



Sandia National Laboratories, New Mexico (SNL/NM)

Environmental Restoration Project

A Department of Energy Environmental Cleanup Program

**CONSOLIDATED
Quarterly Report**

August-September-October

December 2009



United States Department of Energy
Sandia Site Office

CONSOLIDATED QUARTERLY REPORT

December 2009

SANDIA NATIONAL LABORATORIES/NEW MEXICO (SNL/NM)

ENVIRONMENTAL RESTORATION PROJECT

DEPARTMENT OF ENERGY (DOE): Sandia Site Office
CONTRACTOR: Sandia Corporation
PROJECT MANAGER: John Cochran

NUMBER OF POTENTIAL RELEASE SITES SUBJECT TO THIS PERMIT: 36
SUSPECT WASTE: radionuclides, metals, organics, and explosives.

OVERVIEW

This Consolidated Quarterly Report for the Sandia National Laboratories Environmental Project addresses all quarterly reporting requirements pertaining to the Hazardous and Solid Waste Amendments (HSWA) Module of the Resource Conservation and Recovery Act (RCRA) Permit, the Compliance Order on Consent (Consent Order), and the Chemical Waste Landfill (CWL) Closure Plan. The following entities and reporting periods are addressed in these Sections:

SECTION I

Environmental Restoration Project Quarterly Report, reporting period: August-October 2009

SECTION II

Chemical Waste Landfill Quarterly Report, reporting period: August-October 2009

SECTION III

Perchlorate Screening Quarterly Report, reporting period: July-September 2009



Environmental Restoration Project Consolidated Quarterly Report

Section I

Environmental Restoration Project Quarterly Report

December 2009



United States Department of Energy
Sandia Site Office

TABLE OF CONTENTS

Abbreviations and Acronyms	i
1.0 Introduction.....	1
2.0 ER Work Completed this Quarter.....	1
2.1 Mixed Waste Landfill (MWL).....	1
2.1.1 MWL Documents submitted to NMED pending regulatory review and approval.....	1
2.2 Project Management Site Closure.....	2
2.2.1 Permit Modification Request submitted in March 2006.....	2
2.2.2 Permit Modification Request submitted in January 2008.....	2
2.3 Site-Wide Hydrogeologic Characterization.....	3
2.3.1 TA-3/5 Groundwater.....	3
2.3.2 Burn Site Groundwater (BSG).....	3
2.3.3 Tijeras Arroyo Groundwater (TAG).....	3
2.3.4 Mixed Waste Landfill Groundwater (MWL).....	4
2.3.5 Chemical Waste Landfill Groundwater (CWL).....	4
2.4 Corrective Action Management Unit (CAMU).....	4
2.4.1 CAMU Waste Management Activities.....	5
2.5 Suspected Solid Waste Management Unit: Long Term Environmental Stewardship (LTES) Site 501, Cable Debris Site	6
2.5.1 LTES Documents submitted to NMED pending regulatory review and approval.....	6

ABBREVIATIONS AND ACRONYMS

BSG	Burn Site Groundwater
BW	background well
CAC	Corrective Action Complete
CFR	Code of Federal Regulations
CME	Corrective Measures Evaluation
COC	Contaminants of Concern
CWL	Chemical Waste Landfill
EB	equipment blank
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration Project
ET	evapotranspirative
FB	field blank
FOP	Field Operating Procedure
FY09	Fiscal Year 2009
LTES	Long Term Environmental Stewardship
MCL	maximum contaminant level
MDL	method detection limit
NOD	Notice of Deficiency
µg/L	microgram per liter
mg/L	milligram per liter
MW	monitoring well
MWL	Mixed Waste Landfill
NMED	New Mexico Environment Department
pH	potential of hydrogen
QC	quality control
RCRA	Resource Conservation and Recovery Act
RPD	relative percent difference
Sandia	Sandia Corporation
SC	specific conductance
SNL/NM	Sandia National Laboratories/New Mexico
SWMU	Solid Waste Management Unit
TAG	Tijeras Arroyo Groundwater
TB	trip blank
TCE	trichloroethene
VCM	Voluntary Corrective Measure
VE	Vapor Extraction
VOC	volatile organic compound

1.0 Introduction

This Environmental Restoration Consolidated Quarterly Report (ER Quarterly Report) discusses ongoing corrective actions being implemented by the Sandia National Laboratories (SNL) Environmental Restoration (ER) Project. The status of regulatory closure activities is outlined below. In this Section, the Quarter refers to the August through October 2009 quarterly reporting period.

2.0 ER Work Completed this Quarter

2.1 Mixed Waste Landfill (MWL)

- The MWL Evapotranspirative (ET) Cover Construction was completed on September 3, 2009. Activities completed during this reporting period included installation of the Topsoil Layer, revegetation, and supplemental watering.
- A second quarterly progress report on the MWL ET Cover Construction Project is provided concurrent with this ER Project Quarterly Report. The construction progress report will summarize ET Cover construction activities from August through October 2009 as required by the NMED Final Order.
- Preparation of the MWL Corrective Measures Implementation Report is ongoing and will be completed in February 2010
- On October 29, 2009, DOE/Sandia received a Notice of Disapproval for the “MWL Groundwater Monitoring Report Calendar Year 2008” submitted to NMED in May 2009. DOE/Sandia anticipate submitting a response to NMED in November 2009.
- Mixed Waste Landfill Groundwater monitoring results for 2009, including sampling conducted during this reporting period, will be compiled in the next annual MWL Groundwater Monitoring Report (anticipated delivery to NMED in the spring of 2010).

2.1.1 MWL Documents submitted to NMED pending regulatory review and approval

- There are no MWL Documents currently pending that require regulatory review and approval.

2.2 Project Management and Site Closure

ER Sites undergoing regulatory and administrative closure activities are presently addressed under project management. Two permit modification requests are currently in progress with the New Mexico Environment Department (NMED) and are outlined below. The sites, summarized below, were discussed with NMED and public stakeholders in June 2009 as part of comment resolution process for the renewal of the SNL Resource Conservation and Recovery Amendment (RCRA Permit). NMED indicated verbally at the meeting that some of the sites included in the March 2006 and January 2008 permit modification requests would require groundwater characterization and additional soil characterization; official written communication regarding these requirements is anticipated.

2.2.1 Permit Modification Request submitted in March 2006

- Twenty-six sites were submitted to NMED for the final determination of Corrective Action Complete (CAC) in March 2006. The sites included nineteen SWMUs, and seven AOCs. The NMED issued a Notice of Public Comment Period and Intent to Approve a Class 3 Permit Modification of the RCRA Permit for Sandia National Laboratories for these 26 sites on December 10, 2007. The NMED public review and comment period ended on February 8, 2008. The SWMUs and AOCs included in this permit modification request are listed below.

SWMUs – 4, 5, 46, 49, 52, 68, 91, 101, 116, 138, 140, 147, 149, 150, 154, 161, 196, 233, 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. This permit modification included all remaining SNL ER sites with the exception of the three active sites (SWMUs 83, 84, and 240), three Groundwater Investigation sites (Tijeras Arroyo, Technical Area V, and Burn Site), and the MWL (SWMU 76). Final reporting of the Corrective Measure Implementation for the MWL is pending. The MWL is addressed separately in section 2.1 of this Section of this ER Quarterly Report. The four SWMUs and one AOC included in the January 2008 permit modification request are listed below.

