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

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NMED Hazardous Waste Bureau

Mr. John E. Kieling
Acting Chief
New Mexico Environment Department
Hazardous Waste Bureau
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 January 2012

Dear Mr. Kieling:

On behalf of the Department of Energy/National Nuclear Security Administration (DOE/NNSA) and Sandia Corporation, DOE/NNSA is submitting the *Environmental Restoration Operations Consolidated Quarterly Report January 2012* that addresses all quarterly reporting (July through September 2011) 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 (CWL) Closure Plan* for Sandia National Laboratories/New Mexico, Environmental Protection Agency identification number NM5890110518.

If you have any questions please contact me at (505) 845-6036 or John Weckerle of my staff at (505) 845-6026.

Sincerely,

Patty Wagner

Patty Wagner
Manager

Enclosure

cc:
See Page 2

12-048-413358

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
Carolyn Daniel, SNL/NM, MS-0718
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:
Robert Fleming, NA-173, HQ/GTN
Joanna Serra, NA-173, HQ/FORS
Amy Blumberg, SNL/NM, MS-0141
Andrew Orrell, SNL/NM, MS-0771
David Miller, SNL/NM, MS-0718
John Cochran, SNL/NM, MS-0719
Richard Sena, SSO/MO, MS-0184
Shirley Mondy, SSO/MO, MS-0184
Daniel Pellegrino, NNSA/SSO, MS-0184
Michael McFadden, SSO/FP, MS-0184
Joe Estrada, SSO/FP, MS-0184
John Weckerle, SSO/FP, MS-0184
12-048-413358

CERTIFICATION STATEMENT FOR APPROVAL AND FINAL RELEASE OF DOCUMENTS

Document title: **Environmental Restoration Operations Consolidated Quarterly Report, January 2012**

Document author: **John Cochran, Department 06234**

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment for knowing violations.

Signature: _____ 1/19/2012
Date

S. Andrew Orrell, Director
Nuclear Energy & Fuel Cycle Programs
Center 6200
Sandia National Laboratories/New Mexico
Albuquerque, New Mexico 87185
Operator

and

Signature: _____ 1-30-12
Date

Ms. Patty Wagner, Manager
U.S. Department of Energy
National Nuclear Security Administration
Sandia Site Office
Owner and Co-Operator

Sandia National Laboratories, New Mexico

Environmental Restoration Operations

A U.S. Department of Energy Environmental Cleanup Program

Consolidated Quarterly Report

July through September 2011

January 2012

United States Department of Energy
Sandia Site Office

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CONSOLIDATED QUARTERLY REPORT

January 2012

SANDIA NATIONAL LABORATORIES, NEW MEXICO

ENVIRONMENTAL RESTORATION OPERATIONS

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

NUMBER OF POTENTIAL RELEASE SITES SUBJECT TO THIS PERMIT: 36

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

REPORTING PERIOD: **July through September 2011**

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 (RCRA) Permit, the Compliance Order on Consent, and the Chemical Waste Landfill Closure Plan. The 36 potential release sites that require corrective action under the SNL/NM RCRA 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 Area of Concern sites, which include eight Drain and Septic System sites and the Tijeras Arroyo Groundwater Area of Concern. The Burn Site Groundwater and Technical Area V Groundwater areas of investigation are not included in the current HSWA Module of the SNL/NM RCRA Permit but have been added as Areas of Concern to the revised HSWA Module of the SNL/NM RCRA Permit that is pending approval by the New Mexico Environment Department at this time. This ER Quarterly Report presents activities and data in sections as follows:

SECTION I:	Environmental Restoration Operations Consolidated Quarterly Report
SECTION II:	Perchlorate Screening Quarterly Monitoring Report
SECTION III:	Solid Waste Management Units 149 and 154 Quarterly Groundwater Monitoring Report

Front Cover Photo: Cover maintenance on the Mixed Waste Landfill Evapotranspirative Cover, August 2011

ABBREVIATIONS AND ACRONYMS

µg/L	microgram(s) per liter
AGMR	Annual Groundwater Monitoring Report
AOC	Area of Concern
AOP	Administrative Operating Procedure
BSG	Burn Site Groundwater
CAC	Corrective Action Complete
CAMU	Corrective Action Management Unit
CME	Corrective Measures Evaluation
CMI	Corrective Measures Implementation
COA	Certificates of Analysis
CTF	Coyote Test Field
CWL	Chemical Waste Landfill
CY	Calendar Year
CYN	Canyons (Burn Site)
DO	dissolved oxygen
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration Operations
ET	evapotranspirative
famsl	feet above mean sea level
FOP	Field Operating Procedure
FY11	Fiscal Year 2011
GEL	GEL Laboratories LLC
HE	high explosive
HQ	hazard quotient
KAFB	Kirtland Air Force Base
lb(s)	pound(s)
LTES	Long-Term Environmental Stewardship
LTMMP	Long-Term Monitoring and Maintenance Plan
LTS	Long-Term Stewardship
MCL	maximum contaminant level
MDA	minimum detectable activity
MDL	method detection limit
mg/L	milligram(s) per liter
MW	monitoring well
MWL	Mixed Waste Landfill
NAVD	North American Vertical Datum

ND	nondetect
NMED	New Mexico Environment Department
NPN	nitrate plus nitrite
ORP	oxidation-reduction potential
PCC	Post-Closure Care
pCi/L	picocuries per liter
PPE	personal protective equipment
PQL	practical quantitation limit
QC	quality control
RCRA	Resource Conservation and Recovery Act
Sandia	Sandia Corporation
SAP	Sampling and Analysis Plan
SC	specific conductance
SNL/NM	Sandia National Laboratories, New Mexico
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
TA	Technical Area
TAG	Tijeras Arroyo Groundwater
TAL	Target Analyte List
TB	trip blank
tetryl	2,4,6-trinitrophenylmethylnitramine
TSWS	temporary supplemental watering system
VOC	volatile organic compound

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SECTION I
ENVIRONMENTAL RESTORATION OPERATIONS CONSOLIDATED QUARTERLY REPORT

1.0 Introduction

This Environmental Restoration Operations (ER) Consolidated Quarterly Report (ER Quarterly Report) provides the status of ongoing corrective actions being implemented by Sandia National Laboratories, New Mexico (SNL/NM) ER for the July, August, and September 2011 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 August 11, 2011, the U.S. Department of Energy (DOE) and Sandia Corporation (Sandia) submitted "Responses to the New Mexico Environment Department Notice of Disapproval: Mixed Waste Landfill Corrective Measures Implementation Report, January 2010" to the New Mexico Environment Department (NMED) (SNL/NM August 2011).

- On September 30, 2011, DOE/Sandia submitted the "Mixed Waste Landfill Groundwater Monitoring Report, Calendar Year 2010" to the NMED (SNL/NM September 2011a).

- 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

Supplemental watering activities began in June 2011, following the NMED approval of a request to conduct supplemental watering and cover maintenance activities at the MWL in lieu of an approved Long-Term Monitoring and Maintenance Plan (LTMMP) (Bearzi April 2011 and Wagner March 2011). Revision and submittal of the LTMMP will follow the NMED's anticipated approval of the MWL Corrective Measures Implementation (CMI) Report (SNL/NM January 2010).

- The initial phase of the supplemental watering employed a large sprinkler operated at 16 locations. The system and watering method are described in detail in the October 2011 ER Quarterly Report (SNL/NM October 2011). The final event using the large sprinkler was conducted from July 7 through July 13, 2011. A temporary supplemental watering system (TSWS) was installed from July 19 to August 2, 2011, and used for watering from August 10 to September 22, 2011 (Table 1). The TSWS system allows for more efficient, as-needed supplemental watering of the evapotranspirative (ET) cover (ET Cover).

- The TSWS system configuration is designed for approximately 80 to 90% coverage of the entire ET Cover (Figures 1 and 2). Seven additional supplemental watering events, each simulating 0.5 inches of rainfall, were conducted using this system during the reporting period. The TSWS is comprised of seven zones and due to the size, layout, and distance from the hydrant, only one-half the TSWS can be operated at one time. As a result, each event was conducted in the morning hours over a two-day period. All Calendar Year (CY) 2011 supplemental watering events were completed by September 22, 2011, and are summarized in Table 1.

Figure 1
Weed Removal at the MWL, August 2011, after installation of the TSWS

Table 1
Calendar Year 2011 Supplemental Watering Events at the MWL

Watering Event	Dates	Total Gallons Applied	Method	Total Monthly Gallons	Precipitation Equivalent (inches)
1	June 23-30	56,000	Large Sprinkler	56,000	0.5
2	July 7-13	56,000	Large Sprinkler	56,000	0.5
3	August 10-11	56,000	TSWS	280,000	2.5
4	August 15-17	56,000	TSWS		
5	August 22-23	56,000	TSWS		
6	August 25-29	56,000	TSWS		
7	August 30-31	56,000	TSWS		
8	September 19-20	56,000	TSWS	112,000	1.0
9	September 21-22	56,000	TSWS		
GRAND TOTALS		**504,000**	**—**	**--**	**4.5**

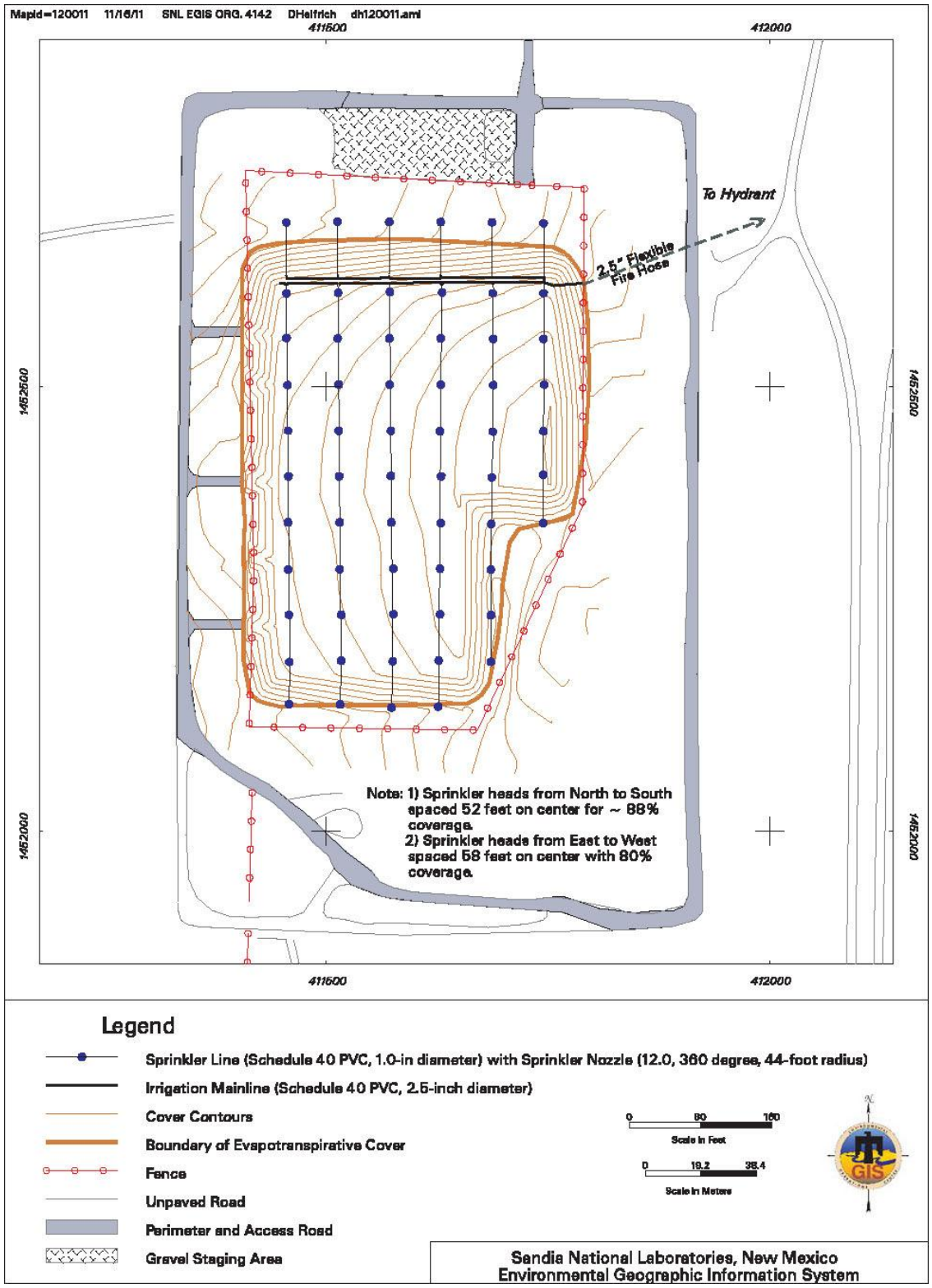

Figure 2

MWL Temporary Supplemental Watering System

2.1.2 MWL Evapotranspirative Cover Maintenance Activities

Two weed removal events were conducted at the MWL during the reporting period. The first event was conducted from August 23 through September 1, 2011 (Figure 1), and the second event was conducted from September 20 through October 3, 2011. Weed removal was performed prior to the plants going to seed and was facilitated by supplemental watering to soften the ground that allowed for complete removal of the root system in most cases. After removal, the plants were loaded into a trailer (capacity of approximately 8 cubic yards), compressed, and transported off site to the Kirtland Air Force Base (KAFB) landfill for disposal. A total of nine trailer-loads of plant material were removed during the two events.

A second access gate was installed in the southern part of the perimeter fence around the ET Cover during the week of July 11, 2011. The gate was approved by the NMED in an e-mail dated April 28, 2011 (Moats April 2011). The revised ET Cover as-built drawings depicting both the northern and southern access gates were provided to the NMED as part of the response to the Notice of Disapproval for the MWL CMI Report. The drawings were incorporated into the revised CMI Report that was submitted to the NMED in August 2011 (SNL/NM August 2011).

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, 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 SNL/NM” 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 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 (Technical Area [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 Sections I.2.3 and III 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
  7. SWMU 101 – Building 9926/9926A Septic System and Seepage Pit (Coyote Test Field [CTF])
  8. SWMU 105 – Mercury Spill (Building 6536)
  9. SWMU 116 – Building 9990 Septic System (CTF)
  10. SWMU 138 – Building 6630 Septic Systems (TA-III)
  11. SWMU 140 – Building 9965 Septic System and Drywell (Thunder Range)
  12. SWMU 147 – Building 9925 Septic Systems (CTF)
  13. SWMU 150 – Building 9939/9939A Septic System and Drainfield (CTF)
  14. SWMU 161 – Building 6636 Septic System (TA-III)
  15. SWMU 196 – Building 6597 Cistern (TA-V)
  16. SWMU 233 – Storm Drain System Outfall
  17. SWMU 234 – Storm Drain System Outfall
  18. AOC 1090 – Building 6721 Septic System (TA-III)
  19. AOC 1094 – Live Fire Range East Septic System (Lurance Canyon)
  20. AOC 1095 – Building 9938 Seepage Pit (CTF)
  21. AOC 1101 – Building 885 Septic System
  22. AOC 1114 – Building 9978 Drywell (CTF)
  23. AOC 1115 – Former Offices Septic System (Solar Tower Complex)
  24. AOC 1116 – Building 9981A Seepage Pit (Solar Tower Complex)
  25. AOC 1117 – Building 9982 Drywell (Solar Tower Complex)

- SWMU 52 (Liquid Waste Disposal System) 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). SNL/NM ER personnel are currently preparing a responsive document.

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.

2.3.1 Technical Area V Groundwater

- Groundwater sampling at TA-V was conducted in July 2011. The results for the perchlorate analysis are discussed in Section II of this ER Quarterly Report; other analytical results will be presented and discussed in the SNL/NM CY 2011 Annual Groundwater Monitoring Report (AGMR) (anticipated submittal to the NMED in summer 2012).

2.3.2 Burn Site Groundwater

- On August 3, 2011, the NMED issued an approval of the BSG Corrective Measures Evaluation (CME) Work Plan (SNL/NM March 2008a) submitted in March 2008 (NMED August 2011a).

- Groundwater sampling for the BSG investigation was conducted in August 2011. The perchlorate analytical results are discussed in Section II of this ER Quarterly Report; other analytical results will be presented and discussed in the CY 2011 AGMR (anticipated submittal to the NMED in summer 2012).

2.3.3 Tijeras Arroyo Groundwater

- Groundwater sampling for the TAG investigation was conducted in August and September 2011. Analytical results will be discussed in the CY 2011 AGMR (anticipated submittal to the NMED in summer 2012).

2.3.4 Mixed Waste Landfill Groundwater

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

2.3.5 Chemical Waste Landfill Groundwater

- Groundwater sampling for the CWL was completed in July and August 2011. The data for this sampling event will be presented in the CY 2011 AGMR (anticipated submittal to the NMED in summer 2012) and in the first CWL Post-Closure Care (PCC) Annual Report (due to the NMED by March 31, 2012).

2.3.6 SWMUs 8/58 Groundwater

- Two groundwater monitoring wells, CCBA-MW1 and CCBA-MW2, were installed at SWMUs 8/58 in August and September 2011 (Figure 3).

- On August 3, 2011, DOE/Sandia received a letter from the NMED entitled "Notice of Approval: Request for Extension to Complete Well Installation Report for Groundwater Monitoring Wells at Solid Waste Management Units 8, 58, and 68, June 27, 2011" (NMED August 2011b).

Figure 3
Installation of Monitoring Well CCBA-MW2 at SWMU 58, August 2011

- The groundwater monitoring well installation report for groundwater monitoring wells CCBA-MW1 and CCBA-MW2 is currently in production and will be submitted to the NMED in November 2011.

- No groundwater monitoring activities were performed at SWMUs 8/58 during this reporting period.

2.3.7 SWMU 68 Groundwater

- Three groundwater monitoring wells, OBS-MW1, OBS-MW2, and OBS-MW3, were installed at SWMU 68 in August 2011.

- On August 3, 2011, DOE/Sandia received a letter from the NMED entitled "Notice of Approval: Request for Extension to Complete Well Installation Report for Groundwater Monitoring Wells at Solid Waste Management Units 8, 58, and 68, June 27, 2011" (NMED August 2011b).

- The groundwater monitoring well installation report for groundwater monitoring wells OBS-MW1, OBS-MW2, and OBS-MW3 is currently in production and will be submitted to the NMED in November 2011.

- No groundwater monitoring activities were performed at SWMU 68 during this reporting period.

2.3.8 SWMU 49 Groundwater

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

2.3.9 SWMU 116 Groundwater

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

2.3.10 SWMU 149 Groundwater

- Groundwater sampling for SWMU 149 was conducted in September 2011. Analytical results for this sampling event are presented in Section III of this ER Quarterly Report. The results for the perchlorate analysis are discussed in Section II of this ER Quarterly Report. Analytical results will also be discussed in the CY 2011 AGMR (anticipated submittal to the NMED in summer 2012).

2.3.11 SWMU 154 Groundwater

- Groundwater sampling for SWMU 154 was conducted in September 2011. Analytical results for this sampling event are presented in Section III of this ER Quarterly Report. The results for the perchlorate analysis are discussed in Section II of this ER Quarterly Report. Analytical results will also be discussed in the CY 2011 AGMR (anticipated submittal to the NMED in summer 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 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 2008b).
- The TA-V Geophysical Logs and Slug Test Results Report, submitted to the NMED on November 24, 2010 (SNL/NM November 2010).
- Summary Report for TA-V Groundwater and Soil-Vapor Monitoring Well Installation submitted to the NMED on June 30, 2011 (SNL/NM June 2011).
- MWL CMI Report, submitted to the NMED in January 2010 (SNL/NM January 2010).

3.0 Environmental Restoration Operations/Long-Term Stewardship Work Completed

3.1 Chemical Waste Landfill

On June 2, 2011, the NMED approved the CWL Final RCRA Closure Report and the CWL PCC Permit became effective (Kieling June 2011), transitioning the CWL from ER to LTS. A summary of PCC activities at the CWL will be provided in this and future ER Quarterly reports. More detailed documentation of ongoing activities under the PCC Permit will be reported in the CWL PCC Annual Report due to the NMED by March 31 of each year, beginning in 2012.

- Weed removal activities were performed at the CWL from August 18 to August 23, 2011 (Figure 4). Russian thistle (i.e., tumbleweeds) and other annual invasive species were removed along with four-wing salt bush seedlings. Two trailer-loads (capacity of approximately 8 cubic yards each) of tightly compressed weeds were removed from the site and disposed of at the KAFB landfill.

Figure 4
Weed Removal at the CWL, August 2011, view from the southeast

- Under the PCC Permit, the first groundwater monitoring event was performed in July and August 2011 (Section I.2.3.5), and the first cover and site inspections were performed in September 2011. No significant issues were noted during the inspections.

3.2 Corrective Action Management Unit

Corrective Action Management Unit (CAMU) PCC operations consist of vadose zone monitoring, leachate removal, and post-closure inspections, as required in the PCC Permit. Activities for this reporting period (July through September 2011) include the following:

- Quarterly monitoring of the Vadose Zone Monitoring System was conducted in September 2011. 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 August 16, 2011.

- Weekly pumping of leachate from the leachate collection and removal system (Figure 5) was performed. Waste management associated with the leachate collection and removal system during this reporting period is outlined in Section I.3.2.1.

Figure 5
CAMU Leachate Collection and Removal System

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

- Quarterly inspection of the site was performed on September 8 and September 15, 2011, and included the containment cell cover, storm water diversion structures, security fences, gates, signs, and benchmarks. The inspection findings are as follows:

    - Twenty-two four-wing saltbush plants were identified growing on the containment cell. Because these plants can develop extensive root systems that could damage the high-density polyethylene fabric that is part of the cover system, the plants were removed from the cover on September 8, 2011.

    - Debris and vegetation need to be removed from the drainage grate and drainage pit.

    - The CWL sanitary sewer protective casings and bollards need repainting.

    - Site locks need lubricating.

    - Debris and vegetation need to be removed from benchmarks.

Activities to address the aforementioned findings are to be scheduled prior to the next quarterly site inspection. If these issues have not been resolved satisfactorily, each deficiency will be noted on the following quarterly site inspection to ensure the necessary follow-up action.

3.2.1 CAMU Waste Management Activities

Waste management data for the CAMU are reported in this section for the reporting period of July through September 2011.

- Waste stored on site on July 1, 2011:
    - 23 gallons of leachate
    - 2 pounds (lbs) of personal protective equipment (PPE)

- Waste generated on site during the reporting period:
    - 69 gallons of leachate
    - 2 gallons of rinsate
    - 4 lbs of PPE, paper wipes, plastic drum pump

- Waste removed from the site by Hazardous Waste Handling Facility personnel on August 18, 2011:
  - 77 gallons of leachate
  - 2 gallons of rinsate
  - 5 lbs of PPE, paper wipes, plastic drum pump

- Waste remaining on site at the end of this reporting period:
  - 15 gallons of leachate
  - 1 lb of PPE

3.2.2 CAMU Regulatory Activities

On September 23, 2011, DOE/Sandia submitted the "Corrective Action Management Unit Vadose Zone Monitoring System Annual Monitoring Results Report," to the NMED (SNL/NM September 2011b). This report presents the results for data collected from July 2010 through September 2011.

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

No LTS documents are pending NMED review and approval.

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SECTION II
PERCHLORATE SCREENING QUARTERLY MONITORING REPORT

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) 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 report summarizes the perchlorate screening monitoring completed during the Third Quarter of Calendar Year (CY) 2011 (July, August, and September 2011) 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 and which will remain at a semiannual frequency for sampling and reporting.

This report is the twenty-third to be submitted since the November 2005 letter report; the previous reports were submitted for Fourth Quarter of CY 2005 through the Second 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 2010, December 2010, March 2011, June 2011a, and October 2011).

Groundwater at BSG monitoring well CYN-MW6 has been sampled 17 times; Coyote Test Field (CTF) wells CTF-MW2 and CTF-MW3 have been sampled three times; and Technical Area (TA)-V wells TAV-MW11, TAV-MW12, TAV-MW13, and TAV-MW14 have been sampled three times (Figure 1). 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 analytical results for the Third Quarter of CY 2011 (July, August, and September 2011) for the wells currently active in the perchlorate-screening program as shown on Figure 1 and listed in Table 1. In accordance with the requirements of Table XI-1 of the Order, a well with four consecutive quarters of nondetects (NDs) for perchlorate at the screening level/method detection limit (MDL) of 4 micrograms per liter (µg/L) is removed from the requirement of continued monitoring for perchlorate. Data for numerous wells identified in the Order have satisfied this requirement; therefore, these wells have been removed from the perchlorate-screening program. The perchlorate results for these wells have been provided in previous reports and are not discussed in this current report. Wells discussed in previous perchlorate-screening reports include the following: CYN-MW1D, CYN-MW5 (recently reinstated), 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, and TA2-W-27.

