SAND2017-7465R

Sandia National Laboratories, New Mexico

Environmental Restoration Operations

A U.S. Department of Energy Environmental Cleanup Program

Consolidated Quarterly Report

January – March 2017

July 2017

United States Department of Energy
Sandia Field Office

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology and Engineering Solutions of Sandia, LLC, a wholly-owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA-0003525.

CONSOLIDATED QUARTERLY REPORT

July 2017

SANDIA NATIONAL LABORATORIES, NEW MEXICO

ENVIRONMENTAL RESTORATION OPERATIONS

U.S. DEPARTMENT OF ENERGY:	SANDIA FIELD OFFICE
CONTRACTOR:	NATIONAL TECHNOLOGY AND ENGINEERING SOLUTIONS OF SANDIA
PROJECT MANAGER:	John R. Cochran

NUMBER OF POTENTIAL RELEASE SITES SUBJECT TO CORRECTIVE ACTION: 12

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

REPORTING PERIOD: January – March 2017

OVERVIEW

This Sandia National Laboratories, New Mexico Environmental Restoration Operations (ER) Consolidated Quarterly Report (ER Quarterly Report) fulfills all quarterly reporting requirements set forth in the Resource Conservation and Recovery Act Facility Operating Permit and the Compliance Order on Consent. The 12 sites in the corrective action process are listed in Table I-1. This ER Quarterly Report presents activities and data in sections as follows:

SECTION I: Environmental Restoration Operations Consolidated Quarterly Report, January – March 2017

SECTION II: Perchlorate Screening Quarterly Groundwater Monitoring Report, January – March 2017

ABBREVIATIONS AND ACRONYMS

µg/L	microgram(s) per liter
µmhos/cm	micromhos per centimeter
°C	degrees Celsius
% Sat	percent saturation
AGMR	Annual Groundwater Monitoring Report
AOC	Area of Concern
AR/COC	Analysis Request/Chain-of-Custody
AVN	Area V (North)
BSG	Burn Site Groundwater
BW	background well
CAC	corrective action complete
CCBA	Coyote Canyon Blast Area
COA	certificates of analyses
COC	constituent of concern
the Consent Order	Compliance Order on Consent
CME	Corrective Measures Evaluation
CTF	Coyote Test Field
CY	Calendar Year
CYN	Canyons (Burn Site Groundwater Area of Concern)
DO	dissolved oxygen
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration Operations
ER Quarterly Report	Environmental Restoration Operations (ER) Consolidated Quarterly Report
FOP	Field Operating Procedure
FY	Fiscal Year
GEL	GEL Laboratories LLC
GWQB	Ground Water Quality Bureau
HQ	hazard quotient
HWB	Hazardous Waste Bureau
ISB	in situ bioremediation
LWDS	liquid waste disposal system
MCL	maximum contaminant level
MDL	method detection limit
mg/L	milligrams per liter
MRN	Magazine Road North
MW	monitoring well
MWL	Mixed Waste Landfill

mV	millivolts
NA	not applicable
ND	nondetect
NE	not established
NMED	New Mexico Environment Department
NNSA	National Nuclear Security Administration
NTU	nephelometric turbidity unit
NWTA	Northwest Technical Area (-III)
OBS	Old Burn Site
ORP	oxidation-reduction potential
PGS	Parade Ground South
pH	potential of hydrogen (negative logarithm of the hydrogen ion concentration)
PQL	practical quantitation limit
QC	quality control
SAP	sampling and analysis plan
SC	specific conductivity
SNL/NM	Sandia National Laboratories, New Mexico
SWMU	Solid Waste Management Unit
SWTA	Southwest Technical Area (-III)
TA	Technical Area
TA1-W	Technical Area-I (Well)
TA2-NW	Technical Area-II (Northwest)
TA2-SW	Technical Area-II (Southwest)
TA2-W	Technical Area-II (Well)
TAG	Tijeras Arroyo Groundwater
TAV	Technical Area-V (acronym used for well identification numbers in tables only)
TA-V	Technical Area-V
TAVG	Technical Area-V Groundwater
TBD	to be determined
TCE	trichloroethene
TJA	Tijeras Arroyo (acronym used for well identification numbers in tables only)
TS/IM	Treatability Study/Interim Measure
TSWP	Treatability Study Work Plan
WYO	Wyoming

SECTION I
TABLE OF CONTENTS

LIST OF TABLES

This page intentionally left blank.

SECTION I
ENVIRONMENTAL RESTORATION OPERATIONS CONSOLIDATED QUARTERLY REPORT, January – March 2017

1.0 Introduction

This Environmental Restoration Operations (ER) Consolidated Quarterly Report (ER Quarterly Report) provides the status of ongoing corrective action activities being implemented at Sandia National Laboratories, New Mexico (SNL/NM) during the January, February, and March 2017 quarterly reporting period.

