analyte was detected in the blank above the effective MDL.
- U = Analyte is absent or below the method detection limit.

#### <sup>b</sup>Validation Qualifier

- If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.
- UJ = The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

#### <sup>c</sup>Analytical Method

U.S. Environmental Protection Agency, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, 3<sup>rd</sup> 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*, 20<sup>th</sup> ed., Method 2320B.

#### **Summary of Perchlorate Results**

#### Solid Waste Management Units 8/58 and 68 Groundwater Monitoring

#### **Quarterly Assessment, January – March 2012**

Well ID	Perchlorate Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier <sup>a</sup>	Validation Qualifier <sup>b</sup>	Sample Number	Analytical Method <sup>c</sup>	
SWMUs 8/58							•		
<b>CCBA-MW1</b> 16-Jan-12	ND	0.004	0.012	NE	U		091615-020	EPA 314.0	
CCBA-MW1 (Duplicate) 16-Jan-12	ND	0.004	0.012	NE	U		091616-020	EPA 314.0	
<b>CCBA-MW2</b> 12-Jan-12	ND	0.004	0.012	NE	U		091610-020	EPA 314.0	
SWMU 68									
<b>OBS-MW1</b> 09-Jan-12	ND	0.004	0.012	NE	U		091600-020	EPA 314.0	
<b>OBS-MW2</b> 10-Jan-12	ND	0.004	0.012	NE	U		091604-020	EPA 314.0	
<b>OBS-MW2</b> (Duplicate) 10-Jan-12	ND	0.004	0.012	NE	U		091605-020	EPA 314.0	
<b>OBS-MW3</b> 11-Jan-12	ND	0.004	0.012	NE	U		091607-020	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, January – March 2012

#### Notes (continued)

#### <sup>a</sup>Laboratory Qualifier

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

#### <sup>b</sup>Validation Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

#### <sup>c</sup>Analytical Method

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

## **Summary of Hexavalent Chromium Results**

#### Solid Waste Management Unit 68 Groundwater Monitoring

## Quarterly Assessment, January – March 2012

Well ID	Hexavalent Chromium Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier <sup>a</sup>	Validation Qualifier <sup>b</sup>	Sample Number	Analytical Method <sup>c</sup>
<b>OBS-MW1</b> 09-Jan-12	ND	0.003	0.010	NE	U		091600-014	SW846 7196A
<b>OBS-MW2</b> 10-Jan-12	ND	0.003	0.010	NE	U		091604-014	SW846 7196A
<b>OBS-MW2</b> (Duplicate) 10-Jan-12	ND	0.003	0.010	NE	U		091605-014	SW846 7196A
<b>OBS-MW3</b> 11-Jan-12	ND	0.003	0.010	NE	J		091607-014	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.

#### <sup>a</sup>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.

#### <sup>b</sup>Validation Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

#### <sup>c</sup>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

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier <sup>a</sup>	Validation Qualifier <sup>b</sup>	Sample Number	Analytical Method <sup>c</sup>
CCBA-MW1	Aluminum	0.0437	0.015	0.050	NE	J		091615-009	SW846 6020
16-Jan-12	Antimony	ND	0.001	0.003	0.006	U		091615-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		091615-009	SW846 6020
	Barium	0.00672	0.0006	0.002	2.00			091615-009	SW846 6020
	Beryllium	0.000273	0.0002	0.0005	0.004	J		091615-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		091615-009	SW846 6020
	Calcium	43.6	0.060	0.200	NE	В		091615-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		091615-009	SW846 6020
	Cobalt	0.000104	0.0001	0.001	NE	J		091615-009	SW846 6020
	Copper	ND	0.00035	0.001	NE	U		091615-009	SW846 6020
	Iron	0.0869	0.033	0.100	NE	J		091615-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		091615-009	SW846 6020
	Magnesium	10.2	0.010	0.030	NE			091615-009	SW846 6020
	Manganese	0.012	0.001	0.005	NE			091615-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		091615-009	SW846 7470
	Nickel	ND	0.0005	0.002	NE	U	UJ	091615-009	SW846 6020
	Potassium	4.53	0.080	0.300	NE			091615-009	SW846 6020
	Selenium	0.00207	0.0015	0.005	0.050	J		091615-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		091615-009	SW846 6020
	Sodium	72.6	0.400	1.25	NE			091615-009	SW846 6020
	Thallium	0.000947	0.00045	0.002	0.002	J	0.0032U	091615-009	SW846 6020
	Uranium	0.0019	0.000067	0.0002	0.03			091615-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		091615-009	SW846 6010
	Zinc	0.00359	0.0035	0.010	NE	J		091615-009	SW846 6020

## Table IV-10 (Continued)

## Summary of Unfiltered Total Metal Results

## Solid Waste Management Units 8/58 Groundwater Monitoring

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier <sup>a</sup>	Validation Qualifier <sup>b</sup>	Sample Number	Analytical Method <sup>c</sup>
CCBA-MW1	Aluminum	0.0323	0.015	0.050	NE	J		091616-009	SW846 6020
(Duplicate)	Antimony	0.00114	0.001	0.003	0.006	J		091616-009	SW846 6020
16-Jan-12	Arsenic	0.00197	0.0017	0.005	0.010	J		091616-009	SW846 6020
	Barium	0.00682	0.0006	0.002	2.00			091616-009	SW846 6020
	Beryllium	0.000501	0.0002	0.0005	0.004			091616-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		091616-009	SW846 6020
	Calcium	43.6	0.300	1.00	NE	В		091616-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		091616-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		091616-009	SW846 6020
	Copper	ND	0.00035	0.001	NE	U		091616-009	SW846 6020
	Iron	0.0893	0.033	0.100	NE	J		091616-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		091616-009	SW846 6020
	Magnesium	10.4	0.010	0.030	NE			091616-009	SW846 6020
	Manganese	0.012	0.001	0.005	NE			091616-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		091616-009	SW846 7470
	Nickel	ND	0.0005	0.002	NE	U	UJ	091616-009	SW846 6020
	Potassium	4.50	0.080	0.300	NE			091616-009	SW846 6020
	Selenium	0.00164	0.0015	0.005	0.050	J		091616-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		091616-009	SW846 6020
	Sodium	65.6	0.080	0.250	NE			091616-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		091616-009	SW846 6020
	Uranium	0.0019	0.000067	0.0002	0.03			091616-009	SW846 6020
	Vanadium	ND	0.001	0.005	NE	U		091616-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		091616-009	SW846 6020

## Table IV-10 (Continued)

## Summary of Unfiltered Total Metal Results

## Solid Waste Management Units 8/58 Groundwater Monitoring

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier <sup>a</sup>	Validation Qualifier <sup>b</sup>	Sample Number	Analytical Method <sup>c</sup>
CCBA-MW2	Aluminum	ND	0.015	0.050	NE	U	0.29UJ	091610-009	SW846 6020
12-Jan-12	Antimony	ND	0.001	0.003	0.006	U		091610-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		091610-009	SW846 6020
	Barium	0.0462	0.0006	0.002	2.00			091610-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		091610-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		091610-009	SW846 6020
	Calcium	76.5	0.300	1.00	NE			091610-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		091610-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		091610-009	SW846 6020
	Copper	0.000535	0.00035	0.001	NE	J		091610-009	SW846 6020
	Iron	0.136	0.033	0.100	NE			091610-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		091610-009	SW846 6020
	Magnesium	15.9	0.010	0.030	NE			091610-009	SW846 6020
	Manganese	0.00328	0.001	0.005	NE	J		091610-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		091610-009	SW846 7470
	Nickel	ND	0.0005	0.002	NE	U	UJ	091610-009	SW846 6020
	Potassium	1.36	0.080	0.300	NE			091610-009	SW846 6020
	Selenium	0.00562	0.0015	0.005	0.050			091610-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		091610-009	SW846 6020
	Sodium	45.0	0.080	0.250	NE		J	091610-009	SW846 6020
	Thallium	0.000709	0.00045	0.002	0.002	J	0.0030U	091610-009	SW846 6020
	Uranium	0.00513	0.000067	0.0002	0.03			091610-009	SW846 6020
	Vanadium	0.0104	0.001	0.005	NE			091610-009	SW846 6010
	Zinc	0.0104	0.0035	0.010	NE			091610-009	SW846 6020

#### Table IV-10 (Concluded)

#### Summary of Unfiltered Total Metal Results

#### Solid Waste Management Units 8/58 Groundwater Monitoring

#### **Quarterly Assessment, January – March 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.

#### <sup>a</sup>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.

#### <sup>b</sup>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.

#### <sup>c</sup>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

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier <sup>a</sup>	Validation Qualifier <sup>b</sup>	Sample Number	Analytical Method <sup>c</sup>
OBS-MW1	Aluminum	ND	0.015	0.050	NE	U		091600-009	SW846 6020
09-Jan-12	Antimony	ND	0.001	0.003	0.006	U		091600-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		091600-009	SW846 6020
	Barium	0.0174	0.0006	0.002	2.00			091600-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		091600-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		091600-009	SW846 6020
	Calcium	77.9	0.600	2.00	NE	В		091600-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		091600-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		091600-009	SW846 6020
	Copper	0.000981	0.00035	0.001	NE	J		091600-009	SW846 6020
	Iron	0.143	0.033	0.100	NE			091600-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		091600-009	SW846 6020
	Magnesium	15.2	0.010	0.030	NE			091600-009	SW846 6020
	Manganese	0.00304	0.001	0.005	NE	J		091600-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		091600-009	SW846 7470
	Nickel	0.00096	0.0005	0.002	NE	J		091600-009	SW846 6020
	Potassium	1.50	0.080	0.300	NE			091600-009	SW846 6020
	Selenium	0.00249	0.0015	0.005	0.050	J		091600-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		091600-009	SW846 6020
	Sodium	20.7	0.800	2.50	NE			091600-009	SW846 6020
	Thallium	0.000472	0.00045	0.002	0.002	J		091600-009	SW846 6020
	Uranium	0.010	0.000067	0.0002	0.03			091600-009	SW846 6020
	Vanadium	0.0015	0.001	0.005	NE	J		091600-009	SW846 6010
	Zinc	0.00654	0.0035	0.010	NE	J		091600-009	SW846 6020

## Table IV-11 (Continued)

## Summary of Unfiltered Total Metal Results

## Solid Waste Management Unit 68 Groundwater Monitoring

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier <sup>a</sup>	Validation Qualifier <sup>b</sup>	Sample Number	Analytical Method <sup>c</sup>
OBS-MW2	Aluminum	ND	0.015	0.050	NE	U		091604-009	SW846 6020
10-Jan-12	Antimony	ND	0.001	0.003	0.006	U		091604-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		091604-009	SW846 6020
	Barium	0.0203	0.0006	0.002	2.00			091604-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		091604-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		091604-009	SW846 6020
	Calcium	80.0	0.600	2.00	NE	В		091604-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		091604-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		091604-009	SW846 6020
	Copper	0.00065	0.00035	0.001	NE	J	0.0028U	091604-009	SW846 6020
	Iron	0.149	0.033	0.100	NE			091604-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		091604-009	SW846 6020
	Magnesium	15.2	0.010	0.030	NE			091604-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		091604-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		091604-009	SW846 7470
	Nickel	0.000924	0.0005	0.002	NE	J		091604-009	SW846 6020
	Potassium	1.60	0.080	0.300	NE			091604-009	SW846 6020
	Selenium	0.00431	0.0015	0.005	0.050	J		091604-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		091604-009	SW846 6020
	Sodium	21.0	0.800	2.50	NE			091604-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		091604-009	SW846 6020
	Uranium	0.0145	0.000067	0.0002	0.03			091604-009	SW846 6020
	Vanadium	0.00162	0.001	0.005	NE	J		091604-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		091604-009	SW846 6020

## Table IV-11 (Continued)

## Summary of Unfiltered Total Metal Results

## Solid Waste Management Unit 68 Groundwater Monitoring

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier <sup>a</sup>	Validation Qualifier <sup>b</sup>	Sample Number	Analytical Method <sup>c</sup>
OBS-MW2	Aluminum	0.0183	0.015	0.050	NE	J		091605-009	SW846 6020
(Duplicate)	Antimony	ND	0.001	0.003	0.006	U		091605-009	SW846 6020
10-Jan-12	Arsenic	ND	0.0017	0.005	0.010	U		091605-009	SW846 6020
	Barium	0.0205	0.0006	0.002	2.00			091605-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		091605-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		091605-009	SW846 6020
	Calcium	83.5	0.600	2.00	NE	В		091605-009	SW846 6020
	Chromium	0.00213	0.002	0.010	0.100	J		091605-009	SW846 6020
	Cobalt	ND	0.0001	0.001	NE	U		091605-009	SW846 6020
	Copper	0.000605	0.00035	0.001	NE	J	0.0028U	091605-009	SW846 6020
	Iron	0.156	0.033	0.100	NE			091605-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		091605-009	SW846 6020
	Magnesium	15.8	0.010	0.030	NE			091605-009	SW846 6020
	Manganese	ND	0.001	0.005	NE	U		091605-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		091605-009	SW846 7470
	Nickel	0.000961	0.0005	0.002	NE	J		091605-009	SW846 6020
	Potassium	1.76	0.080	0.300	NE			091605-009	SW846 6020
	Selenium	0.00488	0.0015	0.005	0.050	J		091605-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		091605-009	SW846 6020
	Sodium	22.3	0.080	0.250	NE			091605-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		091605-009	SW846 6020
	Uranium	0.0151	0.000067	0.0002	0.03			091605-009	SW846 6020
	Vanadium	0.00173	0.001	0.005	NE	J		091605-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		091605-009	SW846 6020

## Table IV-11 (Continued)

## Summary of Unfiltered Total Metal Results

## Solid Waste Management Unit 68 Groundwater Monitoring

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier <sup>a</sup>	Validation Qualifier <sup>b</sup>	Sample Number	Analytical Method <sup>c</sup>
OBS-MW3	Aluminum	0.0162	0.015	0.050	NE	J		091607-009	SW846 6020
11-Jan-12	Antimony	ND	0.001	0.003	0.006	U		091607-009	SW846 6020
	Arsenic	ND	0.0017	0.005	0.010	U		091607-009	SW846 6020
	Barium	0.0287	0.0006	0.002	2.00			091607-009	SW846 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		091607-009	SW846 6020
	Cadmium	ND	0.00011	0.001	0.005	U		091607-009	SW846 6020
	Calcium	76.0	0.600	2.00	NE	В		091607-009	SW846 6020
	Chromium	ND	0.002	0.010	0.100	U		091607-009	SW846 6020
	Cobalt	0.000257	0.0001	0.001	NE	J		091607-009	SW846 6020
	Copper	0.0016	0.00035	0.001	NE			091607-009	SW846 6020
	Iron	0.248	0.033	0.100	NE			091607-009	SW846 6020
	Lead	ND	0.0005	0.002	NE	U		091607-009	SW846 6020
	Magnesium	16.4	0.010	0.030	NE			091607-009	SW846 6020
	Manganese	0.00198	0.001	0.005	NE	J		091607-009	SW846 6020
	Mercury	ND	0.000066	0.0002	0.002	U		091607-009	SW846 7470
	Nickel	0.00153	0.0005	0.002	NE	J		091607-009	SW846 6020
	Potassium	1.66	0.080	0.300	NE			091607-009	SW846 6020
	Selenium	0.00265	0.0015	0.005	0.050	J		091607-009	SW846 6020
	Silver	ND	0.0002	0.001	NE	U		091607-009	SW846 6020
	Sodium	21.0	0.080	0.250	NE			091607-009	SW846 6020
	Thallium	ND	0.00045	0.002	0.002	U		091607-009	SW846 6020
	Uranium	0.0111	0.000067	0.0002	0.03			091607-009	SW846 6020
	Vanadium	0.00112	0.001	0.005	NE	J		091607-009	SW846 6010
	Zinc	ND	0.0035	0.010	NE	U		091607-009	SW846 6020

#### Table IV-11 (Concluded)

#### **Summary of Unfiltered Total Metal Results**

#### Solid Waste Management Unit 68 Groundwater Monitoring

#### **Quarterly Assessment, January – March 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.

#### <sup>a</sup>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.

#### <sup>b</sup>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 was not detected. The associated numerical value is the sample quantitation limit.

#### <sup>c</sup>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

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier <sup>a</sup>	Validation Qualifier <sup>b</sup>	Sample Number	Analytical Method <sup>c</sup>
SWMUs 8/58	•						•		
CCBA-MW1	Calcium	44.2	0.060	0.200	NE	В		091615-017	SW846 6020
16-Jan-12	Magnesium	9.61	0.010	0.030	NE			091615-017	SW846 6020
	Potassium	4.45	0.080	0.300	NE			091615-017	SW846 6020
	Sodium	67.7	0.400	1.25	NE			091615-017	SW846 6020
CCBA-MW1 (Duplicate)	Calcium	43.7	0.300	1.00	NE	В		091615-017	SW846 6020
16-Jan-12	Magnesium	10.1	0.010	0.030	NE			091615-017	SW846 6020
	Potassium	4.78	0.080	0.300	NE			091615-017	SW846 6020
	Sodium	68.0	0.080	0.250	NE			091615-017	SW846 6020
CCBA-MW2	Calcium	76.4	0.300	1.00	NE			091615-017	SW846 6020
12-Jan-12	Magnesium	15.7	0.010	0.030	NE			091615-017	SW846 6020
	Potassium	1.38	0.080	0.300	NE			091615-017	SW846 6020
	Sodium	48.2	0.080	0.250	NE		J	091615-017	SW846 6020
SWMU 68	•			•			•		
OBS-MW1	Calcium	79.7	0.600	2.00	NE	В		091600-017	SW846 6020
09-Jan-12	Magnesium	15.1	0.010	0.030	NE			091600-017	SW846 6020
	Potassium	1.61	0.080	0.300	NE			091600-017	SW846 6020
	Sodium	21.0	0.800	2.50	NE			091600-017	SW846 6020
OBS-MW2	Calcium	74.9	0.600	2.00	NE	В		091600-017	SW846 6020
10-Jan-12	Magnesium	14.8	0.010	0.030	NE			091600-017	SW846 6020
	Potassium	1.53	0.080	0.300	NE			091600-017	SW846 6020
	Sodium	20.8	0.800	2.50	NE			091600-017	SW846 6020
OBS-MW2 (Duplicate)	Calcium	83.7	0.600	2.00	NE	В		091600-017	SW846 6020
10-Jan-12	Magnesium	16.3	0.010	0.030	NE			091600-017	SW846 6020
	Potassium	1.67	0.080	0.300	NE			091600-017	SW846 6020
	Sodium	21.0	0.080	0.250	NE			091600-017	SW846 6020
OBS-MW3	Calcium	75.6	0.600	2.00	NE	В		091600-017	SW846 6020
11-Jan-12	Magnesium	16.8	0.010	0.030	NE			091600-017	SW846 6020
	Potassium	1.59	0.080	0.300	NE			091600-017	SW846 6020
	Sodium	21.5	0.080	0.250	NE			091600-017	SW846 6020

#### Table IV-12 (Concluded)

#### **Summary of Filtered Cation Results**

## Solid Waste Management Units 8/58 and 68 Groundwater Monitoring

#### **Quarterly Assessment, January – March 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.

#### <sup>a</sup>Laboratory Qualifier

B = The analyte was detected in the blank above the effective MDL.