SNL/NM personnel performed groundwater sampling at seven wells on the dates listed in Table 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:

- “TA-V Groundwater Monitoring, Mini-SAP for Fourth Quarter FY11 [Fiscal Year 2011]” (SNL/NM June 2011b)

- “Burn Site Groundwater Monitoring, Mini-SAP for Fourth Quarter, FY11” (SNL/NM July 2011)

SNL EGIS DEPT 4142 DHelfrich GIS MAP-ID = 120004 nmloc_dh.aml 31-OCT-2011

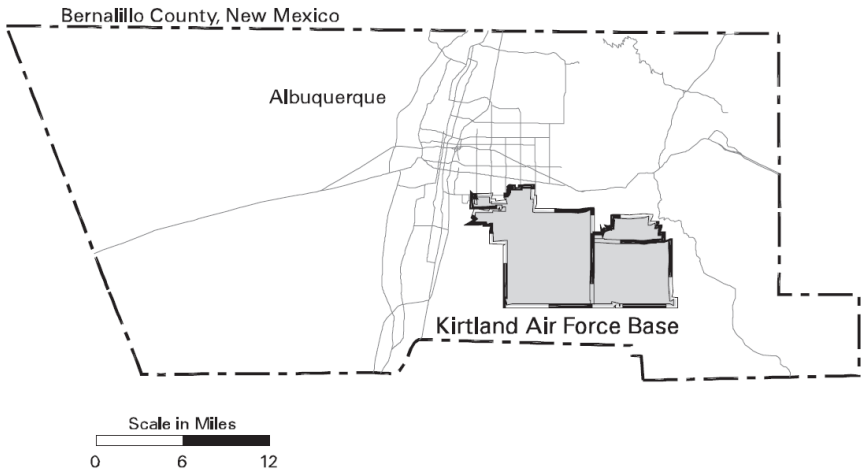
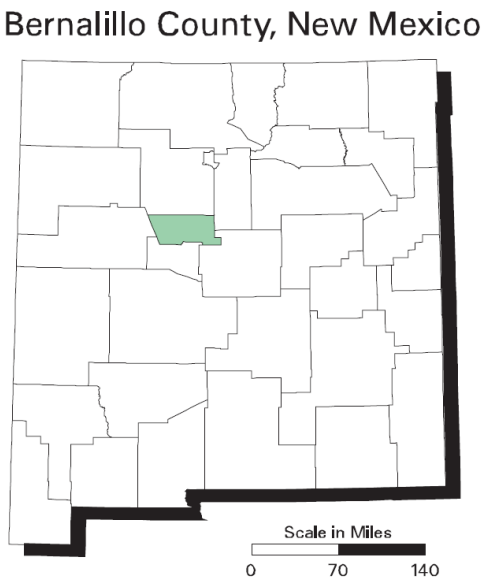


Figure 1
Sandia National Laboratories
New Mexico
Current Perchlorate-Screening
Monitoring-Well Network
(July, August, and September 2011)



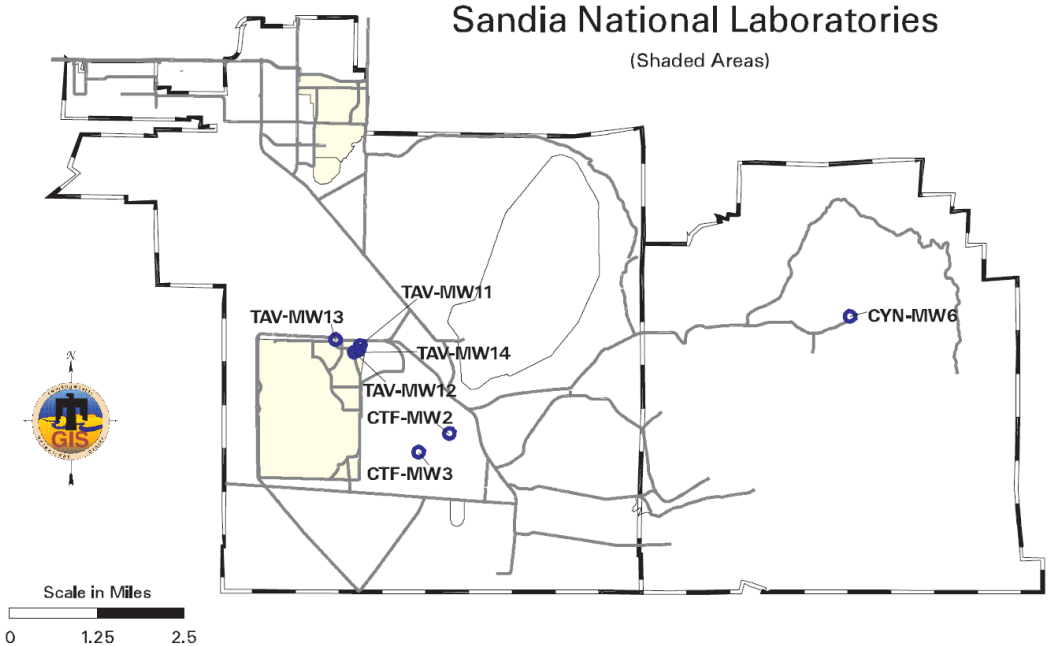


Table 1
Current Perchlorate Screening Monitoring Well Network
Third Quarter, CY 2011
(July, August, and September 2011)

Well	Date Sampled	Number of Consecutive Sampling Events[a]	Remaining Number of Sampling Events[b]	Sampling Equipment
CTF-MW2	29-Sep-11	3	5	Bennett™ Pump
CTF-MW3	23-Sep-11	3	5	Bennett™ Pump
CYN-MW6	18-Aug-11	17	TBD[c]	Bennett™ Pump
TAV-MW11	08-Jul-11	3	1	Bennett™ Pump
TAV-MW12	15-Jul-11	3	1	Bennett™ Pump
TAV-MW13	05-Jul-11	3	1	Bennett™ Pump
TAV-MW14	14-Jul-11	3	1	Bennett™ Pump

Notes

[a]Includes this sampling event.
[b]Per the requirements of Table XI-1 of the Order (NMED April 2004), a well will be removed from the perchlorate-screening monitoring well network after four quarters unless perchlorate is detected above the screening level/MDL of 4 µg/L. 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.
[c]TBD = To be determined. This well has been sampled for the required initial four quarters. Because perchlorate concentrations in this well have exceeded the screening level, DOE/Sandia and the NMED have agreed to further characterization requirements in the BSG study area (NMED February 2010).
µg/L = Microgram(s) per liter.
BSG = Burn Site Groundwater.
CTF = Coyote Test Field.
CY = Calendar Year.
CYN = Canyons (Burn Site).
DOE = U.S. Department of Energy.
MDL = Method detection limit.
MW = Monitoring well.
NMED = New Mexico Environment Department.
Sandia = Sandia Corporation.
TAV = Technical Area V.

- "SWMU [Solid Waste Management Unit] 149 Groundwater Monitoring, Mini-SAP for Fourth Quarter, FY11" (SNL/NM September 2011a).

- "SWMU 154 Groundwater Monitoring, Mini-SAP for Fourth Quarter, FY11" (SNL/NM September 2011b).

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™ groundwater sampling system was used to collect the groundwater samples. The sampling pump and tubing bundle were decontaminated prior to installation into monitoring wells in

accordance with procedures described in FOP 05-03, "LTES Groundwater Sampling Equipment Decontamination" (SNL/NM August 2007a). With the exception of CYN-MW6, 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 August 2007b). Well CYN-MW6 is a low-yield monitoring well and was purged dry and allowed to recover before sampling to ensure a representative groundwater sample.

Field water-quality measurements for turbidity, pH, temperature, specific conductance (SC), oxidation-reduction potential (ORP), and dissolved oxygen (DO) were obtained from the well prior to collecting groundwater samples. Groundwater temperature, SC, ORP, DO, and pH were measured with a YSI™ Model 620 water quality meter. Turbidity was measured with a HACH™ Model 2100P turbidity meter. Purging continued until four stable measurements for turbidity, pH, temperature, and SC were obtained. Groundwater stability is considered acceptable when the following parameters are achieved:

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

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

Table 2
Sample Details for Third Quarter, CY 2011 Perchlorate Sampling

Well	Sample Identification	AR/COC Number	Associated Groundwater Investigation
CTF-MW2	091259-020	613855	SWMU 154
CTF-MW3	091257-020	613854	SWMU 149
CYN-MW6	091035-020	613723	BSG
TAV-MW11	090822-020	613625	TAV
TAV-MW12	090837-020	613631	TAV
TAV-MW13	090813-020	613621	TAV
TAV-MW14	090834-020 090835-020	613630	TAV

Notes

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

3.0 Regulatory Criteria

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

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

characterization of this well. In January 2008, DOE/Sandia requested a meeting with the NMED to discuss the need for continued monitoring or additional characterization work and, potentially, a CME.

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

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

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

In April 2009, DOE/Sandia received a letter from the NMED requiring DOE/Sandia to characterize the nature and extent of the perchlorate contamination in soil and groundwater in the BSG study area (NMED April 2009). A characterization work plan was prepared and submitted to the NMED (SNL/NM November 2009), approved by the NMED (February 2010), and implemented in July 2010. In the April 2009 letter, the NMED had also requested that DOE/Sandia monitor perchlorate concentrations for a minimum of four quarters at several Tijeras Arroyo Groundwater and TA-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).

4.0 Monitoring Results

Table 3 summarizes current and historical perchlorate results for wells currently in the perchlorate-screening monitoring network. The analytical laboratory COA for the Third Quarter of CY 2011 perchlorate data is included as Appendix A. Consistent with historical analytical results, no perchlorate was detected above the screening level in any samples collected from CTF-MW2, CTF-MW3, TAV-MW11, TAV-MW12, TAV-MW13, or TAV-MW14. Also consistent with historical analytical results, perchlorate was detected above the screening level/MDL in the sample from CYN-MW6.

Table 3
Summary of Perchlorate Screening Analytical Results for the Current Monitoring Well Network as of Third Quarter, CY 2011

Well ID	Sample Date	AR/COC No.	Sample No.	Perchlorate Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Analytical Method[g]	Comments
CTF-MW2	08-Mar-11	613448	090237-020	ND	4.0	12	NE	U		EPA 314.0	
			090238-020	ND	4.0	12	NE	U		EPA 314.0	Duplicate sample
	31-May-11	613578	090670-020	ND	4.0	12	NE	U		EPA 314.0	
	29-Sep-11	613855	091259-020	ND	4.0	12	NE	U		EPA 314.0	
CTF-MW3	09-Mar-11	613450	090243-020	ND	4.0	12	NE	U		EPA 314.0	
			090244-020	ND	4.0	12	NE	U		EPA 314.0	Duplicate sample
	03-Jun-11	613579	090672-020	ND	4.0	12	NE	U		EPA 314.0	
	23-Sep-11	613854	091257-020	ND	4.0	12	NE	U		EPA 314.0	
CYN-MW6	23-Mar-06	609578	075985-020	**6.92**	4.0	12	NE	J		EPA 314.0	
			075986-020	**7.44**	4.0	12	NE	J		EPA 314.0	Duplicate sample
			075985-R20	**6.39**	0.50	2.0	NE	Hh	HT, J	EPA 6850M	Verification/Reanalysis
			075986-R20	**6.48**	0.50	2.0	NE	Hh	HT, J	EPA 6850M	Verification/Reanalysis
	22-Jun-06	609929	078687-020	**6.63**	4.0	12	NE	J		EPA 314.0	
			078688-020	**6.45**	4.0	12	NE	J		EPA 314.0	Duplicate sample
			078687-021	**6.99**	1.0	4.0	NE			EPA 6850M	Verification
			078688-021	**6.92**	1.0	4.0	NE			EPA 6850M	Verification/Duplicate Sample
	20-Sep-06	610652	081626-020	**7.52**	4.0	12	NE	J		EPA 314.0	
			081626-R20	**6.96**	1.0	4.0	NE		P2	EPA 6850M	Verification/Reanalysis
	15-Dec-06	611057	083858-020	**8.46**	4.0	12	NE	J		EPA 314.0	
			083859-020	**8.93**	4.0	12	NE	J		EPA 314.0	Duplicate sample
	14-Mar-07	611200	084237-020	**8.12**	4.0	12	NE	J		EPA 314.0	
	27-Jun-07	611399	084833-020	**6.57**	4.0	12	NE	J	J-, X1	EPA 314.0	
			084833-R20	**5.94**	0.5	2.0	NE			EPA 6850M	Verification/Reanalysis
	12-Sep-07	611581	085249-020	**7.74**	4.0	12	NE	J		EPA 314.0	
			085249-R20	**6.46**	0.5	2.0	NE	Hh	J	EPA 6850M	Verification/Reanalysis
	18-Dec-07	611668	085446-020	**6.20**	4.0	12	NE	J		EPA 314.0	
			085447-020	**6.56**	4.0	12	NE	J		EPA 314.0	Duplicate sample
	10-Mar-08	611749	085661-020	**7.25**	4.0	12	NE	J		EPA 314.0	
	23-Jun-08	611912	086280-020	**6.67**	4.0	12	NE	J		EPA 314.0	
	17-Sep-08	612004	086782-020	**6.85**	4.0	12	NE	J		EPA 314.0	
	02-Mar-09	612120	087047-020	**7.24**	4.0	12	NE	J		EPA 314.0	
	30-Sep-09	612392	087734-020	**4.12**	4.0	12	NE	J	J-	EPA 314.0	
			087735-020	**4.71**	4.0	12	NE	J	J-	EPA 314.0	Duplicate sample
	03-Mar-10	612580	088180-020	**4.59**	4.0	12	NE	J		EPA 314.0	
	20-Sep-10	613279	089659-020	**6.14**	4.0	12	NE	J		EPA 314.0	

Refer to footnotes at end of table.

Table 3 (Continued)
Summary of Perchlorate Screening Analytical Results for the Current Monitoring-Well Network, as of Third Quarter CY 2011

Well ID	Sample Date	AR/COC No.	Sample No.	Perchlorate Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Analytical Method[g]	Comments
CYN-MW6 (Continued)	14-Feb-11	613413	090000-020	**6.95**	4.0	12	NE	J	J-	EPA 314.0	
				6.26	0.5	2.0	NE	Hh		EPA 6850M	Verification/Reanalysis
	18-Aug-11	613723	091035-020	**7.06**	4.0	12	NE	J		EPA 314.0	
TAV-MW11	06-Jan-11	613384	089917-020	ND	4.0	12	NE	U		EPA 314.0	
	18-Apr-11	613524	090435-020	ND	4.0	12	NE	U		EPA 314.0	
	08-Jul-11	613625	090822-020	ND	4.0	12	NE	U		EPA 314.0	
TAV-MW12	19-Jan-11	613392	089935-020	ND	4.0	12	NE	U		EPA 314.0	
	20-Apr-11	613527	090442-020	ND	4.0	12	NE	U		EPA 314.0	
			090443-020	ND	4.0	12	NE	U		EPA 314.0	Duplicate sample
	15-Jul-11	613631	090837-020	ND	4.0	12	NE	U		EPA 314.0	
TAV-MW13	10-Jan-11	613386	089921-020	ND	4.0	12	NE	U		EPA 314.0	
			089922-020	ND	4.0	12	NE	U		EPA 314.0	Duplicate sample
	06-Apr-11	613516	090417-020	ND	4.0	12	NE	U		EPA 314.0	
	05-Jul-11	613621	090813-020	ND	4.0	12	NE	U		EPA 314.0	
TAV-MW14	20-Jan-11	613393	089938-020	ND	4.0	12	NE	U		EPA 314.0	
	21-Apr-11	613528	090445-020	ND	4.0	12	NE	U		EPA 314.0	
	14-Jul-11	613630	090834-020	ND	4.0	12	NE	U		EPA 314.0	
			090835-020	ND	4.0	12	NE	U		EPA 314.0	

Notes

AR/COC = Analysis Request and Chain of Custody.
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.
TAV = Technical Area V.

[a]Result
Values in **bold** exceed the screening level/MDL
ND = Not detected (at MDL).
µg/L = Micrograms per liter.

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

Table 3 (Concluded)
Summary of Perchlorate Screening Analytical Results for the Current Monitoring-Well Network, as of Third Quarter CY 2011

Notes (Continued)

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

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

[e]Laboratory Qualifier
H = Analytical holding time was exceeded.
h = Preparation holding time was exceeded.
J = Amount detected is below the practical quantitation limit.
U = Analyte is absent or below the method detection limit.

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

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

As shown on Figure 2, the August 2011 perchlorate concentration reported for well CYN-MW6 is 7.06 µg/L, which is consistent with the average concentration detected since sampling began in March 2006. The hydrograph for well CYN-MW6 (Figure 2) shows that the water table is rapidly declining.

Table 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 2 (SNL/NM July 2007). 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 included as Appendix B.

No variances or nonconformances in field activities or field conditions from requirements in the groundwater monitoring Mini-SAPs (SNL/NM June 2011b, July 2011, September 2011a and 2011b) were identified during the Third Quarter of CY 2011 sampling activities.

5.0 Summary and Conclusions

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

- No perchlorate was detected in the environmental samples from groundwater monitoring wells CTF-MW2, CTF-MW3, TAV-MW11, TAV-MW12, TAV-MW13, or TAV-MW14 at the screening level/MDL of 4 µg/L.

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

- The perchlorate concentration for well CYN-MW6 for the Third Quarter of CY 2011 sampling event was 7.06 µg/L, which is consistent with the average concentration reported since the inception of perchlorate sampling at well CYN-MW6 in March 2006 (Figure 2).

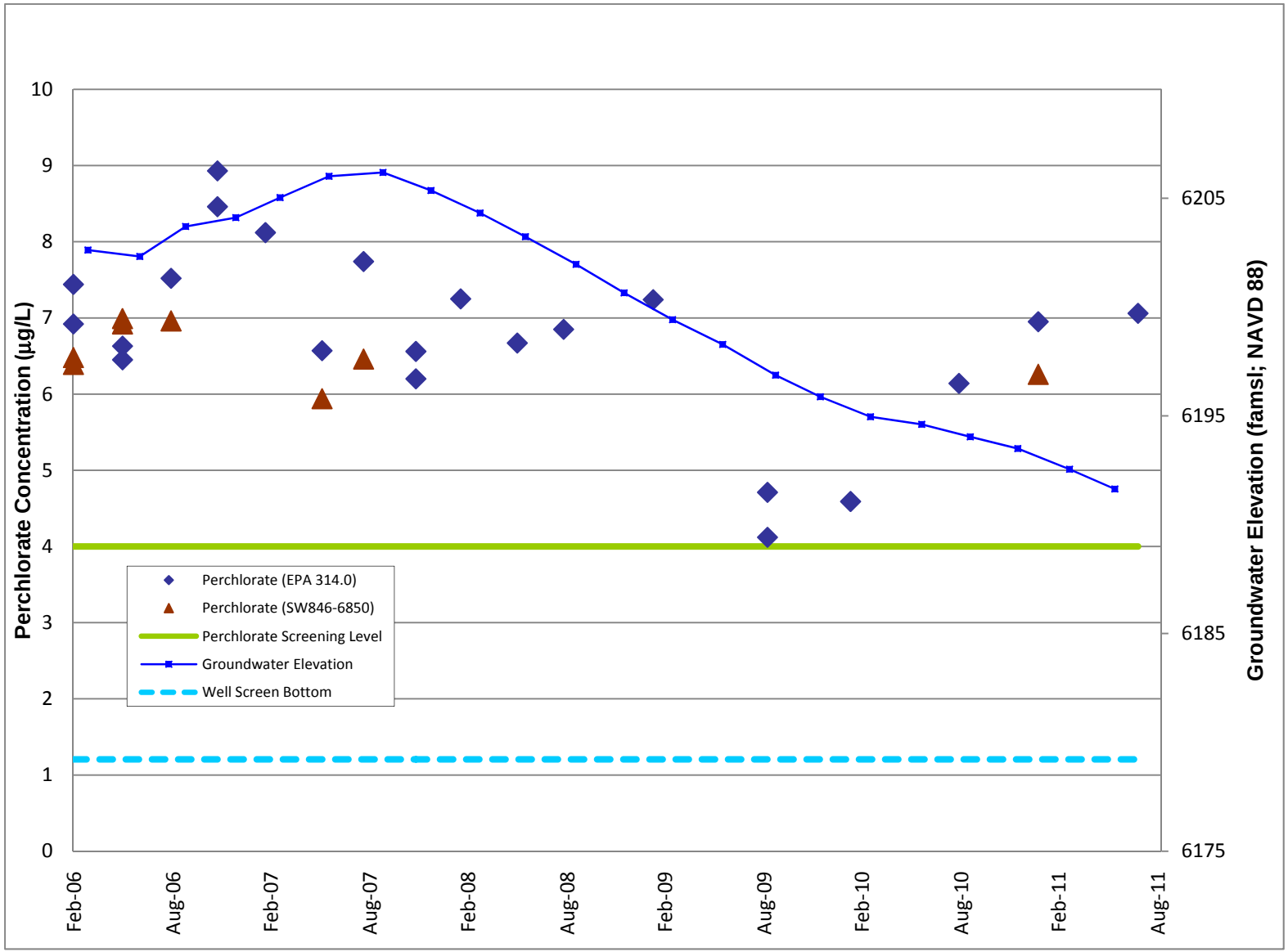


Figure 2

Groundwater Elevations and Perchlorate Concentrations Over Time in CYN-MW6

Table 4
Perchlorate Screening Groundwater Monitoring
Field Water Quality Measurements[a], Third Quarter, CY 2011

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmhos/cm)	Oxidation-Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
CTF-MW2	29-Sep-11	18.66	4036	52.2	5.58	2.72	2.2	0.20
CTF-MW3	23-Sep-11	20.76	1850	417.5	6.70	0.46	70.8	6.26
CYN-MW6	18-Sep-11	19.10	1126	391.8	6.92	0.87	17.6	1.62
TAV-MW11	08-Jul-11	24.06	621	365.5	7.22	0.43	80.6	6.77
TAV-MW12	15-Jul-11	22.60	660	358.4	7.16	1.98	65.8	5.68
TAV-MW13	05-Jul-11	23.01	586	366	7.23	0.63	24.7	2.12
TAV-MW14	14-Jul-11	22.42	727	338.8	7.13	1.14	82.7	7.13

Notes

[a]Field measurements obtained immediately before the groundwater sample was collected.
°C = Degrees Celsius.
% Sat = Percent saturation.
µmhos/cm = Micromhos per centimeter.
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.
pH = Potential of hydrogen (negative logarithm of the hydrogen ion concentration).
TAV = Technical Area V.

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

DOE/Sandia will continue annual monitoring for perchlorate in CTF-MW1 and CYN-MW5, semiannual monitoring in CYN-MW6, and quarterly monitoring in wells CTF-MW2, CTF-MW3, TAV-MW11, TAV-MW12, TAV-MW13, and TAV-MW14. DOE/Sandia recently installed two new groundwater monitoring wells (CCBA-MW1 and CCBA-MW2) at SWMUs 8/58 and three new groundwater monitoring wells (OBS-MW1, OBS-MW2, and OBS-MW3) at SWMU 68. Samples from these five new wells will be analyzed for perchlorate, and the results will be discussed in the next quarterly report.