SWMUs – 8, 28-2, 58, and 105

AOC – 1101

2.3 Site-Wide Hydrogeologic Characterization

2.3.1 TA-3/5 Groundwater

- Groundwater sampling was completed in August and September 2009. Results of perchlorate analysis are discussed in Section III of this ER Quarterly Report, and other analytical results will be discussed in the Calendar Year 2009 Groundwater Protection Program (GWPP) Annual Groundwater Monitoring Report (anticipated delivery to NMED in the summer of 2010).
- On August 12, 2009, DOE/Sandia received a second Notice of Deficiency (NOD) from the NMED on the Technical Area V Corrective Measures Evaluation (CME) Report (submitted July 2005). A response to the NOD will be submitted in November 2009.

2.3.2 Burn Site Groundwater (BSG)

- Groundwater sampling was completed in September 2009. Results of perchlorate analysis are discussed in Section III of this ER Quarterly Report, and other analytical results will be discussed in the Calendar Year 2009 GWPP Annual Groundwater Monitoring Report (anticipated delivery to NMED in the summer of 2010).
- On April 30, 2009, DOE/Sandia received a letter from NMED entitled “Perchlorate Contamination in Groundwater,” requiring, among other items, characterization of the nature and extent of perchlorate contamination at or near the Burn Site. A work plan to fulfill NMED’s requirements will be submitted by DOE/Sandia in November 2009.

2.3.3 Tijeras Arroyo Groundwater (TAG)

- Groundwater sampling began in July 2009 and was completed in August of 2009. Results of perchlorate analysis are discussed in Section III of this ER Quarterly Report, and other analytical results will be discussed in the Calendar Year 2009 GWPP Annual Groundwater Monitoring Report (anticipated delivery to NMED in the summer of 2010).

- On August 12, 2009, DOE/Sandia received a second NOD from the NMED on the TAG Continuing Investigation Report (submitted in November 2005). A response from DOE/Sandia is expected to be delivered in January 2010.

2.3.4 Mixed Waste Landfill Groundwater (MWL)

- Groundwater sampling was performed in October 2009. Results from these MWL sampling events will be discussed in the upcoming MWL Annual Groundwater Monitoring Report (anticipated delivery to NMED in the spring of 2010).

2.3.5 Chemical Waste Landfill Groundwater (CWL)

- CWL semi-annual groundwater monitoring activities were performed in October 2009. Analytical results associated with the October 2009 sampling event have not been received and will be summarized in Section II of the next ER Quarterly Report to be submitted in March 2010.

2.3.5.1 Groundwater Documents submitted to the NMED pending regulatory review and approval

- CME Report for Tijeras Arroyo Groundwater, submitted August 2005.
- BSG Interim Measures Work Plan, submitted May 2005.
- BSG Current Conceptual Model of Groundwater Flow and Contaminant Transport, submitted April 2008.
- BSG CME Work Plan, submitted April 2008.

2.4 Corrective Action Management Unit (CAMU)

CAMU Post-closure Care operations consist of vadose-zone monitoring, leachate removal, and post-closure inspections, as required in the permit. Activities for this reporting period include the following:

- Weekly pumping of leachate from the leachate collection and removal system.
- Weekly inspection of the less-than-90-day area.

- Quarterly inspection of the site (September 2009), including containment cell cover, storm water diversion structures, security fences, gates, signs, and benchmarks:
 - Approximately 40 four-wing saltbush plants were identified growing on the cover. These plants can develop extensive root systems that could damage the high-density polyethylene cover. They were removed on October 23, 2009.
- Quarterly monitoring of the Vadose Zone Monitoring System (VZMS) was conducted in September 2009. Results will be posted in the annual CAMU report.
- Waste management associated with the leachate collection was conducted (see below).
- Composite leachate sampling for waste characterization was conducted on September 15, 2009.

2.4.1 CAMU Waste Management Activities

- Waste stored on site at the beginning of this period:
 - 30 gallons of leachate.
 - 2 lbs PPE.
- Waste generated on-site during the period:
 - 137 gallons of leachate.
 - 2 gallons of rinsate.
 - 5 lbs PPE, paper wipes, plastic drum pump.
- Waste removed from site by the Hazardous Waste Management Facility:
 - 107 gallons of leachate on September 29, 2009.
 - 2 gallons of rinsate on September 29, 2009.
 - 5 lbs PPE, paper wipes, plastic drum pump on September 29, 2009.
- Waste remaining on site at the end of this period:
 - 60 gallons of leachate.
 - 2 lbs PPE.

2.4.1.1 CAMU Regulatory Activities

- On October 30, 2009, SNL/DOE delivered a “Notification of Class 1 Modification to Hazardous Waste Operating Permits for SNL/NM, Environmental Protection Agency ID NM5890110518 effective on October 26, 2009” to NMED.
 - Pager contact information for emergency coordinators has been updated due to a recent change in vendors for pager services.

2.5 Suspected Solid Waste Management Unit: Long Term Environmental Stewardship (LTES) Site 501, Cable Debris Site

- In August 17, 2009 a temporary irrigation system was installed at the Cable Debris Site, the site was seeded and 1/2" gravel applied.
- On September 21, 2009, DOE/Sandia received NMED's "Notice of Disapproval: Investigation Report and Proposal for Corrective Action Complete for LTES Site 1/Cable Debris Site" delivered to NMED in March 2009.
- On October 5, 2009, after successful re-vegetation, the irrigation system was removed from the Cable Debris Site.
- In October, a memorandum was drafted that standardized LTES and other RCRA site names. This resulted in a name change for the Cable Debris Site from LTES Site 1 to LTES Site 501.

2.5.1 LTES Documents submitted to NMED pending regulatory review and approval

- There are no LTES Documents currently pending that require regulatory review and approval.



Environmental Restoration Project Consolidated Quarterly Report

Section II

Chemical Waste Landfill Quarterly Closure Progress Report

December 2009



United States Department of Energy
Sandia Site Office

Sandia is a multiprogram laboratory managed and operated by Sandia Corporation, a wholly-owned subsidiary of Lockheed Martin Corporation, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000

SECTION II. CHEMICAL WASTE LANDFILL QUARTERLY PROGRESS REPORT

This Sandia National Laboratories/New Mexico (SNL/NM) Chemical Waste Landfill (CWL) Quarterly Closure Progress Report has been prepared pursuant to the CWL Final Closure Plan and Post-closure Permit Application (Closure Plan) (SNL/NM December 1992). This section documents activities at the CWL for the reporting period of August through October 2009. CWL semi-annual groundwater monitoring activities were performed in October 2009. Analytical results associated with the October 2009 sampling event have not been received and will be summarized in Section II of the next Environmental Restoration (ER) Consolidated Quarterly Report to be submitted in March 2010.

1.0 Introduction

All voluntary corrective measures (VCMs) activities for the CWL have been completed. The CWL Landfill Excavation (LE) VCM Final Report was submitted to the NMED in April 2003 (SNL/NM April 2003) and approved by the NMED in December 2003 (Moats December 2003). The Site Operational Boundary Closure Addendum to the LE VCM Final Report was submitted to the NMED in August 2005 (SNL/NM August 2005) and approved by the NMED on October 25, 2005 (Bearzi October 2005). With the submittal of the Waste Management Addendum to the LE VCM Final Report in the February 22, 2006 CWL Quarterly Closure Progress Report (SNL/NM February 2006), as Appendix B, all LE VCM regulatory deliverables have been submitted. With the completion of the VCMs, technical meetings will be held on an as-needed basis. The public will continue to be informed of significant events through the Environmental Restoration (ER) Project public meeting process.