#### <sup>b</sup>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.

#### <sup>c</sup>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

Well ID	Analyte	Activity <sup>a</sup> (pCi/L)	MDA (pCi/L)	Critical Level <sup>b</sup> (pCi/L)	MCL (pCi/L)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>d</sup>	Sample Number	Analytical Method <sup>e</sup>
SWMUs 8/58									
CCBA-MW1	Americium-241	$1.76 \pm 7.28$	12.6	6.16	NE	U	BD	091615-033	EPA 901.1
16-Jan-12	Cesium-137	-0.847 ± 2.47	4.26	2.02	NE	U	BD	091615-033	EPA 901.1
	Cobalt-60	1.94 ± 2.91	5.32	2.48	NE	U	BD	091615-033	EPA 901.1
	Potassium-40	10.5 ± 61.1	42.2	19.3	NE	U	BD	091615-033	EPA 901.1
	Gross Alpha	0.99	NA	NA	15	NA	None	091615-034	EPA 900.0
	Gross Beta	$4.61 \pm 1.20$	0.978	0.441	4mrem/yr			091615-034	EPA 900.0
	Uranium-233/234	$1.70 \pm 0.307$	0.0865	0.035	NE			091615-035	HASL-300
	Uranium-235/236	$0.0341 \pm 0.0391$	0.0765	0.0281	NE	U	BD	091615-035	HASL-300
	Uranium-238	0.634 ± 0.151	0.0735	0.0285	NE			091615-035	HASL-300
CCBA-MW1 (Duplicate)	Americium-241	-3.76 ± 17.6	28.7	14.0	NE	U	BD	091616-033	EPA 901.1
16-Jan-12	Cesium-137	$-2.65 \pm 2.36$	3.37	1.62	NE	U	BD	091616-033	EPA 901.1
	Cobalt-60	$0.459 \pm 2.05$	3.67	1.74	NE	U	BD	091616-033	EPA 901.1
	Potassium-40	$-22.6 \pm 40.2$	47.8	22.9	NE	U	BD	091616-033	EPA 901.1
	Gross Alpha	1.29	NA	NA	15	NA	None	091616-034	EPA 900.0
	Gross Beta	$5.93 \pm 1.45$	0.993	0.438	4mrem/yr			091616-034	EPA 900.0
	Uranium-233/234	$1.98 \pm 0.374$	0.110	0.0445	NE		J+	091616-035	HASL-300
	Uranium-235/236	$0.0623 \pm 0.0566$	0.0972	0.0357	NE	U	BD	091616-035	HASL-300
	Uranium-238	0.564 ± 0.157	0.0933	0.0363	NE		J+	091616-035	HASL-300
CCBA-MW2	Americium-241	-8.34 ± 7.20	9.81	4.82	NE	U	BD	091610-033	EPA 901.1
12-Jan-12	Cesium-137	0.148 ± 1.78	3.07	1.48	NE	U	BD	091610-033	EPA 901.1
	Cobalt-60	1.67 ± 2.16	3.69	1.76	NE	U	BD	091610-033	EPA 901.1
	Potassium-40	$-42.4 \pm 40.9$	42.7	20.5	NE	U	BD	091610-033	EPA 901.1
	Gross Alpha	2.22	NA	NA	15	NA	None	091610-034	EPA 900.0
	Gross Beta	$2.49 \pm 0.852$	1.07	0.510	4mrem/yr		J	091610-034	EPA 900.0
	Uranium-233/234	$6.93 \pm 0.947$	0.0632	0.026	NE			091610-035	HASL-300
	Uranium-235/236	0.118 ± 0.0506	0.0556	0.0208	NE		J	091610-035	HASL-300
	Uranium-238	1.63 ± 0.264	0.0535	0.0211	NE			091610-035	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

Well ID	Analyte	Activity <sup>a</sup> (pCi/L)	MDA (pCi/L)	Critical Level <sup>b</sup> (pCi/L)	MCL (pCi/L)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>d</sup>	Sample Number	Analytical Method <sup>e</sup>
SWMU 68									
OBS-MW1	Americium-241	$0.586 \pm 8.39$	12.7	6.18	NE	U	BD	091600-033	EPA 901.1
09-Jan-12	Cesium-137	-1.41 ± 1.78	2.72	1.30	NE	U	BD	091600-033	EPA 901.1
	Cobalt-60	-0.555 ± 1.78	3.00	1.41	NE	U	BD	091600-033	EPA 901.1
	Potassium-40	$16.0 \pm 40.6$	27.9	13.0	NE	U	BD	091600-033	EPA 901.1
	Gross Alpha	7.28	NA	NA	15	NA	None	091600-034	EPA 900.0
	Gross Beta	$6.74 \pm 1.54$	1.16	0.557	4mrem/yr			091600-034	EPA 900.0
	Uranium-233/234	$18.9 \pm 2.61$	0.117	0.0481	NE			091600-035	HASL-300
	Uranium-235/236	$0.171 \pm 0.0822$	0.103	0.0386	NE		J	091600-035	HASL-300
	Uranium-238	$3.35 \pm 0.544$	0.0991	0.0391	NE			091600-035	HASL-300
OBS-MW2	Americium-241	$3.99 \pm 7.23$	10.6	5.20	NE	U	BD	091604-033	EPA 901.1
10-Jan-12	Cesium-137	-2.24 ± 1.91	2.68	1.28	NE	U	BD	091604-033	EPA 901.1
	Cobalt-60	2.63 ± 2.18	3.44	1.64	NE	U	BD	091604-033	EPA 901.1
	Potassium-40	14.7 ± 39.4	27.2	12.8	NE	U	BD	091604-033	EPA 901.1
	Gross Alpha	5.52	NA	NA	15	NA	None	091604-034	EPA 900.0
	Gross Beta	$5.36 \pm 1.38$	1.43	0.690	4mrem/yr			091604-034	EPA 900.0
	Uranium-233/234	$22.3\pm2.93$	0.065	0.0267	NE			091604-035	HASL-300
	Uranium-235/236	$0.269 \pm 0.0829$	0.0571	0.0214	NE			091604-035	HASL-300
	Uranium-238	4.31 ± 0.613	0.0551	0.0217	NE			091604-035	HASL-300
OBS-MW2 (Duplicate)	Americium-241	-10.6 ± 12.2	18.7	9.14	NE	U	BD	091605-033	EPA 901.1
10-Jan-12	Cesium-137	-0.901 ± 1.77	2.96	1.42	NE	U	BD	091605-033	EPA 901.1
	Cobalt-60	0.0469 ± 1.70	3.06	1.43	NE	U	BD	091605-033	EPA 901.1
	Potassium-40	-37.6 ± 37.4	42.8	20.4	NE	U	BD	091605-033	EPA 901.1
	Gross Alpha	-3.54	NA	NA	15	NA	None	091605-034	EPA 900.0
	Gross Beta	4.53 ± 1.27	1.44	0.695	4mrem/yr			091605-034	EPA 900.0
	Uranium-233/234	$22.9\pm2.97$	0.0608	0.025	NE			091605-035	HASL-300
	Uranium-235/236	$0.375 \pm 0.098$	0.0535	0.020	NE			091605-035	HASL-300
	Uranium-238	4.66 ± 0.651	0.0515	0.0203	NE			091605-035	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

Well ID	Analyte	Activity <sup>a</sup> (pCi/L)	MDA (pCi/L)	Critical Level <sup>b</sup> (pCi/L)	MCL (pCi/L)	Laboratory Qualifier <sup>c</sup>	Validation Qualifier <sup>d</sup>	Sample Number	Analytical Method <sup>e</sup>
SWMU 68					•				
OBS-MW3	Americium-241	$5.29\pm3.69$	5.30	2.22	NE	U	BD	091607-033	EPA 901.1
11-Jan-12	Cesium-137	-7.66 ± 6.51	5.84	2.85	NE	U	R	091607-033	EPA 901.1
	Cobalt-60	-0.964 ± 2.19	3.73	1.76	NE	U	BD	091607-033	EPA 901.1
	Potassium-40	92.0 ± 42.7	34.5	16.2	NE		J	091607-033	EPA 901.1
	Gross Alpha	2.25	NA	NA	15	NA	None	091607-034	EPA 900.0
	Gross Beta	5.96 ± 1.67	1.86	0.903	4mrem/yr			091607-034	EPA 900.0
	Uranium-233/234	$21.3 \pm 2.85$	0.0731	0.0301	NE			091607-035	HASL-300
	Uranium-235/236	$0.273 \pm 0.0867$	0.0643	0.0241	NE			091607-035	HASL-300
	Uranium-238	$4.38\pm0.639$	0.062	0.0245	NE			091607-035	HASL-300

#### Quarterly Assessment, January – March 2012

#### 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.

<sup>a</sup>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).

<sup>b</sup>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, January – March 2012

#### Notes (continued)

#### <sup>c</sup>Laboratory Qualifier

- NA = Not applicable.
- U = Analyte is absent or below the method detection limit.

#### <sup>d</sup>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.
- J+ = The associated numerical value is an estimated quantity with a suspected positive bias.
- R = The data are unusable, and resampling or reanalysis are necessary for verification.
- None = No data validation for corrected gross alpha activity.

#### <sup>e</sup>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 March 2012**

Well ID	Date	Analyte	Result	MCL	Laboratory Qualifier	Validation Qualifier <sup>a</sup>	Sample Number	Analytical Method <sup>b</sup>
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

#### 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.

#### <sup>a</sup>Validation Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

#### <sup>b</sup>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

Well ID/Parameter	Environmental Sample (R1)	Duplicate Sample (R2)	RPD <sup>a</sup>
	mg/L unless othe	erwise noted	
CCBA-MW1			
Nitrate plus Nitrite	1.23	1.20	2
Bicarbonate Alkalinity	178	179	1
Bromide	0.3200	0.372	15
Chloride	27.4	27.0	1
Fluoride	4.94	4.94	< 1
Sulfate	53.6	52.5	2
Aluminum	0.0437	0.032	30
Barium	ND	0.00114	NC
Calcium	ND	0.00197	NC
Cobalt	0.00672	0.00682	1
Iron	0.000273	0.000501	59
Magnesium	43.6	43.6	<1
Manganese	0.000104	ND	NC
Nickel	0.0869	0.0893	3
Potassium	10.2	10.4	2
Selenium	0.012	0.012	<1
Sodium	4.53	4.50	1
Uranium	0.00207	0.00164	23
Vanadium	72.6	65.6	10
Zinc	0.0019	0.0019	<1
Filtered Calcium	0.00359	ND	NC
Filtered Magnesium	44.2	43.7	1
Filtered Potassium	9.61	10.1	5
Filtered Sodium	4.45	4.78	7
Gross Alpha	67.7	68.0	<1
Gross Beta	0.99	1.29	NC
Uranium-233/234	4.61 ± 1.20	5.93 ± 1.45	NC
Uranium-235/236	0.634 ± 0.151	1.98 ± 0.374	NC
Uranium-238	0.634 ± 0.151	0.564 ± 0.157	NC
OBS-MW2	0.004 ± 0.101	0.004 ± 0.107	NO
Nitrate plus Nitrite	1.49	0.540	94
Bicarbonate Alkalinity	176	175	1
Bromide	0.406	0.349	15
Chloride	21.5	21.4	<1
Fluoride	2.11	2.12	<1
Sulfate	87.2	87.0	<1
Hexavalent Chromium	ND	0.0183	NC
Aluminum	0.0203	0.0205	1
Barium	80.0	83.5	4
Calcium	80.0	0.00213	NC 4
Cobalt	0.149	0.156	5
Lead	15.2	15.8	4
	0.000924	0.000961	4 4
Magnesium Nickel	1.60	1.76	<u> </u>
Potassium	0.00431	0.00488	12
			6
Selenium	21.0	22.3	Ö

## Table IV-15 (Concluded)

## **Summary of Duplicate Samples**

## Solid Waste Management Units 8/58 and 68 Groundwater Monitoring

## Quarterly Assessment, January – March 2012

Well ID/Parameter	Environmental Sample (R1)	Duplicate Sample (R2)	RPD <sup>a</sup>
	mg/L unless othe	erwise noted	
OBS-MW2 (Continued)			
Uranium	0.0145	0.0151	4
Vanadium	0.00162	0.00173	7
Filtered Calcium	74.9	83.7	11
Filtered Magnesium	14.8	16.3	10
Filtered Potassium	1.53	1.67	9
Filtered Sodium	20.8	21.0	1
Gross Alpha	5.52	-3.54	NC
Gross Beta	$5.36 \pm 1.38$	4.53 ± 1.27	NC
Uranium-233/234	$22.3\pm2.93$	22.9 ± 2.97	NC
Uranium 235/236	$0.269 \pm 0.0829$	$0.375 \pm 0.098$	NC
Uranium-238	$4.31\pm0.613$	$4.66\pm0.651$	NC

#### Notes

CCBA	= Coyote Canyon Blast Area.
ID	= Identification.
mg/L	= Milligrams per liter.
MŴ	= Monitoring well.
NC	= Not calculated.
OBS	= Old Burn Site.

 $\mathsf{R}_1$ 

 $R_2$ 

<sup>a</sup>RPD

RPD = Relative percent difference is calculated with the following equation and rounded to nearest whole number.

$$RPD = \frac{|R_1 - R_2|}{[(R_1 + R_2)/2]} \times 100$$

where:

= analysis result = duplicate analysis result

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Appendix A Field Measurement Logs for SWMUs 8/58 and 68 Groundwater Monitoring Data

Project Na	те: swмu	I			I	Project N	o.:				
Well I.D.:		/W1				Date: 01/					
Well Cond	lition:				1	Weather (	Condition:	24,0	2 in Hoya 29°F		
Method: 1	Portable p	ump	$\rangle$	(	Dedic	ated pum	ıp	Pump depth:79			
			]	PURGE	MEAS	UREM	ENTS				
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		
47.96	0803	/	St	ART-					~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		
49.08	0819	5	14.35	600	400.8	6.72	1.56	22.5	2.29		
49.27	0827	10	14.34	581	408.7	6.56	0.88	24.0	2.46		
59,41	0835	15	14.31	571	411.1	6.54	6.51	28.0	2.56		
49.51	0843	20	14.29	568	413.4	6.52	0,34	27.6	5.89		
49.57	0857	25	14.11	567	415.2	6.50	0.23	27.5	2.82		
49.60	0855	27	14.06	568	415.9	6.49	0.30	27.3	2.81		
49.61	0858	29	14.00	567	416.2	6.49	0.21	27.3	2.81		
49.63		31	14.02	567	416.5	6.49	0.78	27.4	2.83		
49.63		33	14.03	567	416.7	6.49	0.20	27.3	2.82		
	0906.	/	SAM	pling					$\rightarrow$		
				0							
									x 21 00 4 1 0		
									24.00 galpurged		
									24.00. gal purged purge provineasares 0811		

Project Na						Project N	and the second se						
Well I.D.:		4W2				Date: 01/		21111					
Well Conc				,			Condition:		Havin 21°F				
Method: I	Portable p	ump	X			Dedicated pump Pump depth: _//7							
			I	PURGE	MEAS	IEASUREMENTS							
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				
71.45	0801		Sto	ivt	ç		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~						
72.21	0813	5	14.09	688	361.9	7.45	5.37	341	3.50				
72.23	0819	10	14.31	688	370.2	7.42	4.29	335	342				
72.25	0825	15	14.45	686	374.4	7.39	2,35	41.1	4.20				
72.16	0834	20	14.19	685	379.2	7.40	1.28	50.1	5.13				
72.18	0838	23	14.34	685	380.9	7.38	0.95	53.5	5.47				
72.19	0840	25	14.43	685	380.9	7.40	1.02	55.9	5.71				
72,20	0843	27	14,50	685	381.6	7.40	1.22	56.8	5.77				
72.20	0846	29	14.47	686	382.9	7.39	1.18	57.6	5.87				
72.21	0849	31	14.44	686	383.0	7.39	1.24	57.8	5.89				
72.21	0852	33	14.45	686	383,1	7.39	1.24	57.6	5188				
	0853		SAM	plin	a-		5		>				
				/	2								
									24.00 gal prior				
									r. 4. or gal prior to measurement				
									0807				