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Appendix A

Analytical Laboratory Certificates of Analysis for the Perchlorate Data

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 2

Batch No. N/A

SMO/Use

AR/COC 613855

Dept. No./Mail Stop:	6234/MS 0718	Date Samples Shipped:	9/29/11	Project/Task No.98026.01.15	☐ Waste Characterization -Send preliminary/copy report to:
Project/Task Manager:	Alicia Aragon	Carrier/Waybill No.	132432	SMO Authorization:	
Project Name:	SWMU 154	Lab Contact:	Edie Kent/803-556-8171	Contract # PO 691436	
Record Center Code:	NA	Lab Destination:	GEL		☐ Released by COC No.:_____
Logbook Ref. No.:	NA	SMO Contact/Phone:	Lorraine Herrera/505-844-3199	SEE OUTLOOK ORDER	☑ Validation Required
Service Order No.	CF 251-12	Send Report to SMO:	Lorraine Herrera /505-844-3199		Bill To:Sandia National Labs (Accounts Payable) P.O. Box 5800 MS 0154 Albuquerque, NM 87185-0154
Location	Tech Area				286865
Building	Room				

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
091259-001	CTF-MW2	125	NA	09/29/11 0920	GW	G	3x40ml	HCL	G	SA	TCL VOC (SW846-8260B)	001 .1
091259-002	CTF-MW2	125	NA	09/29/11 0922	GW	AG	4x1L	4C	G	SA	TCL SVOC (SW846-8270C)	002 .2
091259-009	CTF-MW2	125	NA	09/29/11 0923	GW	P	500 ml	HNO3	G	SA	TAL Metals+ Ur (SW846-6020/7470)	003 .3
091259-010	CTF-MW2	125	NA	09/29/11 0925	FGW	P	500 ml	HNO3	G	SA	TAL Metals+ Ur (SW846-6020/7470)	286867 001
091259-016	CTF-MW2	125	NA	09/29/11 0926	GW	P	125 ml	4C	G	SA	Anions (SW846-9056)	286865 004 .4
091259-018	CTF-MW2	125	NA	09/29/11 0927	GW	P	125 ml	H2SO4	G	SA	NPN (353.2)	005 .5
091259-020	CTF-MW2	125	NA	09/29/11 0928	GW	P	250 ml	4C	G	SA	Perchlorate (314.0)	006 .6
091259-022	CTF-MW2	125	NA	09/29/11 0929	GW	P	500 ml	4C	G	SA	Alkalinity (SM2320B)	007 .7
091259-024	CTF-MW2	125	NA	09/29/11 0931	GW	AG	4x1L	4C	G	SA	High Explosive (SW846-8321A) Mod.	008 .8
091259-033	CTF-MW2	125	NA	09/29/11 0933	GW	P	1 Liter	HNO3	G	SA	Gamma Spec (short list)(901.0)	009 .9
091259-034	CTF-MW2	125	NA	09/29/11 0935	GW	P	1 Liter	HNO3	G	SA	Gross Alpha/Beta (900.0)	010 .10

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day

Return Samples By: ☐ Negotiated TAT QC Inits:

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

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level D Package ☐ Yes ☑ No
*Send report to:
Tim Jackson/ORG.4142/MS.0729/ 284-2547
If Perchlorate detected perform verification analysis(SW846-6850M)
Alkalinity as total bicarbonate and carbonate
Anions as Br,Fl,Cl,SO4
FGW (filtered in field with .45 micron filter)
*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cellular
	Robert Lynch	Robert Lynch	RL	Weston/4142/844-4013/250-7090
	Alfred Santillanes	Alfred Santillanes	AS	Weston/4142/844-5130/228-0710

1.Relinquished by Alfred Santillanes	Org. 4142	Date 9/29/11	Time 1020	4.Relinquished by	Org.	Date	Time
1. Received by [illegible]	Org. 4142	Date 9/29/11	Time 1020	4. Received by	Org.	Date	Time
2.Relinquished by [illegible] SMO	Org 4142	Date 9/29/11	Time 1134	5.Relinquished by	Org.	Date	Time
2. Received by Lorraine Herrera	Org.	Date 9/30/11	Time 0785	5. Received by	Org.	Date	Time
3.Relinquished by	Org.	Date	Time	6.Relinquished by	Org.	Date	Time
3. Received by	Org.	Date	Time	6. Received by	Org.	Date	Time

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: October 26, 2011

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:	091259-020	Project:	SNLSGWater
Sample ID:	286865006	Client ID:	SNLS003
Matrix:	AQUEOUS		
Collect Date:	29-SEP-11 09:28		
Receive Date:	30-SEP-11	Client Desc.:	CTF-MW2
Collector:	Client	Vol. Recv.:	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
EPA 314.0 Perchlorate by IC "As Received"											
Perchlorate	U	ND	0.004	0.012	mg/L	1	MAR1	10/11/11	2146	1145635	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 314.0 DOE-AL	

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

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Batch No. N/A

SMO Use

AR/COC 613854

Dept. No./Mail Stop:	6234/MS 0718	Date Samples Shipped:	9/27/11	Project/Task No.98026.01.14	☐ Waste Characterization -Send preliminary/copy report to:
Project/Task Manager:	Alicia Aragon	Carrier/Waybill No.	132314	SMO Authorization: SMO	
Project Name:	SWMU-149	Lab Contact:	Edie Kent/803-556-8171	Contract # PO 691436	☐ Released by COC No.: ☑ Validation Required
Record Center Code:	NA	Lab Destination:	GEL		
Logbook Ref. No.:	NA	SMO Contact/Phone:	Lorraine Herrera/505-844-3199	SEE BOTTLE ORDER	
Service Order No.	CF 250-12	Send Report to SMO:	Lorraine Herrera /505-844-3199		Bill To: Sandia National Labs (Accounts Payable) P.O. Box 5800 MS 0154 Albuquerque, NM 87185-0154 286722
Location	Tech Area				
Building	Room				

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
091257-001	CTF-MW3	361	NA	09/23/11 0929	GW	G	3x40ml	HCL	G	SA	TCL VOC (SW846-8260B)	001 .1
091257-009	CTF-MW3	361	NA	09/23/11 0930	GW	P	500 ml	HNO3	G	SA	TAL Metals (SW846-6020/7470)	002 .2
091257-010	CTF-MW3	361	NA	09/23/11 0931	FGW	P	500 ml	HNO3	G	SA	TAL Metals (SW846-6020/7470)	286723 001
091257-016	CTF-MW3	361	NA	09/23/11 0932	GW	P	125 ml	4C	G	SA	Anions (SW846-9056)	286722 003 .3
091257-018	CTF-MW3	361	NA	09/23/11 0933	GW	P	125 ml	H2SO4	G	SA	NPN (353.2)	004 .4
091257-020	CTF-MW3	361	NA	09/23/11 0934	GW	P	250 ml	4C	G	SA	Perchlorate (314.0)	005 .5
091257-022	CTF-MW3	361	NA	09/23/11 0935	GW	P	500 ml	4C	G	SA	Alkalinity (SM2320B)	006 .6
091258-001	CTF-TB1	NA	NA	09/23/11 0929	DIW	G	3x40ml	HCL	G	TB	TCL VOC (SW846-8260B)	007 .1

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day

Return Samples By: ☐ Negotiated TAT

Sample Tracking Smo Use

Date Entered(mm/dd/yy)

Entered by:

QC inits.

Special Instructions/QC Requirements

EDD ☑ Yes ☐ No

Level D Package ☐ Yes ☑ No

*Send report to:

Tim Jackson/ORG.4142/MS.0729/ 284-2547

If perchlorate detected perform verification analysis(SW846-6850M)

Alkalinity as total bicarbonate and carbonate

Anions as Br,Fl,Cl,SO4

FGW (filtered in field with .45 micron filter)

*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	Robert Lynch		RL	Weston/4142/844-4013/250-7090
	Alfred Santillanes		AS	Weston/4142/844-5130/228-0710
	William Gibson			Weston/4142/844-4013/239-7367

1.Relinquished by		Org. 4142	Date 9/27/11	Time 1037	4.Relinquished by	Org.	Date	Time
1. Received by	SMO	Org. 4142	Date 9/27/11	Time 1037	4. Received by	Org.	Date	Time
2.Relinquished by	SMO	Org. 4142	Date 9/27/11	Time 1200	5.Relinquished by	Org.	Date	Time
2. Received by	Daniel Poole	Org.	Date 9/28/11	Time 0745	5. Received by	Org.	Date	Time
3.Relinquished by		Org.	Date	Time	6.Relinquished by	Org.	Date	Time
3. Received by		Org.	Date	Time	6. Received by	Org.	Date	Time

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: October 26, 2011

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:	091257-020	Project:	SNLSGWater
Sample ID:	286722005	Client ID:	SNLS003
Matrix:	AQUEOUS		
Collect Date:	23-SEP-11 09:34		
Receive Date:	28-SEP-11	Client Desc.:	CTF-MW3
Collector:	Client	Vol. Recv.:	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
EPA 314.0 Perchlorate by IC "As Received"											
Perchlorate	U	ND	0.004	0.012	mg/L	1	MARI	10/11/11	2049	1145635	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 314.0 DOE-AL	

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No.

SMO Use

AR/COC 613723

Dept. No./Mail Stop:	4142/MS1126	Date Samples Shipped:	8-18-11	Project/Task No. 146422.10.11.01	☐ Waste Characterization -Send preliminary/copy report to:
Project/Task Manager:	Don Schofield	Carrier/Waybill No.	130271	SMO Authorization:	
Project Name:	Burn Site GWM	Lab Contact:	Edie Kent/803-556-8171	Contract #: PO 691436	
Record Center Code:	ER/1333/DAT	Lab Destination:	GEL		☐ Released by COC No.:
Logbook Ref. No.:	ER 058	SMO Contact/Phone:	Lorraine Herrera/505-844-3199	SEE BOTTLE ORDER	☑ Validation Required
Service Order No.	CF058-11	Send Report to SMO:			Bill To: Sandia National Labs (Accounts Payable) P.O. Box 5800 MS 0154 Albuquerque, NM 87185-0154
Location	Tech Area				
Building	Room				254378

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
091035-001	CYN-MW6	163	NA	081811\0850	GW	G	3x40 ml	HCL	G	SA	TCL VOC (SW846-8260B)	001
091035-005	CYN-MW6	163	NA	081811\0854	GW	AG	4x1 L	4C	G	SA	TPH Diesel (SW846-8015A/B) SVOC	002
091035-006	CYN-MW6	163	NA	081811\0852	GW	AG	3x40 ml	4C	G	SA	TPH Gasoline (SW846-8015A/B) VOC	003
091035-009	CYN-MW6	163	NA	081811\0856	GW	P	500 ml	HNO3	G	SA	TAL Metals+Tot U (SW846-6020/7470)	004
091035-016	CYN-MW6	163	NA	081811\0857	GW	P	125 ml	4C	G	SA	Anions (SW846-9056)	005
091035-018	CYN-MW6	163	NA	081811\0858	GW	P	125 ml	H2SO4	G	SA	NPN (353.2)	006
091035-020	CYN-MW6	163	NA	081811\0859	GW	P	250 ml	4C	G	SA	Perchlorate (314.0)	007
091035-033	CYN-MW6	163	NA	081811\0900	GW	P	1 L	HNO3	G	SA	Gamma Spec (short list)(901.0)	008
091035-034	CYN-MW6	163	NA	081811\0901	GW	P	1 L	HNO3	G	SA	Gross Alpha\Beta (900.0)	009
091035-035	CYN-MW6	163	NA	081811\0902	GW	P	1 L	HNO3	G	SA	Isotopic-U (ASTM D3972-09M)	010

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

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level D Package ☐ Yes ☑ No
*Send report to:
Tim Jackson/Org.4142/MS 0756/505-284-2547

Last well for BSG project 4th Qtr.

Anions/Br,Cl,F,SO4
*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cellular
	William J Gibson		WJG	Weston/4142/844-4013/239-7367
	Robert Lynch		RL	Weston/4142/844-4013/250-7090
	Alfred Santillanes		AS	Weston/4142/844-5130/228-0710

1.Relinquished by	Org. 4142	Date 8/18/11	Time 0947	4.Relinquished by	Org.	Date	Time
1. Received by	Org. 4139	Date 8-18-11	Time 9:47	4. Received by	Org.	Date	Time
2.Relinquished by	Org. 4139	Date 8-18-11	Time 1:00	5.Relinquished by	Org.	Date	Time
2. Received by	Org. GEL	Date 8-19-11	Time 0750	5. Received by	Org.	Date	Time
3.Relinquished by	Org.	Date	Time	6.Relinquished by	Org.	Date	Time
3. Received by	Org.	Date	Time	6. Received by	Org.	Date	Time

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

AR/COC- 613723

Project Name:	Burn Site GWM	Project/Task Manger:	Don Schofield	Project/Task No.:	146422.10.11.01
Location	Tech Area				
Building	Room				

Reference LOV (available at SMO)

Sample No-Fraction	ER Sample ID or Sample Location detail	Pump Depth (ft)	ER Site No.	Date/Time (hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab use: Lab Sample ID
091035-036	CYN-MW6	163	NA	081811\0903	GW	AG	250 ml	4C	G	SA	Tritium (906.0)	011
X 091036-001	CYN-TB23	NA	NA	081811\0850	DIW	G	3x40 ml	HCL	G	TB	TCL VOC (SW846-8260B)	012
091037-006	CYN-TB24	NA	NA	081811\0852	DIW	AG	3x40 ml	4C	G	TB	TPH Gasoline (SW846-8015A/B) VOC	013
091038-001	CYN-FB3	NA	NA	081811\0844	DIW	G	3x40 ml	HCL	G	FB	TCL VOC (SW846-8260B)	014
091039-006	CYN-FB4	NA	NA	081811\0845	DIW	AG	3x40 ml	4C	G	FB	TPH Gasoline (SW846-8015A/B) VOC	015

Abnormal Conditions on Receipt

LAB USE

Recipient Initials

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: October 12, 2011

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:	091035-020	Project:	SNLSGWater
Sample ID:	284378007	Client ID:	SNLS003
Matrix:	AQUEOUS		
Collect Date:	18-AUG-11 08:59		
Receive Date:	19-AUG-11	Client Desc.:	CYN-MW6
Collector:	Client	Vol. Recv.:	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
EPA 314.0 Perchlorate by IC "As Received"											
Perchlorate	J	0.00706	0.004	0.012	mg/L	1	MAR1	09/15/11	0959	1134226	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 314.0 DOE-AL	

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. N/A

SMO Use

AR/COC **613625**

Dept. No./Mail Stop:	6234/MS 0719	Date Samples Shipped:	7/11/11	Project/Task No. 98026.01.10	☐ Waste Characterization
Project/Task Manager:	John Cochran	Carrier/Waybill No.	129 202	SMO Authorization:	-Send preliminary/copy report to:
Project Name:	TA-V GWM	Lab Contact:	Edie Kent/803-556-8171	Contract #: 691436	
Record Center Code:	ER/1306/DAT	Lab Destination:	GEL	500 BOTTLES ORDER	☐ Released by COC No.:
Logbook Ref. No.:	NA	SMO Contact/Phone:	Pam Puissant/505-844-3185		☑ Validation Required
Service Order No.	CFO# 240-11	Send Report to SMO:	Lorraine Herrera /505-844-3199		Bill To: Sandia National Labs (Accounts Payable)
Location	Tech Area				P.O. Box 5800 MS 0154
Building	Room				Albuquerque, NM 87185-0154 281793

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
090822-001	TAV-MW11	530.7	NA	07/08/11 0948	GW	G	3x40 ml	HCL	G	SA	TCL VOC (SW846-8260)	001
090822-004	TAV-MW11	530.7	NA	07/08/11 0950	GW	AG	500 ml	H2SO4	G	SA	TOC (SW846-9060)	002
090822-009	TAV-MW11	530.7	NA	07/08/11 0951	GW	P	500 ml	HNO3	G	SA	Metals-Ca,Mg,K,Na (SW846-6020)	003
090822-010	TAV-MW11	530.7	NA	07/08/11 0952	FGW	P	500 ml	HNO3	G	SA	Metals- Fe and Mn (SW846-6020)	281798 004
090822-016	TAV-MW11	530.7	NA	07/08/11 0953	GW	P	125 ml	4C	G	SA	Anions (SW846-9056)	281795 005
090822-018	TAV-MW11	530.7	NA	07/08/11 0954	GW	P	125 ml	H2SO4	G	SA	NPN (353.2)	005
090822-020	TAV-MW11	530.7	NA	07/08/11 0955	GW	P	250 ml	4C	G	SA	Perchlorate (314.0)	006
090822-022	TAV-MW11	530.7	NA	07/08/11 0956	GW	P	500 ml	4C	G	SA	Alkalinity (SM2320B)	007
090822-023	TAV-MW11	530.7	NA	07/08/11 0958	GW	P	1 L	NaOH-Zn	G	SA	Sulfide (SW846-9034)	008
090823-001	TAV-TB5	NA	NA	07/08/11 0948	DIW	G	3x40 ml	HCL	G	TB	TCL VOC (SW846-8260)	009
090824-001	TAV-FB1	NA	NA	07/08/11 0935	DIW	G	3x40 ml	HCL	G	FB	TCL VOC (SW846-8260)	010

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day

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

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

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level D Package ☐ Yes ☑ No
***Send report to:**
Tim Jackson/ORG. 4142/MS.0729/ 284-2547
Alkalinity (total,bicarbonate,carbonate)
Anions (Cl,SO4)
FGW (Filtered in field w/40 micron filter)
Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

	Name	Signature	init	Company/Organization/Phone/Cellular
Sample Team Members	Robert Lynch	Robert Lynch	RL	Weston/4133/844-4013/250-7090
	Alfred Santillanes	Alfred Santillanes	AS	Weston/4133/844-5130/228-0710
	William J. Gibson	William J. Gibson	WJG	Weston/4133/844-4013/239-7367

1.Relinquished by	Alfred Santillanes	Org. 4142	Date 7/11/11	Time 1035	4.Relinquished by	Org.	Date	Time
1. Received by	SMO	Org. 4142	Date 7/11/11	Time 1035	4. Received by	Org.	Date	Time
2.Relinquished by	SMO	Org. 4142	Date 7/11/11	Time 1145	5.Relinquished by	Org.	Date	Time
2. Received by	[illegible]	Org. GEL	Date 7-12-11	Time 0735	5. Received by	Org.	Date	Time
3.Relinquished by		Org.	Date	Time	6.Relinquished by	Org.	Date	Time
3. Received by		Org.	Date	Time	6. Received by	Org.	Date	Time

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: August 11, 2011

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:	090822-020	Project:	SNLSGWater
Sample ID:	281793006	Client ID:	SNLS003
Matrix:	AQUEOUS		
Collect Date:	08-JUL-11 09:55		
Receive Date:	12-JUL-11	Client Desc.:	TAV-MW11
Collector:	Client	Vol. Recv.:	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
EPA 314.0 Perchlorate by IC "As Received"											
Perchlorate	U	ND	0.004	0.012	mg/L	1	MAR1	07/27/11	1222	1122518	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 314.0 DOE-AL	

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. N/A

SMO Use

AR/COC **613631**

Dept. No./Mail Stop:	6234/MS 0719	Date Samples Shipped:	7/18/11	Project/Task No. 98026.01.10	☐ Waste Characterization -Send preliminary/copy report to:
Project/Task Manager:	John Cochran	Carrier/Waybill No:	129416	SMO Authorization:	
Project Name:	TA-V GWM	Lab Contact:	Edie Kent/803-556-8171	Contract #: 691436	
Record Center Code:	ER/1306/DAT	Lab Destination:	GEL		☐ Released by COC No.:
Logbook Ref. No.:	NA	SMO Contact/Phone:	Pam Puissant/505-844-3185		☑ Validation Required
Service Order No.	CFO# 240-11	Send Report to SMO:	Lorraine Herrera /505-844-3199		Bill To: Sandia National Labs (Accounts Payable) P.O. Box 5800 MS 0154 Albuquerque, NM 87185-0154 282276
Location	Tech Area				
Building	Room				

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
090837-001	TAV-MW12	528.8	NA	07/15/11 0942	GW	G	3x40 ml	HCL	G	SA	TCL VOC (SW846-8260)	001
090837-004	TAV-MW12	528.8	NA	07/15/11 0944	GW	AG	500 ml	H2SO4	G	SA	TOC (SW846-9060)	002
090837-009	TAV-MW12	528.8	NA	07/15/11 0945	GW	P	500 ml	HNO3	G	SA	Metals-Ca,Mg,K,Na (SW846-6020)	003
090837-010	TAV-MW12	528.8	NA	07/15/11 0946	FGW	P	500 ml	HNO3	G	SA	Metals- Fe and Mn (SW846-6020)	282272 001
090837-016	TAV-MW12	528.8	NA	07/15/11 0947	GW	P	125 ml	4C	G	SA	Anions (SW846-9056)	282276 004
090837-018	TAV-MW12	528.8	NA	07/15/11 0948	GW	P	125 ml	H2SO4	G	SA	NPN (353.2)	005
090837-020	TAV-MW12	528.8	NA	07/15/11 0949	GW	P	250 ml	4C	G	SA	Perchlorate (314.0)	006
090837-022	TAV-MW12	528.8	NA	07/15/11 0950	GW	P	500 ml	4C	G	SA	Alkalinity (SM2320B)	007
090837-023	TAV-MW12	528.8	NA	07/15/11 0952	GW	P	1 L	NaOH-Zn	G	SA	Sulfide (SW846-9034)	008
090838-001	TAV-TB11	NA	NA	07/15/11 0942	DIW	G	3x40 ml	HCL	G	TB	TCL VOC (SW846-8260)	009

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day

Return Samples By: ☐ Negotiated TAT

Sample Tracking — Smo Use
Date Entered(mm/dd/yy)
Entered by:
QC Initials

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level D Package ☐ Yes ☑ No
*Send report to:
Tim Jackson/ORG. 4142/MS.0729/ 284-2547
Alkalinity (total,bicarbonate,carbonate)
Anions (Cl,SO4)
FGW (Filtered in field w/40 micron filter)
*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	Robert Lynch		RL	Weston/4133/844-4013/250-7090
	Alfred Santillanes			Weston/4133/844-5130/228-0710
	William J. Gibson			Weston/4133/844-4013/239-7367

1.Relinquished by		Org. 4142	Date 7/18/11	Time 1040	4.Relinquished by	Org.	Date	Time
1. Received by		Org. 4142	Date 7/18/11	Time 1040	4. Received by	Org.	Date	Time
2.Relinquished by		Org. 4142	Date 7/18/11	Time 1145	5.Relinquished by	Org.	Date	Time
2. Received by		Org. Eel	Date 7-19-11	Time 0735	5. Received by	Org.	Date	Time
3.Relinquished by		Org.	Date	Time	6.Relinquished by	Org.	Date	Time
3. Received by		Org.	Date	Time	6. Received by	Org.	Date	Time

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: August 16, 2011

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:	090837-020	Project:	SNLSGWater
Sample ID:	282276006	Client ID:	SNLS003
Matrix:	AQUEOUS		
Collect Date:	15-JUL-11 09:49		
Receive Date:	19-JUL-11	Client Desc.:	TAV-MW12
Collector:	Client	Vol. Recv.:	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
EPA 314.0 Perchlorate by IC "As Received"											
Perchlorate	U	ND	0.004	0.012	mg/L	1	MAR1	07/27/11	1417	1122518	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 314.0 DOE-AL	

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. N/A

SMO Use

AR/COC 613621

Dept. No./Mail Stop:	6234/MS 0719	Date Samples Shipped:	7/5/11	Project/Task No. 98026.01.10	☐ Waste Characterization -Send preliminary/copy report to:
Project/Task Manager:	John Cochran	Carrier/Waybill No.	128751	SMO Authorization:	
Project Name:	TA-V GWM	Lab Contact:	Edie Kent/803-556-8171	Contract #: 691436	
Record Center Code:	ER/1306/DAT	Lab Destination:	GEL		☐ Released by COC No.:
Logbook Ref. No.:	NA	SMO Contact/Phone:	Pam Puissant/505-844-3185	See Bottle order	☑ Validation Required
Service Order No.	CFO# 240-11	Send Report to SMO:	Lorraine Herrera /505-844-3199		Bill To: Sandia National Labs (Accounts Payable) P.O. Box 5800 MS 0154 Albuquerque, NM 87185-0154 281170
Location	Tech Area				
Building	Room				

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
090813-001	TAV-MW13	547	NA	07/05/11 1000	GW	G	3x40 ml	HCL	G	SA	TCL VOC (SW846-8260)	001
090813-004	TAV-MW13	547	NA	07/05/11 1001	GW	AG	500 ml	H2SO4	G	SA	TOC (SW846-9060)	002
090813-009	TAV-MW13	547	NA	07/05/11 1002	GW	P	500 ml	HNO3	G	SA	Metals-Ca,Mg,K,Na (SW846-6020)	003
090813-010	TAV-MW13	547	NA	07/05/11 1003	FGW	P	500 ml	HNO3	G	SA	Metals- Fe and Mn (SW846-6020)	281172 001
090813-016	TAV-MW13	547	NA	07/05/11 1004	GW	P	125 ml	4C	G	SA	Anions (SW846-9056)	004
090813-018	TAV-MW13	547	NA	07/05/11 1005	GW	P	125 ml	H2SO4	G	SA	NPN (353.2)	005
090813-020	TAV-MW13	547	NA	07/05/11 1006	GW	P	250 ml	4C	G	SA	Perchlorate (314.0)	006
090813-022	TAV-MW13	547	NA	07/05/11 1007	GW	P	500 ml	4C	G	SA	Alkalinity (SM2320B)	007
090813-023	TAV-MW13	547	NA	07/05/11 1008	GW	P	1 L	NaOH-Zn	G	SA	Sulfide (SW846-9034)	008
090814-001	TAV-TB1	NA	NA	07/05/11 1000	DIW	G	3x40 ml	HCL	G	TB	TCL VOC (SW846-8260)	009

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day

Return Samples By: ☐ Negotiated TAT

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

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level D Package ☐ Yes ☑ No
*Send report to:
Tim Jackson/ORG. 4142/MS.0729/ 284-2547
Aikalinity (total,bicarbonate,carbonate)
Anions (Cl,SO4)
FGW (Filtered in field w/40 micron filter)
*Please list as separate report.