Installation of the cover as an interim measure was requested in April 2004 (Wagner April 2004) and approved with conditions in September 2004 (Kieling September 2004); the cover was completed in September 2005 in accordance with the conditions of approval. All field activities, with the exception of long-term monitoring, have been completed at the CWL.

2.0 Status of Closure

The Final Toxic Substances Control Act (TSCA) Closure Report documents the completion of all closure activities specified in the "Risk-Based Approval Request, 40 CFR 761.61(c) Risk-Based Method for Management of PCB [Polychlorinated Biphenyl] Materials" (SNL/NM October 2001), approved by the U.S. Environmental Protection Agency (EPA) in June 2002 (Cooke June 2002). The Final TSCA Closure Report was submitted to the EPA and NMED on November 2, 2006 (SNL/NM November 2006).

Upcoming CWL Closure Plan reporting activities include revising and submitting the Final Resource Conservation and Recovery Act (RCRA) Closure Report, to be submitted after NMED approval of the Corrective Measures Study (CMS) Report has been received. The Final RCRA Closure Report will document both the backfilling of the former CWL and installation of the cover.

On May 21, 2007, the NMED issued, for public comment, the draft post-closure care permit for the CWL. Also included in the public notices were the CMS Report and the Closure Plan amendment (changes to Chapter 12 revising the closure process). On July 19, 2007, DOE and Sandia responded in opposition to the issuance of the CWL post-closure care permit as drafted and offered a number of

comments, the most important of which were related to groundwater and vadose zone monitoring. In addition, DOE and Sandia requested that a public hearing be scheduled to address these outstanding issues.

For this reporting period the post-closure care permit negotiations that included a CWL Closure Plan amendment addressing the replacement of four groundwater monitoring wells, were completed and approved by NMED. Sandia and DOE signatures for the final settlement agreement were provided in October and the settlement agreement and Final Order In the Matter of Application for a Post-Closure Care Hazardous Waste Permit for the Chemical Waste Landfill, Sandia National Laboratories No. NM5890110518 (Final Order) were signed by NMED on October 15, 2009. NMED issued a "Notice of Approval Final Remedy and Closure Plan Amendment Chemical Waste Landfill" on October 16, 2009. Sandia will now proceed with the replacement of four groundwater monitoring wells at the CWL according to the approved Closure Plan Amendment.

3.0 Water Monitoring Assessment

CWL semi-annual groundwater monitoring activities were performed in October 2009. Analytical results associated with this groundwater sampling event have not been received. The October 2009 activities associated with the groundwater monitoring task will be summarized in the next ER Quarterly Progress Report to be submitted in March 2010.

No soil-gas sampling was performed at the CWL during this reporting period. Soil-gas sampling is not required under the Closure Plan but is expected to be a requirement for post-closure care (Kieling, December 2003).

4.0 Projected Activities for the Upcoming Quarter

Planning and contracting associated with the replacement of four groundwater monitoring wells at the CWL according to the approved Closure Plan Amendment will proceed during the next quarter. After installation of the four groundwater monitoring wells, Sandia and DOE will prepare and submit the CWL Final RCRA Closure Report.

5.0 References

Bearzi, J.P. (New Mexico Environment Department), October 2005. Letter to P. Wagner (U.S. Department of Energy) and P.B. Davies (Sandia Corporation), "Notice of Approval: Chemical Waste Landfill Site Operational Boundary Closure Addendum to the Landfill Excavation Corrective Measure Final Report; August 2005, Sandia National Laboratories, NM5890110518, HWB-SNL-05-021." October 25, 2005.

Cooke, G. (U.S. Environmental Protection Agency Region 6), June 2002. Letter to M.J. Zamorski (U.S. Department of Energy), "Approval of the TSCA Risk-Based Approach Request for the CWL." June 26, 2002.

Kieling, J.E. (New Mexico Environment Department), December 2003. Letter to

K.L. Boardman (U.S. Department of Energy) and P.B. Davies (Sandia Corporation), “Chemical Waste Landfill Corrective Measures Study, May 2003, Sandia National Laboratories, NM5890110518, HWB-SNL-03-013 ” December 12, 2003.

Kieling, J.E. (New Mexico Environment Department), September 2004. Letter to P. Wagner (U.S. Department of Energy) and P.B. Davies (Sandia Corporation), “Approval With Conditions of the Landfill Cover Interim Measure at the Chemical Waste Landfill, Sandia National Laboratories, NM5890110518, HWB-SNL-03-013.” September 22, 2004.

Moats, W.P. (New Mexico Environment Department), December 2003. Letter to K.L. Boardman (U.S. Department of Energy) and P.B. Davies (Sandia Corporation), “Final Approval, Landfill Excavation Voluntary Corrective Measures, Final Report, April 2003, Sandia National Laboratories, NM5890110518 HWB-SNL-03-012.” December 16, 2003.

Sandia National Laboratories/New Mexico (SNL/NM), December 1992. “The Chemical Waste Landfill Final Closure Plan and Postclosure Permit Application,” Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), October 2001. “Risk-Based Approval Request, 40 CFR 761.61 (c) Risk-Based Method For Management of PCB Materials,” Chemical Waste Landfill Remediation and Corrective Action Management Unit, Sandia National Laboratories, Albuquerque, New Mexico. October 24, 2001.

Sandia National Laboratories/New Mexico (SNL/NM), April 2004. “Request for Approval to Install the Vegetative Soil Cover Presented in the RAP as an Interim Measure,” Sandia National Laboratories, Albuquerque, New Mexico. April 19, 2004.

Sandia National Laboratories/New Mexico (SNL/NM), August 2005. “Chemical Waste Landfill Site Operational Boundary Closure Addendum to the Landfill Excavation Voluntary Corrective Measure Final Report,” Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), February 2006. “Chemical Waste Landfill Quarterly Closure Progress Report,” Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), November 2006. “Chemical Waste Landfill Toxic Substances Control Act Final Report.” Sandia National Laboratories, Albuquerque, New Mexico. November 2, 2006.

Wagner, P. (U.S. Department of Energy), April 2004. Letter to J. Kieling (New Mexico Environment Department) requesting approval of “an interim measure (cover) at the Chemical Waste Landfill.” April 19, 2004.



Environmental Restoration Project Consolidated Quarterly Report

Section III

Perchlorate Screening Quarterly Monitoring Report Third Quarter of Calendar Year 2009 (July, August, and September 2009)

December 2009



United States Department of Energy
Sandia Site Office

Sandia is a multiprogram laboratory managed and operated by Sandia Corporation, a wholly-owned subsidiary of Lockheed Martin Corporation, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000

Section III: Perchlorate Screening Quarterly Monitoring Report Third Quarter of Calendar Year 2009 (July, August, and September 2009)

Executive Summary

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 be sampled for perchlorate at SNL/NM (NMED April 2004). This report summarizes the perchlorate monitoring completed during the third quarter of Calendar Year 2009 (CY2009) (July, August, and September 2009) in response to the requirements of the Order. During the third quarter of CY2009, groundwater samples were collected from CYN-MW6, LWDS-MW1, TA1-W-06, TA1-W-08, TA2-W-01, and TA2-W-27.