		14							
	W1							11.1	
								"Hg 33°F	
ortable p	ump	X_		Dedic	ated pum	up	_ Pump	depth: <u>154</u>	
		]	PURGE	MEAS	UREM	ENTS			
Time 24 hr	Vol. (Lgal)	Temp (°C)	SC (µS/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (%)	Comments DO mg/L	
0808	/	STA	RY						
0922	5	14.66	595	379.8	7.16	3.10	3616	3.71	
0829	10	15.12	596	379.8	7.22	1,11	35.1	3.52	
0836	15	15.31	596	382.7	7.22	0.64	3517	3.57	
0 843	20	15.47	596	384.3	7.23	0.53	36.3	3.62	
0847	23	15.53	597	385.7	7.23	0.42	36.3	3.61	
0850	25	15.58	596	38611	7.23	6.44	36.3	3.61	
0852	27	15.63	597	386.6	7.23	0.37	.36.6	3.64	
0855		15.60	596	387.2	7.23	0.38	36.7	3.65	
0858		15.58	596	387.7	7.23	0.33	36.7	3.65	
0901	33	15.44	597	388.0	7.23	0.37	36.8	3.68	
0902	/	SAM	20/in	a-					
			/	0					
								From tubing 0815	
								Dals	
	0BS-MV ition: ortable p Time 24 hr 0808 0808 0808 0808 0808 0808 0847 0847	OBS-MW1         ition:         ortable pump         Time 24       Vol.         hr       (L/gal) $0808$ $0922$ $0808$ $0922$ $0808$ $10$ $0808$ $10$ $0808$ $10$ $0808$ $10$ $0808$ $10$ $0808$ $15$ $0808$ $15$ $0836$ $15$ $0847$ $23$ $0857$ $25$ $0855$ $29$ $0855$ $29$ $0858$ $31$ $0901$ $33$	ition: ortable pump $X$ Time 24 Vol. Temp (L(gal) (°C) 0808 $5774$ 0808 $5774$ 0807 $5774$ 0808 $5774$ 0808 $5774$ 0807 $5774$ 0707 $5775$ 0707 $5775$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	OBS-MW1       I         ition:       Dedic         ortable pump       X       Dedic         PURGE MEAS         Time 24       Vol.       Temp       SC       ORP         D'URGE MEAS         D'URGE MEAS         D'URGE MEAS         ORP       (°C)       ( $\mu S/cm$ )       ORP         D'URGE MEAS         ORP       ORP         hr       (L'gal)       C°C) $(\mu S/cm)$ (mV)         O'SO'S       STAC       ORP         0'SO'S       STAC       ORP         0'SO'SO       IS-SO       STAC       OSSO         0'SO'SO       IS-SO       IS-SO       SSO <th col<="" td=""><td><math display="block">\begin{array}{c c c c c c c c c c c c c c c c c c c </math></td><td><math display="block">\begin{array}{c c c c c c c c c c c c c c c c c c c </math></td><td>OBS-MW1         Date: 01/09/12           ition:         Weather Condition: 24.25           ortable pump         X         Dedicated pump         Pump           PURGE MEASUREMENTS           Time 24         Vol. Temp (°C)         0RP (mV)         pH         Turbidity (NTU)         0%           04008         9774/R+        </td></th>	<td><math display="block">\begin{array}{c c c c c c c c c c c c c c c c c c c </math></td> <td><math display="block">\begin{array}{c c c c c c c c c c c c c c c c c c c </math></td> <td>OBS-MW1         Date: 01/09/12           ition:         Weather Condition: 24.25           ortable pump         X         Dedicated pump         Pump           PURGE MEASUREMENTS           Time 24         Vol. Temp (°C)         0RP (mV)         pH         Turbidity (NTU)         0%           04008         9774/R+        </td>	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	OBS-MW1         Date: 01/09/12           ition:         Weather Condition: 24.25           ortable pump         X         Dedicated pump         Pump           PURGE MEASUREMENTS           Time 24         Vol. Temp (°C)         0RP (mV)         pH         Turbidity (NTU)         0%           04008         9774/R+

Project Na	те: swмt	J				roject N			
Well I.D.:		W2			I	Date: 01/	10/12		
Well Cond	lition:			_	V	Veather (	Condition: 7	4.23"	Hg 26°F
Method: F	ortable p	ump	_X			ated pum		_ Pump	depth: <u>253</u>
			1	PURGE	MEAS	UREM	ENTS		
Depth to Water (ft)	Time 24 hr	Vol. (Lgal)	Temp (°C)	SC (µS/cm)	ORP (mV)	pН	Turbidity (NTU)	DO (%)	Comments DO mg/L
175.36	0758	/	STAR	1					
76.40	0814	5	15.55	600	371.7	7.34	0.31	43.0	4.28
176.41	0821	10	16.34	601	377.7	7.32	0.36	42.1	9,12
176.43	0828	15	16.75	601	381.7	7.28	0.38	41.8	4.05
176.45	0836		16.90	602	383.2		0.38	42.4	4,09
176.44	¥			602	384.8	7,26	6.34	41.5	9.00
176.45	0844			602	385.5		0.39	41.4	3.99
76:47	0846			602	385.9	7.25	0.38	41.4	3.98
176.48	40 0814 5 15.55 .41 0821 10 16.34 .43 0828 15 16.75 .45 0836 20 16.90 44 0840 23 16.98 45 0849 25 17.05 .47 0846 27 17.09 .48 0849 29 17.00 .49 0852 31 17.03				386.6	7.24	0.40	4111	3.97
				602	386.9	7.24	0.40	41.2	3.97
176.46		35		602	386.9	7,24	0.36	41,1	3.96
	0857	/	SAT	1.011	119-				
				/	0				
									<u>r4.00 gals purge</u> from tubing 0806
									from tubing
									0 806

Project Na	me: swмt	J			P	roject N	o.:		
Well I.D.:					L	Date: 01/	/11/12		
Well Cond	lition:				V	Veather (	Condition:		
Method: I	ortable p	ump	X				ıp	_ Pump	depth: <u>209</u>
				PURGE		UREM			
Depth to Water (ft)	Time 24 hr	Vol. (Lgal)	Temp (°C)	SC (µS/cm)	ORP (mV)	101-1	Turbidity (NTU)	DO (%)	Comments DO mg/L
69.35	0800		STA	R+.					
74.47	0815	5	15.24		368.1	7.39	2.44	45.3	454
76.96	0890	10	15.65	599	370.6	7.34	2.20	42.9	4.26
78.57	0828	15	15.89	599	369.9	7.32	1.72	42.8	4.23
79.65	0835	20	16.05	599	370.4	7.29	1,21	42.7	4.21
80.15	0839	23	16.11	600	370.8	7.28	1,23	42.7	4.19
80.44	0841	25	16.16	600	3708	7.28	1.24	42.6	4,18
80.68	0844	27	16.19	599	371.0	7.28	0.98	42.6	4.18
80.92	\$847	29	16.22	600	371.8	7.27	0.87	42.6	4.18
81.12	0850	31	16,25	600	372,1	7.26	0,82	42.6	4.18
81.31	0853	33	16.28	600	371.9	7.26	0.86	42.9	4.20
	0854	/	SAN	polina	j				
				/ (	/				
									-4.00 gals purge From tubing 0809
									from tubing
									0809

Appendix B Analytical Laboratory Certificates of Analysis for SWMUs 8/58 and 68 Groundwater Monitoring Data

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab	17												Page 1 of	2
Batch No. NA	SAR/W	IR No.		1	/							AR/COC	6139	958
Dept. No./Mail Stop:	6234/0718	Date Samples	s Shipped:	1/161	12	SMO USE	Contrac	t No:		PO 69143	6	Waste Characterization		,
Project/Task Manager:	Alicia Aragon	Carrier/Wayb	ill No.	136	29	8	Project/	Task No.:	:	98026.01.	1212	RCRA Date=		
Project Name:	SWMU & GW Char 8/58	Lab Contact:	NUCCH CONT	Edie Kent/80			SMO AL	thorizatio	on: 9	161	-	Send:Preliminary/report to	0	
Record Center Code:	ER/1267 074/DAT	Lab Destinatio	on:	GEL			1				TMO	Validation Required		
Logbook Ref. No .:	ER 049 262-12	SMO Contact	/Phone:	Lorraine Herr	rera /505-8	344-3199	1	0	× 081	1.5.4		Released by COC No.:		
Service Order No.	CFO# 0203-12	Send Report	to SMO:		-		500	BALL	HE ORC	ie ic		Bill To: Sandia National Lat	os (Accounts P	avable)
Location	Tech Area											P.O. Box 5800, M		
Building	Room	1		Refe	erence l	OV(av	ailable	at SM0	$\hat{\alpha}$	941	78	Albuquerque, NM		
Dununig	ER Sample ID or	Beginning	ER Site	Date/Tin	and the second se	Sample				Collection	Sample	Parameter & Met	and the second se	Lab Samp
Sample NoFraction	Sample Location Detail	Depth (ft)	No.	Collec		Matrix	Туре		All@4C		Туре	Requested	inou	ID
	Contract Mean Articles	1	Sectores	011612-	ALL TRUE CA		<u> </u>							definition of
/ 091615 -001 /	SWMU 8/58-SA1	N/A	N/A	<del>10/16/31</del>	9:06	GW	G	3x40ml	HCL	G	SA	TCL VOC (SW846-8260	B)	
√091615 -002 1	SWMU 8/58-SA1	N/A	N/A	10/16/31	9:07	GW	AG	4x1L	4C	G	SA	TCL SVOC (SW846-827	0C)	
091615 -009-	SWMU 8/58-SA1	N/A	N/A	10/16/31	9:09	GW	P	500 ml	HNO3	G	SA	TAL Metals + Ur (SW846-60	010/6020/7470)	)
091615 -016	SWMU 8/58-SA1	N/A	N/A	10/1/6/31	9:10	GW	Р	125 ml	4C	G	SA	Anions (SW846-9056)		
√ 091615 -017 ′	SWMU 8/58-SA1	N/A	N/A	10/16/31	9:11	FGW	Р	250 ml	HNO3	G	SA	Cations (SW846-6020)		
J 091615 -018 /	SWMU 8/58-SA1	N/A	N/A	10/16/31	9:12	GW	Р	125 ml	H2SO4	G	SA	NPN (353.2)		
091615 -020 -	SWMU 8/58-SA1	N/A	N/A	10/16/31	9:13	GW	Р	250 ml	4C	G	SA	Perchlorate (314.0) *		
1 091615 -022 1	SWMU 8/58-SA1	N/A	N/A	10/16/31	9:14	GW	Р	500 ml	4C	G	SA	Alkalinity (SM2320B)		
091615 -024 '	SWMU 8/58-SA1	N/A	N/A	10/16/31	9:15	GW	AG	4x1L	4C	G	SA	HE (SW846-8321A)		
J 091615 -027 /	SWMU 8/58-SA1	N/A	N/A	10/10/31		GW	Р	250 ml		G	the second se	Total Cyanide (SW846-9	and the second se	
RMMA	1.1	. No.		Sample Trac		)	SMO US			Instructio		uirements:	Abnormal Co	onditions
Sample Disposal	Return to Client	Disposal by la	ab	Date Entered	l(mm/dd/y	y) 01/,	18/21	1/2	EDD		✓ Yes		on Receipt	
Turnaround Time	7 Day * 15 D	ay* 🗸	30 Day	Entered by:	RK	- /			Raw Da	ta Packag	L Yes	✓ No		
Return Samples E	By:		Negotia	ated TAT		QC inits.	WF	>	*Send/e	-mail repo	rt to:			
Sample	Name	Signature	1	Init	Company	y/Organiz	ation/Pho	one	Tim Jac	kson/ORG	. 4142/MS	.0729/ 284-2547		
	Robert Lynch	OLAN	ch	TZL	SNL/414	2/844-401	13/250-70	090	FGW (F	Filtered in fi	eld w/40 m	icron filter)		
	Alfred Santillanes	w Sont	La	alx	SNL/414	2/844-513	30/228-0	710	Anions (	Br,Cl,F,SC	4)			
	William J. Gibson	wild of	4h	2425		2/844-401			1	(Ca,Mg,K,				
		The	1	- y	1				South March		rbonate,ca	(bonate)		
		/									parate repo			
1.Relinquished by	Webotile	Org. 414	Z Date /	16/17/me	095		4.Relino	uished b	1	1131 03 304	Org.	Date	Time	<u>en 1997 (1997)</u> E
1. Received by	19. the GMO	Org. 4142	Dater	16/11 ime	095	0	4. Rece	ived by			Org.	Date	Time	I
2.Relinquished by	Doughunge				1200		5.Relind	uished b	y		Org.	Date	Time	1
2. Received by		Org.	Date	Time			5. Rece	ived by		PEDI	Org.	Date	Time	1
3.Relinguished by		Org.	Date	Time		•	6.Relind	uished b	y		Org.	Date	Time	r
3. Received by		Org.	Date	Time		C) - C) - C) - C) - C) - C	6. Rece	ived by		andres strate	Org.	Date	Time	

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

# RACT LABORATORY

# Analysis Request And Chain Of Custody (Continuation)

						5 N	·						AR/COC-	61395
Project Name:		SWMU 68 GW Char	Project/Task M	anger;	Alicia Aragon				Project/Task	No.:	98026.01.13			4
Location		Tech Area			Defere		<u> </u>		1					
Building Sample No-	Fraction	Room ER Sample ID or	Beginning	ER	Refere Date/Time	and the second se	Sample				Collection	Comple	Description & Mathead	Lab use
	Flaction	Sample Location detail	Depth (ft)		Collect		Matrix	Туре	Volume	Preserv- ative	Method	Type	Parameter & Method Requested	Lab Samp ID
/091615	-033 /	SWMU 8/58-SA1	N/A	N/A	01/6/2 1 <del>0/16/31</del>	9:18	GW	Р	1L	HNO3	G	SA	Gamma spec (short list)(901.0)	
J 091615	-034 1	SWMU 8/58-SA1	N/A	N/A	10/16/31	9:19	GW	Р	1L	HNO3	G	SA	Gross Alpha/Beta (900.0)	
/ 091615	-035 -	SWMU 8/58-SA1	N/A	N/A	10/16/31	9:20	GW	Р	1L	HNO3	G	SA	Isotopic Ur (ASTM D3972-09M)	
091616	-001 /	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:06	GW	G	3x40ml	HCL	G	DU	TCL VOC (SW846-8260B)	
1 091616	-002 ′	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:07	GW	AG	4x1L	4C	G	DU	TCL SVOC (SW846-8270C)	
091616	-009 1	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:09	GW	Р	500 ml	HNO3	G	DU	TAL Metals + Ur (SW846-6010/6020/7470)	
/ 091616	-016 /	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:10	GW	Р	125 ml	4C	G	DU	Anions (SW846-9056)	
√ 091616	-017 /	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:11	FGW	Р	250 ml	HNO3	G	DU	Cations (SW846-6020)	
/ 091616	-018 /	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:12	GW	Р	125 ml	H2SO4	G	DU	NPN (353.2)	
·/ 091616	-020 /	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:13	GW	Р	250 ml	4C	G	DU	Perchlorate (314.0)	
/ 091616	-022 ′	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:14	GW	Р	500 ml	_4C	G	DU	Alkalinity (SM2320B)	
/ 091616	-024 1	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:15	GW	AG	4x1L	4C	G	DU	HE (SW846-8321A)	
/ 091616	-027 1	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:17	GW	Р	250 ml	NaOH	G	DU	Total Cyanide (SW846-9012)	
1 091616	-033 ′	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:18	GW	Р	1L	HNO3	G	DU	Gamma spec (short list)(901.0)	
1 091616	-034 ′	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:19	GW	Р	1L	HNO3	G	DU	Gross Alpha/Beta (900.0)	
1091616	-035 1	SWMU 8/58-SA2	N/A	N/A	0/16/31	9:20	GW	Р	1L	HNO3	G	DU	Isotopic Ur (ASTM D3972-09M)	
J <sub>091617</sub>	-001 1	SWMU 8/58-TB3	N/A	N/A	40/16/31	, 9:06	DIW	G	3x40ml	HCL	G	ТВ	VOC (SW846-8260B)	
													* If perchlorate detected perform	
													verification analysis SW846-6850M	

Recipient Initials

Page 2 of 2

	SF	2001	-COC	(7/00
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# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Page 5 of	SF 2001-CO	C (7/00)	A	NALY	CO SIS RE		ACT LA				USTO	DY			
of 1220	Internal Lab	CAD			,	/							AR/COC	Page 1 of 6139	
0	Batch No. No.	6234/0718	WR No.	- Chiesed	1/16/	17	SMO USE	Cantras	t Mai		PO 69143	-	T	0100	100
		Alicia Aragon	Date Sample Carrier/Wayb	1.155.224	1362		- SMO USE		Task No.		98026.01.		Waste Characterization RCRA Date=		
		SWMU & GW Char 8/5			Edie Kent/80		71						Send:Preliminary/report to		
	C 101 C	ER/1267 074/DAT	Lab Destinati		GEL	5-550-617		SIVIO A	amonzam		194	TMO	Validation Required		
	Logbook Ref. No.:	ER 049	SMO Contac		Lorraine Herr	rera /505-	844-3199					1.00	Released by COC No.:		
		CFO# 0263-12	Send Report			0.0.1000		500	BATT	H ORC	lek		Bill To: Sandia National Lab	s (Accounts P	avable)
	Location	Tech Area											P.O. Box 5800, MS	S-0154	
	Building	Room	-1		Refe	erence	LOV(ava	ailable	at SMO	C)			Albuquerque, NM		29417
		ER Sample ID or	Beginning	ER Site			Sample				Collection	Sample	Parameter & Met	and the second se	Lab Sample
	Sample NoFraction	Sample Location Detail	Depth (ft)	No.	Collec		Matrix		Volume	All@4C	Method	Туре	Requested		ID
٩	091615 -001	SWMU 8/58-SA1	N/A	N/A	10/16/31	9:06	GW	G	3x40ml	HCL	G	SA	TCL VOC (SW846-8260	3)	001
,	091615 -002	SWMU 8/58-SA1	N/A	N/A	10/16/31	9:07	GW	AG	4x1L	4C	G	SA	TCL SVOC (SW846-827	0C)	002
•	091615 -009	SWMU 8/58-SA1	N/A	N/A	10/16/31	9:09	GW	Р	500 ml	HNO3	G	SA	TAL Metals + Ur (SW846-60	)10/6020/7470)	003
	091615 -016	SWMU 8/58-SA1	N/A	N/A	10/16/31	9:10	GW	Р	125 ml	4C	G	SA	Anions (SW846-9056)		004
۲	091615 -017	SWMU 8/58-SA1	N/A	N/A	10/16/31	9:11	FGW	Р	250 ml	ниоз	G	SA	Cations (SW846-6020)		294182
۱	091615 -018	SWMU 8/58-SA1	N/A	N/A	10/16/31	9:12	GW	Р	125 ml	H2SO4	G	SA	NPN (353.2)		005
¥	091615 -020	SWMU 8/58-SA1	N/A	N/A	10/16/31	9:13	GW	Р	250 ml	4C	G	SA	Perchlorate (314.0) *		006
•	091615 -022	SWMU 8/58-SA1	N/A	N/A	10/16/31	9:14	GW	Р	500 ml	4C	G	SA	Alkalinity (SM2320B)		007
`	091615 -024	SWMU 8/58-SA1	N/A	N/A	10/16/31	9:15	GW	AG	4x1L	4C	G	SA	HE (SW846-8321A)		800
۱	091615 -027	SWMU 8/58-SA1	N/A	N/A	10/16/31	9:17	GW	Р	250 ml	NaOH	G	SA	Total Cyanide (SW846-9	012)	009
	RMMA	Yes 🗹 No Re	ef. No.		Sample Trac	king		SMO U	se	Special	Instruction		quirements:	Abnormal Co	onditions
	Sample Disposal	Return to Client	Disposal by la		Date Entered	l(mm/dd/y	ry)	thagad <u>h</u>		EDD		Yes		on Receipt	
	Turnaround Time		Day * 🔽	-	Entered by:	dies eil		a belte	a teluca		ta Packag		⊡ No		
	Return Samples B				ated TAT		QC inits.	the second s			-mail repo				
	Sample	Name	Signature		Init		y/Organiz			1			.0729/ 284-2547		
		Robert Lynch	194M	ch-	ZL		2/844-401			1	iltered in fi		licron filter)		
		Alfred Santillanes	1 sont	de	gar					-	Br,CI,F,SO				
		William J. Gibson 101	herfor	Tr	WFA	SNL/414	2/844-401	3/239-7	367	1	(Ca,Mg,K,		1		
			1	,	~						y (total,bica				
	1.Relinquished by	Wed Satel a	Org. UIL	7 Date	16/17 me	095	0	4.Relino	uished b	-	list as sep	org.	Date	Time	
	1. Received by	19 1 GM	0 Org. 4142			095		4. Rece				Org.	Date	Time	
	2.Relinquished by		~ Org.414			1200			uished b	v		Org.	Date	Time	the second se
	2. Received by	The Long In	Org. (el		-i6-12 Time	075		5. Rece	-	,		Org.	Date	Time	
	3.Relinquished by	, and the second	Org.	Date	Time	015			uished b	у		Org.	Date	Time	
	3. Received by		Org.	Date	Time			6. Rece				Org.	Date	Time	