Abnormal Conditions on Receipt
Lab Use

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	Robert Lynch	Robert Lynch	RL	Weston/4133/844-4013/250-7090
	Alfred Santillanes	Alfred Santillanes	AS	Weston/4133/844-5130/228-0710
	William J. Gibson	William J. Gibson	WJG	Weston/4133/844-4013/239-7367

1.Relinquished by	Org. 4142	Date 7/5/11	Time 1030	4.Relinquished by	Org.	Date	Time
1. Received by	Org. 4142	Date 7/5/11	Time 1030	4. Received by	Org.	Date	Time
2.Relinquished by	Org. 4142	Date 7/5/11	Time 1113	5.Relinquished by	Org.	Date	Time
2. Received by	Org. GEL	Date 7/6/11	Time 0735	5. Received by	Org.	Date	Time
3.Relinquished by	Org.	Date	Time MS 7/6/11	6.Relinquished by	Org.	Date	Time
3. Received by	Org.	Date	Time	6. Received by	Org.	Date	Time

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: August 2, 2011

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:	090813-020	Project:	SNLSGWater
Sample ID:	281170006	Client ID:	SNLS003
Matrix:	AQUEOUS		
Collect Date:	05-JUL-11 10:06		
Receive Date:	06-JUL-11	Client Desc.:	TAV-MW13
Collector:	Client	Vol. Recv.:	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
EPA 314.0 Perchlorate by IC "As Received"											
Perchlorate	U	ND	0.004	0.012	mg/L	1	MAR1	07/12/11	1954	1119988	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 314.0 DOE-AL	

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 2

Batch No. N/A

SMO Use

AR/COC 613630

Dept. No./Mail Stop:	6234/MS 0719	Date Samples Shipped:	7/14/11	Project/Task No. 98026.01.10	☐ Waste Characterization -Send preliminary/copy report to:
Project/Task Manager:	John Cochran	Carrier/Waybill No.	139 345	SMO Authorization:	
Project Name:	TA-V GWM	Lab Contact:	Edie Kent/803-556-8171	Contract #: 691436	
Record Center Code:	ER/1306/DAT	Lab Destination:	GEL		☐ Released by COC No.:
Logbook Ref. No.:	NA	SMO Contact/Phone:	Pam Puissant/505-844-3185	SUV BOTTLES ORDER	☑ Validation Required
Service Order No.	CFO# 240-11	Send Report to SMO:	Lorraine Herrera /505-844-3199		Bill To: Sandia National Labs (Accounts Payable) P.O. Box 5800 MS 0154 Albuquerque, NM 87185-0154 281793
Location	Tech Area				
Building	Room				

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
090834-001	TAV-MW14	534.9	NA	07/14/11 0924	GW	G	3x40 ml	HCL	G	SA	TCL VOC (SW846-8260)	020 .1
090834-004	TAV-MW14	534.9	NA	07/14/11 0926	GW	AG	500 ml	H2SO4	G	SA	TOC (SW846-9060)	021 .2
090834-009	TAV-MW14	534.9	NA	07/14/11 0927	GW	P	500 ml	HNO3	G	SA	Metals-Ca,Mg,K,Na (SW846-6020)	022 .3
090834-010	TAV-MW14	534.9	NA	07/14/11 0928	FGW	P	500 ml	HNO3	G	SA	Metals- Fe and Mn (SW846-6020)	281793 023
090834-016	TAV-MW14	534.9	NA	07/14/11 0929	GW	P	125 ml	4C	G	SA	Anions (SW846-9056)	281793 023 .4
090834-018	TAV-MW14	534.9	NA	07/14/11 0930	GW	P	125 ml	H2SO4	G	SA	NPN (353.2)	024 .5
090834-020	TAV-MW14	534.9	NA	07/14/11 0931	GW	P	250 ml	4C	G	SA	Perchlorate (314.0)	025 .6
090834-022	TAV-MW14	534.9	NA	07/14/11 0932	GW	P	500 ml	4C	G	SA	Alkalinity (SM2320B)	026 .7
090834-023	TAV-MW14	534.9	NA	07/14/11 0934	GW	P	1 L	NaOH-Zn	G	SA	Sulfide (SW846-9034)	027 .8
090835-001	TAV-MW14	534.9	NA	07/14/11 0924	GW	G	3x40 ml	HCL	G	DU	TCL VOC (SW846-8260)	028 .1
090835-004	TAV-MW14	534.9	NA	07/14/11 0926	GW	AG	500 ml	H2SO4	G	DU	TOC (SW846-9060)	029 .2

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day

Return Samples By: ☐ Negotiated TAT

Sample Tracking: Smo Use
Date Entered(mm/dd/yy):
Entered by:
QC Inits:

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level D Package ☐ Yes ☑ No
*Send report to:
Tim Jackson/ORG. 4142/MS.0729/ 284-2547
Alkalinity (total,bicarbonate,carbonate)
Anions (Cl,SO4)
FGW (Filtered in field w/40 micron filter)
*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	Robert Lynch		RL	Weston/4133/844-4013/250-7090
	Alfred Santillanes			Weston/4133/844-5130/228-0710
	William J. Gibson			Weston/4133/844-4013/239-7367

1.Relinquished by	Org. 4142	Date 7/14/11	Time 1020	4.Relinquished by	Org.	Date	Time
1. Received by	Org. 4142	Date 7/14/11	Time 1020	4. Received by	Org.	Date	Time
2.Relinquished by	Org. 4142	Date 7/14/11	Time 1200	5.Relinquished by	Org.	Date	Time
2. Received by	Org. GEL	Date 7-15-11	Time 0735	5. Received by	Org.	Date	Time
3.Relinquished by	Org.	Date	Time	6.Relinquished by	Org.	Date	Time
3. Received by	Org.	Date	Time	6. Received by	Org.	Date	Time

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

AR/COC- 613630

Project Name:	TA-V GWM	Project/Task Manger:	John Cochran	Project/Task No.:	98026.01.10
Location	Tech Area				
Building	Room				

Reference LOV (available at SMO)

Sample No-Fraction	ER Sample ID or Sample Location detail	Pump Depth (ft)	ER Site No.	Date/Time (hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab use: Lab Sample ID
090835-009	TAV-MW14	534.9	NA	07/14/11 0927	GW	P	500 ml	HNO3	G	DU	Metals-Ca,Mg,K,Na (SW846-6020)	030 .3
090835-010	TAV-MW14	534.9	NA	07/14/11 0928	FGW	P	500 ml	HNO3	G	DU	Metals- Fe and Mn (SW846-6020)	28798 029
090835-016	TAV-MW14	534.9	NA	07/14/11 0929	GW	P	125 ml	4C	G	DU	Anions (SW846-9056)	28793 031 .4
090835-018	TAV-MW14	534.9	NA	07/14/11 0930	GW	P	125 ml	H2SO4	G	DU	NPN (353.2)	032 .5
090835-020	TAV-MW14	534.9	NA	07/14/11 0931	GW	P	250 ml	4C	G	DU	Perchlorate (314.0)	033 .6
090835-022	TAV-MW14	534.9	NA	07/14/11 0932	GW	P	500 ml	4C	G	DU	Alkalinity (SM2320B)	034 .7
090835-023	TAV-MW14	534.9	NA	07/14/11 0934	GW	P	1 L	NaOH-Zn	G	DU	Sulfide (SW846-9034)	035 .8
090836-001	TAV-TB10	NA	NA	07/14/11 0924	DIW	G	3x40 ml	HCL	G	TB	TCL VOC (SW846-8260)	036 .1

Abnormal Conditions on Receipt

LAB USE

Recipient Initials: MV

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: August 11, 2011

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:	090834-020	Project:	SNLSGWater
Sample ID:	281793025	Client ID:	SNLS003
Matrix:	AQUEOUS		
Collect Date:	14-JUL-11 09:31		
Receive Date:	15-JUL-11	Client Desc.:	TAV-MW14
Collector:	Client	Vol. Recv.:	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
EPA 314.0 Perchlorate by IC "As Received"											
Perchlorate	U	ND	0.004	0.012	mg/L	1	MAR1	07/27/11	1338	1122518	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 314.0 DOE-AL	

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: August 11, 2011

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:	090835-020	Project:	SNLSGWater
Sample ID:	281793033	Client ID:	SNLS003
Matrix:	AQUEOUS		
Collect Date:	14-JUL-11 09:31		
Receive Date:	15-JUL-11	Client Desc.:	TAV-MW14
Collector:	Client	Vol. Recv.:	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
EPA 314.0 Perchlorate by IC "As Received"											
Perchlorate	U	ND	0.004	0.012	mg/L	1	MAR1	07/27/11	1358	1122518	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

Sample Findings Summary

AR/COC: 613855

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 901.1			
	091259-033/CTF-MW2	Americium-241 (14596-10-2)	BD, FR3
	091259-033/CTF-MW2	Cesium-137 (10045-97-3)	BD, FR3
	091259-033/CTF-MW2	Cobalt-60 (10198-40-0)	BD, FR3
	091259-033/CTF-MW2	Potassium-40 (13966-00-2)	R, Z1
SW846 3005/6020 DOE-AL			
	091259-009/CTF-MW2	Barium (7440-39-3)	J, D1
	091259-009/CTF-MW2	Cobalt (7440-48-4)	J+, CK2
	091259-009/CTF-MW2	Copper (7440-50-8)	J+, CK2
	091259-009/CTF-MW2	Iron (7439-89-6)	J-, MS3
	091259-009/CTF-MW2	Manganese (7439-96-5)	J, MS1
	091259-009/CTF-MW2	Nickel (7440-02-0)	J, MS3,CK2
	091259-009/CTF-MW2	Selenium (7782-49-2)	J-, CK3
	091259-009/CTF-MW2	Zinc (7440-66-6)	J-, MS3,D1
	091259-010/CTF-MW2	Barium (7440-39-3)	J, D1
	091259-010/CTF-MW2	Cobalt (7440-48-4)	J+, CK2
	091259-010/CTF-MW2	Copper (7440-50-8)	J+, CK2
	091259-010/CTF-MW2	Iron (7439-89-6)	J-, MS3
	091259-010/CTF-MW2	Manganese (7439-96-5)	J, MS1
	091259-010/CTF-MW2	Nickel (7440-02-0)	J, MS3,CK2
	091259-010/CTF-MW2	Selenium (7782-49-2)	J-, CK3
	091259-010/CTF-MW2	Zinc (7440-66-6)	J-, MS3,D1
SW846 3535/8321A Modified			
	091259-024/CTF-MW2	Tetryl (479-45-8)	R, MS3,MS5

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

ANALYTICAL QUALITY ASSOCIATES, INC.

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

Memorandum

Date: November 3, 2011

To: File

From: Kevin Lambert

Subject: Inorganic Data Review and Validation – SNL
Site: SWMU 154 GWM
AR/COC: 613855
SDG: 286865
Laboratory: GEL
Project/Task: 98026.01.15
Analysis: General Chemistry

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM ER Project AOP 00-03 Rev 3.

Summary

One sample was prepared and analyzed with accepted procedures using methods EPA 9056 (anions by ion chromatography), EPA 353.2 (nitrate/nitrite by Cd reduction), EPA 314.0 (perchlorate), and SM 2320B (alkalinity). 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 QC acceptance criteria were met.

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.

All Analyses:
It should be noted that the MS analyses were performed on SNL samples from other SDGs. No sample data will be qualified as a result.

Laboratory Replicate

The replicate met all QC acceptance criteria.

All Analyses:
It should be noted that the replicate analyses were performed on SNL samples from other SDGs. No sample data will be qualified as a result.

Detection Limits/Dilutions

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

Nitrate/Nitrite:
The sample was diluted 5X due to matrix interference.

Anions:
The sample was diluted 5X for bromide, fluoride, and sulfate and 50X for chloride due to high concentration for this analysis and/or matrix interference.

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

Other QC

No other specific issues that affect data quality were identified.

Reviewed by: David Schwent **Date**: 11/04/11

Sample Findings Summary

AR/COC: 613854

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
SW846 3005/6020 DOE-AL			
	091257-009/CTF-MW3	Cobalt (7440-48-4)	J+, CK2
	091257-009/CTF-MW3	Copper (7440-50-8)	J+, CK2
	091257-009/CTF-MW3	Magnesium (7439-95-4)	J, D1
	091257-009/CTF-MW3	Manganese (7439-96-5)	J+, CK2
	091257-009/CTF-MW3	Nickel (7440-02-0)	J+, CK2
	091257-009/CTF-MW3	Selenium (7782-49-2)	J-, CK3
	091257-009/CTF-MW3	Sodium (7440-23-5)	J, D1
	091257-009/CTF-MW3	Zinc (7440-66-6)	J+, CK2
	091257-010/CTF-MW3	Cobalt (7440-48-4)	J+, CK2
	091257-010/CTF-MW3	Copper (7440-50-8)	J+, CK2
	091257-010/CTF-MW3	Magnesium (7439-95-4)	J, D1
	091257-010/CTF-MW3	Manganese (7439-96-5)	J+, CK2
	091257-010/CTF-MW3	Nickel (7440-02-0)	J+, CK2
	091257-010/CTF-MW3	Selenium (7782-49-2)	J-, CK3
	091257-010/CTF-MW3	Sodium (7440-23-5)	J, D1
	091257-010/CTF-MW3	Zinc (7440-66-6)	J+, CK2

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

ANALYTICAL QUALITY ASSOCIATES, INC.

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

Memorandum

Date: November 1, 2011

To: File

From: Kevin Lambert

Subject: Inorganic Data Review and Validation – SNL
Site: SWMU 149 GWM
AR/COC: 613854
SDG: 286722
Laboratory: GEL
Project/Task: 98026.01.14
Analysis: General Chemistry

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM ER Project AOP 00-03 Rev 3.

Summary

One sample was prepared and analyzed with accepted procedures using methods EPA 9056 (anions by ion chromatography), EPA 353.2 (nitrate/nitrite by Cd reduction), EPA 314.0 (perchlorate), and SM 2320B (alkalinity). 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 QC acceptance criteria were met.

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

Anions and Alkalinity:
It should be noted that the MS analyses were performed on SNL samples from other SDGs. No sample data will be qualified as a result.

Laboratory Replicate

The replicate met all QC acceptance criteria.

Anions and Alkalinity:
It should be noted that the replicate analyses were performed on SNL samples from other SDGs. No sample data will be qualified as a result.

Detection Limits/Dilutions

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

Nitrate/Nitrite:
The sample was diluted 10X due to high concentration for this analysis.

Anions:
The sample was diluted 5X for fluoride, 10X for chloride, and 20X for sulfate due to high concentration for this analysis and/or matrix interference.

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

Other QC

No other specific issues that affect data quality were identified.

Reviewed by: David Schwent **Date**: 11/03/11

Sample Findings Summary

AR/COC: 613723

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 900.0/SW846 9310			
	091035-034/CYN-MW6	BETA (12587-47-2)	J, FR7
EPA 901.1			
	091035-033/CYN-MW6	Americium-241 (14596-10-2)	BD, FR3
	091035-033/CYN-MW6	Cesium-137 (10045-97-3)	BD, FR3
	091035-033/CYN-MW6	Cobalt-60 (10198-40-0)	BD, FR3
	091035-033/CYN-MW6	Potassium-40 (13966-00-2)	R, Z2
EPA 906.0 Modified			
	091035-036/CYN-MW6	Tritium (10028-17-8)	BD, FR3
SW846 3005/6020 DOE-AL			
	091035-009/CYN-MW6	Cobalt (7440-48-4)	J+, CK2
	091035-009/CYN-MW6	Sodium (7440-23-5)	J, D1
	091035-009/CYN-MW6	Uranium (U)	J+, CK2
	091035-009/CYN-MW6	Zinc (7440-66-6)	J+, CK2
SW846 8260B DOE-AL			
	091035-001/CYN-MW6	Acetone (67-64-1)	UJ, C3,MS3
	091036-001/CYN-TB23	Acetone (67-64-1)	UJ, C3,MS3
	091038-001/CYN-FB3	Acetone (67-64-1)	UJ, C3,MS3

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

ANALYTICAL QUALITY ASSOCIATES, INC.

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

Memorandum

DATE: September 30, 2011

TO: File

FROM: David Schwent

SUBJECT: General Chemistry Data Review and Validation - SNL
Site: Burn Site GWM
AR/COC: 613723
SDG: 284378
Laboratory: GEL
Project/Task No: 146422.10.11.01

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 2.

Summary

The samples were prepared and analyzed with accepted procedures using methods EPA 314.0 (perchlorate), EPA 353.2 (nitrate/nitrite), and EPA 9056 (anions). 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/Preservation

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

Calibration

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

Blanks

Nitrate/nitrite Analysis: In the MB, nitrate/nitrite was detected at concentration > the MDL but ≤ the PQL. The associated result of sample 284378-006 was a detect >5X the MB concentration and will not be qualified.

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

Laboratory Control Sample (LCS)

All Analyses: All LCS QC acceptance criteria were met.

Matrix Spike (MS)

All Analyses: All MS (PS) QC acceptance criteria were met. It should be noted that the MS (PS) analysis for the nitrate/nitrite analysis was performed on an SNL sample of similar matrix from another SDG. No sample data will be qualified as a result.

Replicates

All Analyses: All replicate QC acceptance criteria were met. It should be noted that the replicate analysis for the nitrate/nitrite analysis was performed on an SNL sample of similar matrix from another SDG. No sample data will be qualified as a result.

Detection Limits/Dilutions

Perchlorate Analysis: All detection limits were properly reported. No samples required dilution.

Anions Analysis: All detection limits were properly reported. Sample -005 was diluted 10X for chloride and sulfate due to high concentrations of the target analytes. All associated batch QC samples were analyzed at dilution factors that resulted in relative dilution factors to the samples that were ≤5X. No sample data will be qualified as a result.

Nitrate/nitrite Analysis: All detection limits were properly reported. Sample -006 was diluted 100X for nitrate/nitrite due to high concentration of the target analyte. All associated batch QC samples were analyzed at dilution factors that resulted in relative dilution factors to the samples that were ≤5X. No sample data will be qualified as a result.

Other QC

All Analyses: No EBs, FBs, or FDs were submitted on the AR/COC(s).

No other specific issues were identified that affect data quality.

Reviewed by: Kevin A. Lambert Date: 10/03/11

Sample Findings Summary

AR/COC: 613621

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC

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

ANALYTICAL QUALITY ASSOCIATES, INC.

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

Memorandum

Date: August 9, 2011

To: File

From: Kevin Lambert

Subject: Inorganic Data Review and Validation – SNL
Site: TAV GW Characterization
AR/COC: 613621
SDG: 281170
Laboratory: GEL
Project/Task: 98026.01.10
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 9060 (total organic carbon), EPA 9056 (anions by ion chromatography), EPA 353.2 (nitrate/nitrite by Cd reduction), EPA 314.0 (perchlorate), SM 2320B (alkalinity), and EPA 9034 (total sulfide). 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 QC acceptance criteria were met.

Blanks

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

Nitrate/Nitrite:
In the MB, nitrate/nitrite was detected at a concentration > the MDL but ≤ the PQL. The associated sample result was a detect >5X the MB concentration and will not be qualified.

Alkalinity:
In the MB, bicarbonate alkalinity was detected at a concentration > 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

Sulfides:
It should be noted that the MS analysis was 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.

Sulfides:
It should be noted that the replicate analysis was 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 sample was diluted 50X due to high concentration for this analysis.

Anions:
The sample was diluted 2X for 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 ≤5X. No sample data will be qualified as a result.

Other QC

No other specific issues that affect data quality were identified.

Reviewed by: David Schwent **Date**: 08/12/11

Sample Findings Summary

AR/COC: 613625, 613629, 613630

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 353.2			
	090832-018/TAV-EB2	Nitrogen, Nitrate/Nitrite (N/A)	UJ, MS1,RP1

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

ANALYTICAL QUALITY ASSOCIATES, INC.

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

Memorandum

Date: August 19, 2011

To: File

From: Kevin Lambert

Subject: Inorganic Data Review and Validation – SNL
Site: TAV GW Characterization
AR/COC: 613625, 613629, and 613630
SDG: 281793
Laboratory: GEL
Project/Task: 98026.01.10
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 9060 (total organic carbon), EPA 9056 (anions by ion chromatography), EPA 353.2 (nitrate/nitrite by Cd reduction), EPA 314.0 (perchlorate), SM 2320B (alkalinity), and EPA 9034 (total sulfide). Problems were identified with the data package that results in the qualification of data.

Nitrate/Nitrite:
The relative dilution factor between sample 281793-015 and the QC sample was >5. The associated sample result 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 QC acceptance criteria were met.

Blanks

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

Alkalinity:
In the MB and EB, 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.

Anions:
In the EB, sample -014, associated with samples -023 and -031, chloride was detected at a concentration > the PQL and sulfate was detected at a concentration > the MDL but ≤ the PQL. All associated sample results were detects >5X the EB concentrations and will not be qualified.

Nitrate/Nitrite:
In the MB, nitrate/nitrite was detected at a concentration > the MDL but ≤ the PQL. The associated sample results were detects >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 recoveries met QC acceptance criteria

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

Laboratory Replicate

The replicate met all QC acceptance criteria.

Alkalinity, Anions, and Sulfides:
It should be noted that the replicate analyses were performed on SNL samples from other SDGs. No sample data will be qualified as a result.

Detection Limits/Dilutions

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

Nitrate/Nitrite:
Samples -005, -024, and -032 were diluted 50X due to high concentration for this analysis. Sample -015 was diluted 5X due to matrix interference.

Anions:
Samples -004, -023, and -031 were diluted 5X for chloride and sulfate due to high concentration for this analysis.

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 ≤5X. No sample data will be qualified as a result.

Other QC

EBs and a field duplicate pair were submitted on the AR/COC(s). There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues that affect data quality were identified.

Reviewed by: David Schwent **Date**: 08/23/11

Sample Findings Summary

AR/COC: 613631

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
SW846 3005/6020 DOE-AL			
	090837-009/TAV-MW12	Magnesium (7439-95-4)	J, D1

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

ANALYTICAL QUALITY ASSOCIATES, INC.

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

Memorandum

Date: August 23, 2011

To: File

From: Kevin Lambert

Subject: Inorganic Data Review and Validation – SNL
Site: TAV GW Characterization
AR/COC: 613631
SDG: 282276
Laboratory: GEL
Project/Task: 98026.01.10
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 9060 (total organic carbon), EPA 9056 (anions by ion chromatography), EPA 353.2 (nitrate/nitrite by Cd reduction), EPA 314.0 (perchlorate), SM 2320B (alkalinity), and EPA 9034 (total sulfide). 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 QC acceptance criteria were met.

Blanks

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

Nitrate/Nitrite:
In the MB, nitrate/nitrite was detected at a concentration > the MDL but ≤ the PQL. The associated sample result was a detect >5X the MB concentration and will not be qualified.

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

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

Detection Limits/Dilutions

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

Nitrate/Nitrite:
The sample was diluted 50X due to high concentration for this analysis.