CYN-MW6 is one of the seven wells in the Burn Site Groundwater monitoring well network. LWDS-MW1 is in the Technical Area V Groundwater Investigation study area and was sampled for the second time for perchlorate based on requirements stipulated in an April 2009 letter from the NMED (NMED April 2009). TA1-W-06, TA1-W-08, TA2-W-01, and TA2-W-27 are in the Tijeras Arroyo Groundwater Investigation study area and were sampled for the first time for perchlorate based on NMED requirements (NMED April 2009). All samples were submitted to General Engineering Laboratories (GEL) for perchlorate analysis using U.S. Environmental Protection Agency (EPA) Method 314.0 (EPA November 1999).

No perchlorate was detected in the environmental samples from LWDS-MW1, TA1-W-06, TA1-W-08, TA2-W-01, or TA2-W-27 at a method detection limit of 4 micrograms per liter ($\mu\text{g/L}$). In September of 2009 the environmental samples from CYN-MW6 revealed perchlorate at concentrations of 4.12 and 4.71 $\mu\text{g/L}$. The source for the perchlorate in the groundwater at CYN-MW6 is unknown although a natural source may be present. Because perchlorate concentrations in 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 NMED to discontinue quarterly monitoring and proceed with semiannual sampling for perchlorate at CYN-MW6 (NMED November 2008).

TABLE OF CONTENTS

1.0	Introduction.....	1
2.0	Scope of Activities	3
3.0	Regulatory Criteria.....	5
4.0	Monitoring Results.....	6
5.0	Summary and Conclusions	7
6.0	References.....	11

List of Figures

<u>Figure</u>	<u>Title</u>	
1	Sandia National Laboratories New Mexico Current Perchlorate-Screening Monitoring-Well Network (July, August, September 2009).....	2
2	Perchlorate-Concentrations ($\mu\text{g/L}$) over Time in CYN-MW6.....	12

List of Tables

<u>Table</u>	<u>Title</u>	
1	Current Perchlorate-Screening Monitoring-Well Network Third Quarter of CY2009 (July, August, and September 2009).....	3
2	Sample Details for Third Quarter of CY2009 Perchlorate Sampling	5
3	Summary of Perchlorate Screening Analytical Results for the Current Monitoring-Well Network, as of Third Quarter CY2009	8
4	Perchlorate Screening Groundwater Monitoring Field Water Quality Measurements, Third Quarter of CY2009	13

Appendices

Appendix A. Analytical Laboratory Certificates of Analysis for the Perchlorate Data

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

Acronyms

AOP	Administrative Operating Procedures
ARCOC	analysis request and chain of custody
CME	Corrective Measures Evaluation
COA	certificates of analyses
CY	Calendar Year
CYN	Canyons (Burn Site)
DO	dissolved oxygen
DOE	Department of Energy
EPA	U.S. Environmental Protection Agency
FOP	Field Operating Procedure
GEL	General Engineering Laboratories
HQ	hazard quotient
LTES	Long Term Environmental Stewardship
LWDS	Liquid Waste Disposal System
MDL	method detection limit
MW	monitoring well
ND	non-detect
NMED	New Mexico Environment Department
NTU	Nephelometric Turbidity Units
ORP	oxidation-reduction potential
pH	potential of hydrogen
PQL	practical quantitation limits
QC	quality control
SAP	Standard Operating Procedures
SC	specific conductance
SNL/NM	Sandia National Laboratories, New Mexico
TA	Technical Area
µg/L	microgram per liter
W	well

1.0 Introduction

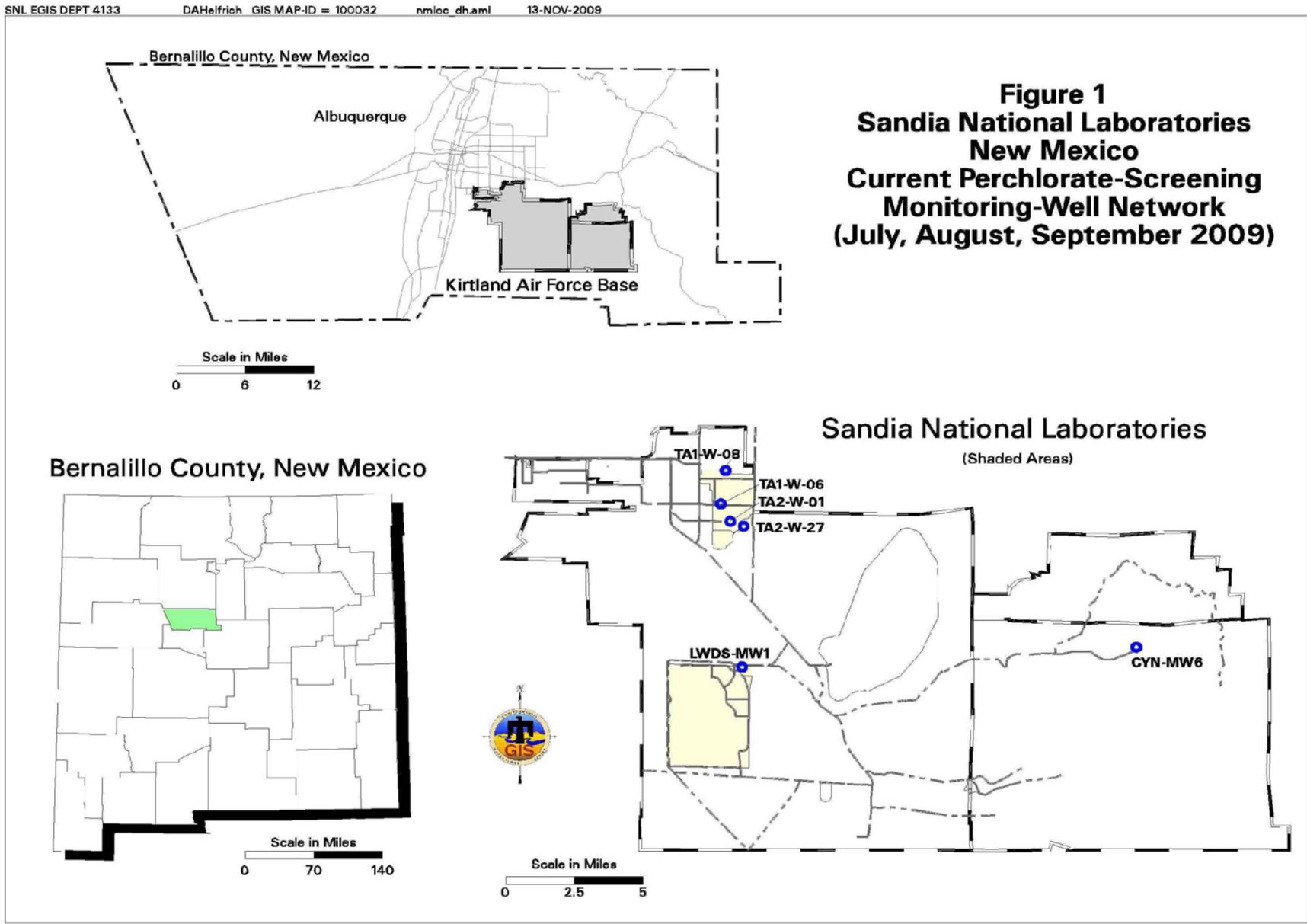
Section IV.B of the Compliance Order on Consent (the Order), between the New Mexico Environment Department (NMED), the U.S. Department of Energy (DOE), and Sandia Corporation (Sandia) for Sandia National Laboratories/New Mexico (SNL/NM), effective on April 29, 2004, stipulates that a select group of groundwater monitoring wells be sampled for perchlorate at SNL/NM (NMED April 2004). This report summarizes the perchlorate screening monitoring completed during the third quarter of Calendar Year 2009 (CY2009) (July, August, and September 2009) 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 that 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. Per the letter report, quarterly reports will be submitted for wells actively in the perchlorate-screening monitoring-well network. Based on 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 NMED to proceed to semiannual reporting (NMED November 2008), and then upon further consideration NMED once more required quarterly reporting (NMED April 2009). This did not alter the previously negotiated frequency for CYN-MW6, an existing well that has been under the sampling and reporting requirements of the Order since the well was installed, which will remain at semiannual sampling and reporting.