Table I-1 lists the Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) identified for corrective action at SNL/NM. Sections I.2.1 and I.2.2 summarize the work completed during this quarter. Section I.2.1 summarizes the quarterly activities at sites undergoing corrective action *field* activities. Field activities are conducted at the three groundwater AOCs (Burn Site Groundwater [BSG AOC], Technical Area [TA]-V Groundwater [TAVG AOC], and Tijeras Arroyo Groundwater [TAG AOC]). Section I.2.2 summarizes quarterly activities at sites where the New Mexico Environment Department (NMED) Hazardous Waste Bureau (HWB) issued a certificate of completion and the sites are in the corrective action complete (CAC) *regulatory* process. Currently, SWMUs 8 and 58, 68, 149, 154, and 502 are in the CAC regulatory process.

Corrective action activities are deferred at the Long Sled Track (SWMU 83), the Gun Facilities (SWMU 84), and the Short Sled Track (SWMU 240) because these three sites are active mission facilities. These three active mission sites are located in TA-III.

2.0 Environmental Restoration Operations Work Completed

2.1 Sites Undergoing Corrective Action

In a letter dated April 14, 2016, the NMED HWB defined the scope and milestones for corrective action at the three groundwater AOCs (BSG AOC, TAVG AOC, and TAG AOC) (NMED April 2016). Sections 2.1.1 through 2.1.3 discuss the specific milestones from this letter.

2.1.1 Burn Site Groundwater Area of Concern

Nitrate has been identified as a constituent of concern (COC) in groundwater at the BSG AOC based on detections above the U.S. Environmental Protection Agency (EPA) maximum contaminant level (MCL) in samples collected from monitoring wells. The EPA MCL and State of New Mexico drinking water standard for nitrate is 10 milligrams per liter (mg/L) (as nitrogen).

The U.S. Department of Energy/National Nuclear Security Administration (DOE/NNSA) and SNL/NM personnel met with the NMED HWB on July 20, 2015 to discuss the status of sites currently undergoing corrective action. For the BSG AOC, all parties agreed to a weight-of-evidence characterization program: (1) to conduct additional isotopic analyses/nitrate fingerprinting and age-dating of the groundwater; (2) to conduct a transducer study using existing wells to determine whether the groundwater is unconfined, semi-confined, or confined; and (3) to conduct a detailed aquifer pumping test to help determine the origin of the elevated nitrates in the groundwater.

Semiannual sampling at the BSG AOC currently includes perchlorate analyses at one groundwater monitoring well.

The following activities occurred at BSG AOC during January, February, and March 2017:

- No groundwater sampling was conducted during this reporting period. Table I-2 presents the identification and the sampling frequency for BSG AOC monitoring wells.

- In support of the weight-of-evidence characterization, an Aquifer Pumping Test was performed during the week of March 13, 2017.

2.1.2 Technical Area-V Groundwater Area of Concern

Trichloroethene (TCE) and nitrate have been identified as COCs in groundwater at the TAVG AOC based on detections above the EPA MCLs in samples collected from monitoring wells. The EPA MCLs and the State of New Mexico drinking water standards for TCE and nitrate are 5 micrograms per liter (µg/L) and 10 mg/L (as nitrogen), respectively.

Personnel from the DOE/NNSA, DOE Headquarters Office of Environmental Management, SNL/NM, and NMED HWB worked together to address the groundwater contamination at

TAVG AOC. A meeting was held with the NMED HWB on July 20, 2015 and all parties agreed on a phased Treatability Study/Interim Measure (TS/IM) for in situ bioremediation (ISB) to evaluate the effectiveness of ISB as a potential technology to treat the groundwater contamination at TAVG AOC.

For the TS/IM, up to three injection wells (TAV-INJ1, TAV-INJ2, and TAV-INJ3) will be installed at TA-V in the vicinity of the highest contaminant concentrations in groundwater detected in monitoring wells LWDS-MW1, TAV-MW6, and TAV-MW10. The proposed injection wells will be used to deliver substrate solution and biodegradation bacteria to groundwater. The substrate solution containing essential food and nutrients for biostimulation will be prepared in aboveground tanks. The substrate solution, along with the biodegradation bacteria, will be gravity-injected to groundwater via injection wells.

The Revised Treatability Study Work Plan (TSWP) (SNL/NM March 2016) was approved by NMED HWB on May 10, 2016 (NMED May 2016). The Revised TSWP covers implementing the TS/IM of ISB at TAVG AOC and installation of two more groundwater monitoring wells (TAV-MW15 and TAV-MW16) south of the TA-V boundary (SNL/NM March 2016). These new wells will help define the extent of the TCE plume and the potentiometric surface along the southern boundary of TA-V.