Anions:
The sample was 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 ≤5X. No sample data will be qualified as a result.

Other QC

No other specific issues that affect data quality were identified.

Reviewed by: David Schwent **Date**: 08/26/11

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SECTION III
SOLID WASTE MANAGEMENT UNITS 149 AND 154 QUARTERLY GROUNDWATER MONITORING REPORT

1.0 Introduction

This report summarizes the third of eight quarterly groundwater sampling events for Coyote Test Field (CTF) monitoring well CTF-MW3, located near Solid Waste Management Unit (SWMU) 149 (Building 9930 Septic System), and monitoring well CTF-MW2, located near SWMU 154 (Building 9960 Septic System and Seepage Pits) at Sandia National Laboratories, New Mexico. This supplemental groundwater monitoring 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 New Mexico Environment Department (NMED) Hazardous Waste Bureau (NMED April 2010). The analytical results discussed in this section correspond to the reporting period of July through September 2011. Monitoring wells CTF-MW3 and CTF-MW2 were sampled on September 23 and September 29, 2011, respectively.

Monitoring wells CTF-MW3 and CTF-MW2 were installed in August 2001. Prior to this sampling event, CTF-MW3 and CTF-MW2 had been sampled 14 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. Monitoring well CTF-MW2 is located approximately 260 feet to the southwest and downgradient of SWMU 154. Both wells are screened in Precambrian bedrock.

The September 2011 groundwater samples were collected in accordance with the NMED-approved Sampling and Analysis Plan for the two sites (SNL/NM June 2010). The samples from CTF-MW3 were analyzed for all required constituents, consisting of volatile organic compounds (VOCs), Target Analyte List (TAL) metals (including selenium), general chemistry parameters, perchlorate, and nitrate plus nitrite. The samples from CTF-MW2 were analyzed for all required constituents, consisting of VOCs, semivolatile organic compounds, general chemistry parameters, high explosive compounds, perchlorate, TAL metals (including barium), nitrate plus nitrite, and radionuclides consisting of gross alpha/beta activity and gamma spectroscopy.

Analytical results for the September 2011 groundwater samples were compared with the U.S. Environmental Protection Agency maximum contaminant levels (MCLs) for drinking water. 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 0.0651 mg/L in the unfiltered sample and 0.0610 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 samples consisting of two trip blanks were also submitted for analysis during this quarterly sampling event. The corresponding data validation results are presented in Appendix A.

The U.S. Department of Energy and Sandia Corporation will continue to conduct quarterly groundwater sampling of monitoring wells CTF-MW3 and CTF-MW2.

2.0 Groundwater Monitoring

Quarterly groundwater monitoring activities were performed at SWMUs 149 and 154 in 2011; the analytical results are presented in Appendix A. This groundwater sampling event represents the third of eight supplemental quarterly events for the two monitoring wells (CTF-MW3 and CTF-MW2).

3.0 Projected Activities for the Upcoming Quarter

The fourth of the eight supplemental quarterly groundwater sampling events will be conducted during the upcoming quarter (October to December 2011).

4.0 References

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

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

NMED, see New Mexico Environment Department.

Sandia National Laboratories, New Mexico (SNL/NM), June 2010. "Sampling and Analysis Plans for Monitoring Wells CTF-MW2 and CTF-MW3," in U.S. Department of Energy/Sandia Corporation Response to the New Mexico Environment Department letter 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, Albuquerque, New Mexico, April 8, 2010.

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

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Appendix A

SWMUs 149 and 154 Quarterly Groundwater Monitoring Assessment Report, July – September 2011

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ATTACHMENTS

Attachment 1. Field Measurement Logs

Attachment 2. Analysis Request/Chain-of-Custody Forms

Attachment 3. Data Validation Reports for Groundwater Analytical Results, July 2011 – September 2011

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SECTION III, APPENDIX A
SWMUs 149 AND 154 QUARTERLY GROUNDWATER MONITORING ASSESSMENT REPORT, JULY – SEPTEMBER 2011

1.0 Introduction

This Quarterly Groundwater Monitoring Assessment 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 as follows.

SNL/NM personnel performed Third Quarter groundwater sampling for Calendar Year (CY) 2011 at SWMUs 149 and 154 (Figures A-1 and A-2) on September 29 and September 23, 2011, respectively. This sampling event represents the quarterly groundwater monitoring event for the time period from July through September 2011. Quarterly groundwater monitoring at SWMUs 149 and 154 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 from the NMED dated April 8, 2010 (NMED April 2010).

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" (Attachment 1, SNL/NM June 2010) 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" (Attachment 2, SNL/NM June 2010). These Sampling and Analysis Plans (SAPs) were approved by the NMED in December 2010 (NMED December 2010).

This report describes groundwater sampling activities and presents analytical results for the third of eight quarterly groundwater assessment monitoring periods. In September 2011, environmental groundwater samples were collected from Coyote Test Field (CTF) monitoring well CTF-MW3, located near SWMU 149 (Figure A-1), and CTF-MW2, located near SWMU 154 (Figure A-2), in accordance with the NMED-approved SAP for

each site (Attachments 1 and 2, SNL/NM June 2010). Both wells were installed in August 2001. 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 gamma spectroscopy.

The following sections provide descriptions of the field methods used and discussions of the analytical and quality control (QC) sampling results.

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 SWMUs 149 and 154 was performed according to the SAPs submitted as Attachments 1 and 2 to the DOE/Sandia Response (SNL/NM June 2010) and updated SNL/NM Administrative Operating Procedures (AOPs) (SNL/NM July 2007) and Field Operating Procedures (FOPs) (SNL/NM August 2007a and August 2007b).

2.1 Equipment Decontamination

A portable Bennett™ groundwater sampling system was used to collect the groundwater samples from both wells. The Bennett™ sampling pump and tubing bundle were decontaminated prior to installation into the monitoring wells in accordance with the procedures described in SNL/NM FOP 05-03, “Long-Term Environmental Stewardship (LTES) Groundwater Sampling Equipment Decontamination” (SNL/NM August 2007a). An equipment blank or rinsate sample was collected to verify the effectiveness of the equipment decontamination process and analyzed for relevant parameters, listed in Table A-1, prior to sampling each well. Table A-2 presents the details for groundwater samples collected from CTF-MW3 and CTF-MW2 during Third Quarter, CY 2011.

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 August

2007b), all wells were purged a minimum of one saturated casing volume (the volume of one length of the saturated screen plus the borehole annulus around the saturated screen interval) and monitored for stability of water quality parameters, if applicable.

Field water-quality measurements for turbidity, pH, temperature, specific conductance (SC), oxidation-reduction potential (ORP), and dissolved oxygen (DO) were obtained from the wells prior to collecting groundwater samples. Groundwater temperature, SC, ORP, DO, and pH were measured with a YSI™ Model 620 water quality meter. Turbidity was measured with a HACH™ Model 2100P turbidity meter. Purging continued until four stable measurements for turbidity, pH, temperature, and SC were obtained. Groundwater stability is considered acceptable when:

- 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 A-3 summarizes the temperature, pH, SC, and turbidity measurements, which are discussed in Section 3.1 of this appendix. Field Measurement Logs (Attachment 1) documenting details of well purging and water quality measurements have been submitted to the SNL/NM Customer Funded 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 A-1. Table A-1 also lists the sample containers and preservation requirements. Section 3.0 of this appendix summarizes the analytical results.

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

3.0 Analytical Results

Groundwater samples were submitted to GEL for chemical and radiological analyses. Samples were analyzed in accordance with applicable U.S. Environmental Protection Agency (EPA) analytical methods (EPA 1980, 1984, 1986, and 1999; Clesceri, et al. 1998). Groundwater sampling results are compared with established EPA maximum contaminant levels (MCLs) for drinking water (EPA, 2009). Analytical results for samples collected from wells CTF-MW3 and CTF-MW2 are shown in tabulated form in Tables A-4 through A-16. Analytical reports, including certificates of analyses, analytical methods, method detection limits (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 Customer Funded Records Center.

The analytical data were reviewed and qualified in accordance with AOP 00-03, "Data Validation Procedure for Chemical and Radiochemical Data," Revision 2 (SNL/NM July 2007). 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 Attachment 3.

3.1 Field Water Quality Measurements

SWMU 149, CTF-MW3. Table A-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 A-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 at concentrations of 0.570, 0.770, and 0.460 micrograms per liter (µg/L), respectively. No MCLs are established for these compounds. Table A-4 summarizes VOCs detected in environmental groundwater samples from well CTF-MW3, and Table A-5 lists the MDLs for associated VOCs analyzed.

SWMU 154, CTF-MW2. No VOCs were detected at concentrations exceeding established MCLs in any of the CTF-MW2 groundwater samples. The VOC toluene was detected below the MCL of 1,000 μg/L at a concentration of 0.970 μg/L. Table A-4 summarizes VOCs detected in environmental groundwater samples from well CTF-MW2, and Table A-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 exceeding established MCLs in any CTF-MW2 groundwater samples. No SVOCs were reported above laboratory MDLs. Table A-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 at concentrations exceeding established MCLs in any of the CTF-MW2 groundwater samples. The HE compound RDX [hexahydro-trinitro-triazine] was detected in the CTF-MW2 environmental sample at a concentration of 0.144 μg/L. Table A-4 summarizes HE compounds detected in environmental groundwater samples, and Table A-7 lists the MDLs for the associated HE compounds.

3.5 Nitrate Plus Nitrite

SWMU 149, CTF-MW3. Table A-8 summarizes NPN results for CTF-MW3. NPN values were compared with the nitrate MCL of 10 milligrams per liter (mg/L). NPN was reported at a concentration of 5.70 mg/L for CTF-MW3.

SWMU 154, CTF-MW2. Table A-8 summarizes NPN results for CTF-MW2.
No detections of NPN above the laboratory MDL (0.050 mg/L) were reported for the CTF-MW2 samples.

3.6 Anions and Alkalinity

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

SWMU 154, CTF-MW2. Table A-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 screening level/MDL of 4 µg/L (0.004 mg/L) in CTF-MW3 samples. Table A-10 presents the perchlorate results.

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

Perchlorate results are discussed in more detail in Section II of this 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 samples from CTF-MW2 also included analysis of uranium in both the unfiltered and filtered fractions.

SWMU 149, CTF-MW3. No metals were detected above established MCLs in any of the groundwater samples. Metal results for both unfiltered and filtered samples from CTF-MW3 are summarized in Tables A-11 and A-12, respectively.

SWMU 154, CTF-MW2. No metals were detected above established MCLs in any of the CTF-MW2 groundwater samples, except for arsenic. Arsenic was detected above the MCL of 0.010 mg/L with total arsenic reported at a concentration of 0.0651 mg/L, and

dissolved arsenic at 0.0610 mg/L. 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. Unfiltered and filtered metal results for CTF-MW2 are summarized in Tables A-13 and A-14, respectively.

3.9 Gamma Spectroscopy and Radioisotopic Analyses

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

SWMU 154, CTF-MW2. CTF-MW2 groundwater samples were screened for gamma-emitting radionuclides, gross alpha, and gross 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 A-15. Gamma spectroscopy activities for short-list radionuclides are less than the associated MDAs, except for potassium-40. The potassium-40 activity was qualified as unusable during data validation because the laboratory was unable to achieve the corresponding identification criteria. Additional corrective action was not performed based on historical groundwater results for potassium-40.

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 picocuries per liter (pCi/L) at 4.20 pCi/L. The results reported for isotopic uranium are as follows: uranium 233/234 at 56.1 ± 8.93 pCi/L; uranium 235/236 at 0.437 ± 0.176 pCi/L; and uranium 238 at 7.76 ± 1.36 pCi/L. In this region, groundwater contacts the Precambrian bedrock, which contains naturally occurring uranium.

3.10 Sample Results Exceeding Maximum Contaminant Levels

Table A-16 lists the results for all constituents that were detected at concentrations exceeding the EPA MCLs (EPA 2009) during all quarterly sampling events. The only constituents exceeding MCLs in samples collected during this quarter consist of arsenic, gross alpha, and thallium, which were detected in the CTF-MW2 samples. Figure A-3 shows the concentrations of arsenic and groundwater elevations over time in CTF-MW2. 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.

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

4.2 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 volatile organic analysis vials prepared by the analytical laboratory, which accompany the empty sample containers supplied by the laboratory. The TBs were brought to the field and accompanied each sample shipment. A total of two TBs were submitted with the samples collected during the July through September 2011 sampling event. No VOCs were detected in the TB samples above associated laboratory MDLs.

4.3 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 validated in accordance with AOP 00-03, “Data Validation Procedure for Chemical and Radiochemical Data,” Revision 2 (SNL/NM July 2007).

No significant data quality problems were noted during the data validation process for CTF-MW3 samples. The interference check sample and serial dilution percent differences for several metals were outside acceptance criteria and were qualified during data validation as estimated values.

Data quality problems were noted for CTF-MW2 samples during the data validation process. The interference check sample, matrix spike recoveries, or serial dilution percent differences for several metals were outside acceptance criteria and were qualified during data validation as estimated values. The result for the HE compound tetryl [2,4,6-trinitrophenylmethylnitramine] was qualified during data validation as unusable because the matrix spike and matrix spike duplicate sample recoveries exceeded the acceptance criteria. The potassium-40 activity was qualified as unusable during data validation because the laboratory was unable to meet the corresponding identification criteria. The data validation reports are provided in Attachment 3 and are maintained in the SNL/NM Customer Funded Records Center.

4.4 Variances and Nonconformances

No variances or nonconformances from the requirements in the SWMU 149 Groundwater Monitoring SAP or project-specific issues were identified during the July through September 2011 sampling activities at CTF-MW3.

Variances, nonconformances, or project-specific issues that deviated from the requirements in the SWMU 154 Groundwater Monitoring SAP during the July through September 2011 sampling activities at CTF-MW2 are identified as follows:

- The result for the HE compound tetryl was qualified during data validation as unusable because the matrix spike and matrix spike duplicate sample recoveries exceeded the acceptance criteria. No additional corrective action has been performed as the holding time requirement has been exceeded and this compound has not been detected in historical samples.

5.0 Summary

During Third Quarter of CY 2011, samples were collected from monitoring wells 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 included 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 included VOCs, SVOCs, HE compounds, NPN, major anions, alkalinity, TAL total metals plus uranium, perchlorate, gamma spectroscopy, gross alpha/beta activity, and isotopic uranium. No parameters were detected above established MCLs, except for arsenic.

Arsenic was detected above the MCL of 0.010 mg/L in CTF-MW2 groundwater samples at concentrations of 0.0651 mg/L in the unfiltered sample and 0.0610 mg/L in the filtered sample. 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. 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.

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EPA, see U.S. Environmental Protection Agency.

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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, U.S. Environmental Protection Agency, Washington, D.C.

Figures

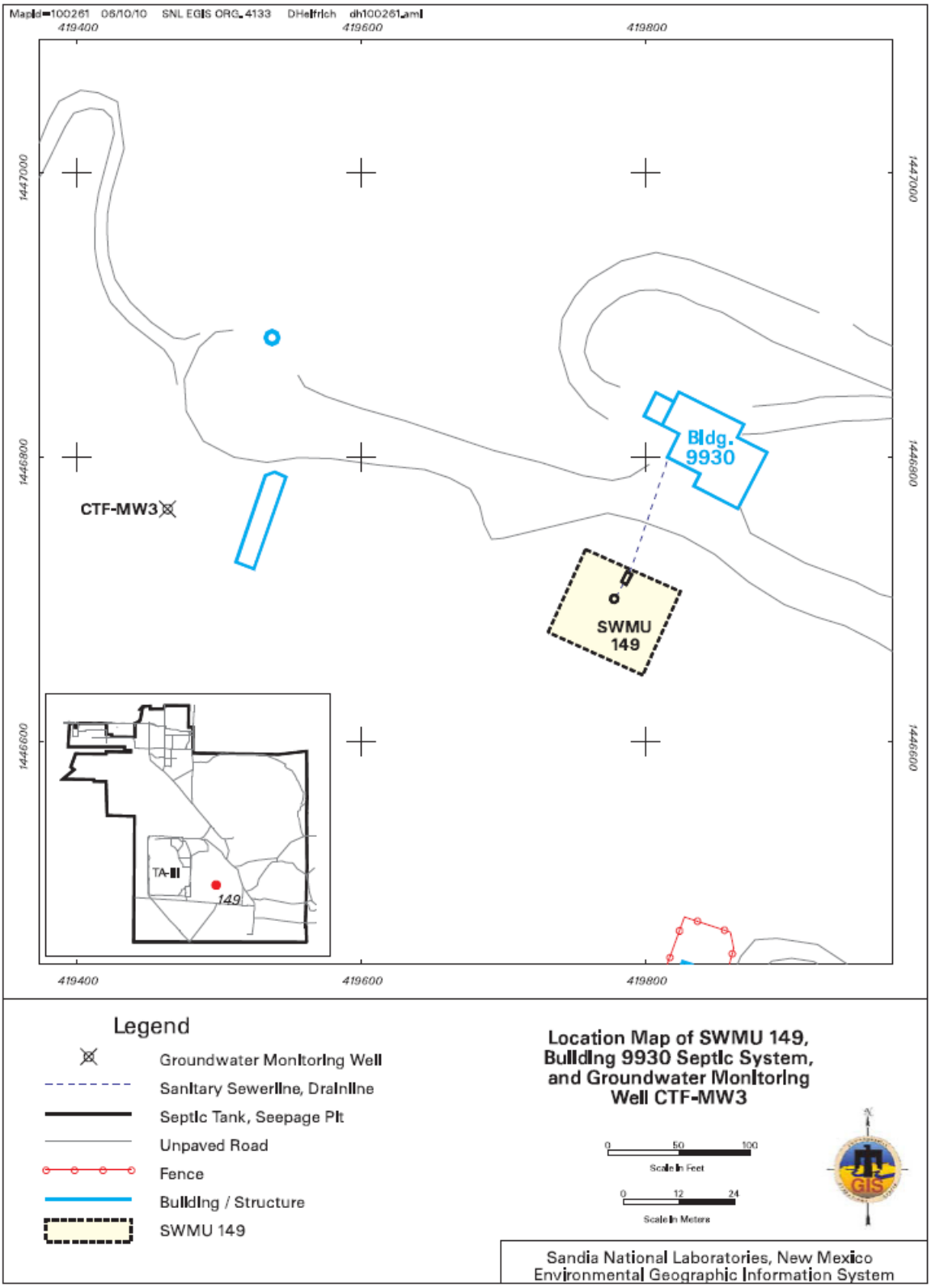


Figure A-1

Location of Monitoring Well CTF-MW3 near SWMU 149

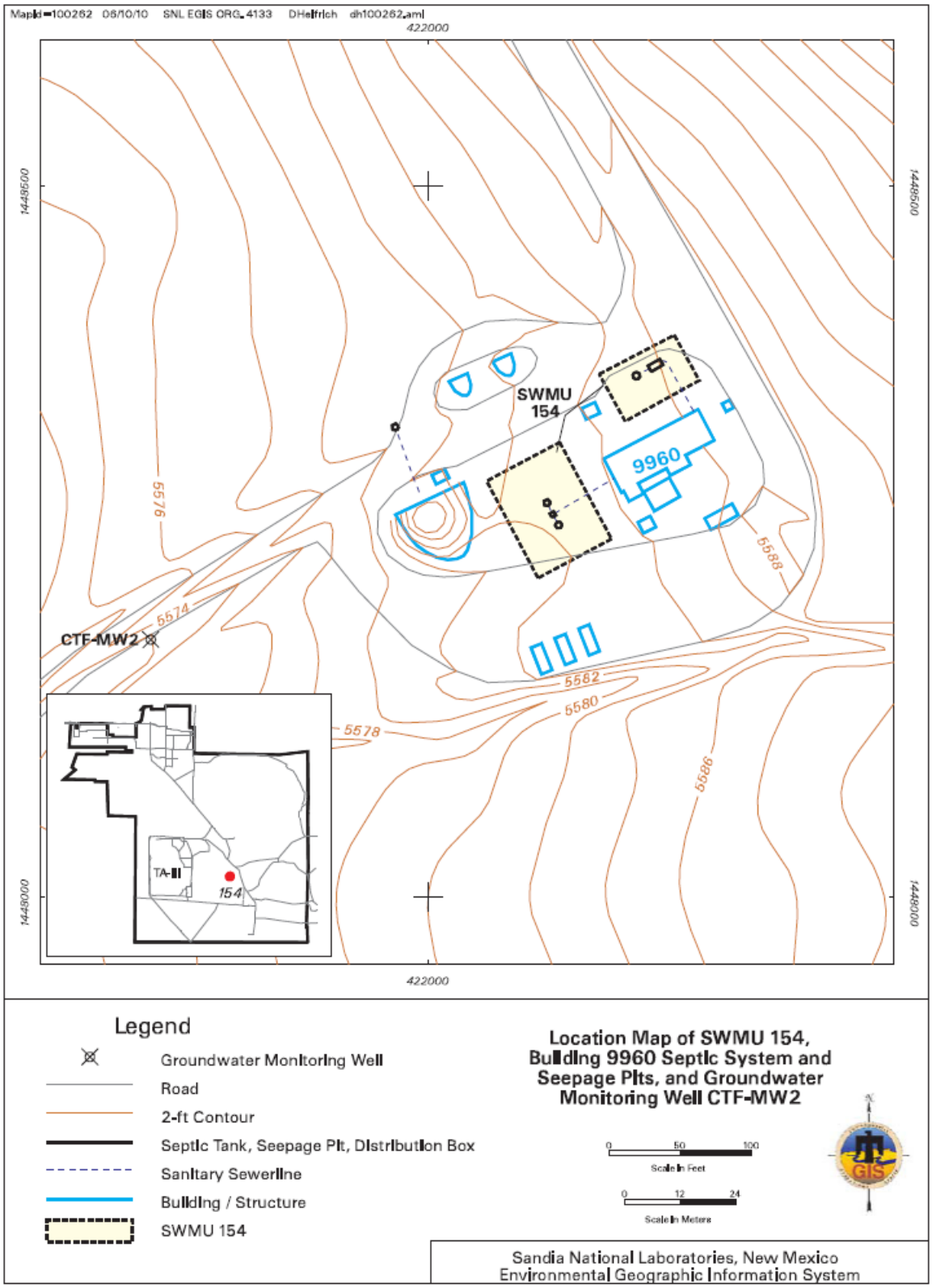


Figure A-2

Location of Monitoring Well CTF-MW2 near SWMU 154

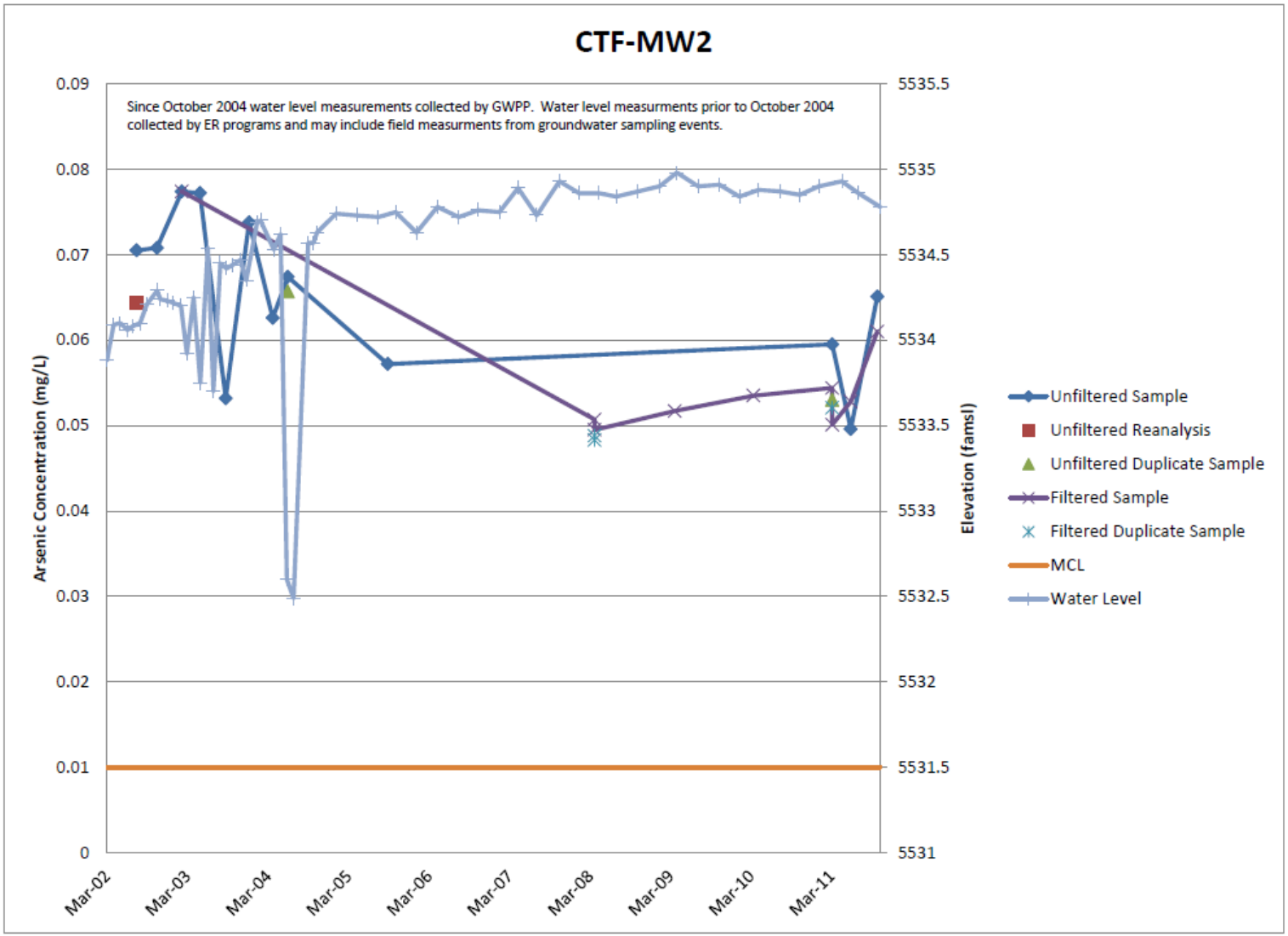


Figure A-3

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

Tables

Table A-1

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

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

Notes

[a]U.S. Environmental Protection Agency, 1986 (and updates), "*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*," SW-846, 3rd ed., U.S. Environmental Protection Agency, Washington, D.C.
U.S. Environmental Protection Agency, 1999, "*Perchlorate in Drinking Water Using Ion Chromatography*," EPA 815/R-00-014, U.S. Environmental Protection Agency, Washington, D.C.
Clesceri, L.S., A.E. Greenburg, and A.D. Eaton, 1998. *Standard Methods for the Examination of Water and Wastewater,* 20th ed., Standard Method 2320B, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation, Washington, D.C.
U.S. Environmental Protection Agency, 1980, "*Prescribed Procedures for Measurement of Radioactivity in Drinking Water,"* EPA-600/4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.
[b]Metals = filtered and unfiltered samples, TAL metals including barium, calcium, magnesium, potassium, and sodium, plus uranium.
[c]Major anions include bromide, chloride, fluoride, and sulfate.
[d]Gamma spectroscopy = Americium-241, Cesium-137, Cobalt-60, and Potassium-40.