This report is the fifteenth to be submitted since the November 2005 letter report; the previous reports were submitted Fourth Quarter of Calendar Year 2005 through the Second Quarter of Calendar Year 2009 (SNL/NM February 2006, SNL/NM June 2006, SNL/NM September 2006, SNL/NM December 2006, SNL/NM March 2007, SNL/NM June 2007, SNL/NM September 2007, SNL/NM December 2007, SNL/NM March 2008, SNL/NM June 2008, SNL/NM September 2008, SNL/NM December 2008, SNL/NM June 2009a, and SNL/NM September 2009).

Groundwater monitoring well CYN-MW6 (Figure 1) has now been sampled 13 times, LWDS-MW1 has been sampled two consecutive quarters; and TA1-W-06, TA1-W-08, TA2-W-01, and TA2-W-27 (Figure 1) have been sampled one quarter. 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 a groundwater monitoring well remains in the perchlorate-screening monitoring well network unless negotiated otherwise with NMED. The April 30, 2009 NMED letter, required that monitoring well TA1-W-03 be sampled for perchlorate. However, a groundwater sample could not be collected from monitoring well TA1-W-03 due to unstable turbidity measurements. Two attempts were made to sample this well on July 16th and 24th, 2009. A total of 88 gallons was purged and turbidity measurements ranged from 5.30 Nephelometric Turbidity Units (NTU) to >1000 NTU. SNL/NM personnel have scheduled a borehole camera survey of this monitoring well to examine the physical condition of the well casing. If the well casing is still intact, TA1-W-03 will be redeveloped to remove the silt and clay material that produce the turbid water.

Figure 1. Sandia National Laboratories, New Mexico Current Perchlorate-Screening Monitoring-Well Network (July, August, and September 2009)



2.0 Scope of Activities

This report provides perchlorate screening results from the third quarter of CY2009 (July, August, and September 2009) for the wells currently active in the perchlorate screening program as shown on Figure 1 and listed in Table 1. It should be noted that CYN-MW6 is currently being sampled on a semi-annual basis and all other wells are being sampled quarterly. Per the requirements of Table XI-1 of the Order, a well with four consecutive quarters of non-detect results at the screening level/method detection limit (MDL) of 4 micrograms per liter ($\mu\text{g/L}$) is removed from the requirement of continued monitoring for perchlorate. Data from numerous wells identified in the Order have satisfied this requirement and, therefore, these wells have been removed from the perchlorate screening program. Data for these wells were provided in previous reports, and are not discussed in this current report. Wells discussed in previous perchlorate screening reports include: CYN-MW1D, CYN-MW5, CYN-MW7, CYN-MW8, MRN-2, MRN-3D, MWL-BW1, MWL-BW2, MWL-MW1, MWL-MW7, MWL-MW8, MWL-MW9, NWT A3-MW2, and SWTA3-MW4.

Table 1
Current Perchlorate-Screening Monitoring-Well Network
Third Quarter of CY2009
(July, August, and September 2009)

Well	Date Sampled	Number of Consecutive Sampling Events ^a	Remaining Number of Sampling Events ^b	Sampling Method
CYN-MW6	30-SEP-2009	13	TBD ^c	Bennett™ Pump
LWDS-MW1	15-SEP-2009	2	2	Bennett™ Pump
TA1-W-06	21-JUL-2009	1	3	Bennett™ Pump
TA1-W-08	22-JUL-2009	1	3	Bennett™ Pump
TA2-W-01	30-JUL-2009	1	3	Bennett™ Pump
TA2-W-27	3-AUG-2009	1	3	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 $\mu\text{g/L}$. 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 initiated the negotiation process with the NMED to determine further characterization requirements.

DOE/Sandia performed groundwater sampling at six wells on the dates listed in Table 1. CYN-MW6 was installed after the Order was finalized and was therefore required to be sampled for perchlorate as a “new” well; the other five wells were specifically required by NMED’s April 2009 letter (NMED April 2009). Groundwater sampling activities were conducted in conformance with procedures outlined in the investigation-specific sampling and analysis plans (SAP) entitled:

- ♦ “Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY09, 4th Quarter Sampling, July/August 2009” (SNL/NM June 2009b).
- ♦ “Burn Site Groundwater Monitoring, Mini-SAP for Fourth Quarter Fiscal Year 2009” (SNL/NM August 2009a); and
- ♦ “TA-V Groundwater Monitoring Mini-SAP for Fourth Quarter, Fiscal Year 2009” (SNL/NM August 2009b).

As described in the Mini-SAPs, groundwater sampling was performed in conformance with current Sandia Environmental Management, Long Term Environmental Stewardship (LTES) Project field operating procedures (FOPs). A portable BennettTM 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). Wells TA1-W-06, TA1-W-08, TA2-W-01, and TA2-W-27 were purged a minimum of one saturated screen volume before sampling in conformance with FOP 05-01, “LTES Groundwater Monitoring Well Sampling and Field Analytical Measurements” (SNL/NM August 2007b). Wells CYN-MW6 and LWDS-MW1 are low-yield monitoring wells, and these wells were purged dry and allowed to recover before sampling to ensure the most representative groundwater sample possible.

Field water-quality measurements for turbidity, potential of hydrogen (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 YSITM Model 620 Water Quality Meter. Turbidity was measured with a HACHTM Model 2100P turbidity meter. Purging continued until four stable measurements for turbidity, pH, temperature, and SC were obtained. Groundwater stability was considered acceptable when measurements were within 10 percent or less than 5 nephelometric turbidity units for turbidity, 0.1 pH units, 1.0 degree Celsius, and SC within 5 percent. Field Measurement Logs documenting details of well purging and water quality measurements were submitted to the Sandia Customer-Funded Records Center.

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

Table 2
Sample Details for the Third Quarter of CY2009 Perchlorate Sampling

Well	Sample Identification	ARCOC Number	Date Shipped
CYN-MW6	087734-020 087735-020	612392	30-SEP-09
LWDS-MW1	087662-020 087663-020	612368	15-SEP-09
TA1-W-06	087550-020 087551-020	612301	21-JUL-09
TA1-W-08	087553-020	612302	22-JUL-09
TA2-W-01	087562-020	612306	30-JUL-09
TA2-W-27	087566-020 087567-020	612308	03-AUG-09

Notes

ARCOC = Analysis request and chain of custody.