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

## **RACT LABORATORY**

# Analysis Request And Chain Of Custody (Continuation)

-		Tech Area Room			Refere	nce l	OV (a)	ailal	ole at S	MO)				
S	ample No- Fraction		Beginning Depth (ft)	ER Site No.	Date/Tim Collect	e (hr)	Sample Matrix	Co	ntainer Volume	Preserv- ative	Collection Method	Sample Type	Parameter & Method Requested	Lab use Lab Sample
	091615 -033	SWMU 8/58-SA1	N/A	N/A	10/16/31	9:18	GW	P	1L	HNO3	G	SA	Gamma spec (short list)(901.0)	1D
	091615 -034	SWMU 8/58-SA1	N/A	N/A	10/16/31	9:19	GW	Р	1L	HNO3	G		Gross Alpha/Beta (900.0)	011
	091615 -035	SWMU 8/58-SA1	N/A	N/A	10/16/31	9:20	GW	Р	1L	HNO3	G		Isotopic Ur (ASTM D3972-09M)	012
	091616 -001	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:06	GW	G	3x40ml	HCL	G	DU	TCL VOC (SW846-8260B)	013
	091616 -002	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:07	GW	AG	4x1L	4C	G	DU	TCL SVOC (SW846-8270C)	014
	091616 -009	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:09	GW	Р	500 ml	HNO3	G	DU	TAL Metals + Ur (SW846-6010/6020/7470)	015
	091616 -016	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:10	GW	Р	125 ml	4C	G		Anions (SW846-9056)	016
	091616 -017	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:11	FGW	Р	250 ml	HNO3	G		Cations (SW846-6020)	294182
	091616 -018	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:12	GW	Ρ	125 ml	H2SO4	G	DU	NPN (353.2)	017
	091616 -020	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:13	GW	Р	250 ml	4C	G	DU	Perchlorate (314.0)	018
	091616 -022	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:14	GW	Р	500 ml	4C	G	DU	Alkalinity (SM2320B)	019
	091616 -024	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:15	GW	AG	4x1L	4C	G	DU	HE (SW846-8321A)	020
	091616 -027	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:17	GW	Р	250 ml	NaOH	G	DU	Total Cyanide (SW846-9012)	021
	091616 -033	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:18	GW	Р	1L	HNO3	G	DU	Gamma spec (short list)(901.0)	022
	091616 -034	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:19	GW	Р	1L	HNO3	G	DU	Gross Alpha/Beta (900.0)	023
	091616 -035	SWMU 8/58-SA2	N/A	N/A	10/16/31	9:20	GW	Ρ	1L	HNO3	G	DU	Isotopic Ur (ASTM D3972-09M)	024
	091617 -001	SWMU 8/58-TB3	N/A	N/A	10/16/31	9:06	DIW	G	3x40ml	HCL	G	ТВ	VOC (SW846-8260B)	025
													* If perchlorate detected perform	
	Abnormal Condition												verification analysis SW846-6850M	

SF 2001-COC (7/00)

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab	945	58											Page 1 of	_2_
Batch No. MA	/ s	AR/WR No.		,	,							AR/COC	613	956
Dept. No./Mail Stop:	6234/0718	Date Sample	s Shipped	1/12	112	SMO USE	Contrac	t No:		PO 69143	3	Waste Characterization	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	and sector of the sector
Project/Task Manager:	Alicia Aragon	Carrier/Wayb	ill No.	13	612	7	Project/	Task No.:	:	98026.01.	12	RCRA Date=		
Project Name:	SWMU 8/68 GW Char	Lab Contact:		Edie Kent/80	NAME OF TAXABLE PARTY.	and the second se	SMO A	uthorizatio		1. 44		Send:Preliminary/report to	, ,	
Record Center Code:	ER/1267 074/DAT	Lab Destinati	ion:	GEL						4-6-6	SmO	Validation Required	0.000	
Logbook Ref. No .:	ER 049	SMO Contac	t/Phone:	Lorraine Her	rera /505-	844-3199	1	GEIS	BOTTL	EORPO	R	Released by COC No.:		
Service Order No.	CFO# 0262-12	Send Report	to SMO:									Bill To: Sandia National Lat	os (Accounts F	avable)
Location	Tech Area						1		640 mm			P.O. Box 5800, MS		-,,
Building	Room			Ref	Reference LOV(ava			at SMC	) 293951		5/	Albuquerque, NM		
Sample NoFraction	ER Sample ID or Sample Location De		ER Site No.		ne(hr)	Sample Matrix		ntainer		Collection	Sample Type	Parameter & Met Requested		Lab Sample
/ 091610 -001 /	SWMU 8/58-SA3	N/A	N/A	1/12/12	8:53	GW	G	3x40ml	HCL	G	SA	TCL VOC (SW846-8260)	B)	
1091610 -002	SWMU 8/58-SA3	N/A	N/A	1/12/12	8:55	GW	AG	4x1L	4C	G	SA	TCL SVOC (SW846-827)	0C)	
091610 -009 -	SWMU 8/58-SA3	N/A	N/A	1/12/12	8:56	GW	Р	500 ml	HNO3	G	SA	TAL Metals + Ur (SW846-60	)10/6020/7470	)
√091610 -016 <sup>&lt;</sup>	SWMU 8/58-SA3	N/A	N/A	1/12/12	8:57	GW	Р	125 ml	4C	G	SA	Anions (SW846-9056)		
¥ 091610 -017 -	SWMU 8/58-SA3	N/A	N/A	1/12/12	8:58	FGW	Р	250 ml	HNO3	G	SA	Cations (SW846-6020)		
. 091610 -018 -	SWMU 8/58-SA3	N/A	N/A	1/12/12	8:59	GW	Р	125 ml	H2SO4	G	SA	NPN (353.2)		
091610 -020 /	SWMU 8/58-SA3	N/A	N/A	1/12/12	9:00	GW	Р	250 ml	4C	G	SA	Perchlorate (314.0) *	-	
091610 -022	SWMU 8/58-SA3	N/A	N/A	1/12/12	9:01	GW	Р	500 ml	4C	G	SA	Alkalinity (SM2320B)		
091610 -024 -	SWMU 8/58-SA3	N/A	N/A	1/12/12	9:03	GW	AG	4x1L	4C	G	SA	HE (SW846-8321A)		
091610 -027 /	SWMU 8/58-SA3	N/A	N/A	1/12/12	9:04	GW	Р	250 ml	NaOH	G	SA	Total Cyanide (SW846-9	012)	
RMMA	Yes 🗸 No	Ref. No.		Sample Tra	cking		SMO U	se	Special	Instruction	ns/QC Rec	uirements:	Abnormal C	onditions
Sample Disposal	Return to Client	✓ Disposal by la	ab	Date Entered	l(mm/dd/y	N) 011	17/1	2-	EDD		V Yes	No No	on Receipt	
Turnaround Time	7 Day *	15 Day * 🗸	30 Day	Entered by:	RK	<u> </u>			Raw Da	ta Packag	Yes	🗹 No		
Return Samples E	By:		Negoti	ated TAT		QC inits	WH	2	*Send/e	-mail repo	rt to:			
Sample	Name	/ Şignature	1	Init	Compan	y/Organiz	ation/Ph	one	Tim Jac	kson/ORG	. 4142/MS	.0729/ 284-2547		
	Robert Lynch	FEETLAC	h	JEL	SNL/414	2/844-40	13/250-7	090	FGW (F	iltered in fi	eld w/40 m	icron filter)		
	Alfred Santillanes	Hel Boot	la	6A	SNL/414	2/844-513	30/228-0	710	Anions (	Br,CI,F,SO	4)			
	William J. Gibson	Millienthe	BJ.	WIEK	SNL/414	2/844-40	13/239-7	367	Cations	(Ca,Mg,K,	Na)			
	Gilbert Quintana	Gry Like 2	1.	1910	SNL/414	12/844-250	07		Alkalinit	y (total,bica	rbonate,ca	rbonate)		
	A a land the survey of the								*Please	list as sep	arate repo	ort.		
1.Relinquished by	Houl Sali	Org. 414	z Date (	12/12Time	1040	2	4.Reline	quished b	y		Org.	Date	Time	5
1. Received by	Blig. la	5 mic Org. 414	2 Dates	12/12Time	104		4. Rece	ived by		24 A 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	Org.	Date	Time	>
2.Relinquished by	Phy a VI			12 Fime	114		5.Reline	quished b	У		Org.	Date	Time	3
2. Received by	y rocar	Org.	Date /	Time			5. Rece	ived by			Org.	Date	Time	•
3.Relinquished by		Org.	Date	Time		11.55	6.Relind	quished b	у		Org.	Date	Time	3
3. Received by		Org.	Date	Time			6. Rece	ived by			Org.	Date	Time	*

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

# RACT LABORATORY

# Analysis Request And Chain Of Custody (Continuation)

													Page 2 of 2
						-						AR/COC-	613956
Project Name:	SWMU 8/68 GW Char	Project/Task M	anger:	Alicia Aragon				Project/Task	No.:	98026.01.12			
Building	Room			Refer	ence L	OV (av	ailat	ole at S	MO)				Lab use
Sample No- Fraction	ER Sample ID or Sample Location detail	Beginning Depth (ft)		Date/Tin Collect	ne (hr)	Sample Matrix		ntainer Volume	Preserv- ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
/091610 -033 -	SWMU 8/58-SA3	N/A	N/A	1/12/12	9:05	GW	P	1 L	HNO3	G		Gamma Spec (short list)(901.0)	
✓ 091610 -034 <i>∽</i>	SWMU 8/58-SA3	N/A	N/A	1/12/12	9:07	GW	Р	1 L	HNO3	G	SA	Gross Alpha/Beta (900.0)	
1091610 -035 -	SWMU 8/58-SA3	N/A	N/A	1/12/12	9:08	GW	Р	1 L	HNO3	G	SA	Isotopic Ur (ASTM D3972-09M)	
091611 -001-	SWMU 68-TB1	N/A	N/A	1/12/12	8:53	DIW	G	3x40ml	HCL	G	тв	VOC (SW846-8260B)	
091612 -001 -	SWMU 68-FB1	N/A	N/A	1/12/12	8:46	DIW	G	3x40ml	HCL	G	FB	VOC (SW846-8260B)	
		!											
		1										* If perchlorate detected, perform	
												verification analysis SW846-6850M	
	1		-			-							
		1											
	5. 												
				5					10				
Abnormal Condition	ns on Receipt												

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab													Page <u>1</u> of <u>2</u>	_
Batch No. NA	- SAR	/WR No.		1	1							AR/COC	6139	952
Dept. No./Mail Stop:	6234/0718	Date Sample	s Shipped:	1/9	112	SMO USE	Contrac	t No:		PO 69143	6	Waste Characterization		
Project/Task Manager:	Alicia Aragon	Carrier/Wayb	ill No.	13	605			Task No.		98026.01.	13	RCRA Date=		-
Project Name:	SWMU 68 GWC	Lab Contact:		Edie Kent/803	-556-817	1		thorizatio		16 6 .	D	Send:Preliminary/report to		
Record Center Code:	ER/1267 074/DAT	Lab Destinati		GEL			1			a 7. 6	sa_	Validation Required		
Logbook Ref. No.:	ER 049	SMO Contac	1990)	Lorraine Herre	ara /505-8	344-3199	66	To do	TIT	. 9	mo	Released by COC No.:		
Service Order No.	CFO 263-12	Send Report		Longino Hone			1 70	- 00	" On	eron		Bill To: Sandia National Labs	Accounte P	avable)
Location	Tech Area		to onto.									P.O. Box 5800, MS		ayable)
Building	Room			Pofe	roncol	_OV(ava	ailabla	at SMC	2	936.	21.	Albuquerque, NM.		
Duilding	ER Sample ID or	Beginning	ER Site	Date/Tim		Sample				Collection	Sample	Parameter & Meth	. Provide the stand with the resource	Lab Sample
Sample NoFraction		Depth (ft)	No.	Collect		Matrix	Туре		All@4C		Type	Requested	iou	ID ID
1/201000 001/				N	1.1									
091600001 1	SWMU 68-SA1	N/A	N/A	1/9/12	9:02	GW	G	3x40ml	HCL	G	SA	TCL VOC (SW846-8260B	)	
1 091600002 1	SWMU 68-SA1	N/A	N/A	1/9/12	9:05	GW	AG	4x1L	4C	G	SA	TCL SVOC (SW846-8270	C) -	
· 091600009 ·	SWMU 68-SA1	N/A	N/A	1/9/12	9:06	GW	Р	500 ml	HNO3	G	SA	TAL Metals + Ur (SW846-60*	10/6020/7470)	) 
091600014 -	SWMU 68-SA1	N/A	N/A	1/9/12	9:07	GW	Р	250 ml	4C	G	SA	Hexavalent Chromium (SW8	46-719)	14.114
091600016	SWMU 68-SA1	N/A	N/A	1/9/12	9:08	GW	Р	125 ml	4C	G	SA	Anions (SW846-9056)		
091600017 -	SWMU 68-SA1	N/A	N/A	1/9/12	9:09	FGW	Р	250 ml	HNO3	G	SA	Cations (SW846-6020)		1997 (A.1
• / <sub>091600018</sub> -	SWMU 68-SA1	N/A	N/A	1/9/12	9:10	GW	Р	125 ml	H2SO4	G	SA	NPN (353.2)		
/091600020 -	SWMU 68-SA1	N/A	N/A	1/9/12	9:11	GW	Р	250 ml	4C	G	SA	Perchlorate (314.0)		
091600022	SWMU 68-SA1	N/A	N/A	1/9/12	9:12	GW	Р	500 ml	4C	G	SA	Alkalinity (SM2320B)		
091600024	SWMU 68-SA1	N/A	N/A	1/9/12	9:14	GW	AG	4x1L	4C	G	SA	HE (SW846-8321A)		
RMMA	🗌 Yes 🗹 No 🛛 R	ef. No.		Sample Trac	king		SMO U	se	Special	Instructio	ns/QC Red	quirements:	Abnormal C	onditions
Sample Disposal	Return to Client	Disposal by I	ab	Date Entered	(mm/dd/y	y) OI/I	nliz		EDD		✓ Yes	i 🗆 No	on Receipt	54 ( <u>)</u> 11
Turnaround Time	and the second			Entered by:	RIC		71-		Raw Da	ta Packag	🗆 Yes	s 🗹 No		
Return Samples I				ated TAT		QC inits.	LH	2019 - E.M.	*Send/e	-mail repo	rt to:		8	
Sample	Name	Signature		Init	Compan	y/Organiz		one				.0729/ 284-2547		3 1. (A) - E
Cumpio		altyn				2/844-401		and the second se	If Perch	lorate deter	cted.perfor	m verification analysis SW846	-6850M	관 관계 여
		InBata		1 million		2/844-513				(- <del>CI,SO4)</del> 1				- 50 N. 5
	V11.0	11 17	TA	1 AL		2/844-401			-	(Ca,Mg,K,		, - (		1.00
	William J. Gibson 14/1111 William JSUL 1						13/239-1	507	Some Harris	그럼 모두 걸 다 정말하면		-thomato)		
									- 100 Contraction	ty (total,bica		and show that the second se		
1.Relinguished by	elinquished by Alfart SatelOrg. 4/42 Date (				1100	<u>,                                     </u>	4 Relino	uished b		e list as sep	Org.	Date	Time	
1. Received by		W Org. 414			1100		4. Rece				Org.	Date	Time	
2.Relinquished by		10 mg. 414			12.0			uished b	y		Org.	Date	Time	
2. Received by	Vi u cue n	Org.	Date	Time			5. Rece	and the second s	A		Org.	Date	Time	
3.Relinquished by		Org.	Date	Time				uished b	y		Org.	Date	Time	
3. Received by		Org.	Date	Time			6. Rece				Org.	Date	Time	
													10 CONTRACT 11 CON	

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

# **RACT LABORATORY**

Analysis Request And Chain Of Custody (Continuation)

												AR/COC-	613952
Project Name: Location	SWMU 68 GWC Tech Area	Project/Task M	langer:	Alicia Aragon	9			Project/Task	No.:	98026.01.13			
	Room			Refere	ence L	OV (av	ailat	ole at S	MO)				Lab use
Sample No- Fraction	ER Sample ID or Sample Location detail	Beginning Depth (ft)		Date/Tin Collec		Sample Matrix	Со Туре	ntainer Volume	Preserv- ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
/091600027 /	SWMU 68-SA1	N/A	N/A	1/9/12	9:15	GW	Р	250 ml	NaOH	G	SA	Total Cyanide (SW846-9012)	
091600033 -	SWMU 68-SA1	N/A	N/A	1/9/12	9:16	GW	Р	1 L	HNO3	G	SA	Gamma Spec (short list)(901.0)	
091600034 -	SWMU 68-SA1	N/A	N/A	1/9/12	9:17	GW	Р	1L	HNO3	G	SA	Gross Alpha/Beta (900.0)	
091600035 /	SWMU 68-SA1	N/A	N/A	1/9/12	9:18	GW	Р	1 L	HNO3	G	SA	Isotopic Ur (ASTM D3972-09M)	
J091601001-	SWMU 68-TB1	N/A	N/A	1/9/12	9:02	DIW	G	3x40ml	HCL	G	ТВ	VOC (SW846-8260B)	
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Abnormal Condition	ns on Receipt												
Recipient Initials													