°C = Degrees Celsius.
EPA = U.S. Environmental Protection Agency.
H_2SO_4 = Sulfuric acid.
HCl = Hydrochloric acid.
HNO_3 = Nitric acid.
L = Liter
mL = Milliliter(s).
SM = Standard Method.
SWMU = Solid Waste Management Unit.
TAL = Target Analyte List.

Table A-2

Sample Details for Third Quarter, CY 2011 Groundwater Sampling

Solid Waste Management Units 149 and 154 Groundwater Monitoring Quarterly Assessment

July 2011 – September 2011

Well	Sample Identification	AR/COC Number	Associated Groundwater Investigation
CTF-MW3	091257	613854	SWMU 149
CTF-MW2	091259	613855	SWMU 154

Notes

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

Table A-3

Summary of Field Water Quality Measurements[a]

Solid Waste Management Units 149 and 154 Groundwater Monitoring

Quarterly Assessment, July 2011 – September 2011

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmhos/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
SWMU 149								
CTF-MW3	23-Sep-11	20.76	1850	417.5	6.70	0.46	70.8	6.26
SWMU 154								
CTF-MW2	29-Sep-11	18.66	4036	52.2	5.58	2.72	2.2	0.20

Notes

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

Table A-4

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

Solid Waste Management Units 149 and 154 Groundwater Monitoring

Quarterly Assessment, July 2011 – September 2011

Well ID	Analyte	Result (µg/L)	MDL (µg/L)	PQL (µg/L)	MCL (µg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample No.	Analytical Method[c]
SWMU 149									
CTF-MW3 23-Sep-11	Bromodichloromethane	0.570	0.250	1.00	NE	J		091257-001	EPA 8260B
	Chloroform	0.770	0.250	1.00	NE	J		091257-001	EPA 8260B
	Dibromochloromethane	0.460	0.300	1.00	NE	J		091257-001	EPA 8260B
SWMU 154									
CTF-MW2 29-Sep-11	Toluene	0.970	0.250	1.00	1000	J		091259-001	EPA 8260B
	RDX	0.144	0.104	0.325	NE	J		091259-024	EPA 8321A

Notes

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

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

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

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

Table A-5

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

Solid Waste Management Unit 149 Groundwater Monitoring

Quarterly Assessment, July 2011 – September 2011

Analyte	MDL (µg/L)
1,1,1-Trichloroethane	0.325
1,1,2,2-Tetrachloroethane	0.250
1,1,2-Trichloroethane	0.250
1,1-Dichloroethane	0.300
1,1-Dichloroethene	0.300
1,2-Dichloroethane	0.250
1,2-Dichloropropane	0.250
2-Butanone	1.25
2-Hexanone	1.25
4-methyl-, 2-Pentanone	1.25
Acetone	3.50
Benzene	0.300
Bromodichloromethane	0.250
Bromoform	0.250
Bromomethane	0.300
Carbon disulfide	1.25
Carbon tetrachloride	0.300
Chlorobenzene	0.250
Chloroethane	0.300
Chloroform	0.250
Chloromethane	0.300
Dibromochloromethane	0.300
Ethyl benzene	0.250
Methylene chloride	3.00
Styrene	0.250
Tetrachloroethene	0.300
Toluene	0.250
Trichloroethene	0.250
Vinyl acetate	1.50
Vinyl chloride	0.500
Xylene	0.300
cis-1,2-Dichloroethene	0.300
cis-1,3-Dichloropropene	0.250
trans-1,2-Dichloroethene	0.300
trans-1,3-Dichloropropene	0.250

Notes

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

Table A-6
Method Detection Limits for Volatile and Semivolatile Organic Compounds
Solid Waste Management Unit 154 Groundwater Monitoring
Quarterly Assessment, July 2011 – September 2011

Analyte	MDL (µg/L)	Analytical Method[a]	Analyte	MDL (µg/L)	Analytical Method[a]	Analyte	MDL (µg/L)	Analytical Method[a]
1,1,1-Trichloroethane	0.325	8260B	1,2,4-Trichlorobenzene	3.00	8270C	Di-n-butyl phthalate	3.00	8270C
1,1,2,2-Tetrachloroethane	0.250	8260B	1,2-Dichlorobenzene	3.00	8270C	Di-n-octyl phthalate	3.00	8270C
1,1,2-Trichloroethane	0.250	8260B	1,3-Dichlorobenzene	3.00	8270C	Dibenz[a,h]anthracene	0.300	8270C
1,1-Dichloroethane	0.300	8260B	1,4-Dichlorobenzene	3.00	8270C	Dibenzofuran	3.00	8270C
1,1-Dichloroethene	0.300	8260B	2,4,5-Trichlorophenol	3.00	8270C	Diethylphthalate	3.00	8270C
1,2-Dichloroethane	0.250	8260B	2,4,6-Trichlorophenol	3.00	8270C	Dimethylphthalate	3.00	8270C
1,2-Dichloropropane	0.250	8260B	2,4-Dichlorophenol	3.00	8270C	Dinitro-o-cresol	3.00	8270C
2-Butanone	1.25	8260B	2,4-Dimethylphenol	3.00	8270C	Diphenyl amine	3.00	8270C
2-Hexanone	1.25	8260B	2,4-Dinitrophenol	5.00	8270C	Fluoranthene	0.300	8270C
4-methyl-, 2-Pentanone	1.25	8260B	2,4-Dinitrotoluene	3.00	8270C	Fluorene	0.300	8270C
Acetone	3.50	8260B	2,6-Dinitrotoluene	3.00	8270C	Hexachlorobenzene	3.00	8270C
Benzene	0.300	8260B	2-Chloronaphthalene	0.300	8270C	Hexachlorobutadiene	3.00	8270C
Bromodichloromethane	0.250	8260B	2-Chlorophenol	3.00	8270C	Hexachlorocyclopentadiene	3.00	8270C
Bromoform	0.250	8260B	2-Methylnaphthalene	0.300	8270C	Hexachloroethane	3.00	8270C
Bromomethane	0.300	8260B	2-Nitroaniline	3.00	8270C	Indeno(1,2,3-c,d)pyrene	0.300	8270C
Carbon disulfide	1.25	8260B	2-Nitrophenol	3.00	8270C	Isophorone	3.00	8270C
Carbon tetrachloride	0.300	8260B	3,3'-Dichlorobenzidine	3.00	8270C	Naphthalene	0.300	8270C
Chlorobenzene	0.250	8260B	3-Nitroaniline	3.00	8270C	Nitro-benzene	3.00	8270C
Chloroethane	0.300	8260B	4-Bromophenyl phenyl ether	3.00	8270C	Pentachlorophenol	3.00	8270C
Chloroform	0.250	8260B	4-Chloro-3-methylphenol	3.00	8270C	Phenanthrene	0.300	8270C
Chloromethane	0.300	8260B	4-Chlorobenzenamine	3.00	8270C	Phenol	3.00	8270C
Dibromochloromethane	0.300	8260B	4-Chlorophenyl phenyl ether	3.00	8270C	Pyrene	0.300	8270C
Ethyl benzene	0.250	8260B	4-Nitroaniline	3.00	8270C	bis(2-Chloroethoxy)methane	3.00	8270C
Methylene chloride	3.00	8260B	4-Nitrophenol	3.00	8270C	bis(2-Chloroethyl)ether	3.00	8270C
Styrene	0.250	8260B	Acenaphthene	0.300	8270C	bis(2-Ethylhexyl)phthalate	3.00	8270C
Tetrachloroethene	0.300	8260B	Acenaphthylene	0.300	8270C	bis-Chloroisopropyl ether	3.00	8270C
Toluene	0.250	8260B	Anthracene	0.300	8270C	m,p-Cresol	3.00	8270C
Trichloroethene	0.250	8260B	Benzo(a)anthracene	0.300	8270C	n-Nitrosodipropylamine	3.00	8270C
Vinyl acetate	1.50	8260B	Benzo(a)pyrene	0.300	8270C	o-Cresol	3.00	8270C
Vinyl chloride	0.500	8260B	Benzo(b)fluoranthene	0.300	8270C			
Xylene	0.300	8260B	Benzo(ghi)perylene	0.300	8270C			
cis-1,2-Dichloroethene	0.300	8260B	Benzo(k)fluoranthene	0.300	8270C			
cis-1,3-Dichloropropene	0.250	8260B	Butylbenzyl phthalate	3.00	8270C			
trans-1,2-Dichloroethene	0.300	8260B	Carbazole	0.300	8270C			
trans-1,3-Dichloropropene	0.250	8260B	Chrysene	0.300	8270C			

Notes

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

Table A-7

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

Solid Waste Management Unit 154 Groundwater Monitoring

Quarterly Assessment, July 2011 – September 2011

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

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

Table A-8

Summary of Nitrate plus Nitrite Results

Solid Waste Management Units 149 and 154 Groundwater Monitoring

Quarterly Assessment, July 2011 – September 2011

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample No.	Analytical Method[c]
SWMU 149									
CTF-MW3 23-Sep-11	Nitrate plus nitrite as N	5.70	0.100	0.500	10.0			091257-018	EPA 353.2
SWMU 154									
CTF-MW2 29-Sep-11	Nitrate plus nitrite as N	ND	0.050	0.250	10.0	U		091259-018	EPA 353.2

Notes

CFR = Code of Federal Regulations.
CTF = Coyote Test Field.
EPA = U.S. Environmental Protection Agency.
ID = Identification.
MCL = Maximum contaminant level. Established by the EPA Primary Water Regulations (40 CFR 141.11, Subpart B), National Primary Drinking Water Standards (EPA, 2009).
MDL = Method detection limit. The minimum concentration that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix-specific.
mg/L = Milligrams per liter.
MW = Monitoring well.
N = Nitrogen.
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.

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

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

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

Table A-9

Summary of Anion and Alkalinity Results

Solid Waste Management Units 149 and 154 Groundwater Monitoring

Quarterly Assessment, July 2011 – September 2011

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample No.	Analytical Method[c]
SWMU 149									
CTF-MW3	Bicarbonate Alkalinity	329	0.725	1.00	NE	B		091257-022	SM2320B
23-Sep-11	Carbonate Alkalinity	ND	0.725	1.00	NE	U		091257-022	SM2320B
	Bromide	1.15	0.066	0.200	NE			091257-016	EPA 9056
	Chloride	123	0.660	2.00	NE			091257-016	EPA 9056
	Fluoride	2.60	0.165	0.500	4.0			091257-016	EPA 9056
	Sulfate	466	2.00	8.00	NE			091257-016	EPA 9056
SWMU 154									
CTF-MW2	Bicarbonate Alkalinity	1460	0.725	1.00	NE	B		091259-022	SM2320B
29-Sep-11	Carbonate Alkalinity	ND	0.725	1.00	NE	U		091259-022	SM2320B
	Bromide	1.86	0.330	1.00	NE			091259-016	EPA 9056
	Chloride	448	3.30	10.0	NE			091259-016	EPA 9056
	Fluoride	2.75	0.165	0.500	4.0			091259-016	EPA 9056
	Sulfate	147	0.500	2.00	NE			091259-016	EPA 9056

Notes

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

Table A-9 (Concluded)

Summary of Anion and Alkalinity Results

Solid Waste Management Units 149 and 154 Groundwater Monitoring

Quarterly Assessment, July 2011 – September 2011

Notes (continued)

[a]Laboratory Qualifier
B = The analyte was detected in the blank above the effective MDL.
U = Analyte is absent or below the method detection limit.

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

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

Table A-10

Summary of Perchlorate Results

Solid Waste Management Units 149 and 154 Groundwater Monitoring

Quarterly Assessment, July 2011 – September 2011

Well ID	Perchlorate Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample No.	Analytical Method[c]
SWMU 149								
CTF-MW3 23-Sep-11	ND	0.004	0.012	NE	U		091257-020	EPA 314.0
SWMU 154								
CTF-MW2 29-Sep-11	ND	0.004	0.012	NE	U		091259-020	EPA 314.0

Notes

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

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

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

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

Table A-11

Summary of Unfiltered Total Metal Results

Solid Waste Management Unit 149 Groundwater Monitoring

Quarterly Assessment, July 2011 – September 2011

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample No.	Analytical Method[c]
CTF-MW3	Aluminum	ND	0.015	0.050	NE	U		091257-009	EPA 6020
23-SepJun-11	Antimony	ND	0.001	0.003	0.006	U		091257-009	EPA 6020
	Arsenic	ND	0.0017	0.005	0.010	U		091257-009	EPA 6020
	Barium	0.0345	0.0006	0.002	2.00			091257-009	EPA 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		091257-009	EPA 6020
	Cadmium	ND	0.00011	0.001	0.005	U		091257-009	EPA 6020
	Calcium	211	0.600	2.00	NE			091257-009	EPA 6020
	Chromium	ND	0.002	0.010	0.100	U		091257-009	EPA 6020
	Cobalt	0.000429	0.0001	0.001	NE	J	J+	091257-009	EPA 6020
	Copper	0.00207	0.00035	0.001	NE		J+	091257-009	EPA 6020
	Iron	0.663	0.033	0.100	NE			091257-009	EPA 6020
	Lead	ND	0.0005	0.002	NE	U		091257-009	EPA 6020
	Magnesium	51.8	0.100	0.300	NE		J	091257-009	EPA 6020
	Manganese	0.00183	0.001	0.005	NE	J	J+	091257-009	EPA 6020
	Mercury	ND	0.000066	0.0002	0.002	U		091257-009	EPA 7470
	Nickel	0.00518	0.0005	0.002	NE		J+	091257-009	EPA 6020
	Potassium	11.4	0.080	0.300	NE			091257-009	EPA 6020
	Selenium	0.027	0.0015	0.005	0.050		J-	091257-009	EPA 6020
	Silver	ND	0.0002	0.001	NE	U		091257-009	EPA 6020
	Sodium	197	0.800	2.50	NE		J	091257-009	EPA 6020
	Thallium	ND	0.00045	0.002	0.002	U		091257-009	EPA 6020
	Vanadium	ND	0.001	0.005	NE	U		091257-009	EPA 6020
	Zinc	0.00461	0.0035	0.010	NE	J	J+	091257-009	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.

Table A-11 (Concluded)

Summary of Unfiltered Total Metal Results

Solid Waste Management Unit 149 Groundwater Monitoring

Quarterly Assessment, July 2011 – September 2011

Notes (continued)

ND = Not detected (at MDL).
NE = Not established.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

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

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

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

Table A-12

Summary of Filtered Total Metal Results

Solid Waste Management Unit 149 Groundwater Monitoring

Quarterly Assessment, July 2011 – September 2011

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample No.	Analytical Method[c]
CTF-MW3	Aluminum	ND	0.015	0.050	NE	U		091257-010	EPA 6020
23-Sep-11	Antimony	ND	0.001	0.003	0.006	U		091257-010	EPA 6020
	Arsenic	ND	0.0017	0.005	0.010	U		091257-010	EPA 6020
	Barium	0.034	0.0006	0.002	2.00			091257-010	EPA 6020
	Beryllium	ND	0.0002	0.0005	0.004	U		091257-010	EPA 6020
	Cadmium	ND	0.00011	0.001	0.005	U		091257-010	EPA 6020
	Calcium	215	0.600	2.00	NE			091257-010	EPA 6020
	Chromium	ND	0.002	0.010	0.100	U		091257-010	EPA 6020
	Cobalt	0.000476	0.0001	0.001	NE	J	J+	091257-010	EPA 6020
	Copper	0.00228	0.00035	0.001	NE		J+	091257-010	EPA 6020
	Iron	0.686	0.033	0.100	NE			091257-010	EPA 6020
	Lead	ND	0.0005	0.002	NE	U		091257-010	EPA 6020
	Magnesium	55.4	0.100	0.300	NE		J	091257-010	EPA 6020
	Manganese	ND	0.001	0.005	NE	U	J+	091257-010	EPA 6020
	Mercury	ND	0.000066	0.0002	0.002	U		091257-010	EPA 7470
	Nickel	0.0054	0.0005	0.002	NE		J+	091257-010	EPA 6020
	Potassium	11.7	0.080	0.300	NE			091257-010	EPA 6020
	Selenium	0.029	0.0015	0.005	0.050		J-	091257-010	EPA 6020
	Silver	ND	0.0002	0.001	NE	U		091257-010	EPA 6020
	Sodium	183	0.800	2.50	NE		J	091257-010	EPA 6020
	Thallium	ND	0.00045	0.002	0.002	U		091257-010	EPA 6020
	Vanadium	ND	0.001	0.005	NE	U		091257-010	EPA 6020
	Zinc	0.00519	0.0035	0.010	NE	J	J+	091257-010	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.
ND = Not detected (at MDL).

Table A-12 (Concluded)

Summary of Filtered Total Metal Results

Solid Waste Management Unit 149 Groundwater Monitoring

Quarterly Assessment, July 2011 – September 2011

Notes (continued)

NE = Not established.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

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

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

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

Table A-13

Summary of Unfiltered Total Metal Results

Solid Waste Management Unit 154 Groundwater Monitoring

Quarterly Assessment, July 2011 – September 2011

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample No.	Analytical Method[c]
CTF-MW2	Aluminum	0.150	0.015	0.050	NE			091259-009	EPA 6020
29-Sep-11	Antimony	ND	0.001	0.003	0.006	U		091259-009	EPA 6020
	Arsenic	**0.0651**	0.0017	0.005	0.010			091259-009	EPA 6020
	Barium	0.0833	0.0006	0.002	2.00		J	091259-009	EPA 6020
	Beryllium	0.00355	0.0002	0.0005	0.004			091259-009	EPA 6020
	Cadmium	ND	0.00011	0.001	0.005	U		091259-009	EPA 6020
	Calcium	377	1.50	5.00	NE			091259-009	EPA 6020
	Chromium	ND	0.002	0.010	0.100	U		091259-009	EPA 6020
	Cobalt	0.0118	0.0001	0.001	NE		J+	091259-009	EPA 6020
	Copper	0.00164	0.00035	0.001	NE		J+	091259-009	EPA 6020
	Iron	3.55	0.033	0.100	NE		J-	091259-009	EPA 6020
	Lead	ND	0.0005	0.002	NE	U		091259-009	EPA 6020
	Magnesium	83.4	0.050	0.150	NE			091259-009	EPA 6020
	Manganese	2.58	0.005	0.025	NE		J	091259-009	EPA 6020
	Mercury	ND	0.000066	0.0002	0.002	U		091259-009	EPA 7470
	Nickel	0.0222	0.0005	0.002	NE		J	091259-009	EPA 6020
	Potassium	57.3	0.400	1.50	NE			091259-009	EPA 6020
	Selenium	0.00298	0.0015	0.005	0.050	J	J-	091259-009	EPA 6020
	Silver	ND	0.0002	0.001	NE	U		091259-009	EPA 6020
	Sodium	491	2.00	6.25	NE			091259-009	EPA 6020
	Thallium	0.00126	0.00045	0.002	0.002	J		091259-009	EPA 6020
	Uranium	0.0277	0.000067	0.0002	0.03			091259-009	EPA 6020
	Vanadium	ND	0.001	0.005	NE	U		091259-009	EPA 6020
	Zinc	0.588	0.0035	0.010	NE		J-	091259-009	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.
ND = Not detected (at MDL).

Table A-13 (Concluded)

Summary of Unfiltered Total Metal Results

Solid Waste Management Unit 154 Groundwater Monitoring

Quarterly Assessment, July 2011 – September 2011

Notes (continued)

NE = Not established.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

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

[b]Validation Qualifier
If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.
J = The associated value is an estimate and may be inaccurate or imprecise.
J+ = The associated value is an estimated quantity with a suspected positive bias.
J- = The associated value is an estimated quantity with a suspected negative bias.

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

Table A-14

Summary of Filtered Total Metal Results

Solid Waste Management Unit 154 Groundwater Monitoring

Quarterly Assessment, July 2011 – September 2011

Well ID	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	MCL (mg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample No.	Analytical Method[c]
CTF-MW2	Aluminum	0.123	0.015	0.050	NE			091259-010	EPA 6020
29-Sep-11	Antimony	ND	0.001	0.003	0.006	U		091259-010	EPA 6020
	Arsenic	**0.0610**	0.0017	0.005	0.010			091259-010	EPA 6020
	Barium	0.081	0.0006	0.002	2.00		J	091259-010	EPA 6020
	Beryllium	0.00334	0.0002	0.0005	0.004			091259-010	EPA 6020
	Cadmium	ND	0.00011	0.001	0.005	U		091259-010	EPA 6020
	Calcium	348	1.50	5.00	NE			091259-010	EPA 6020
	Chromium	ND	0.002	0.010	0.100	U		091259-010	EPA 6020
	Cobalt	0.00976	0.0001	0.001	NE		J+	091259-010	EPA 6020
	Copper	0.0014	0.00035	0.001	NE		J+	091259-010	EPA 6020
	Iron	3.04	0.033	0.100	NE		J-	091259-010	EPA 6020
	Lead	ND	0.0005	0.002	NE	U		091259-010	EPA 6020
	Magnesium	70.0	0.050	0.150	NE			091259-010	EPA 6020
	Manganese	2.25	0.005	0.025	NE		J	091259-010	EPA 6020
	Mercury	ND	0.000066	0.0002	0.002	U		091259-010	EPA 7470
	Nickel	0.0187	0.0005	0.002	NE		J	091259-010	EPA 6020
	Potassium	46.8	0.080	0.300	NE			091259-010	EPA 6020
	Selenium	0.00207	0.0015	0.005	0.050	J	J-	091259-010	EPA 6020
	Silver	ND	0.0002	0.001	NE	U		091259-010	EPA 6020
	Sodium	509	2.00	6.25	NE			091259-010	EPA 6020
	Thallium	0.00129	0.00045	0.002	0.002	J		091259-010	EPA 6020
	Uranium	0.0239	0.000067	0.0002	0.03			091259-010	EPA 6020
	Vanadium	ND	0.001	0.005	NE	U		091259-010	EPA 6020
	Zinc	0.561	0.0035	0.010	NE		J-	091259-010	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.
ND = Not detected (at MDL).