3.0 Regulatory Criteria

In a given monitoring well, four consecutive non-detects (NDs) using the screening level/MDL of 4 µg/L are considered by the NMED to be 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, 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, the DOE/Sandia will evaluate the nature and extent of perchlorate contamination, based on a screening level/MDL of 4 µg/L, and requires that the results of this evaluation be incorporated into a Corrective Measures Evaluation (CME). Section VII.C of the Order clarifies that the CME process will be initiated where there was a 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 from the NMED stating the requirement that DOE/Sandia “determine the nature and extent of the contamination and complete a Corrective Measures Evaluation 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 assure appropriate characterization of this

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

In preparation of 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 soils has been characterized at Solid Waste Management Units (SWMUs) in the study area (SNL/NM June 2006; SNL/NM March 2008--Appendix C). Based upon these data, DOE/Sandia believe the nature and extent of perchlorate in groundwater at the Burn Site has been sufficiently characterized. Since 2004, four other monitoring wells in the vicinity of the Burn Site have been sampled and analyzed for perchlorate, including CYN-MW1D, CYN-MW5, CYN-MW7, and CYN-MW8. All of these wells were sampled for four quarters and all results were non-detect for perchlorate (SNL/NM March 2008--Appendix D).

Per 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. The maximum concentration of perchlorate in CYN-MW6 to date (8.93 µg/L) was used in the 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 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 NMED to proceed with semi-annual monitoring of perchlorate in CYN-MW6 and proceed with semiannual reporting of all perchlorate results (NMED November 2008). Upon further consideration, 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 soils and groundwater in the Burn Site Groundwater study area (NMED April 2009). A characterization work plan is currently being prepared for submittal to the NMED. The NMED has also requested that DOE/Sandia monitor perchlorate concentrations for a minimum of four quarters at several Tijeras Arroyo Groundwater and Technical Area-V monitoring wells, including TA1-W-03, TA1-W-06, TA1-W-08, TA2-W-01, TA2-W-27, and LWDS-MW1 (NMED April 2009).

4.0 Monitoring Results

Table 3 summarizes current and historical perchlorate results for wells currently in the perchlorate monitoring network. The analytical laboratory COA for the third quarter of CY2009 perchlorate data is included as Appendix A. Perchlorate was not detected above the screening level in LWDS-MW1, TA1-W-06, TA1-W-08, TA2-W-01, or TA2-W-27. Consistent with historical analytical results, perchlorate was detected above the screening level/MDL in the third quarter of CY2009 in CYN-MW6. As shown in Figure 2, the concentrations of perchlorate found in CYN-MW6 in September 2009 (4.12 and 4.71 µg/L) is significantly less than concentrations from previous quarters (for example,

SNL/NM June 2009a). These low concentrations for the CYN-MW6 environmental and duplicate sample values were qualified as an estimated quantity with a suspected negative bias (“J-“) because the matrix spike recovered beyond established acceptance criteria, due to matrix interference. The hydrograph of CYN-MW6 is provided at the end of this Section.

Table 4 summarizes field water quality measurements collected immediately before the analytical sample was collected. Field water quality measurements include turbidity, pH, temperature, SC, ORP, and DO.

The analytical data were reviewed and qualified in accordance with AOP 00-03 Revision 2, “Data Validation Procedure for Chemical and Radiochemical Data” (SNL/NM July 2007). Although validation qualifiers were assigned to several of the analytical results, no problems were identified with the analytical data that resulted in the qualification of the data as unusable. The data are acceptable and reported quality control measures are adequate. The data validation sample findings summary sheets for the perchlorate data are included as Appendix B.

There was one variance from requirements set forth in the Tijeras Arroyo Groundwater Investigation Mini-SAP (SNL/NM June 2009b): no groundwater sample was collected from monitoring well TA1-W-03 due to unstable turbidity measurements during pre-sampling purging. No other variances or nonconformances in field activities or field conditions from requirements in the groundwater monitoring mini-SAPs (SNL/NM June 2009b, August 2009a, and August 2009b) were identified during the third quarter of CY2009 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 sample from groundwater monitoring wells LWDS-MW1, TA1-W-06, TA1-W-08, TA2-W-01, or TA2-W-27 at a screening level/MDL of 4 µg/L.
- Since June 2004 (the start of sampling required by the Order), perchlorate has only been detected above the screening level/MDL (4 µg/L) in one of the wells (CYN-MW6) in the perchlorate-screening monitoring-well network.
- The analytical results from CYN-MW6 for the third quarter of CY2009 sampling event (4.12 and 4.71 µg/L) is significantly less than concentrations reported since the inception of sampling for perchlorate at CYN-MW6 in March 2006 (Figure 2). These lower concentrations are attributed to matrix interference.
- 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. The maximum concentration of perchlorate in CYN-MW6 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).

**Table 3
Summary of Perchlorate Screening Analytical Results for the
Current Monitoring-Well Network, as of Third Quarter CY2009.**

Well ID	Sample Date	ARCOG 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	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/Re-analysis	
			075986-R20	6.48	0.50	2.0	NE	Hh	HT, J	EPA 6850M	Verification/Re-analysis	
	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/Re-analysis	
	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/Re-analysis
	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/Re-analysis
	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	

Refer to notes at the bottom of table.

**Table 3 (continued)
Summary of Perchlorate Screening Analytical Results for the
Current Monitoring-Well Network, as of Third Quarter CY2009.**

Well ID	Sample Date	ARCOC 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
LWDS-MW1	10-Jun-09	612210	087464-020	ND	4.0	12	NE	U		EPA 314.0	
	15-Sep-09	612368	087662-020	ND	4.0	12	NE	HU	UJ	EPA 314.0	
			087663-020	ND	4.0	12	NE	HU	UJ	EPA 314.0	Duplicate sample
TA1-W-06	21-Jul-09	612301	087550-020	ND	4.0	12	NE	U		EPA 314.0	
			087551-020	ND	4.0	12	NE	U		EPA 314.0	Duplicate sample
TA1-W-08	22-Jul-09	612302	087553-020	ND	4.0	12	NE	U		EPA 314.0	
TA2-W-01	30-Jul-09	612306	087562-020	ND	4.0	12	NE	U		EPA 314.0	
TA2-W-27	03-Aug-09	612308	087566-020	ND	4.0	12	NE	U		EPA 314.0	
			087567-020	ND	4.0	12	NE	U		EPA 314.0	Duplicate sample

Notes

^aResult

Values in **bold** exceed the screening level/MDL.

ND not detected (at method detection limit).

µg/L micrograms per liter.

^bMDL

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.

^cPQL

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.

^dMCL

Maximum contaminant level. Established by the U.S. Environmental Protection Agency Primary Water Regulations [40 CFR 141.11(b)], and subsequent amendments or the New Mexico Environmental Improvement Board in Title 20, Chapter 7, Part 1 of the New Mexico Administrative Code (20MAC 7.1).

NE = Not established.

^eLab Qualifier

H = Analytical holding time was exceeded.

h = Prep holding time was exceeded.

J = Amount detected is below the practical quantitation limit.

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

Table 3 (concluded)
Summary of Perchlorate Screening Analytical Results for the
Current Monitoring-Well Network, as of Third Quarter CY2009.

Notes (continued)

¹Validation 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.

UJ = Analyte is absent or below the method detection limit and the associated quantitation limits (MDL and PQL) may be inaccurate or imprecise because the analysis was performed outside method specific hold time requirements.

X1 = General data quality is suspect.

⁹Analytical 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).

DOE/Sandia will continue semiannual monitoring of perchlorate in CYN-MW6 and quarterly monitoring of perchlorate in LWDS-MW1, TA1-W-06, TA1-W-08, TA2-W-01, and TA2-W-27. If the borehole camera survey of TA1-W-03 shows that there is no problem with the physical condition of the well casing, the well will be redeveloped to remove the silt and clay material causing the high turbidity. After redevelopment TA1-W-03 will be added to the perchlorate screening well network and will be sampled a minimum of four consecutive quarters.