Page 2 of 2

# RACT LABORATORY

# Analysis Request And Chain Of Custody (Continuation)

Page 2 of 2

												AR/COC-	613953
Project Name:	SWMU 68 GWC	Project/Task M	langer:	Alicia Aragon				Project/Task	No.:	98026.01.13			
Location	Tech Area												
Building	Room			Refere	ence L			ole at S					Lab use
Sample No- Fraction	ER Sample ID or Sample Location detail	Beginning Depth (ft)	ER Site No.	Date/Tin Collec		Sample Matrix	Со Туре	ntainer Volume	Preserv- ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
091602027 -	SWMU 68-EB1	N/A	N/A	1/9/12	10:22	DIW	P	250 ml	NaOH	G	EB	Total Cyanide (SW846-9012)	
J <sub>091602-</sub> -033 ~	SWMU 68-EB1	N/A	N/A	1/9/12	10:23	DIW	Р	1L	HNO3	G	EB	Gamma Spec (short list)(901.0)	
091602034 /	SWMU 68-EB1	N/A	N/A	1/9/12	10:24	DIW	P	1 L	HNO3	G	EB	Gross Alpha/Beta (900.0)	
091602035/	SWMU 68-EB1	N/A	N/A	1/9/12	10:25	DIW	Р	1 L	HNO3	G	EB	Isotopic Ur (ASTM D3972-09M)	
091603-001-	SWMU-68-TB2-	-N/A	N/A	4/9/12		<del>DIW</del>	-G	3x40ml	HCL	G		<del>VOC (SW846-8260B</del> )	
	Ť			1								SEE COC	
												613952 FOR	
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Abnormal Conditio	ns on Receipt	1	1			1				1			-harmanna
Recipient Initials													

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

	Internal Lab													Page <u>1</u> of <u>2</u>	
	Batch No. N/A	SAR/	WR No.		1 1	/							AR/COC	6139	953
	Dept. No./Mail Stop:	6234/0718	Date Sample	s Shipped:	191	12	SMO USE	Contract	No:	<u> </u>	PO 691436	3	Waste Characterization	-	
	Project/Task Manager:	Alicia Aragon	Carrier/Wayb	ill No.	136	059	9	Project/	ask No.		98026.01.1		RCRA Date=		1
	Project Name:	SWMU 68 GWC	Lab Contact:	a constant a la constant a	Edie Kent/80	The second s			thorizatio		1.4.1	0	Send:Preliminary/report to		
		ER/1267 074/DAT	Lab Destinati	00.	GEL					- 4	2 .	Curre	Validation Required		
		ER 049	SMO Contact		Lorraine Herr	era /505-8	44-3199	58	r An	THE	Khan	Smo	Released by COC No.:		
		CFO 263-12	Send Report		Lonano rion		110100		DOU	100 0	MOR		Bill To: Sandia National Labs	Accounte P	avable)
		Tech Area		to onto.									P.O. Box 5800, MS		ayable)
					Def		01//01/0	lable						AND AND STREET	1
2	Building	Room ER Sample ID or	Deciminal	ER Site		erence L					0-11-11-1	Comula	Albuquerque, NM.	and the second second second second	
	Sample NoFraction	Sample Location Detail	Beginning Depth (ft)	No.	Collec		Sample Matrix	Type		All@4C	Collection Method	Sample Type	Parameter & Meth Requested	iod	Lab Sample
	7				+										
1	091602001 -	SWMU 68-EB1	N/A	N/A	1/9/12	10:10	DIW	G	3x40ml	HCL	G	EB	TCL VOC (SW846-8260B	)	
•	Ø 91602002 /	SWMU 68-EB1	N/A	N/A	1/9/12	10:12	DIW	AG	4x1L	4C	G	EB	TCL SVOC (SW846-8270	C)	1.14
1	<i>0</i> 91602009 ′	SWMU 68-EB1	N/A	N/A	1/9/12	10:13	DIW	Р	500 ml	HNO3	G	EB	TAL Metals + Ur (SW846-602	20/7470)	
•	v91602014 /	SWMU 68-EB1	N/A	N/A	1/9/12	10:14	DIW	Р	250 ml	4C	G	EB	Hexavalent Chromium (SW8	46-719)	N 18 SA
1	091602016	SWMU 68-EB1	N/A	N/A	1/9/12	10:15	DIW	Р	125 ml	4C	G	EB	Anions (SW846-9056)	+	
	J091602017 /	SWMU 68-EB1	N/A	N/A	1/9/12	10:16	FDIW	Р	250 ml	ниоз	G	EB	Cations (SW846-6020)		
1	091602018 /	SWMU 68-EB1	N/A	N/A	1/9/12	10:17	DIW	Р	125 ml	H2SO4	G	EB	NPN (353.2)		
	/														
•	091602020 /	SWMU 68-EB1	N/A	N/A	1/9/12	10:18	DIW	Р	250 ml	4C	G	EB	Perchlorate (314.0)		
'	0 91602022 -	SWMU 68-EB1	N/A	N/A	1/9/12	10:19	DIW	P	500 ml		G	EB	Alkalinity (SM2320B)		2.41
0	091602024	SWMU 68-EB1	N/A	N/A	1/9/12	10:21	DIW	AG	4x1L	4C	G	EB	HE (SW846-8321A)		1.50000
	RMMA	🗌 Yes 🗹 No Re	ef. No.		Sample Trac	king		,SMO US	e	Special	Instructio	ns/QC Rec	quirements:	Abnormal C	onditions
	Sample Disposal	Return to Client	Disposal by la									Yes	□ No	on Receipt	한 것 가지요?
	<b>Turnaround Time</b>	□ 7 Day * □ 15	Day*	30 Day	Entered by:	RK		1	Set Ger	Raw Da	ta Packag	🗌 Yes	☑ No		영향 전 문문
	Return Samples E	3v:		Negoti	ated TAT	1	QC inits.	LH	2 E 1 F	*Send/e	-mail repo	rt to:	*		
	Sample	Name	/ Signature		Init	Company	y/Organiza		one	Tim Jac	kson/ORG	. 4142/MS	.0729/ 284-2547		가 좀 있는
		Robert Lynch	Mars	2	RU		2/844-401			If perchi	orate detec	ted perform	n verification analysis SW846	-6850M	
		Alfred Santillanes	HIC 1	11	litte	SNI /414	2/844-513	30/228-0	710				F, 504		
			11 19	TA	MATAL		2/844-401			4	(Ca,Mg,K,		- , 1		
		William J. Gibson 74/2	marga	MJ_	100 PA	5110414	2/044-401	51255-1			Second Second Second		the motor (		
											y (total,bica				
	A Defension to the	Aller	E DUIL	lat			1 Deline	wished h		list as se	_	Date	Time		
	1.Relinquished by	Alfre Satile			9/12 Time	1105			uished b	y	-	Org.			
	1. Received by		0 Org. 414			1105		4. Rece				Org.	Date	Time	
	2.Relinquished by L	Mgy gm	100 rg. 4/9			120	5		uished b	у		Org.	Date	Time	
	2. Received by		Org.	Date	Time			5. Rece		_		Org.	Date	Time	
	3.Relinquished by		Org.	Date	Time				uished b	y		Org.	Date	Time	1
	3. Received by		Org.	Date	Time			6. Rece	ived by			Org.	Date	Time	<u>.                                    </u>

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

SF 2001-COC (7/00)

# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab													Page 1 of	2
Batch No. NA	- SAR	/WR No.		1 1	1							AR/COC	613	954
Dept. No./Mail Stop:	6234/0718	Date Sample	s Shipped	LIN	12		Contrac	t No:		PO 69143	3	Waste Characterization		
Project/Task Manager:	Alicia Aragon	Carrier/Wayb	ill No.	136	074	P	Project/	Task No.:		98026.01.1	31	RCRA Date=		
Project Name:	SWMU 68 GW Char	Lab Contact:		Edie Kent/803	3-556-817	1			on:	14	1	Send:Preliminary/report to		
Record Center Code:	ER/1267 074/DAT	Lab Destinat	on:	GEL			1			min	Smo	Validation Required		
Logbook Ref. No .:	ER 049	SMO Contac	t/Phone:	Lorraine Herr	era /505-8	844-3199	5	TT R	ATTLE	ONON	7000	Released by COC No.:		
Service Order No.	CFO# 0263-12	Send Report	to SMO:				1	0 0	04-0	01-4010		Bill To: Sandia National Lab	s (Accounts P	avable)
Location	Tech Area											P.O. Box 5800, MS		
Building	Room			Refe	erence l	_OV(av	ailable	at SMC	) 29	13716	•	Albuquerque, NM		
	ER Sample ID or	Beginning	ER Site	Date/Tim	ne(hr)	Sample				Collection	Sample	Parameter & Met		Lab Sample
Sample NoFraction	Sample Location Detail	Depth (ft)	No.	Collec	ted	Matrix	Туре	Volume	All@4C	Method	Туре	Requested		ID
091604 -001 -	SWMU 68-SA2	N/A	N/A	1/10/12	8:57	GW	G	3x40ml	HCL	G	SA	TCL VOC (SW846-8260E	3)	
1														
091604 -002	SWMU 68-SA2	N/A	N/A	1/10/12	9:00	GW	AG	4x1L	4C	G	SA	TCL SVOC (SW846-8270	)C)	and the second
/ 091604 -009 /	SWMU 68-SA2	N/A	N/A	1/10/12	9:02	GW	Р	500 ml	HNO3	G	SA	TAL Metals + Ur(SW846-	6010/6020/7	/470)
J 091604 -014 /	SWMU 68-SA2	N/A	N/A	1/10/12	10:03	GW	Р	250 ml	4C	G	SA	Hexavalent Chromium (S	W846-7196	A)
091604 -016	SWMU 68-SA2	N/A	N/A	1/10/12	9:04	GW	Р	125 ml	4C	G	SA	Anions (SW846-9056)	Br, CL, F, S	04
/ 091604 -017 /	SWMU 68-SA2	N/A	N/A	1/10/12	9:05	FGW	Р	250 ml	HNO3	G	SA	Cations (SW846-6020)		
√ 091604 -018 <b>′</b>	SWMU 68-SA2	N/A	N/A	1/10/12	9:06	GW	Р	125 ml	H2SO4	G	SA	NPN (353.2)	a	
/091604 -020 /	SWMU 68-SA2	N/A	N/A	1/10/12	9:07	GW	Р	250 ml	4C	G	SA	Perchlorate (314.0)	1	
091604 -022 1	SWMU 68-SA2	N/A	N/A	1/10/12	9:08	GW	Р	500 ml	4C	G	SA	Alkalinity (SM2320B)		
091604 -024	SWMU 68-SA2	N/A	N/A	1/10/12	9:10	GW	AG	4x1L	4C	G.	SA	HE (SW846-8321A)		
RMMA	🗌 Yes 🗹 No 🛛 F	Ref. No.		Sample Trac	king		,SMO U	se	Special	Instructio		quirements:	Abnormal C	onditions
Sample Disposal	Return to Client	Disposal by I	ab	Date Entered	l(mm/dd/y	y) 01/	11/1	12	EDD		🗹 Yes	s 🗆 No	on Receipt	말 한다. 사람을
Turnaround Time	e □ 7 Day* □ 15	5 Day * 🗹	30 Day	Entered by:	RIL	1.1	1	日本語	Raw Da	ita Packag	🗌 Yes	s 🗹 No		
Return Samples	By:	Π	Negoti	ated TAT	1	QC inits	. UV		*Send/e	-mail repo	rt to:			
Sample	Name	Signature		Iniț	Compan	y/Organiz	ation/Ph	one	Tim Jac	kson/ORG	. 4142/MS	<u>.0729/ 284-2547</u>		
	Robert Lynch	Mynce	-	RC	SNL/414	2/844-40	13/250-7	090	FGW (I	Filtered in fi	eld w/40 m	nicron filter)		
	Alfred Santillanes	al Sala	they	INE	SNL/414	2/844-51	30/228-0	710	If perch	lorate detec	ted perform	m verification analysis SW846	6-6850M	
	William J. Gibson	Maria	.017	UNS	SNL/414	2/844-40	13/239-7	367		(Ca,Mg,K				
		a config	and	po pa					Alkalinit	y (total,bica	arbonate.ca	arbonate)		
	1100 000			1	1				-	list as se				
1.Relinguished by	Hundsgatie	Org. 4/4	Z_Date	MaTime	100	2	4.Reline	uished b			Org.	Date	Time	e
1. Received by		n/200rg. 4/4			100		4. Rece	ived by			Org.	Date	Time	a
2.Relinquished by		Org. 4/1			113			uished b	by		Org.	Date	Time	9
2. Received by	1112	Org.	Date	Time			5. Rece				Org.	Date	Time	9
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\*7 & 15 Day Turnaround Time: ERCL requires prior notification.

# RACT LABORATORY

# Analysis Request And Chain Of Custody (Continuation)

Page 2 of 2

A D/000

_													AR/COC-	61395
P	Project Name:	SWMU 68 GW Char	Project/Task M	langer:	Alicia Aragon				Project/Task	No.:	98026.01.13			
	Location	Tech Area												
	Building	Room					OV (av		ole at S	MO)				Lab use
~	Sample No- Fraction	ER Sample ID or Sample Location detail	Beginning Depth (ft)	ER Site No.	Date/Tim Collec		Sample Matrix	Со Туре	ntainer Volume	Preserv- ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Samp ID
1	J 091604 -027 1	SWMU 68-SA2	N/A	N/A	1/10/12	9:11	GW	Р	250 ml	NaOH	G	SA	Total Cyanide (SW846-9012)	
	1091604 -033 -	SWMU 68-SA2	N/A	N/A	1/10/12	9:13	GW	Р	1L	HNO3	G	SA	Gamma spec (short list)(901.0)	
	091604 -034 -	SWMU 68-SA2	N/A	N/A	1/10/12	9:14	GW	Р	1L	HNOA	G	SA	Gross Alpha/Beta (900.0)	
	J 091604 -035 1	SWMU 68-SA2	N/A	N/A	1/10/12	9:16	GW	Р	1L	HNOR	G	SA	Isotopic Ur (ASTM D3972-09M)	
	1 091605 -001 -	SWMU 68-SA3	N/A	N/A	1/10/12	8:57	GW	G	3x40ml	HCL	G	DU	TCL VOC (SW846-8260B)	
	1 091605 -002 -	SWMU 68-SA3	N/A	N/A	1/10/12	9:00	GW	AG	4x1L	4C	G	DU	TCL SVOC (SW846-8270C)	
	<sup>7</sup> 091605 -009 ~	SWMU 68-SA3	N/A	N/A	1/10/12	9:02	GW	Р	500 ml ,	HNO3	G	DU	TAL Metals + Ur (SW846-6020/7470)	
	1 091605 -014 1	SWMU 68-SA3	N/A	N/A	1/10/12	9:03	GW	Р	250 ml	4C	G	DU	Hexavalent Chromium (SW846-719)	
	√ 091605 -016 <i>′</i>	SWMU 68-SA3	N/A	N/A	1/10/12	9:04	GW	Р	125 ml	4C	G	DU	Anions (SW846-9056) Br, CI, F,	504
Ì	<sup>J</sup> 091605 -017 (	SWMU 68-SA3	N/A	N/A	1/10/12	9:05	FGW	Р	250 ml	HNO3	G	DU	Cations (SW846-6020)	
	√ 091605 -018 /	SWMU 68-SA3	N/A	N/A	1/10/12	9:06	GW	Р	125 ml	H2SO4	G	DU	NPN (353.2)	
	√ 091605 -020 -	SWMU 68-SA3	N/A	N/A	1/10/12	9:07	GW	Р	250 ml	4C	G	DU	Perchlorate (314.0)	
	√,091605 -022 /	SWMU 68-SA3	N/A_	N/A	1/10/12	9:08	GW	P	500 ml	4C	G	DU	Alkalinity (SM2320B)	
	091605 -024 1	SWMU 68-SA3	N/A	N/A	1/10/12	9:10	GW	AG	4x1L	4C	G	DU	HE (SW846-8321A)	
	1 091605 -027 1	SWMU 68-SA3	N/A	N/A	1/10/12	9:11	GW	Р	250 ml	NaOH	G	DU	Total Cyanide (SW846-9012)	
	√ 091605 -033 <i>×</i>	SWMU 68-SA3	N/A	N/A	1/10/12	9:13	GW	P	1L	HNO3	G	DU	Gamma spec (short list)(901.0)	
	J 091605 -034 /	SWMU 68-SA3	N/A	N/A	1/10/12	9:14	GW	Р	1L	HNO3	G	DU	Gross Alpha/Beta (900.0)	
	J 091605 -035 /	SWMU 68-SA3	N/A	N/A	1/10/12	9:16	GW	Р	1L	HNO3	G	DU	Isotopic Ur (ASTM D3972-09M)	
[	√091606 -001 <sup>✓</sup>	SWMU 68-TB3	N/A	N/A	1/10/12	8:57	DIW	G	3x40ml	HCL	G	ТВ	VOC (SW846-8260B)	ļ
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# CONTRACT LABORATORY ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