Table A-14 (Concluded)

Summary of Filtered Total Metal Results

Solid Waste Management Unit 154 Groundwater Monitoring

Quarterly Assessment, July 2011 – September 2011

Notes (continued)

NE = Not established.
PQL = Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

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

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

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

Table A-15

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

Solid Waste Management Unit 154 Groundwater Monitoring

Quarterly Assessment, July 2011 – September 2011

Well ID	Analyte	Activity[a] (pCi/L)	MDA (pCi/L)	Critical Level[b] (pCi/L)	MCL (pCi/L)	Laboratory Qualifier[c]	Validation Qualifier[d]	Sample No.	Analytical Method[e]
CTF-MW2	Americium-241	0.0886 ± 10.7	11.7	5.83	NE	U	BD	091259-033	EPA 901.1
29-Sep-11	Cesium-137	0.466 ± 1.93	3.21	1.61	NE	U	BD	091259-033	EPA 901.1
	Cobalt-60	0.478 ± 1.99	3.35	1.68	NE	U	BD	091259-033	EPA 901.1
	Potassium-40	41.6 ± 44.8	30.9	15.5	NE	X	R	091259-033	EPA 901.1
	Gross Alpha	4.20	NA	NA	15	NA	None	091259-034	EPA 900.0
	Gross Beta	63.7 ± 13.0	9.74	4.71	4 mrem/yr			091259-034	EPA 900.0
	Uranium-233/234	56.1 ± 8.93	0.187	0.0765	NE			091259-035	HASL-300
	Uranium-235/236	0.437 ± 0.176	0.140	0.049	NE			091259-035	HASL-300
	Uranium-238	7.76 ± 1.36	0.219	0.0922	NE			091259-035	HASL-300

Notes

CFR = Code of Federal Regulations
CTF = Coyote Test Field..
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.
pCi/L = Picocuries per liter.

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

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

Table A-15 (Concluded)

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

Solid Waste Management Unit 154 Groundwater Monitoring

Quarterly Assessment, July 2011 – September 2011

Notes (continued)

[c]Laboratory Qualifier

NA = Not applicable.
U = Analyte is absent or below the method detection limit.
X = Uncertain identification for gamma spectroscopy analysis and/or peak not meeting identification criteria.

[d]Validation Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.
BD = Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
None = No data validation for corrected gross alpha activity.
R = The data are unusable, and resampling or reanalysis is necessary for verification.

[e]Analytical Method

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

Table A-15 (Concluded)

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

Solid Waste Management Unit 154 Groundwater Monitoring

Quarterly Assessment, July 2011 – September 2011

Notes (continued)

[c]Laboratory Qualifier

NA = Not applicable.
U = Analyte is absent or below the method detection limit.
X = Uncertain identification for gamma spectroscopy analysis and/or peak not meeting identification criteria.

[d]Validation Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.
BD = Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
None = No data validation for corrected gross alpha activity.
R = The data are unusable, and resampling or reanalysis is necessary for verification.

[e]Analytical Method

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

Table A-16

Summary of Constituents Detected Above Established MCLs

Solid Waste Management Units 149 and 154 Groundwater Monitoring

Quarterly Assessments through September 2011

Well ID	Date	Analyte	Result	MCL	Laboratory Qualifier[a]	Validation Qualifier[b]	Sample No.	Analytical Method[c]
SWMU 154								
CTF-MW2	08-Mar-11	Arsenic—Filtered	0.0544 mg/L	0.010 mg/L			090237-010	EPA 6020
CTF-MW2 (Duplicate)	08-Mar-11	Arsenic—Filtered	0.0521 mg/L	0.010 mg/L			090238-010	EPA 6020
CTF-MW2	31-May-11	Arsenic—Filtered	0.0528 mg/L	0.010 mg/L			090670-010	EPA 6020
CTF-MW2	29-Sep-11	Arsenic—Filtered	0.0610 mg/L	0.010 mg/L			090670-010	EPA 6020
CTF-MW2	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	31-May-11	Gross Alpha	23.38 pCi/L	15 pCi/L			090670-010	EPA 900.0
CTF-MW2	08-Mar-11	Thallium—Unfiltered	0.00249 mg/L	0.002 mg/L	J		090237-009	EPA 6020

Notes

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

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

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

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

Attachment 1
Field Measurement Logs

FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: SWMU 154 GWM	Project No.:
Well I.D.: CTF-MW2	Date: 09/29/11
Well Condition:	Weather Condition: 24.54" Hg
Method: Portable pump X Dedicated pump ____ Pump depth: 125'	

PURGE MEASUREMENTS

Depth to Water (ft)	Time 24 hr	Vol (L/gal)	Temp (°C)	SC (µS/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (%)	Comments DO mg/L
43.87	0719		START						
47.80	0751	10	16.83	3890	327.4	5.39	8.46	2.4	0.24
48.17	0800	15	17.00	3941	292.1	5.41	2.55	3.3	0.31
48.39	0809	20	17.20	3962	204.8	5.43	2.53	2.3	0.22
46.85	0824	25	17.72	4059	117.5	5.55	2.90	2.8	0.27
47.07	0839	30	18.10	4036	92.8	5.55	2.79	2.3	0.21
46.83	0855	35	18.62	4034	74.9	5.59	2.81	2.2	0.20
46.66	0902	37	18.66	4038	65.6	5.58	2.77	2.2	0.20
46.52	0910	39	18.58	4035	59.0	5.57	2.72	2.2	0.20
46.37	0919	41	18.66	4036	52.2	5.58	2.72	2.2	0.20
	0920		sampling						
									~4.00 gals purged from tubing 0733

FIELD MEASUREMENT LOG FOR GROUNDWATER SAMPLE COLLECTION

Project Name: SWMU	Project No.:
Well I.D.: CTF-MW3	Date: 09/23/11
Well Condition:	Weather Condition: 24.69" Hg
Method: Portable pump X Dedicated pump ____	Pump depth: 361'

PURGE MEASUREMENTS

Depth to Water (ft)	Time 24 hr	Vol. (L/gal)	Temp (°C)	SC (µS/cm)	ORP (mV)	pH	Turbidity (NTU)	DO (%)	Comments DO mg/L
307.00	0751		Start						
313.82	0811	5	17.88	1827	410.6	6.73	0.65	74.8	7.06
317.28	0821	10	18.92	1832	414.3	6.72	1.13	75.8	7.00
320.07	0832	15	19.37	1834	415.9	6.72	1.10	68.0	6.24
322.32	0843	20	19.69	1839	417.2	6.70	1.05	75.2	6.87
324.24	0854	25	1992	1842	414.9	6.69	0.74	76.5	6.85
324.74	0910	30	20.57	1846	417.6	6.70	0.53	68.2	6.10
324.86	0917	32	20.77	1849	417.9	6.70	0.53	74.0	6.59
324.92	0924	34	20.79	1850	418.3	6.70	0.57	71.1	6.32
324.91	0928	35	20.76	1850	417.5	6.70	0.46	70.8	6.26
	0929		Sampling						
									~4.00 gals. purged from tubing
									0800

Attachment 2
Analysis Request/Chain-of-Custody Forms

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 2

Batch No. N/A

SMO/Use

AR/COC 613855

Dept. No./Mail Stop:	6234/MS 0718	Date Samples Shipped:	9/29/11	Project/Task No.98026.01.15	☐ Waste Characterization -Send preliminary/copy report to:
Project/Task Manager:	Alicia Aragon	Carrier/Waybill No.	132432	SMO Authorization:	
Project Name:	SWMU 154	Lab Contact:	Edie Kent/803-556-8171	Contract # PO 691436	
Record Center Code:	NA	Lab Destination:	GEL		☐ Released by COC No.:
Logbook Ref. No.:	NA	SMO Contact/Phone:	Lorraine Herrera/505-844-3199	SEE OUTLOOK ORDER	☑ Validation Required
Service Order No.	CF 251-12	Send Report to SMO:	Lorraine Herrera /505-844-3199		Bill To:Sandia National Labs (Accounts Payable) P.O. Box 5800 MS 0154 Albuquerque, NM 87185-0154
Location	Tech Area				
Building	Room				

Reference LOV(available at SMO)

286865

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
091259-001	CTF-MW2	125	NA	09/29/11 0920	GW	G	3x40ml	HCL	G	SA	TCL VOC (SW846-8260B)	001 .1
091259-002	CTF-MW2	125	NA	09/29/11 0922	GW	AG	4x1L	4C	G	SA	TCL SVOC (SW846-8270C)	002 .2
091259-009	CTF-MW2	125	NA	09/29/11 0923	GW	P	500 ml	HNO3	G	SA	TAL Metals+ Ur (SW846-6020/7470)	003 .3
091259-010	CTF-MW2	125	NA	09/29/11 0925	FGW	P	500 ml	HNO3	G	SA	TAL Metals+ Ur (SW846-6020/7470)	286867 001
091259-016	CTF-MW2	125	NA	09/29/11 0926	GW	P	125 ml	4C	G	SA	Anions (SW846-9056)	286865 004 .4
091259-018	CTF-MW2	125	NA	09/29/11 0927	GW	P	125 ml	H2SO4	G	SA	NPN (353.2)	005 .5
091259-020	CTF-MW2	125	NA	09/29/11 0928	GW	P	250 ml	4C	G	SA	Perchlorate (314.0)	006 .6
091259-022	CTF-MW2	125	NA	09/29/11 0929	GW	P	500 ml	4C	G	SA	Alkalinity (SM2320B)	007 .7
091259-024	CTF-MW2	125	NA	09/29/11 0931	GW	AG	4x1L	4C	G	SA	High Explosive (SW846-8321A) Mod.	008 .8
091259-033	CTF-MW2	125	NA	09/29/11 0933	GW	P	1 Liter	HNO3	G	SA	Gamma Spec (short list)(901.0)	009 .9
091259-034	CTF-MW2	125	NA	09/29/11 0935	GW	P	1 Liter	HNO3	G	SA	Gross Alpha/Beta (900.0)	010 .10

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

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level D Package ☐ Yes ☑ No
*Send report to:
Tim Jackson/ORG.4142/MS.0729/ 284-2547
If Perchlorate detected perform verification analysis(SW846-6850M)
Alkalinity as total bicarbonate and carbonate
Anions as Br,Fl,Cl,SO4
FGW (filtered in field with .45 micron filter)
*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cellular
	Robert Lynch	RLynch	RL	Weston/4142/844-4013/250-7090
	Alfred Santillanes	ASantillanes	AS	Weston/4142/844-5130/228-0710

1.Relinquished by ASantillanes	Org. 4142	Date 9/29/11	Time 1020	4.Relinquished by	Org.	Date	Time
1. Received by	Org. 4142	Date 9/29/11	Time 1020	4. Received by	Org.	Date	Time
2.Relinquished by	Org. 4142	Date 9/29/11	Time 1134	5.Relinquished by	Org.	Date	Time
2. Received by	Org.	Date 9/30/11	Time 0735	5. Received by	Org.	Date	Time
3.Relinquished by	Org.	Date	Time	6.Relinquished by	Org.	Date	Time
3. Received by	Org.	Date	Time	6. Received by	Org.	Date	Time

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. N/A

SMO Use

AR/COC 613854

Dept. No./Mail Stop:	6234/MS 0718	Date Samples Shipped:	9/27/11	Project/Task No.98026.01.14	☐ Waste Characterization
Project/Task Manager:	Alicia Aragon	Carrier/Waybill No.	132314	SMO Authorization:	-Send preliminary/copy report to:
Project Name:	SWMU-149	Lab Contact:	Edie Kent/803-556-8171	Contract # PO 691436	
Record Center Code:	NA	Lab Destination:	GEL		☐ Released by COC No.:
Logbook Ref. No.:	NA	SMO Contact/Phone:	Lorraine Herrera/505-844-3199	SEE BOTTLE ORDER	☑ Validation Required
Service Order No.	CF 250-12	Send Report to SMO:	Lorraine Herrera /505-844-3199		Bill To: Sandia National Labs (Accounts Payable) P.O. Box 5800 MS 0154 Albuquerque, NM 87185-0154
Location	Tech Area				286722
Building	Room				

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
091257-001	CTF-MW3	361	NA	09/23/11 0929	GW	G	3x40ml	HCL	G	SA	TCL VOC (SW846-8260B)	001 .1
091257-009	CTF-MW3	361	NA	09/23/11 0930	GW	P	500 ml	HNO3	G	SA	TAL Metals (SW846-6020/7470)	002 .2
091257-010	CTF-MW3	361	NA	09/23/11 0931	FGW	P	500 ml	HNO3	G	SA	TAL Metals (SW846-6020/7470)	286723 001
091257-016	CTF-MW3	361	NA	09/23/11 0932	GW	P	125 ml	4C	G	SA	Anions (SW846-9056)	286722 003 .3
091257-018	CTF-MW3	361	NA	09/23/11 0933	GW	P	125 ml	H2SO4	G	SA	NPN (353.2)	004 .4
091257-020	CTF-MW3	361	NA	09/23/11 0934	GW	P	250 ml	4C	G	SA	Perchlorate (314.0)	005 .5
091257-022	CTF-MW3	361	NA	09/23/11 0935	GW	P	500 ml	4C	G	SA	Alkalinity (SM2320B)	006 .6
091258-001	CTF-TB1	NA	NA	09/23/11 0929	DIW	G	3x40ml	HCL	G	TB	TCL VOC (SW846-8260B)	007 .1

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day

Return Samples By: ☐ Negotiated TAT

Sample Tracking Smo Use

Date Entered(mm/dd/yy)

Entered by:

QC inits.

Special Instructions/QC Requirements

EDD ☑ Yes ☐ No

Level D Package ☐ Yes ☑ No

*Send report to:

Tim Jackson/ORG.4142/MS.0729/ 284-2547

If perchlorate detected perform verification analysis(SW846-6850M)

Alkalinity as total bicarbonate and carbonate

Anions as Br,Fl,Cl,SO4

FGW (filtered in field with .45 micron filter)

*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	Robert Lynch		RL	Weston/4142/844-4013/250-7090
	Alfred Santillanes		AS	Weston/4142/844-5130/228-0710
	William Gibson			Weston/4142/844-4013/239-7367

1.Relinquished by	Org. 4142	Date 9/27/11	Time 1037	4.Relinquished by	Org.	Date	Time
1. Received by	Org. 4142	Date 9/27/11	Time 1037	4. Received by	Org.	Date	Time
2.Relinquished by	Org. 4142	Date 9/27/11	Time 1200	5.Relinquished by	Org.	Date	Time
2. Received by	Org.	Date 9/28/11	Time 0745	5. Received by	Org.	Date	Time
3.Relinquished by	Org.	Date	Time	6.Relinquished by	Org.	Date	Time
3. Received by	Org.	Date	Time	6. Received by	Org.	Date	Time

Attachment 3
Data Validation Reports for
Groundwater Analytical Results
July 2011 – September 2011

Sample Findings Summary

AR/COC: 613855

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 901.1			
	091259-033/CTF-MW2	Americium-241 (14596-10-2)	BD, FR3
	091259-033/CTF-MW2	Cesium-137 (10045-97-3)	BD, FR3
	091259-033/CTF-MW2	Cobalt-60 (10198-40-0)	BD, FR3
	091259-033/CTF-MW2	Potassium-40 (13966-00-2)	R, Z1
SW846 3005/6020 DOE-AL			
	091259-009/CTF-MW2	Barium (7440-39-3)	J, D1
	091259-009/CTF-MW2	Cobalt (7440-48-4)	J+, CK2
	091259-009/CTF-MW2	Copper (7440-50-8)	J+, CK2
	091259-009/CTF-MW2	Iron (7439-89-6)	J-, MS3
	091259-009/CTF-MW2	Manganese (7439-96-5)	J, MS1
	091259-009/CTF-MW2	Nickel (7440-02-0)	J, MS3,CK2
	091259-009/CTF-MW2	Selenium (7782-49-2)	J-, CK3
	091259-009/CTF-MW2	Zinc (7440-66-6)	J-, MS3,D1
	091259-010/CTF-MW2	Barium (7440-39-3)	J, D1
	091259-010/CTF-MW2	Cobalt (7440-48-4)	J+, CK2
	091259-010/CTF-MW2	Copper (7440-50-8)	J+, CK2
	091259-010/CTF-MW2	Iron (7439-89-6)	J-, MS3
	091259-010/CTF-MW2	Manganese (7439-96-5)	J, MS1
	091259-010/CTF-MW2	Nickel (7440-02-0)	J, MS3,CK2
	091259-010/CTF-MW2	Selenium (7782-49-2)	J-, CK3
	091259-010/CTF-MW2	Zinc (7440-66-6)	J-, MS3,D1
SW846 3535/8321A Modified			
	091259-024/CTF-MW2	Tetryl (479-45-8)	R, MS3,MS5

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

ANALYTICAL QUALITY ASSOCIATES, INC.

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

Memorandum

Date: November 3, 2011

To: File

From: Kevin Lambert

Subject: Inorganic Data Review and Validation – SNL
Site: SWMU 154 GWM
AR/COC: 613855
SDG: 286865
Laboratory: GEL
Project/Task: 98026.01.15
Analysis: General Chemistry

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM ER Project AOP 00-03 Rev 3.

Summary

One sample was prepared and analyzed with accepted procedures using methods EPA 9056 (anions by ion chromatography), EPA 353.2 (nitrate/nitrite by Cd reduction), EPA 314.0 (perchlorate), and SM 2320B (alkalinity). 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 QC acceptance criteria were met.

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.

All Analyses:
It should be noted that the MS analyses were performed on SNL samples from other SDGs. No sample data will be qualified as a result.

Laboratory Replicate

The replicate met all QC acceptance criteria.

All Analyses:
It should be noted that the replicate analyses were performed on SNL samples from other SDGs. No sample data will be qualified as a result.

Detection Limits/Dilutions

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

Nitrate/Nitrite:
The sample was diluted 5X due to matrix interference.

Anions:
The sample was diluted 5X for bromide, fluoride, and sulfate and 50X for chloride due to high concentration for this analysis and/or matrix interference.

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

Other QC

No other specific issues that affect data quality were identified.

Reviewed by: David Schwent **Date**: 11/04/11

Sample Findings Summary

AR/COC: 613854

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
SW846 3005/6020 DOE-AL			
	091257-009/CTF-MW3	Cobalt (7440-48-4)	J+, CK2
	091257-009/CTF-MW3	Copper (7440-50-8)	J+, CK2
	091257-009/CTF-MW3	Magnesium (7439-95-4)	J, D1
	091257-009/CTF-MW3	Manganese (7439-96-5)	J+, CK2
	091257-009/CTF-MW3	Nickel (7440-02-0)	J+, CK2
	091257-009/CTF-MW3	Selenium (7782-49-2)	J-, CK3
	091257-009/CTF-MW3	Sodium (7440-23-5)	J, D1
	091257-009/CTF-MW3	Zinc (7440-66-6)	J+, CK2
	091257-010/CTF-MW3	Cobalt (7440-48-4)	J+, CK2
	091257-010/CTF-MW3	Copper (7440-50-8)	J+, CK2
	091257-010/CTF-MW3	Magnesium (7439-95-4)	J, D1
	091257-010/CTF-MW3	Manganese (7439-96-5)	J+, CK2
	091257-010/CTF-MW3	Nickel (7440-02-0)	J+, CK2
	091257-010/CTF-MW3	Selenium (7782-49-2)	J-, CK3
	091257-010/CTF-MW3	Sodium (7440-23-5)	J, D1
	091257-010/CTF-MW3	Zinc (7440-66-6)	J+, CK2

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

ANALYTICAL QUALITY ASSOCIATES, INC.

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

Memorandum

Date: November 1, 2011

To: File

From: Kevin Lambert

Subject: Inorganic Data Review and Validation – SNL
Site: SWMU 149 GWM
AR/COC: 613854
SDG: 286722
Laboratory: GEL
Project/Task: 98026.01.14
Analysis: General Chemistry

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM ER Project AOP 00-03 Rev 3.

Summary

One sample was prepared and analyzed with accepted procedures using methods EPA 9056 (anions by ion chromatography), EPA 353.2 (nitrate/nitrite by Cd reduction), EPA 314.0 (perchlorate), and SM 2320B (alkalinity). 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 QC acceptance criteria were met.

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

Anions and Alkalinity:
It should be noted that the MS analyses were performed on SNL samples from other SDGs. No sample data will be qualified as a result.

Laboratory Replicate

The replicate met all QC acceptance criteria.

Anions and Alkalinity:
It should be noted that the replicate analyses were performed on SNL samples from other SDGs. No sample data will be qualified as a result.

Detection Limits/Dilutions

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

Nitrate/Nitrite:
The sample was diluted 10X due to high concentration for this analysis.

Anions:
The sample was diluted 5X for fluoride, 10X for chloride, and 20X for sulfate due to high concentration for this analysis and/or matrix interference.

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

Other QC

No other specific issues that affect data quality were identified.

Reviewed by: David Schwent **Date**: 11/03/11

Sample Findings Summary

AR/COC: 613723

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 900.0/SW846 9310			
	091035-034/CYN-MW6	BETA (12587-47-2)	J, FR7
EPA 901.1			
	091035-033/CYN-MW6	Americium-241 (14596-10-2)	BD, FR3
	091035-033/CYN-MW6	Cesium-137 (10045-97-3)	BD, FR3
	091035-033/CYN-MW6	Cobalt-60 (10198-40-0)	BD, FR3
	091035-033/CYN-MW6	Potassium-40 (13966-00-2)	R, Z2
EPA 906.0 Modified			
	091035-036/CYN-MW6	Tritium (10028-17-8)	BD, FR3
SW846 3005/6020 DOE-AL			
	091035-009/CYN-MW6	Cobalt (7440-48-4)	J+, CK2
	091035-009/CYN-MW6	Sodium (7440-23-5)	J, D1
	091035-009/CYN-MW6	Uranium (U)	J+, CK2
	091035-009/CYN-MW6	Zinc (7440-66-6)	J+, CK2
SW846 8260B DOE-AL			
	091035-001/CYN-MW6	Acetone (67-64-1)	UJ, C3,MS3
	091036-001/CYN-TB23	Acetone (67-64-1)	UJ, C3,MS3
	091038-001/CYN-FB3	Acetone (67-64-1)	UJ, C3,MS3

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

Well Name:	CTF-MW2	**Drilling Contractor:**	WDC INC.
Project Name:	OU 1295 MON. WELLS	**Drilling Method:**	ARCH, AIR ROTARY
NMOSE Well File Code:	RG-90065, Point of Diversion: 6	**Borehole Depth (FBGS):**	190
Owner Name:	SNL/NM	**Casing Depth (FBGS):**	135
Date Drilling Started:	8/17/2001	**Geo Location:**	~1.5 MILES E. OF TA III
Date Well Dev. Completed:	8/18/2001	**Completion Zone:**	REGIONAL GROUNDWATER
		Completion Formation:	PRE-CAMBRIAN GRANITE

Survey Data

Survey Date: 10/4/2001

Surveyed By: ALBQ. SURVEYING CO. (ASC)

State Plane Coordinates: NAD 83

(X) Easting: 1562050.61

(Y) Northing: 1448244.50

Surveyed Evaluations (FAMSL) NAVD 88

Protective Casing: 5578.92

Top of Inner Well Casing: 5578.60

Concrete Pad: 5575.90

Ground Surface: 5575.6

Calculated Depths and Elevations

Initial Depth to Water (FBGS): 41.87

Date Intiial Depth Measured:

Last Measured Water Elevation (FAMSL): 5534.78

Date Last Measured: 10/12/2011

Miscellaneous Information

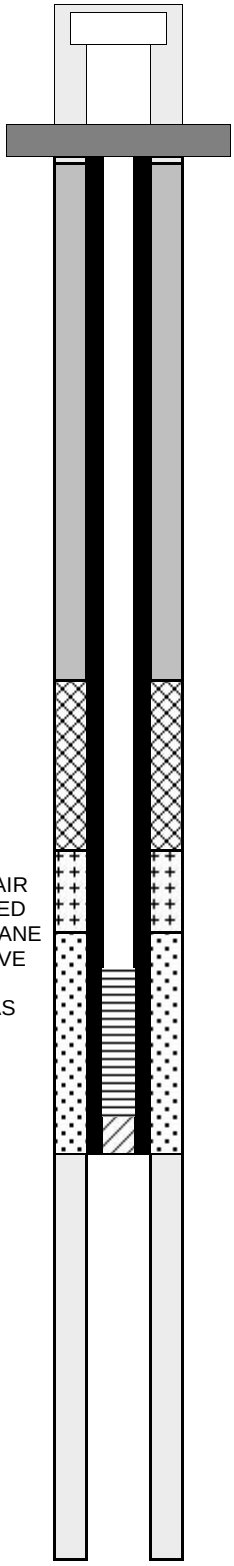
Screen Slot Size (in.): 0.02

Date Updated: 07-SEP-11

Date Printed from EDMS: 1/10/2012 12:13:47 PM

Comments:

0"-110" DRILLED W/ ARCH, 110"-190" DRILLED W/ AIR ROTARY W/ DOWN HOLE HAMMER, HOLE UNCASED CAVED IN 135"-190". 1/1/11 - ORIGINAL STATE PLANE FEET NAD27/NGVD29 SURVEY COORDINATES HAVE BEEN RE-PROJECTED IN STATE PLANE FEET NAD83/NAVD88 COORDINATES. 9/7/11 - WELL WAS REDEVELOPED ON 9/3/11.