Based on recent requirements (NMED April 2009), DOE/Sandia will prepare a work plan for submittal to the NMED that describes efforts to characterize the nature and extent of the perchlorate contamination in soils and groundwater in the Burn Site Groundwater study area.

6.0 References

EPA (see US Environmental Protection Agency).

New Mexico Environment Department (NMED) April 2004. "Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act 74-4-10: Sandia National Laboratories Consent Order, " New Mexico Environment Department, April 24, 2004.

New Mexico Environment Department (NMED) January 2006. "RE: Monitoring Groundwater for Perchlorate, Report of November 22, 2005. Sandia National Laboratories EPA ID# NM5890110518." Letter to Patty Wagner (SSO/NNSA) and Peter Davies (SNL/NM) from James Bearzi. January 27, 2006.

New Mexico Environment Department (NMED) June 2006. "Technical Background Document for Development of Soil Screening Levels, Revision 4.0," New Mexico Environment Department, Hazardous Waste Bureau and Ground Water Quality Bureau Voluntary Remediation Program, Santa Fe, New Mexico. (NMED 2006, 092513). June 2006.

New Mexico Environment Department (NMED) March 2007. "RE: Notice of Approval: Perchlorate Screening Quarterly Monitoring Report, Second Quarter of Calendar Year 2006 (April, May, and June) September 20, 2006. Sandia National Laboratories, EPA ID# NM5890110518. HWB-SNL-06-011" Letter to Patty Wagner (SSO/NNSA) and Peter Davies (SNL/NM) from James Bearzi. March 23, 2007.

New Mexico Environment Department (NMED) November 2008. "RE: Perchlorate Issues" Personal Communication (electronic mail) to John Cochran (SNL/NM) from Sid Brandwein (NMED/HWB). November 07, 2008.

Figure 2
Perchlorate Concentrations ($\mu\text{g/L}$) over Time in CYN-MW6

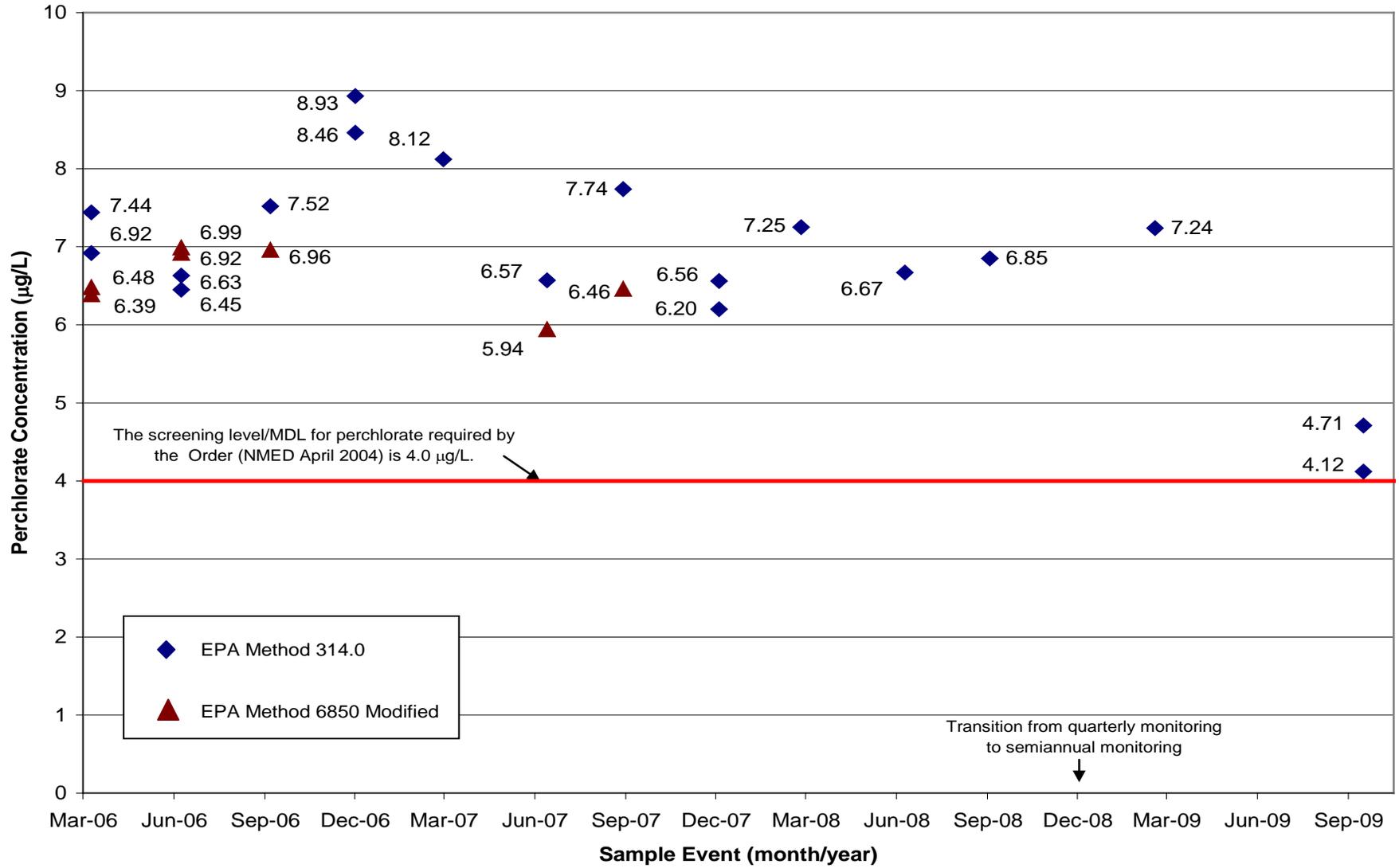


Table 4
Perchlorate Screening Groundwater Monitoring
Field Water Quality Measurements^a, Third Quarter of CY2009

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmho/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
CYN-MW6	30-Sep-09	16.37	1236	151.0	6.99	1.24	24.0	2.34
LWDS-MW1	15-Sep-09	20.23	799	380.0	7.55	0.36	80.7	7.28
TA1-W-06	21-Jul-09	21.98	937	202.8	7.56	0.36	82.7	7.20
TA1-W-08	22-Jul-09	20.54	2072	203.8	7.39	0.78	82.8	7.41
TA2-W-01	30-Jul-09	20.97	687	223.7	7.65	0.40	79.2	7.04
TA2-W-27	03-Aug-09	23.24	909	199.5	7.53	0.36	89.6	7.61

Notes

- a Field measurements made immediately before the groundwater sample was collected.
- °C degrees Celsius.
- % Sat percent saturation.
- µmho/cm micromhos per centimeter.
- mg/L milligrams per liter.
- mV millivolts.
- NTU nephelometric turbidity units.
- pH potential of hydrogen (negative logarithm of the hydrogen ion concentration).

New Mexico Environment Department (NMED) April 2009. RE: Perchlorate Contamination in Groundwater, Sandia National Laboratories, EPA ID# NM5890110518.” Letter to Kimberly Davis (SSO/NNSA) and Francis Nimick (SNL/NM) from James Bearzi. April 30, 2009.

Sandia National Laboratories, New Mexico (SNL/NM) November 2005. To James Bearzi (NMED), “Letter Report on the Status of Perchlorate Screening in Groundwater at Sandia Monitoring Wells” Sandia National Laboratories, New Mexico Environmental Restoration Project. November 22, 2005.