	Internal Lab												Pa	age 1 of 2	2
	Batch No. NIA	SAR	/WR No.										AR/COC	6139	55
	Dept. No./Mail Stop:	6234/0718	Date Samples	Shipped:	Tute	2 10	SMO USE	Contract	t No:		PO 691436	3	Waste Characterization		
	Project/Task Manager:	Alicia Aragon	Carrier/Waybi		1360			Project/	Task No.		98026.01.1		RCRA Date=		
	Project Name:	SWMU 68 GW Char	Lab Contact:		Edie Kent/803		1	SMO AL	thorizatio	10:00	1, 6, 1		Send:Preliminary/report to		
	Record Center Code:	ER/1267 074/DAT	Lab Destinatio	on:	GEL							MO	Validation Required		
	Logbook Ref. No .:	ER 049	SMO Contact	Phone:	Lorraine Herre	era /505-8	44-3199						Released by COC No.:		
	Service Order No.	CFO# 0263-12	Send Report	o SMO:				500	1 001	TIS	ORDOR		Bill To: Sandia National Labs	(Accounts Pa	yable)
	Location	Tech Area						100			0.202	2	P.O. Box 5800, MS-0	0154	
	Building	Room			Refe	erence L	-OV(ava	ailable	at SMC	) 4	9383	8	Albuquerque, NM., 8	87185-0154	
		ER Sample ID or	Beginning	ER Site	Date/Tim		Sample				Collection	Sample	Parameter & Metho	od I	ab Sample
	Sample NoFraction	Sample Location Detail	Depth (ft)	No.	Collect	ted	Matrix	Туре	Volume	All@4C	Method	Туре	Requested		ID
	091607 -001	SWMU 68-SA4	N/A	N/A	1/11/12	8:54	GW	G	3x40ml	HCL	G	SA	TCL VOC (SW846-8260B)		
0	091607 -002 -	SWMU 68-SA4	N/A	N/A	1/11/12	8:56	GW	AG	4x1L	4C	G	SA	TCL SVOC (SW846-8270C	;)	
	091607 -009 -	SWMU 68-SA4	N/A	N/A	1/11/12	8:58	GW	Р	500 ml	HNO3	G	SA	TAL Metals + Ur(SW846-6010	/6020/7470)	
1	/ 091607 -014 -	SWMU 68-SA4	N/A	N/A	1/11/12	8:59	GW	Р	250 ml	4C	G	SA	Hexavalent Chromium (SW	/846-7196A)	
,	J 091607 -016 -	SWMU 68-SA4	N/A	N/A	1/11/12	9:00	GW	Р	125 ml	4C	G	SA	Anions (SW846-9056)		
4	J 091607 -017 -	SWMU 68-SA4	N/A	N/A	1/11/12	9:01	FGW	Р	250 ml	HNO3	G	SA	Cations (SW846-6020)		
٠	√ 091607 -018 ×	SWMU 68-SA4	N/A	N/A	1/11/12	9:03	GW	Р	125 ml	H2SO4	G	SA	NPN (353.2)		
4	J091607 -020 -	SWMU 68-SA4	N/A	N/A	1/11/12	9:04	GW	Р·	250 ml	4C	G	SA	Perchlorate (314.0) *		
,	091607 -022 -	SWMU 68-SA4	N/A	N/A	1/11/12	9:05	GW	P-	500 ml	4C	G	SA	Alkalinity (SM2320B)		
	/091607 -024 /	SWMU 68-SA4	N/A	N/A	1/11/12	9:06	GW	AG	4x1L	4C	G		HE (SW846-8321A)		
	RMMA	🗌 Yes 🗹 No 🛛 F	lef. No.		Sample Trac		= 15. j.	SMO US		Special	Instructio		• · · · · · · · · · · · · · · · · · · ·	bnormal Co	nditions
	Sample Disposal	Return to Client	Disposal by la	ıb	Date Entered	(mm/dd/y	y) 09/	12/1	2	EDD		🗹 Yes		n Receipt	
	<b>Turnaround Time</b>	□ 7 Day * □ 15	5 Day * 🗹	30 Day	Entered by:	RK		1994 - 10 <sup>0</sup>		Raw Da	ta Packag	□ Yes	✓ No		ed as d
	<b>Return Samples E</b>	By:		Negoti	ated TAT		QC inits				e-mail repo				
	Sample	Name	Signature		Init		y/Organiz			-			.0729/ 284-2547		
		Robert Lynch	20141	en	PL	SNL/414	2/844-40	13/250-7	090				icron filter)		
		Alfred Santillanes	pil 5 pl	H.	the	SNL/414	2/844-51	30/228-0	710				F, 504 RK 1-11-12		a data Teriy
		William J. Gibson	Multhe	11	WYS		2/844-40		367	Cations	(Ca,Mg,K,	Na)			
		Gilbert Quintana	Ur zount	na .	way	SNL/414	2/844-25	07		Alkalinit	y (total,bica	arbonate,ca	arbonate)		Sheef 1
		And 1								-	list as sep				3.131.1851
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\*7 & 15 Day Turnaround Time: ERCL requires prior notification.

# RACT LABORATORY

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# Analysis Request And Chain Of Custody (Continuation)

Page 2 of 2

613955 AR/COC-Project Name: SWMU 68 GW Char Project/Task Manger: Alicia Aragon Project/Task No.: 98026.01.13 Location Tech Area Reference LOV (available at SMO) Building Room Lab use Sample No- Fraction Date/Time (hr) ER Sample ID or ER Container Beginning Sample Collection Sample Parameter & Method Preserv-Lab Sample Sample Location detail Depth (ft) Site No. Collected Matrix Volume Type Method ative Type Requested ID 091607 -027 -SWMU 68-SA4 Ρ Total Cyanide (SW846-9012) N/A N/A 1/11/12 9:07 GW 250 ml NaOH G SA J 091607 -033 -SWMU 68-SA4 N/A N/A GW Ρ G SA Gamma Spec (short list)(901.0) 1/11/12 9:08 1 L HNO3 091607 -034 ~ SWMU 68-SA4 Ρ Gross Alpha/Beta (900.0) N/A N/A 1/11/12 9:09 GW 1 L HNO3 G SA 091607 -035 / J SWMU 68-SA4 P N/A N/A GW G Isotopic Ur (ASTM D3972-09M) 1/11/12 9:10 1 L HNO3 SA 091608 -001 -SWMU 68-TB4 G VOC (SW846-8260B) N/A N/A 1/11/12 8:54 DIW 3x40ml HCL G TB at .... v 091609 --001~ SWMU 68-FB1 N/A N/A 1/11/12 DIW G 3x40ml HCL G FB VOC (SW846-8260B) 0848 \* if perchlorate detected use verification analysis.SW846-6850M Abnormal Conditions on Receipt Recipient Initials

Appendix C Data Validation Sample Findings Summary Sheets for SWMUs 8/58 and 68 Groundwater Monitoring Data AR/COC: 613958

Sample Findings Summary



Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
DOE EML HASL-300, U-02-RC			
	091615-035/SWMU 8/58-SA1	Uranium-235/236 (13982-70-2)	BD, FR3
	091616-035/SWMU 8/58-SA2	Uranium-233/234 (N/A)	J+, IS2
	091616-035/SWMU 8/58-SA2	Uranium-235/236 (13982-70-2)	BD, FR3
	091616-035/SWMU 8/58-SA2	Uranium-238 (7440-61-1)	J+, IS2
EPA 901.1			
	091615-033/SWMU 8/58-SA1	Americium-241 (14596-10-2)	BD, FR3
	091615-033/SWMU 8/58-SA1	Cesium-137 (10045-97-3)	BD, FR3
	091615-033/SWMU 8/58-SA1	Cobalt-60 (10198-40-0)	BD, FR3
	091615-033/SWMU 8/58-SA1	Potassium-40 (13966-00-2)	BD, FR3
	091616-033/SWMU 8/58-SA2	Americium-241 (14596-10-2)	BD, FR3
	091616-033/SWMU 8/58-SA2	Cesium-137 (10045-97-3)	BD, FR3
	091616-033/SWMU 8/58-SA2	Cobalt-60 (10198-40-0)	BD, FR3
	091616-033/SWMU 8/58-SA2	Potassium-40 (13966-00-2)	BD, FR3
SW846 3005/6020 DOE-AL			
	091615-009/SWMU 8/58-SA1	Nickel (7440-02-0)	UJ, B4
	091615-009/SWMU 8/58-SA1	Thallium (7440-28-0)	0.0032U, B3
	091616-009/SWMU 8/58-SA2	Nickel (7440-02-0)	UJ, B4
SW846 3535/8321A Modifie	d		
	091615-024/SWMU 8/58-SA1	Tetryl (479-45-8)	UJ, MS3,MS5,L3
	091616-024/SWMU 8/58-SA2	Tetryl (479-45-8)	UJ, MS3,MS5,L3
SW846 9012B			
	091615-027/SWMU 8/58-SA1	Cyanide, Total (57-12-5)	UJ, B4
	091616-027/SWMU 8/58-SA2	Cyanide, Total (57-12-5)	UJ, B4

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



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#### Memorandum

Date: February 21, 2012

To: File

From: Kevin Lambert

Subject: Inorganic Data Review and Validation – SNL Site: SWMU 8 and 58 GW Characterization AR/COC: 613958 SDG: 294178 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

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

1. Total Cyanide:

Total cyanide was detected in the ICB/CCB at negative concentrations with an absolute value > the MDL but  $\leq$  the PQL. The associated sample results were NDs 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 analyzed within the prescribed holding times and properly preserved.

#### **Calibration**

All initial and continuing calibration met QC acceptance criteria.

# **Blanks**

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

#### Nitrate/Nitrite:

Nitrate/Nitrite was detected in the MB at a concentration > the MDL but  $\leq$  the PQL. The associated sample results were detects >5X the MB and will not be qualified.

#### Anions:

In the EB, sample 293963-006 from another SNL SDG, associated with samples 294178-004 and - 016 chloride was detected at a concentration > the PQL. The associated sample results were detects >5X the EB and will not be qualified.

#### Alkalinity:

In the EB, sample 293963-007 from another SNL SDG, associated with samples 294178-007 and -019 total and bicarbonate alkalinity were detected at concentrations > the PQL. However, blanks are not applicable for alkalinity and are not assessed for data validation. No sample data will be qualified as a result.

#### Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria.

### Matrix Spike (MS)

All MS recoveries met QC acceptance criteria.

#### Anions, Nitrate/Nitrite, Perchlorate, and Alkalinity:

It should be noted that the MS analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

#### Laboratory Replicate

The replicate met all QC acceptance criteria.

#### <u>Anions, Nitrate/Nitrite, Perchlorate, and Alkalinity</u>: It should be noted that the replicate analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

#### **Detection Limits/Dilutions**

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

Nitrate/Nitrite:

The samples were diluted 5X due to matrix interference.

Anions:

The samples were diluted 2X for chloride and sulfate due to high concentration for this analysis.

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

# Other QC

Field duplicate pairs 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. It should be noted that the EBs are from another SNL SDG on AR/COC# 613957.

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey

Date: 02/21/12



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#### Memorandum

Date: February 21, 2012

To: File

From: Kevin Lambert

Subject: LC/MS/MS Organic Data Review and Validation – SNL Site: SWMU 8 and 58 GW Characterization AR/COC: 613958 SDG: 294178 Laboratory: GEL Project/Task: 98026.01.12 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 MS and MSD %Rs for tetryl were < the LAL but ≥10%. The associated sample results were NDs and will be **qualified "UJ,MS3."**
- 2. The MS/MSD RPD for tetryl was not within the laboratory acceptance limit. The associated sample results were NDs and will be **qualified "UJ,MS5"** due to poor replicate precision.
- 3. The LCS %R for tetryl was < the LAL but ≥10%. The associated sample result was an ND and will 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.

# Instrument Tune

All instrument tune requirements were met.

# Calibration

All initial and continuing calibration met QC acceptance criteria.

### **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 except as noted above in the summary section.

# Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria except as noted above in the summary section.

#### **Detection Limits/Dilutions**

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

#### Other QC

A field duplicate pair was submitted on the AR/COC(s). There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result. It should be noted that the EB is from another SNL SDG on AR/COC# 613957.

No other specific issues that affect data quality were identified.

Reviewed by:	Marcia Hilchey				Date:	02/21/12
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#### Memorandum

Date: February 21, 2012

To: File

From: Kevin Lambert

Subject: Inorganic Data Review and Validation – SNL Site: SWMU 8 and 58 GW Characterization AR/COC: 613958 SDG: 294178 and 294182 Laboratory: GEL Project/Task: 98026.01.12 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). One sample was prepared and analyzed with approved procedures using methods EPA 6010B (ICP metals) and EPA 7470A (CVAA mercury). Data were reported for all required analytes. Problems were identified with the data package that result in the qualification of data.

1. ICP-MS metals:

TI was detected in the CCB at a concentration > the MDL but  $\leq$  the PQL. The TI result for sample 294178-003 was a detect <5X the CCB result and will be **qualified "0.0032U,B3"** at 5X the CCB value (mg/L). The other associated sample result was an ND and will not be qualified.

Ni was detected in the CCB at a negative concentration with an absolute value > the MDL but  $\leq$  the PQL. The Ni results for 294178-003 and -015 were NDs 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 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 metals:

Ca was detected in the MB at a concentration > the MDL but  $\leq$  the PQL. The associated sample results were detects >5X the MB result and will not be qualified.

In the EB, sample 293963-003 from another SNL SDG, associated with samples 294178-003 and - 015 Cu was detected at a concentration > the MDL but  $\leq$  the PQL. The associated sample results were NDs and will not be qualified.

# **ICP - MS Internal Standards**

All internal standards met QC acceptance criteria.

# Matrix Spike (MS)

All MS recoveries met QC acceptance criteria.

#### **ICP-MS** metals:

It should be noted that the MS had Ca, Mg, and Na at concentrations >4X the analyte spike concentrations and the MS %R for Ca, Mg, and Na did not meet QC acceptance criteria. However, according to AOP criteria, Ca, Mg, and Na are not a required MS analytes. No sample data will be qualified as a result.

# 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 except as follows.

<u>ICP-MS metals</u>: Samples were diluted 5X for Na due to over-range concentrations.

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

# 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

EBs and field duplicate pairs 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. It should be noted that the EBs are from another SNL SDG on AR/COC# 613957.

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey

Date: 02/21/12



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#### Memorandum

Date: February 21, 2012

To: File

From: Kevin Lambert

Subject: Radiochemical Data Review and Validation – SNL Site: SWMU 8 and 58 GW Characterization AR/COC: 613958 SDG: 294178 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

Two 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.

1. Gamma Spec:

All associated gamma spec results were either < the associated 2-sigma TPU or < the associated MDA and will be **qualified "BD,FR3."** 

2. Alpha Spec U:

The U-235/236 results for samples 294178-012 and -024 were either < the associated 2-sigma TPU or < the associated MDA and will be **qualified "BD,FR3."** 

The U-232 tracer %R for sample -024 was  $\geq 10\%$  but <50%. The U-233/234 and U-238 results were detects and will be **qualified "J+, IS2."** 

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 except as noted above in the summary section.

### Matrix Spike (MS)

A MS met all QC acceptance criteria.

### Laboratory Replicate

All replicate error ratio acceptance criteria were met.

#### Gamma Spec and Alpha Spec U:

It should be noted that the replicate analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

Gross Alpha/Beta:

Since a replicate and MSD were performed for gross alpha/beta analysis, two measures of precision were available. The MS/MSD pair was used to evaluate gross alpha/beta precision.

#### 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

A field duplicate pair was submitted on the AR/COC(s). There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result. It should be noted that the EBs are from another SNL SDG on AR/COC# 613957.

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey	Date: 02/21/12



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#### Memorandum

Date: February 21, 2012

To: File

From: Kevin Lambert

Subject: GC/MS Organic Data Review and Validation – SNL Site: SWMU 8 and 58 GW Characterization AR/COC: 613958 SDG: 294178 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

Two 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 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 extracted 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 calibration verification %D for bis(2-ethylhexyl)phthalate was >20% with a positive bias. The associated sample results were NDs and will not be qualified for the calibration infraction.

The calibration verification %Ds for benzo(ghi)perylene; dibenzo(a,h)anthracene; and hexachlorocyclopentadiene were >20% but  $\leq$ 40% with negative bias. All associated sample results were NDs, and no other calibration infractions occurred for these analytes. Therefore, the associated sample results 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)

The MS/MSD analyses met QC acceptance criteria.

### Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria except as noted above in the summary section.

#### **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 field duplicate pair was submitted on the AR/COC(s). There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result. It should be noted that the EB is from another SNL SDG on AR/COC# 613957.

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey

Date: 02/21/12



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#### Memorandum

Date: February 21, 2012

To: File

From: Kevin Lambert

Subject: GC/MS Organic Data Review and Validation – SNL Site: SWMU 8 and 58 GW Characterization AR/COC: 613958 SDG: 294178 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

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

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

The initial calibration %RSD for bromoform was >15% but  $\leq$ 40%. The associated sample results were NDs and no other calibration infractions occurred for this analyte. Therefore, the associated sample results will not be qualified.

# Blanks

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

In the EB, sample 293963-001 from another SNL SDG, associated with samples 294178-001 and - 013, acetone, bromodichloromethane, and dibromochloromethane were detected at concentrations > the MDLs but < the PQLs and chloroform was detected at a concentration > the PQL. All associated sample results were NDs 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. It should be noted that the MS/MSD analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

# 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

A TB and a field duplicate pair were submitted on the AR/COC(s). There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result. It should be noted that the EB is from another SNL SDG on AR/COC# 613957.

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey

Date: 02/21/12



# Sample Findings Summary



AR/COC: 613956			Page 1 of
Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
DOE EML HASL-300, U-02-RC	1.30%。这次总统		
	091610-035/SWMU 8/58-SA3	Uranium-235/236 (13982-70-2)	J, FR7
EPA 900.0/SW846 9310			
	091610-034/SWMU 8/58-SA3	BETA (12587-47-2)	J, FR7
EPA 901.1			
	091610-033/SWMU 8/58-SA3	Americium-241 (14596-10-2)	BD, FR3
	091610-033/SWMU 8/58-SA3	Cesium-137 (10045-97-3)	BD, FR3
	091610-033/SWMU 8/58-SA3	Cobalt-60 (10198-40-0)	BD, FR3
	091610-033/SWMU 8/58-SA3	Potassium-40 (13966-00-2)	BD, FR3
SW846 3005/6020 DOE-AL			
	091610-009/SWMU 8/58-SA3	Aluminum (7429-90-5)	0.29UJ, B
	091610-009/SWMU 8/58-SA3	Nickel (7440-02-0)	UJ, B4
	091610-009/SWMU 8/58-SA3	Sodium (7440-23-5)	J, D1
	091610-009/SWMU 8/58-SA3	Thallium (7440-28-0)	0.0030U, B3
	091610-017/SWMU 8/58-SA3	Sodium (7440-23-5)	J, D1
SW846 3535/8321A Modified	d de la constanti de la constan		
	091610-024/SWMU 8/58-SA3	Tetryl (479-45-8)	UJ, L3
SW846 8270C			
	091610-002/SWMU 8/58-SA3	4-Nitrophenol (100-02-7)	UJ, MS3,MS5,L3
	091610-002/SWMU 8/58-SA3	bis(1-Chloroisopropyl)ether (108- 60-1)	UJ, C3
	091610-002/SWMU 8/58-SA3	p-Nitroaniline (100-01-6)	UJ, MS5
	091610-002/SWMU 8/58-SA3	Pyrene (129-00-0)	UJ, MS5

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



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#### Memorandum

Date: February 23, 2012

To: File

From: Kevin Lambert

Subject: Inorganic Data Review and Validation – SNL Site: SWMU 8 and 58 GW Characterization AR/COC: 613956 SDG: 293951 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

One sample was prepared and analyzed with accepted procedures using methods EPA 9056 (anions by ion chromatography), EPA 353.2 (nitrate/nitrite by Cd reduction), EPA 314.0 (perchlorate), SM 2320B (alkalinity), and EPA 9012B (total cyanide). Data were reported for all required analytes. No problems were identified with the data package that results 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 analyzed within the prescribed holding times and properly preserved.