Completion Data Measured Depths (FBGS)

Casing Stickup: 3

Interval	Material	Start	Stop	Length	ID / OD (in.)
BOREHOLE		0	190	190	/ 9.625
CASING	SCHEDULE 80 PVC	0	135	135	5 / 5.5
GROUT/BACKFILL	BENTONITE GROUT	1	71	70	
SEAL	3/8" BENTONITE CHIP	71	94	23	
SECONDARY PACK	#2/12 MONTERREY S	94	105	11	
PRIMARY PACK	#3 MONTERREY SAN	105	135	30	
SCREEN	SCHEDULE 80 PVC	110	130	20	
SUMP	SCHEDULE 80 PVC	130	135	5	

Well Name:	CTF-MW3	**Drilling Contractor:**	WDC INC.
Project Name:	OU 1295 MON. WELLS	**Drilling Method:**	ARCH, AIR ROTARY
NMOSE Well File Code:	RG-90065, Point of Diversion: 7	**Borehole Depth (FBGS):**	430
Owner Name:	SNL/NM	**Casing Depth (FBGS):**	365
Date Drilling Started:	8/18/2001	**Geo Location:**	~4000' E. OF TA III
Date Well Dev. Completed:	8/21/2001	**Completion Zone:**	REGIONAL GROUNDWATER
		Completion Formation:	PRE-CAM GRANITE & QUARTZITE

Survey Data

Survey Date: 10/4/2001

Surveyed By: ALBQ. SURVEYING CO. (ASC)

State Plane Coordinates: NAD 83

(X) Easting: 1559709.04

(Y) Northing: 1446826.68

Surveyed Evaluations (FAMSL) NAVD 88

Protective Casing: 5523.29

Top of Inner Well Casing: 5522.82

Concrete Pad: 5520.15

Ground Surface: 5519.8

Calculated Depths and Elevations

Initial Depth to Water (FBGS): 296.58

Date Intiial Depth Measured:

Last Measured Water Elevation (FAMSL): 5216.01

Date Last Measured: 10/17/2011

Miscellaneous Information

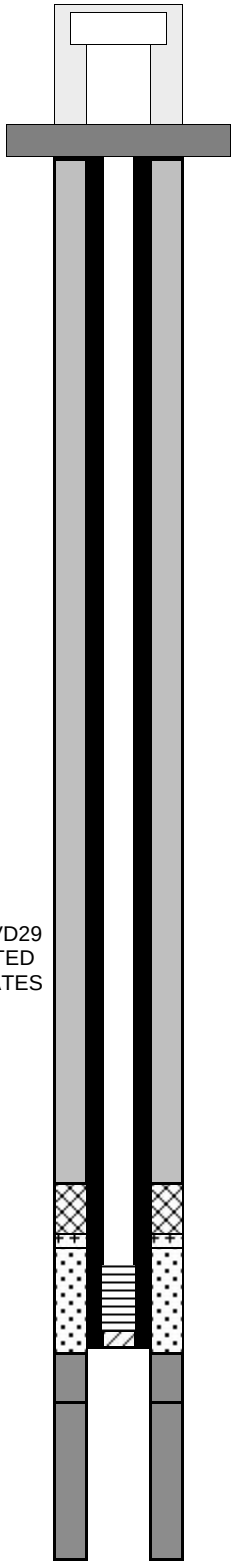
Screen Slot Size (in.): 0.02

Date Updated: 12-APR-2011

Date Printed from EDMS: 11/29/2011 2:58:08 PM

Comments:

0'-29' DRILLED W/ ARCH, 29'-420' DRILLED W/ AIR ROTARY W/ DOWN HOLE HAMMER (UNCASED)
1/1/11 - ORIGINAL STATE PLANE FEET NAD27/NGVD29 SURVEY COORDINATES HAVE BEEN RE-PROJECTED IN STATE PLANE FEET NAD83/NAVD88 COORDINATES



Completion Data Measured Depths (FBGS)

Casing Stickup: 3.1

Interval	Material	Start	Stop	Length	ID / OD (in.)
BOREHOLE		0	430	430	/ 8.5
CASING	SCHEDULE 80 PVC	0	365	365	5 / 5.5
GROUT/BACKFILL	BENTONITE GROUT	1	315	314	
SEAL	3/8" BENTONITE CHIP	315	330.5	15.5	
SECONDARY PACK	#2/12 MONTERREY S	330.5	334.5	4	
PRIMARY PACK	#3 MONTERREY SAN	334.5	367	32.5	
SCREEN	SCHEDULE 80 PVC	340	360	20	
SUMP	SCHEDULE 80 PVC	360	365	5	
PLUGBACK	#2/12 MONTERREY S	367	382	15	
PLUGBACK	BENTONITE GROUT	382	430	63	

Well Name:	CYN-MW6	**Drilling Contractor:**	WTER DEVELOPMENT CORP.
Project Name:	BURN SITE GROUNDWATE	**Drilling Method:**	AIR ROTARY AND ARCH
NMOSE Well File Code:	RG-90065, Point of Diversion: 26	**Borehole Depth (FBGS):**	165
Owner Name:	SNL/NM	**Casing Depth (FBGS):**	161.69
Date Drilling Started:	12/7/2005	**Geo Location:**	LURANCE CANYON
Date Well Dev. Completed:	12/9/2005	**Completion Zone:**	BEDROCK AQUIFER
		Completion Formation:	PHYLLITE

Survey Data

Survey Date: 8/18/2010

Surveyed By: STEPHEN TOLER

State Plane Coordinates: NAD 83

(X) Easting: 1592563.70

(Y) Northing: 1457170.60

Surveyed Evaluations (FAMSL) NAVD 88

Protective Casing: 6343.74

Top of Inner Well Casing: 6343.37

Concrete Pad: 6340.76

Ground Surface: 6340.5

Calculated Depths and Elevations

Initial Depth to Water (FBGS): 136.75

Date Intiial Depth Measured:

Last Measured Water Elevation (FAMSL): 6190.44

Date Last Measured: 10/19/2011

Miscellaneous Information

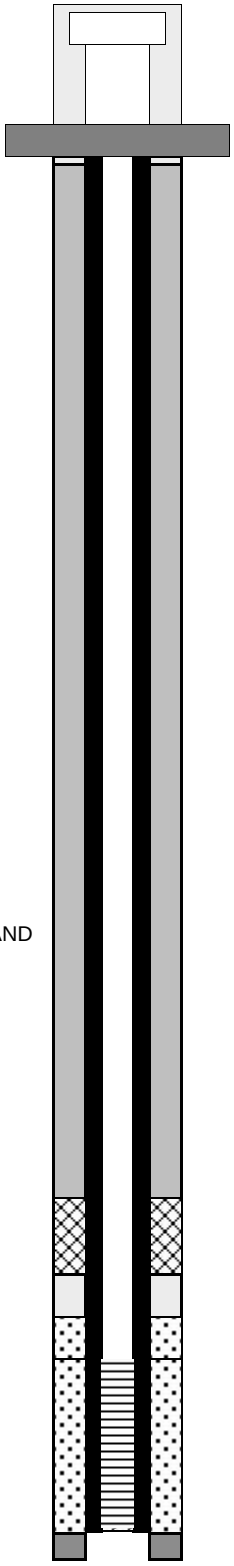
Screen Slot Size (in.): 0.02

Date Updated: 06-APR-2011

Date Printed from EDMS: 11/29/2011 2:59:33 PM

Comments:

NO SUMP INSTALLED IN WELL. NO WATER DETECTED DURING DRILLING. DUST DISCHARGE CHANGE AT 138.5 FBGS. AT 155 FTLET WELL STAND 1 HR., WATER ROSE TO 146 FT. NO WATER OBSERVED DURING DRILLING FROM 155-165 FT.



Completion Data Measured Depths (FBGS)

Casing Stickup: 2.7

Interval	Material	Start	Stop	Length	ID / OD (in.)
BOREHOLE		0	165	165	
CASING	SCHEDULE 80 PVC	0	161.7	161.7	/ 5.5
GROUT/BACKFILL	BENTONITE GROUT	1	122.6	122.6	
BETNONTONITE CHIP S	HYDRATED BENTONI	122.6	131.5	8.9	
PRIMARY FILTER PACK	10/20 SILICA SAND	136.6	141.5	4.9	
PRIMARY FILTER PACK	10/20 SILICA SAND	141.5	162	20.5	
SCREEN	SCHEDULE 80 PVC	141.5	161.3	19.8	/ 5.5
SUMP	SCHEDULE 80 PVC	161.3	161.7	0.4	
SLOUGH PLUG BACK		162	165	3.3	

Well Name:	TAV-MW11	**Drilling Contractor:**	WDC EXPLORATION & WELLS
Project Name:	TA-V GROUNDWATER	**Drilling Method:**	AIR ROTARY CASING HAMMER
NMOSE Well File Code:	RG-90065, POINT OF DIVERSION: 113	**Borehole Depth (FBGS):**	542
Owner Name:	SNL/NM	**Casing Depth (FBGS):**	537
Date Drilling Started:	11/9/2010	**Geo Location:**	TECH AREA V ON KAFB
Date Well Dev. Completed:	11/19/2010	**Completion Zone:**	ALLUVIAL FAN FACIES
		Completion Formation:	SANTA FE

Survey Data

Survey Date: 3/29/2011

Surveyed By: SURVEYING CONTROL, INC.

State Plane Coordinates: NAD 83

(X) Easting: 1555289.81

(Y) Northing: 1454943.33

Surveyed Evaluations (FAMSL) NAVD 88

Protective Casing: 5440.39

Top of Inner Well Casing: 5440.12

Concrete Pad: 5440.39

Ground Surface:

Calculated Depths and Elevations

Initial Depth to Water (FBGS): 517.06

Date Intiial Depth Measured:

Last Measured Water Elevation (FAMSL): 4922.96

Date Last Measured: 10/20/2011

Miscellaneous Information

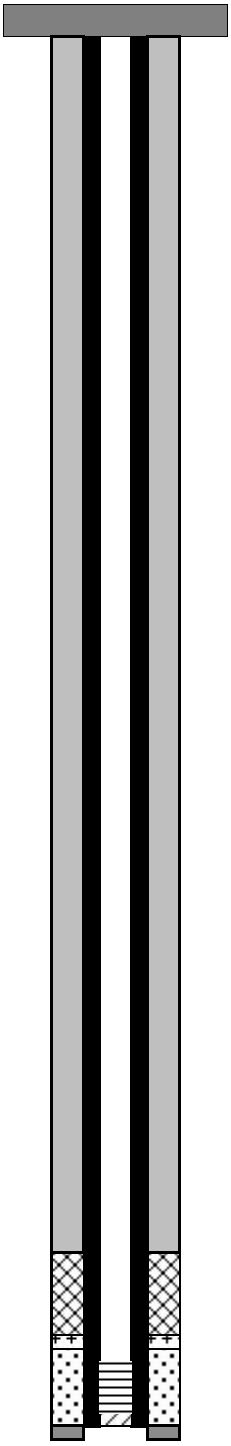
Screen Slot Size (in.): 0.01

Date Updated: 09-JUN-11

Date Printed from EDMS: 11/29/2011 3:02:48 PM

Comments:

BOREHOLE DIAMETER IS 11.75 IN. 0 TO 200 FBGS AND 9.625 IN. FROM 200 TO 542 FBGS.



Completion Data Measured Depths (FBGS)

Casing Stickup: -0.3

Interval	Material	Start	Stop	Length	ID / OD (in.)
BOREHOLE		0	542	542	
CASING	SCHEDULE 80 PVC	0	537	537	4.75 / 5.5
GROUT/BACKFILL	BENTONITE,CONCRE	0	470	470	
SEAL	3/8 IN. BENT. CHIPS	470	502	32	
SECONDARY PACK	#60 SILICA SAND	502	507	5	
PRIMARY PACK	#20-40 SILICA SAND	507	542	35	
SCREEN	SCHEDULE 80 PVC	512	532	20	4.75 / 5.5
SUMP		532	537	5	
PLUG BACK	#20-40 SILICA SAND	537	542	5	

Well Name:	TAV-MW12	**Drilling Contractor:**	WDC EXPLORATION & WELLS
Project Name:	TAV-V GROUNDWATER	**Drilling Method:**	AIR ROTARY CASING HAMMER
NMOSE Well File Code:	RG-90065, POINT OF DIVERSION: 114	**Borehole Depth (FBGS):**	537
Owner Name:	SNL/NM	**Casing Depth (FBGS):**	532
Date Drilling Started:	11/3/2010	**Geo Location:**	TECH AREA V ON KAFB
Date Well Dev. Completed:	11/16/2010	**Completion Zone:**	ALLUVIAL FAN FACIES
		Completion Formation:	SANTA FE

Survey Data

Survey Date: 3/29/2011

Surveyed By: SURVEYING CONTROL, INC.

State Plane Coordinates: NAD 83

(X) Easting: 1554808.97

(Y) Northing: 1454429.88

Surveyed Evaluations (FAMSL) NAVD 88

Protective Casing: 5436.06

Top of Inner Well Casing: 5435.72

Concrete Pad: 5433.14

Ground Surface: 5432.9

Calculated Depths and Elevations

Initial Depth to Water (FBGS): 510.22

Date Intiial Depth Measured:

Last Measured Water Elevation (FAMSL): 4922.22

Date Last Measured: 10/20/2011

Miscellaneous Information

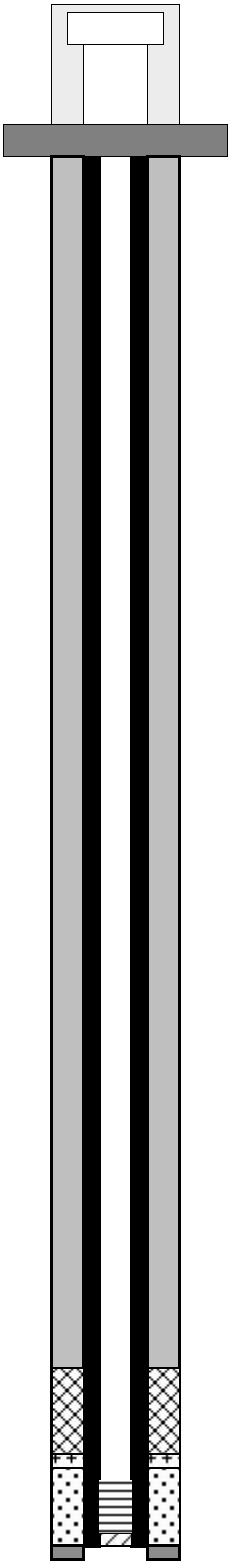
Screen Slot Size (in.): 0.01

Date Updated: 09-JUN-11

Date Printed from EDMS: 11/29/2011 3:03:56 PM

Comments:

BOREHOLE DIAMETER IS 11.75 IN. 0 TO 220 FBGS AND 9.625 IN. FROM 220 TO 537 FBGS.



Completion Data Measured Depths (FBGS)

Casing Stickup: 2.8

Interval	Material	Start	Stop	Length	ID / OD (in.)
BOREHOLE		0	537	537	
CASING	SCHEDULE 80 PVC	0	532	532	4.75 / 5.5
GROUT/BACKFILL	BENTONITE,CONCRE	0	464	464	
SEAL	3/8 IN BENT. CHIPS	464	497	33	
SECONDARY PACK	#60 SILICA SAND	497	502	5	
PRIMARY PACK	#20-40 SILICA SAND	502	537	35	
SCREEN	SCHEDULE 80 PVC	507	527	20	4.75 / 5.5
SUMP		527	532	5	
PLUG BACK	20-40 SILICA SAND	532	537	5	

Well Name:	TAV-MW13	**Drilling Contractor:**	WDC EXPLORATION & WELLS
Project Name:	TA-V GROUNDWATER	**Drilling Method:**	AIR ROTARY CASING HAMMER
NMOSE Well File Code:	RG-90065, POINT OF DIVERSION: 115	**Borehole Depth (FBGS):**	597
Owner Name:	SNL/NM	**Casing Depth (FBGS):**	550
Date Drilling Started:	10/21/2010	**Geo Location:**	TECH AREA V ON KAFB
Date Well Dev. Completed:	11/12/2010	**Completion Zone:**	ALLUVIAL FAN FACIES
		Completion Formation:	SANTA FE

Survey Data

Survey Date: 3/29/2011

Surveyed By: SURVEYING CONTROL, INC.

State Plane Coordinates: NAD 83

(X) Easting: 1553390.72

(Y) Northing: 1455391.70

Surveyed Evaluations (FAMSL) NAVD 88

Protective Casing: 5409.40

Top of Inner Well Casing: 5409.02

Concrete Pad: 5406.23

Ground Surface: 5406.0

Calculated Depths and Elevations

Initial Depth to Water (FBGS): 491.01

Date Intiial Depth Measured:

Last Measured Water Elevation (FAMSL): 4914.68

Date Last Measured: 10/4/2011

Miscellaneous Information

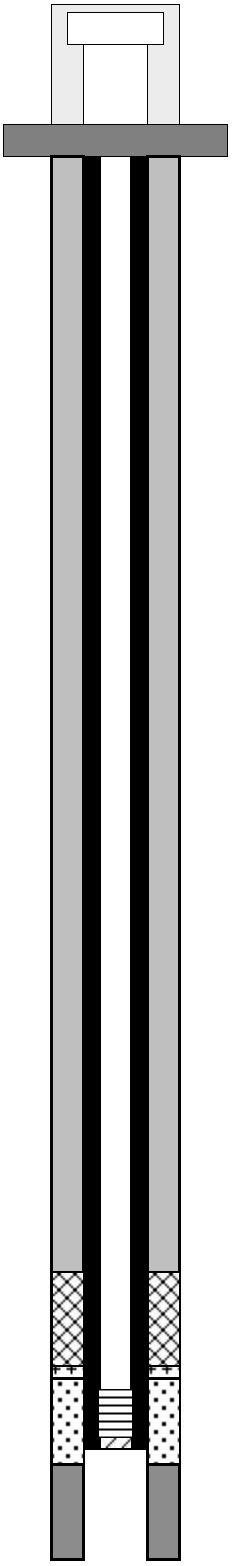
Screen Slot Size (in.): 0.02

Date Updated: 09-JUN-11

Date Printed from EDMS: 11/29/2011 3:05:23 PM

Comments:

BOREHOLE DIAMETER IS 11.75 IN. 0 TO 320 FBGS AND 9.625 IN. FROM 320 TO 597 FBGS.



Completion Data Measured Depths (FBGS)

Casing Stickup: 3

Interval	Material	Start	Stop	Length	ID / OD (in.)
BOREHOLE		0	597	597	
CASING	SCHEDULE 80 PVC	0	550	550	4.75 / 5.5
GROUT/BACKFILL	BENTONITE,CONCRE	0	475	475	
SEAL	3/8 IN. BENT. CHIPS	475	515	40	
SECONDARY PACK	#60 SILICA SAND	515	520	5	
PRIMARY PACK	#10-20 SILICA SAND	520	557	37	
SCREEN	SCHEDULE 80 PVC	525	545	20	4.75 / 5.5
SUMP		545	550	5	
PLUG BACK	3/8 IN. BENT. CHIPS	557	597	40	

Well Name:	TAV-MW14	**Drilling Contractor:**	WDC EXPLORATION & WELLS
Project Name:	TA-V GROUNDWATER	**Drilling Method:**	AIR ROTARY CASING HAMMER
NMOSE Well File Code:	RG-90065, POINT OF DIVERSION: 116	**Borehole Depth (FBGS):**	549
Owner Name:	SNL/NM	**Casing Depth (FBGS):**	538
Date Drilling Started:	10/22/2010	**Geo Location:**	TECH AREA V ON KAFB
Date Well Dev. Completed:	11/9/2010	**Completion Zone:**	ALLUVIAL FAN FACIES
		Completion Formation:	SANTA FE

Survey Data

Survey Date: 3/29/2011

Surveyed By: SURVEYING CONTROL, INC.

State Plane Coordinates: NAD 83

(X) Easting: 1555140.59

(Y) Northing: 1454584.97

Surveyed Evaluations (FAMSL) NAVD 88

Protective Casing: 5441.96

Top of Inner Well Casing: 5441.52

Concrete Pad: 5438.98

Ground Surface: 5438.6

Calculated Depths and Elevations

Initial Depth to Water (FBGS): 516.80

Date Intiial Depth Measured:

Last Measured Water Elevation (FAMSL): 4921.29

Date Last Measured: 10/20/2011

Miscellaneous Information

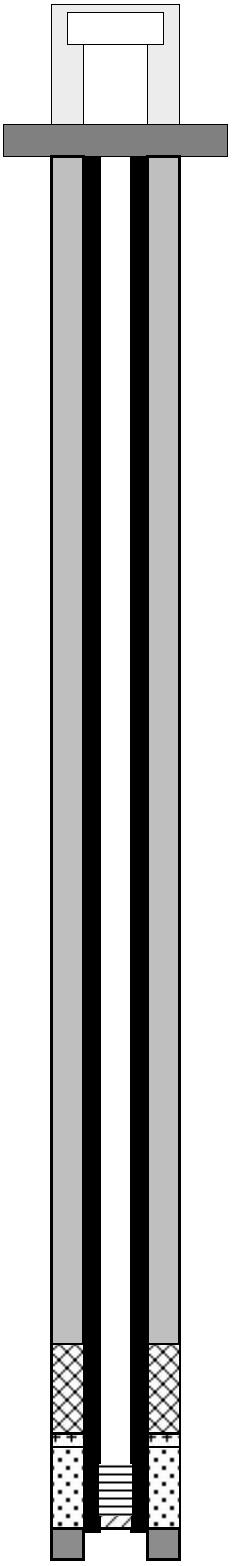
Screen Slot Size (in.): 0.01

Date Updated: 09-JUN-11

Date Printed from EDMS: 11/29/2011 3:06:36 PM

Comments:

BOREHOLE DIAMETER IS 11.75 IN. 0 TO 220 FBGS AND 9.625 IN. FROM 220 FBGS TO 549 FBGS.



Completion Data Measured Depths (FBGS)

Casing Stickup: 2.9

Interval	Material	Start	Stop	Length	ID / OD (in.)
BOREHOLE		0	549	549	
CASING	PVC	0	538	538	4.75 / 5.5
GROUT/BACKFILL	BENTONITE,CONCRE	0	465	465	
SEAL	BAROID HOLE PLUG	465	500	35	
SECONDARY PACK	#60 SILICA SAND	500	505	5	
PRIMARY PACK	#20-40 SILICA SAND	505	545	40	
SCREEN	SCHEDULE 80 PVC	512	532	20	4.75 / 5.5
SUMP		532	537	5	
PLUG BACK	20-40 SILICA SAND	537	549	12	