Sandia National Laboratories, New Mexico (SNL/NM) February 2006. “Perchlorate Screening Quarterly Monitoring Report, Fourth Quarter of Calendar Year 2005 (October, November, and December 2005)”. Sandia National Laboratories, New Mexico Environmental Restoration Project. February 24, 2006.

Sandia National Laboratories, New Mexico (SNL/NM) June 2006. “Perchlorate Screening Quarterly Monitoring Report, First Quarter of Calendar Year 2006 (January, February, and March 2006)”. Sandia National Laboratories, New Mexico Environmental Restoration Project. June 7, 2006.

Sandia National Laboratories, New Mexico (SNL/NM) September 2006. “Perchlorate Screening Quarterly Monitoring Report, Second Quarter of Calendar Year 2006 (April, May, and June 2006)”. Sandia National Laboratories, New Mexico Environmental Restoration Project. September 20, 2006.

Sandia National Laboratories, New Mexico (SNL/NM) December 2006. “Consolidated Quarterly Report, Section III: Perchlorate Screening Quarterly Monitoring Report, Third Quarter of Calendar Year 2006 (July, August, and September 2006)”. Sandia National Laboratories, New Mexico Environmental Restoration Project. December 2006.

Sandia National Laboratories, New Mexico (SNL/NM) March 2007. “Consolidated Quarterly Report, Section III: Perchlorate Screening Quarterly Monitoring Report, Fourth Quarter of Calendar Year 2006 (October, November, and December 2006)”. Sandia National Laboratories, New Mexico Environmental Restoration Project. March 27, 2007.

Sandia National Laboratories, New Mexico (SNL/NM) April 2007. Response to March 23, 2007 NMED letter entitled “RE: Notice of Approval: Perchlorate Screening Quarterly Monitoring Report, Second Quarter of Calendar Year 2006 (April, May, and June) September 20, 2006. Sandia National Laboratories, EPA ID# NM5890110518. HWB-SNL-06-011”. Letter to James Bearzi (NMED HWB) from Patty Wagner (SSO/NNSA). Sandia National Laboratories, New Mexico Environmental Restoration Project. April 19, 2007.

Sandia National Laboratories, New Mexico (SNL/NM) June 2007. “Consolidated Quarterly Report, Section III: Perchlorate Screening Quarterly Monitoring Report, First Quarter of Calendar Year 2007 (January, February, and March 2007)”. Sandia National Laboratories, New Mexico Environmental Restoration Project. June 27, 2007.

Sandia National Laboratories, New Mexico (SNL/NM) July 2007. Sandia Administrative Operating Procedure 00-03, Revision 2, "Data Validation Procedure for Chemical and Radiochemical Data." Sandia National Laboratories, New Mexico Sample Management Office. July 16, 2007.

Sandia National Laboratories, New Mexico (SNL/NM) August 2007a. Sandia Field Operating Procedure 05-03, Revision 02 "LTES Groundwater Sampling Equipment Decontamination," Sandia National Laboratories, New Mexico Long Term Environmental Stewardship, Environmental Management Department. August 16, 2007.

Sandia National Laboratories, New Mexico (SNL/NM) August 2007b. Sandia Field Operating Procedure 05-01, Revision 02 "LTES Groundwater Monitoring Well Sampling and Field Analytical Measurements," Sandia National Laboratories, New Mexico Long Term Environmental Stewardship, Environmental Management Department. August 16, 2007.

Sandia National Laboratories, New Mexico (SNL/NM) September 2007. "Consolidated Quarterly Report, Section III: Perchlorate Screening Quarterly Monitoring Report, Second Quarter of Calendar Year 2007 (April, May, and June 2007)". Sandia National Laboratories, New Mexico Environmental Restoration Project. September 26, 2007.

Sandia National Laboratories, New Mexico (SNL/NM) December 2007. "Consolidated Quarterly Report, Section III: Perchlorate Screening Quarterly Monitoring Report, Third Quarter of Calendar Year 2007 (July, August, and September 2007)". Sandia National Laboratories, New Mexico Environmental Restoration Project. December 27, 2007.

Sandia National Laboratories, New Mexico (SNL/NM) March 2008. "Consolidated Quarterly Report, Section III: Perchlorate Screening Quarterly Monitoring Report, Fourth Quarter of Calendar Year 2007 (October, November, and December 2007)". Sandia National Laboratories, New Mexico Environmental Restoration Project. March 26, 2008.

Sandia National Laboratories, New Mexico (SNL/NM) June 2008. "Consolidated Quarterly Report, Section III: Perchlorate Screening Quarterly Monitoring Report, First Quarter of Calendar Year 2008 (January, February, and March 2008)". Sandia National Laboratories, New Mexico Environmental Restoration Project. June 27, 2008.

Sandia National Laboratories, New Mexico (SNL/NM) September 2008. "Consolidated Quarterly Report, Section III: Perchlorate Screening Quarterly Monitoring Report, Second Quarter of Calendar Year 2008 (April, May, and June 2008)". Sandia National Laboratories, New Mexico Environmental Restoration Project. September 23, 2008.

Sandia National Laboratories, New Mexico (SNL/NM) December 2008. "Consolidated Quarterly Report, Section III: Perchlorate Screening Quarterly Monitoring Report, Third Quarter of Calendar Year 2008 (July, August, and September 2008)". Sandia National Laboratories, New Mexico Environmental Restoration Project. December 22, 2008.

Sandia National Laboratories, New Mexico (SNL/NM) June 2009a. "Consolidated Quarterly Report, Section III: Perchlorate Screening Quarterly Monitoring Report, Fourth Quarter of Calendar Year 2008 and First Quarter of Calendar Year 2009 (October 2008 through March

2009)". Sandia National Laboratories, New Mexico Environmental Restoration Project. June 18, 2009.

Sandia National Laboratories, New Mexico (SNL/NM) June 2009b. "Tijeras Arroyo Groundwater Investigation, Mini-Sampling and Analysis Plan (SAP) for FY09, 4th Quarter Sampling, July/August 2009". Sandia National Laboratories, New Mexico Environmental Restoration Project. June 24, 2009.

Sandia National Laboratories, New Mexico (SNL/NM) August 2009a. "Burn Site Groundwater Monitoring, Mini-Sampling and Analysis Plan (SAP) for Fourth Quarter Fiscal Year 2009". Sandia National Laboratories, New Mexico Environmental Restoration Project. August 25, 2009.

Sandia National Laboratories, New Mexico (SNL/NM) August 2009b. "TA-V Groundwater Monitoring, Mini-Sampling and Analysis Plan (SAP) for Fourth Quarter, Fiscal Year 2009". Sandia National Laboratories, New Mexico Environmental Restoration Project. August 3, 2009.

Sandia National Laboratories, New Mexico (SNL/NM) September 2009. "Consolidated Quarterly Report, Section III: Perchlorate Screening Quarterly Monitoring Report, Second Quarter of Calendar Year 2009 (April 2009 through June 2009)". Sandia National Laboratories, New Mexico Environmental Restoration Project. September 30, 2009.

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

U.S. Environmental Protection Agency (EPA) April 2005, "Perchlorate in Water, Soils, and Solids Using High Performance Liquid Chromatography/Electrospray Ionization/Mass Spectrometry (HPLC/ESI/MS)," Draft, Method 6850. April 2005.

Groundwater Elevations Over Time at CYN-MW6