#### Calibration

All initial and continuing calibration met QC acceptance criteria.

#### **Blanks**

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

Nitrate/Nitrite:

Nitrate/Nitrite was detected in the MB at a concentration > the MDL but  $\leq$  the PQL. The associated sample result was an ND and 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.

<u>Nitrate/Nitrite, Perchlorate, and Total Cyanide</u>: It should be noted that the MS analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

#### Laboratory Replicate

The replicate met all QC acceptance criteria.

<u>Nitrate/Nitrite, Perchlorate, and Total Cyanide</u>: It should be noted that the replicate analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

#### **Detection Limits/Dilutions**

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

Anions:

Sample 293951-004 was diluted 5X due to high concentration for this analysis.

Nitrate/Nitrite:

Sample -005 was diluted 5X for chloride and sulfate due to high concentrations for this analysis.

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

#### Other QC

No other specific issues that affect data quality were identified.

#### Reviewed by: Marcia Hilchey

Date: 02/23/12



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#### Memorandum

Date: February 23, 2012

To: File

From: Kevin Lambert

Subject: LC/MS/MS Organic Data Review and Validation – SNL Site: SWMU 8 and 58 GW Characterization AR/COC: 613956 SDG: 293951 Laboratory: GEL Project/Task: 98026.01.12 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

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. The LCS %R for tetryl was < the LAL but ≥10%. The associated sample result was an ND and will 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 sample was extracted and analyzed within the prescribed holding times and properly preserved.

#### Instrument Tune

All instrument tune requirements were met.

# Calibration

All initial and continuing calibration met QC acceptance criteria.

# **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 the MS/MSD analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

#### Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria 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

No other specific issues that affect data quality were identified.

<b>Reviewed by:</b>	Marcia Hilchey	Date:	02/23/12



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#### Memorandum

Date: February 23, 2012

To: File

From: Kevin Lambert

Subject: Inorganic Data Review and Validation – SNL Site: SWMU 8 and 58 GW Characterization AR/COC: 613956 SDG: 293951 and 293962 Laboratory: GEL Project/Task: 98026.01.12 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). One sample was prepared and analyzed with approved procedures using methods EPA 6010B (ICP metals) and EPA 7470A (CVAA mercury). Data were reported for all required analytes. Problems were identified with the data package that result in the qualification of data.

1. ICP-MS metals:

Tl was detected in the CCB at a concentration > the MDL but  $\leq$  the PQL. The associated sample result was a detect <5X the CCB result and will be **qualified "0.0030U,B3"** at 5X the CCB value (mg/L).

Ni was detected in the CCB at a negative concentration with an absolute value > the MDL but  $\leq$  the PQL. The associated sample result was an ND and will be **qualified "UJ,B4."** 

Al was detected in the MB at a concentration > the PQL. The associated sample result was an ND and will be **qualified "0.29UJ,B"** at 5X the MB value (mg/L).

The serial dilution %D for Na was >10%. The associated sample results were detects and will be **qualified "J,D1"** due to poor serial dilution precision.

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.

#### **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.

### **ICP -MS Internal Standards**

All internal standards met QC acceptance criteria.

### Matrix Spike (MS)

All MS recoveries met QC acceptance criteria.

#### ICP-MS metals:

It should be noted that the MS had Ca, Mg, and Na at concentrations >4X the analyte spike concentrations and the MS %R for Ca, Mg, and Na did not meet QC acceptance criteria. However, according to AOP criteria, Ca, Mg, and Na are not a required MS analytes. No sample data will be qualified as a result.

#### 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 except as follows.

#### ICP-MS metals:

Samples were diluted 5X for Ca due to over-range concentrations.

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

# 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 above in the summary section.

# Other QC

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey

Date: 02/23/12



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#### Memorandum

Date: February 23, 2012

To: File

From: Kevin Lambert

Subject: Radiochemical Data Review and Validation – SNL Site: SWMU 8 and 58 GW Characterization AR/COC: 613956 SDG: 293951 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

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.

1. Gamma Spec:

All associated gamma spec results were either < the associated 2-sigma TPU or < the associated MDA and will be **qualified "BD,FR3."** 

- <u>Gross Alpha/Beta</u>: The gross beta result for sample 293951-011 was <3X the associated MDA and will be qualified "J,FR7."
- <u>Alpha Spec U</u>: The U-235/236 result for sample -010 was <3X the associated MDA and 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

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.

### <u>Blanks</u>

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)

A MS met all QC acceptance criteria.

#### Gross Alpha/Beta:

It should be noted that the MS/MSD analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

# Laboratory Replicate

All replicate error ratio acceptance criteria were met.

#### All Analyses:

It should be noted that the replicate analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result. Since a replicate and MSD were performed for gross alpha/beta analysis, two measures of precision were available. The MS/MSD pair was used to evaluate gross alpha/beta precision.

# 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.



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#### Memorandum

Date: February 23, 2012

To: File

From: Kevin Lambert

Subject: GC/MS Organic Data Review and Validation – SNL Site: SWMU 8 and 58 GW Characterization AR/COC: 613956 SDG: 293951 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

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 result in the qualification of data.

- 1. The calibration verification %D for bis(2-chloroisopropyl)ether was >40% but ≤60% with negative bias. The associated sample result was an ND and will be **qualified "UJ,C3."**
- 2. The MS %R for 4-nitrophenol was < the LAL but ≥10%. The associated sample result was an ND and will be **qualified "UJ,MS3."**
- 3. The MS/MSD RPDs for 4-nitrophenol; pyrene and p-nitroaniline were not within the laboratory acceptance limits. All associated sample results were NDs and will be **qualified "UJ,MS5"** due to poor replicate precision.
- 4. The LCS %R for 4-nitrophenol was <10%. 4-Nitrophenol is known to be a poor responding analyte that is subject to erratic chromatography behavior as stated in the method. This may account for the low recovery observed in the LCS, as well as in the MS (see technical case narrative and data exception report). Therefore, based on professional judgment, the associated ND sample result will 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 sample was extracted 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 noted above in the summary section and as follows.

The calibration verification %Ds for 4-nitrophenol; hexachlorocyclopentadiene; pyrene; and bis(2-chloroethyl)ether were >20% but  $\leq$ 40% with negative bias. All associated sample results were NDs, and no other calibration infractions occurred for these analytes. Therefore, the associated sample results 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. It should noted that for the MSD, the area counts of IS chrysene-d12 and perylene-d12 were <50% the average area count obtained from the calibration standards. Since this was a QC sample, no sample data will be qualified.

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

The MS/MSD analyses met QC acceptance criteria except as noted above in the summary section. It should be noted that the MS/MSD analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

# Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria except as noted above in the summary section.

# **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

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey

Date: 02/23/12



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#### Memorandum

Date: February 23, 2012

To: File

From: Kevin Lambert

Subject: GC/MS Organic Data Review and Validation – SNL Site: SWMU 8 and 58 GW Characterization AR/COC: 613956 SDG: 293951 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

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**

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

The initial calibration %RSD for bromoform was >15% but  $\leq$ 40%. The associated sample results were NDs and no other calibration infractions occurred for this analyte. Therefore, the associated sample results will not be qualified.

# **Blanks**

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

In the TB, sample 293951-013, associated with samples -001 and -014, bromodichloromethane was detected at a concentration > the MDL but <PQL and chloroform was detected at a concentration > the PQL. All associated sample results were NDs 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 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

A TB and an FB were submitted on the AR/COC(s).

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey

Date: 02/23/12



# AR/COC: 613952, 613953

# Page 1 of 2

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
DOE EML HASL-300, U-02-R	с		
	091600-035/SWMU 68-SA1	Uranium-235/236 (13982-70-2)	J, FR7
	091602-035/SWMU 68-EB1	Uranium-233/234 (N/A)	BD, FR3
	091602-035/SWMU 68-EB1	Uranium-235/236 (13982-70-2)	BD, FR3
	091602-035/SWMU 68-EB1	Uranium-238 (7440-61-1)	BD, FR3
EPA 353.2			
	091600-018/SWMU 68-SA1	Nitrogen, Nitrate/Nitrite (N/A)	J, MS1,RP1
	091602-018/SWMU 68-EB1	Nitrogen, Nitrate/Nitrite (N/A)	UJ, MS1, RP1
EPA 900.0/SW846 9310			
	091602-034/SWMU 68-EB1	ALPHA (12587-46-1)	BD, FR3
	091602-034/SWMU 68-EB1	BETA (12587-47-2)	BD, FR3
EPA 901.1			
	091600-033/SWMU 68-SA1	Americium-241 (14596-10-2)	BD, FR3
	091600-033/SWMU 68-SA1	Cesium-137 (10045-97-3)	BD, FR3
	091600-033/SWMU 68-SA1	Cobalt-60 (10198-40-0)	BD, FR3
	091600-033/SWMU 68-SA1	Potassium-40 (13966-00-2)	BD, FR3
	091602-033/SWMU 68-EB1	Americium-241 (14596-10-2)	BD, FR3
	091602-033/SWMU 68-EB1	Cesium-137 (10045-97-3)	BD, FR3
	091602-033/SWMU 68-EB1	Cobalt-60 (10198-40-0)	BD, FR3
	091602-033/SWMU 68-EB1	Potassium-40 (13966-00-2)	BD, FR3
SW846 3005/6020 DOE-AL			
	091602-009/SWMU 68-EB1	Calcium (7440-70-2)	0.68U, B
	091602-017/SWMU 68-EB1	Calcium (7440-70-2)	0.68U, B
5W846 3535/8321A Modifie	d		
	091600-024/SWMU 68-SA1	HMX (2691-41-0)	UJ, MS5
	091600-024/SWMU 68-SA1	Tetryl (479-45-8)	UJ, L3
	091602-024/SWMU 68-EB1	HMX (2691-41-0)	UJ, MS5

# AR/COC: 613952, 613953

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	091602-024/SWMU 68-EB1	Tetryl (479-45-8)	UJ, L3

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



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#### Memorandum

Date: February 24, 2012

To: File

From: Kevin Lambert

Subject: Inorganic Data Review and Validation – SNL Site: SWMU 68 GW Characterization AR/COC: 613952 and 613953 SDG: 293626 and 293630 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). Two samples were prepared and analyzed with approved procedures using methods EPA 6010B (ICP metals) and EPA 7470A (CVAA mercury). Data were reported for all required analytes. Problems were identified with the data package that result in the qualification of data.

1. ICP-MS metals:

Ca was detected in the MB at a concentration > the MDL but  $\leq$  the PQL. The Ca results for samples 293626-017 and 293630-002 were detects <5X the MB result and will be **qualified "0.68U,B"** at 5X the MB value (mg/L). The other associated sample results were detects >5X the MB result and will not be qualified.

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.

# **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.

# **ICP** -MS Internal Standards

All internal standards met QC acceptance criteria.

# Matrix Spike (MS)

All MS recoveries met QC acceptance criteria.

#### ICP-MS metals:

It should be noted that the MS had Ca, Mg, and Na at concentrations >4X the analyte spike concentrations and the MS %Rs for Ca, Mg, and Na did not meet QC acceptance criteria. However, according to AOP criteria, Ca, Mg, and Na are not a required MS analytes. No sample data will be qualified as a result.

# 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 except as follows.

#### **ICP-MS** metals:

Samples 293626-003 and 293630-001 were diluted 5X for Ca due to over-range concentrations.

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

# 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

EBs were submitted on the AR/COC(s). It should be noted that the EBs on AR/COC# 613953 are associated with the samples on AR/COC# 613954 in another SDG.

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey

Date: 02/24/12



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#### Memorandum

Date: February 24, 2012

To: File

From: Kevin Lambert

Subject: Inorganic Data Review and Validation – SNL Site: SWMU 68 GW Characterization AR/COC: 613952 and 613953 SDG: 293626 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 EPA 7196A (hexavalent chromium), EPA 9056 (anions by ion chromatography), EPA 353.2 (nitrate/nitrite by Cd reduction), EPA 314.0 (perchlorate), SM 2320B (alkalinity), and EPA 9012B (total cyanide). Data were reported for all required analytes. Problems were identified with the data package that results in the qualification of data.

1. Nitrate/Nitrite:

The relative dilution factor between samples 293626-006 and -010 and the QC sample was >5. The nitrate/nitrite result for sample -006 was a detect and will be **qualified "J,MS1,RP1"** due to lack of matrix-specific accuracy and precision data. The nitrate/nitrite result for sample -010 was an ND and will be **qualified "UJ,MS1,RP1"** due to lack of matrix-specific accuracy and precision 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**

All initial and continuing calibration met QC acceptance criteria.

# **Blanks**

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

Alkalinity:

In the MB, total and bicarbonate alkalinity were detected at concentrations > the PQL. However, blanks are not applicable for alkalinity and are not assessed for data validation. No sample data will be qualified as a result.

#### Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria.

#### Matrix Spike (MS)

All MS recoveries met QC acceptance criteria.

#### Nitrate/Nitrite:

It should be noted that the MS analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

#### Laboratory Replicate

The replicate met all QC acceptance criteria.

Nitrate/Nitrite:

It should be noted that the replicate analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

#### **Detection Limits/Dilutions**

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

#### Anions:

Sample -005 was diluted 5X for chloride and sulfate due to high concentrations for this analysis.

Nitrate/Nitrite:

Sample -006 was diluted 5X due to high concentration for this analysis and sample -020 was diluted 5X due to matrix interference.

All associated batch QC samples, except as noted above in the summary section, were analyzed at dilution factors that resulted in relative dilution factors to the sample that were  $\leq 5X$ . No sample data will be qualified as a result.

#### Other QC

EBs were submitted on the AR/COC(s). It should be noted that the EBs on AR/COC# 613953 are associated with the samples on AR/COC# 613954 in another SDG.

No other specific issues that affect data quality were identified.



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#### Memorandum

Date: February 24, 2012

To: File

From: Kevin Lambert

Subject: LC/MS/MS Organic Data Review and Validation – SNL Site: SWMU 68 GW Characterization AR/COC: 613952 and 613953 SDG: 293626 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 MS/MSD RPD for HMX was not within the laboratory acceptance limit. The associated sample results were NDs and will be **qualified "UJ,MS5"** due to poor replicate precision.
- 2. The LCS %R for tetryl was < the LAL but ≥10%. The associated sample result results were NDs and will 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 sample 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 calibration met QC acceptance criteria except as follows.

The calibration verification %D for 2,4,6-trinitrotoluene was >20% with a positive bias. The associated sample results were NDs and will not be qualified for the calibration infraction.

## **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 except as noted above in the summary section.

#### Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria 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 was submitted on the AR/COC(s). It should be noted that the EB on AR/COC# 613953 is associated with the samples on AR/COC# 613954 in another SDG.

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey

Date: 02/24/12



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#### Memorandum

Date: February 24, 2012

To: File

From: Kevin Lambert

Subject: Radiochemical Data Review and Validation – SNL Site: SWMU 68 GW Characterization AR/COC: 613952 and 613953 SDG: 293626 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 – 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.

1. Gamma Spec:

All associated gamma spec results were either < the associated 2-sigma TPU or < the associated MDA and will be **qualified "BD,FR3."** 

2. Gross Alpha/Beta:

The gross alpha and gross beta results for sample 293626-026 were either < the associated 2sigma TPU or < the associated MDA and will be **qualified "BD,FR3."** 

#### 3. Alpha Spec U:

The U-235/236 result for sample -013 was <3X the associated MDA and will be **qualified** "J,FR7."

The U-233/234, U-235/236, and U-238 results for sample -027 were either < the associated 2-sigma TPU or < the associated MDA and will be **qualified "BD,FR3."** 

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)

A MS met all QC acceptance criteria.

#### Laboratory Replicate

All replicate error ratio acceptance criteria were met.

Gross Alpha/Beta:

Since a replicate and MSD were performed for gross alpha/beta analysis, two measures of precision were available. The MS/MSD pair was used to evaluate gross alpha/beta precision.

#### 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 were submitted on the AR/COC(s). It should be noted that the EBs on AR/COC# 613953 are associated with the samples on AR/COC# 613954 in another SDG.

No other specific issues that affect data quality were identified.

 Reviewed by:
 Marcia Hilchey
 Date: 02/24/12



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#### Memorandum

Date: February 24, 2012

To: File

From: Kevin Lambert

Subject: GC/MS Organic Data Review and Validation – SNL Site: SWMU 68 GW Characterization AR/COC: 613952 and 613953 SDG: 293626 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 8270C (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 extracted 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 calibration verification %Ds for 4-nitrophenol and o-nitroaniline were >20% but  $\leq$ 40% with negative bias. All associated sample results were NDs, and no other calibration infractions occurred for these analytes. Therefore, the associated sample results 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. It should noted that for the MS and/or MSD, the area counts of IS naphthalene-d8, phenanthrene-d10, chrysene-d12, and perylene-d12 were <50% the average area count obtained from the calibration standards. Since these were QC samples, no sample data will be qualified.

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

The MS/MSD analyses met QC acceptance criteria except as noted above in the summary section. It should be noted that the MS/MSD analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

## Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria.

#### **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). It should be noted that the EB on AR/COC# 613953 is associated with the samples on AR/COC# 613954 in another SDG.

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey

Date: 02/24/12



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#### Memorandum

Date: February 24, 2012

To: File

From: Kevin Lambert

Subject: GC/MS Organic Data Review and Validation – SNL Site: SWMU 68 GW Characterization AR/COC: 613952 and 613953 SDG: 293626 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

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

The initial calibration %RSD for bromoform was >15% but  $\leq$ 40%. The associated sample results were NDs and no other calibration infractions occurred for this analyte. Therefore, the associated sample results will not be qualified.

The calibration verification %Ds for carbon disulfide and vinyl acetate were >20% with a positive bias. All associated sample results were NDs and will not be qualified for the calibration infraction.

# 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.

# 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

A TB and an EB were submitted on the AR/COC(s). It should be noted that the EB on AR/COC# 613953 is associated with the samples on AR/COC# 613954 in another SDG.

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey

Date: 02/24/12



# Sample Findings Summary



# AR/COC: 613954

# Page 1 of 1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 353.2			
	091604-018/SWMU 68-SA2	Nitrogen, Nitrate/Nitrite (N/A)	J, MS1,RP1
	091605-018/SWMU 68-SA3	Nitrogen, Nitrate/Nitrite (N/A)	J, MS1,RP1
EPA 901.1			
	091604-033/SWMU 68-SA2	Americium-241 (14596-10-2)	BD, FR3
	091604-033/SWMU 68-SA2	Cesium-137 (10045-97-3)	BD, FR3
	091604-033/SWMU 68-SA2	Cobalt-60 (10198-40-0)	BD, FR3
	091604-033/SWMU 68-SA2	Potassium-40 (13966-00-2)	BD, FR3
	091605-033/SWMU 68-SA3	Americium-241 (14596-10-2)	BD, FR3
	091605-033/SWMU 68-SA3	Cesium-137 (10045-97-3)	BD, FR3
	091605-033/SWMU 68-SA3	Cobalt-60 (10198-40-0)	BD, FR3
	091605-033/SWMU 68-SA3	Potassium-40 (13966-00-2)	BD, FR3
SW846 3005/6020 DOE-AL			
	091604-009/SWMU 68-SA2	Copper (7440-50-8)	0.0028U, B2
	091605-009/SWMU 68-SA3	Copper (7440-50-8)	0.0028U, B2
SW846 3535/8321A Modifie	d		
	091604-024/SWMU 68-SA2	Tetryl (479-45-8)	UJ, MS3,MS5,L3
	091605-024/SWMU 68-SA3	Tetryl (479-45-8)	UJ <i>,</i> MS3,MS5,L3

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



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#### Memorandum

Date: February 24, 2012

To: File

From: Kevin Lambert

Subject: Inorganic Data Review and Validation – SNL Site: SWMU 68 GW Characterization AR/COC: 613954 SDG: 293716 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 EPA 7196A (hexavalent chromium), EPA 9056 (anions by ion chromatography), EPA 353.2 (nitrate/nitrite by Cd reduction), EPA 314.0 (perchlorate), SM 2320B (alkalinity), and EPA 9012B (total cyanide). Data were reported for all required analytes. Problems were identified with the data package that results in the qualification of data.

1. Nitrate/Nitrite:

The relative dilution factor between samples 293716-006 and -019 and the QC sample was >5. The associated sample results were detects and will be **qualified "J,MS1,RP1"** due to lack of matrix-specific accuracy and precision 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**

All initial and continuing calibration met QC acceptance criteria.

# <u>Blanks</u>

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.

<u>Anions, Nitrate/Nitrite, Perchlorate, Total Cyanide</u>: It should be noted that the MS analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

# Laboratory Replicate

The replicate met all QC acceptance criteria.

<u>Anions, Nitrate/Nitrite, Perchlorate, Total Cyanide</u>: It should be noted that the replicate analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

# **Detection Limits/Dilutions**

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

<u>Anions</u>: Samples were diluted 5X for chloride and sulfate due to high concentrations for this analysis.

<u>Nitrate/Nitrite</u>: Samples were diluted 5X due to matrix interference.

All associated batch QC samples, except as noted above in the summary section, were analyzed at dilution factors that resulted in relative dilution factors to the sample that were  $\leq 5X$ . No sample data will be qualified as a result.

# Other QC

A field duplicate pair was submitted on the AR/COC(s). There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result. It should be noted that the EBs are from another SNL SDG on AR/COC# 613953.

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey

Date: 02/25/12



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#### Memorandum

Date: February 24, 2012

To: File

From: Kevin Lambert

Subject: LC/MS/MS Organic Data Review and Validation – SNL Site: SWMU 68 GW Characterization AR/COC: 613954 SDG: 293716 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 MS %R for tetryl was < the LAL but ≥10%. The associated sample results were NDs and will be **qualified "UJ,MS3."**
- 2. The MS/MSD RPD for tetryl was not within the laboratory acceptance limit. The associated sample results were NDs and will be **qualified "UJ,MS5"** due to poor replicate precision.
- 3. The LCS %R for tetryl was < the LAL but ≥10%. The associated sample results were ND and will 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.

# **Instrument Tune**

All instrument tune requirements were met.

# **Calibration**

All initial and continuing calibration met QC acceptance criteria.

# **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 except as noted above in the summary section.

# Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria except as noted above in the summary section.

#### **Detection Limits/Dilutions**

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

# Other QC

A field duplicate pair was submitted on the AR/COC(s). There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result. It should be noted that the EB is from another SNL SDG on AR/COC# 613953.

No other specific issues that affect data quality were identified.

Reviewed by: Marcia	Hilchey	<b>Date:</b> 02/25/12
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#### Memorandum

Date: February 24, 2012

To: File

From: Kevin Lambert

Subject: Inorganic Data Review and Validation – SNL Site: SWMU 68 GW Characterization AR/COC: 613954 SDG: 293716 and 293718 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). Two samples were prepared and analyzed with approved procedures using methods EPA 6010B (ICP metals) and EPA 7470A (CVAA mercury). Data were reported for all required analytes. Problems were identified with the data package that result in the qualification of data.

1. ICP-MS metals:

In the EB, sample 293626-017 from another SNL SDG, associated with samples 293716-003 and -016, Cu was detected at a concentration > the MDL but  $\leq$  the PQL. The associated sample results were detects <5X the EB result and will be **qualified "0.0028U,B2"** at 5X the EB value (mg/L).

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.

#### **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 metals:

Tl was detected in the ICB/CCB at concentrations > the MDL but  $\leq$  the PQL. The associated sample results were NDs and will not be qualified.

K was detected in the CCB at a negative concentration with an absolute value > the MDL but  $\leq$  the PQL. The associated sample results were detects >5X the MDL and will not be qualified.

Ca was detected in the MB at a concentration > the MDL but  $\leq$  the PQL. The associated sample results were detects >5X the MB result and will not be qualified.

In the EB, sample 293626-017 from another SNL SDG, associated with samples 293716-003 and -016, Ca was detected at a concentration > the MDL but  $\leq$  the PQL. However, it should be noted that the Ca result for the EB has already been qualified ND due to MB contamination and, thus, does not affect the associated field sample results.

In the EB, sample 293630-002 from another SNL SDG, associated with samples 293718-001 and -002, Ca was detected at a concentration > the MDL but  $\leq$  the PQL. However, it should be noted that the Ca result for the EB has already been qualified ND due to MB contamination and, thus, does not affect the associated field 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 metals:

It should be noted that the MS had Ca, Mg, and Na at concentrations >4X the analyte spike concentrations and the MS %R for Ca and Na did not meet QC acceptance criteria. However, according to AOP criteria, Ca, Mg, and Na are not a required MS analytes. No sample data will be qualified as a result.

#### 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 except as follows.

<u>ICP-MS metals</u>: Samples were diluted 5X for Ca due to over-range concentrations.

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

# 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

A field duplicate pair was submitted on the AR/COC(s). There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result. It should be noted that the EBs are from another SNL SDG on AR/COC# 613953.

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey Date: 02/25/12



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#### Memorandum

Date: February 24, 2012

To: File

From: Kevin Lambert

Subject: Radiochemical Data Review and Validation – SNL Site: SWMU 68 GW Characterization AR/COC: 613954 SDG: 293716 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 – 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.

1. Gamma Spec:

All associated gamma spec results were either < the associated 2-sigma TPU or < the associated MDA and will be **qualified "BD,FR3."** 

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)

A MS met all QC acceptance criteria.

#### <u>Gross Alpha/Beta</u>: It should be noted that the MS/MSD analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

# Laboratory Replicate

All replicate error ratio acceptance criteria were met.

All Analyses:

It should be noted that the replicate analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result. Since a replicate and MSD were performed for gross alpha/beta analysis, two measures of precision were available. The MS/MSD pair was used to evaluate gross alpha/beta precision.

#### 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

A field duplicate pair was submitted on the AR/COC(s). There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result. It should be noted that the EBs are from another SNL SDG on AR/COC# 613953.

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey

Date: 02/25/12



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#### Memorandum

Date: February 24, 2012

To: File

From: Kevin Lambert

Subject: GC/MS Organic Data Review and Validation – SNL Site: SWMU 68 GW Characterization AR/COC: 613954 SDG: 293716 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 8270C (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 extracted 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.

# 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.

# Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria except as follows.

The LCS %R for hexachlorocyclopentadiene was < the LAL but  $\geq 10\%$ . The associated sample results were NDs. Up to four LCS recovery infractions are allowed since 64 LCS analytes were reported. Therefore, the associated sample results will 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

A field duplicate pair was submitted on the AR/COC(s). There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result. It should be noted that the EB is from another SNL SDG on AR/COC# 613953.

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey

Date: 02/25/12



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#### Memorandum

Date: February 24, 2012

To: File

From: Kevin Lambert

Subject: GC/MS Organic Data Review and Validation – SNL Site: SWMU 68 GW Characterization AR/COC: 613954 SDG: 293716 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

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

The initial calibration %RSD for bromoform was >15% but  $\leq$ 40%. The associated sample results were NDs and no other calibration infractions occurred for this analyte. Therefore, the associated sample results will not be qualified.

# **Blanks**

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

In the EB, sample 293626-015 from another SNL SDG, associated with samples 293716-001 and -014, bromodichloromethane and chloroform were detected at concentrations > the PQL. All associated sample results were NDs 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. It should be noted that the MS/MSD analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

#### 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

A TB and a field duplicate pair were submitted on the AR/COC(s). There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result. It should be noted that the EB is from another SNL SDG on AR/COC# 613953.

No other specific issues that affect data quality were identified.

<b>Reviewed by:</b>	Marcia Hilchey		Date: 02/25/12





## AR/COC: 613955

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Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 901.1			
	091607-033/SWMU 68-SA4	Americium-241 (14596-10-2)	BD, Z2
	091607-033/SWMU 68-SA4	Cesium-137 (10045-97-3)	R, FR4
	091607-033/SWMU 68-SA4	Cobalt-60 (10198-40-0)	BD, FR3
	091607-033/SWMU 68-SA4	Potassium-40 (13966-00-2)	J, FR7
SW846 3535/8321A Modifie	d		
	091607-024/SWMU 68-SA4	Tetryl (479-45-8)	UJ, L3
SW846 8270C			
	091607-002/SWMU 68-SA4	4-Nitrophenol (100-02-7)	UJ, MS3,L3
	091607-002/SWMU 68-SA4	bis(1-Chloroisopropyl)ether (108- 60-1)	UJ, C3
SW846 9012B			
	091607-027/SWMU 68-SA4	Cyanide, Total (57-12-5)	UJ, B4

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



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#### Memorandum

Date: February 17, 2012

To: File

From: Kevin Lambert

Subject: Inorganic Data Review and Validation – SNL Site: SWMU 68 GW Characterization AR/COC: 613955 SDG: 293838 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 EPA 7196A (hexavalent chromium), EPA 9056 (anions by ion chromatography), EPA 353.2 (nitrate/nitrite by Cd reduction), EPA 314.0 (perchlorate), SM 2320B (alkalinity), and EPA 9012B (total cyanide). Data were reported for all required analytes. Problems were identified with the data package that results in the qualification of data.

1. Total Cyanide:

Total cyanide was detected in the CCB at a negative concentration with an absolute value > the MDL but  $\leq$  the PQL. The associated sample result was an 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 sample was analyzed within the prescribed holding times and properly preserved.

#### **Calibration**

All initial and continuing calibration met QC acceptance criteria.

# **Blanks**

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

Nitrate/Nitrite:

Nitrate/Nitrite was detected in the MB at a concentration > the MDL but  $\leq$  the PQL. The associated sample result was a detect >5X the MB and 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.

Anions and Perchlorate:

It should be noted that the MS analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

#### Laboratory Replicate

The replicate met all QC acceptance criteria.

#### Anions and Perchlorate:

It should be noted that the replicate analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

#### **Detection Limits/Dilutions**

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

Anions:

The sample was diluted 5X for chloride and sulfate due to high concentrations for this analysis.

Nitrate/Nitrite:

The sample was diluted 5X due to matrix interference.

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

#### Other QC

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey

Date: 02/20/12



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#### Memorandum

Date: February 17, 2012

To: File

From: Kevin Lambert

Subject: LC/MS/MS Organic Data Review and Validation – SNL Site: SWMU 68 GW Characterization AR/COC: 613955 SDG: 293838 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

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. The LCS %R for tetryl was < the LAL but ≥10%. The associated sample result was an ND and will 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 sample was extracted and analyzed within the prescribed holding times and properly preserved.

#### **Instrument Tune**

All instrument tune requirements were met.

# Calibration

All initial and continuing calibration met QC acceptance criteria.

# **Reporting Limit Verification**

All CRI recoveries met QC acceptance criteria.

# <u>Blanks</u>

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

# Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria 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

No other specific issues that affect data quality were identified.

Reviewed b	y: Marcia	Hilchey	
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Date: 02/20/12



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# Memorandum

Date: February 17, 2012

To: File

From: Kevin Lambert

Subject: Inorganic Data Review and Validation – SNL Site: SWMU 68 GW Characterization AR/COC: 613955 SDG: 293838 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 6020 (ICP-MS metals). One sample was prepared and analyzed with approved procedures using methods 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 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.

#### **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 metals:

Sb and Ca were detected in the MB at concentrations > the MDL but  $\leq$  the PQL. All associated sample results were either NDs or detects >5X the MB result and will not be qualified.

#### **ICP -MS Internal Standards**

All internal standards met QC acceptance criteria.

#### Matrix Spike (MS)

All MS recoveries met QC acceptance criteria.

#### ICP-MS metals:

It should be noted that the MS had Ca, Mg, and Na at concentrations >4X the analyte spike concentrations and the MS %R for Ca did not meet QC acceptance criteria. However, according to AOP criteria, Ca, Mg, and Na are not a required MS analytes. No sample data will be qualified as a result.

#### 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 except as follows.

ICP-MS metals:

Samples were diluted 5X for Ca due to over-range concentrations.

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

# 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: Marcia Hilchey

Date: 02/20/12



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## Memorandum

Date: February 17, 2012

To: File

From: Kevin Lambert

Subject: Radiochemical Data Review and Validation – SNL Site: SWMU 68 GW Characterization AR/COC: 613955 SDG: 293838 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

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.

#### 1. Gamma Spec:

The Cs-137 result was negative with an absolute value >2X the associated MDA and will be **qualified "R,FR4."** 

No valid peaks for Am-241 were identified by the laboratory and the associated MDA was bias low due to a forced activity calculation. The associated Am-241 result should be considered ND at the calculated MDA and will be **qualified "BD,Z2."** 

The Co-60 result was either < the associated 2-sigma TPU or < the associated MDA and will be **qualified "BD,FR3."** 

The K-40 result was <3X the associated MDA and 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 sample was 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.

# <u>Blanks</u>

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)

A MS met all QC acceptance criteria.

# Gross Alpha/Beta:

It should be noted that the MS/MSD analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

# Laboratory Replicate

All replicate error ratio acceptance criteria were met.

#### All Analyses:

It should be noted that the replicate analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result. Since a replicate and MSD were performed for gross alpha/beta analysis, two measures of precision were available. The MS/MSD pair was used to evaluate gross alpha/beta precision.

# 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: Marcia Hilchey



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#### Memorandum

Date: February 17, 2012

To: File

From: Kevin Lambert

Subject: GC/MS Organic Data Review and Validation – SNL Site: SWMU 68 GW Characterization AR/COC: 613955 SDG: 293838 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

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 result in the qualification of data.

- 1. The calibration verification %D for bis(2-chloroisopropyl)ether was >40% but ≤60% with negative bias. The associated sample result was an ND and will be **qualified "UJ,C3."**
- 2. The MSD %R for 4-nitrophenol was < the LAL but ≥10%. The associated sample result was an ND and will be **qualified "UJ,MS3."**
- 3. The LCS %R for 4-nitrophenol was <10%. 4-Nitrophenol is known to be a poor responding analyte that is subject to erratic chromatography behavior as stated in the method. This may account for the low recovery observed in the LCS, as well as in the MSD (see technical case narrative and data exception report). Therefore, based on professional judgment, the associated ND sample result will 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 sample was extracted 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 noted above in the summary section and as follows.

The calibration verification %Ds for 4-nitrophenol; hexachlorocyclopentadiene; and bis(2-chloroethyl)ether were >20% but  $\leq$ 40% with negative bias. All associated sample results were NDs, and no other calibration infractions occurred for these analytes. Therefore, the associated sample results 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)

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

#### Laboratory Control Sample (LCS)

All LCS recoveries met QC acceptance criteria except as noted above in the summary section.

#### **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

No other specific issues that affect data quality were identified.

Reviewed by: Marcia Hilchey



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#### Memorandum

Date: February 17, 2012

To: File

From: Kevin Lambert

Subject: GC/MS Organic Data Review and Validation – SNL Site: SWMU 68 GW Characterization AR/COC: 613955 SDG: 293838 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

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

The initial calibration %RSD for bromoform was >15% but  $\leq$ 40%. The associated sample results were NDs and no other calibration infractions occurred for this analyte. Therefore, the associated sample results will not be qualified.

# Blanks

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

In the FB, sample 293838-015, associated with samples -001 and -014, bromodichloromethane and dibromochloromethane were detected at concentrations > the MDL but <PQL and chloroform was a detect at a concentration > the PQL. All associated sample results were NDs 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. It should be noted that the MS/MSD analyses were performed on a SNL sample from another SDG. No sample data will be qualified as a result.

#### 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

A TB and an FB were submitted on the AR/COC(s).

No other specific issues that affect data quality were identified.

#### Reviewed by: Marcia Hilchey

Date: 02/20/12