The following activities occurred at TAVG AOC during January, February, and March 2017:

- Two new groundwater monitoring wells (TAV-MW15 and TAV-MW16) were drilled, completed, developed, and surveyed in the first and second quarters of FY 2017. The TA-V groundwater monitoring network now comprises 18 active wells. A well installation report for monitoring wells TAV-MW15 and TAV-MW16 will be submitted in the third quarter to NMED HWB for review and approval.

- A Groundwater Discharge Permit is required for operation of the TA-V Treatability Study injection wells; therefore, a Discharge Permit Application was submitted to NMED Ground Water Quality Bureau (GWQB) in July 2016 (DOE July 2016). After DOE/NNSA and SNL/NM personnel fulfilled the public notice requirements for the Discharge Permit Application (DOE November 2016a), NMED GWQB released the Draft Discharge Permit (DP-1845) on March 3, 2017 for a 30-day public comment period (NMED, March 2017). Injection well TAV-INJ1 will be installed after the Discharge Permit is issued.

- Groundwater sampling was conducted in February and March 2017. As described in Chapter 6 of the Revised TSWP, DOE/NNSA and SNL/NM personnel will implement a revised groundwater monitoring plan for TAVG AOC (SNL/NM March 2016). The revised groundwater monitoring plan was initiated in the first quarter of CY 2017. Table I-2 has been updated for TAVG AOC and presents the identification and the sampling frequency for the monitoring wells. The analytical results for CY 2017 groundwater monitoring will be presented in the SNL/NM CY 2017 Annual Groundwater Monitoring Report, which is anticipated to be submitted to the NMED HWB in the summer of 2018.

- Initial groundwater sampling for monitoring wells TAV-MW15 and TAV-MW16 was conducted in February 2017. Sampling parameters included nitrate, TCE, and perchlorate. Perchlorate was sampled per requirement of the Compliance Order on Consent (NMED April 2004). This is the first of the four quarters' required sampling of perchlorate for newly-installed groundwater monitoring wells. Perchlorate results are presented in Section II.

2.1.3 Tijeras Arroyo Groundwater Area of Concern

Nitrate has been identified as a COC in groundwater for the TAG AOC based on detections above the EPA MCL in samples collected from monitoring wells completed in the Perched Groundwater System and in the Regional Aquifer. TCE was previously identified as a COC for the Perched Groundwater System. However, the area where TCE exceedances occurred has naturally dewatered and the last reported TCE concentration was 3.82 µg/L, occurring in November 2015, which is less than the EPA MCL of 5 µg/L (SNL/NM June 2016). No TCE concentrations in Regional Aquifer samples have exceeded the MCL. The EPA MCLs and State of New Mexico drinking water standards for TCE and nitrate are 5 µg/L and 10 mg/L (as nitrogen), respectively.

NMED HWB is currently reviewing the Current Conceptual Model and Corrective Measures Evaluation Report for the TAG AOC (SNL/NM December 2016) that was submitted to NMED HWB on November 23, 2016 (DOE November 2016b). The report was submitted in accordance with NMED's "Agreements and Proposed Milestones" letter of April 14, 2016 (NMED April 2016).

The following activities occurred at TAG AOC during January, February, and March 2017:

- Groundwater sampling at the TAG AOC was conducted in March 2017. Table I-2 presents the identification and the sampling frequency for these monitoring wells. The analytical results for CY 2017 groundwater monitoring will be presented in the SNL/NM CY 2017 Annual Groundwater Monitoring Report, which is anticipated to be submitted to the NMED HWB in the summer of 2018.

2.2 Sites in Corrective Action Complete Regulatory Process

After NMED HWB certifies completion of corrective action activities at a SWMU or an AOC, a Class 3 Modification to the Permit is requested by DOE/NNSA to formally change the status of the SWMU or AOC from Corrective Action Required to either CAC without Controls or CAC with Controls. The Class 3 Permit Modification is a regulatory process.

2.2.1 Solid Waste Management Units 8 and 58, 68, 149, and 154

In February 2015, NMED HWB agreed that corrective action activities at SWMUs 8 and 58, 68, 149, and 154 had been completed, and that certificates of completion could be requested (NMED February 2015). A letter requesting certificates of completion for these SWMUs was submitted to the NMED HWB on September 4, 2015 (DOE September 2015). In January 2016, NMED HWB granted the certificates of completion for these SWMUs (NMED January 2016). Section I.2.2.3 describes the Class 3 Permit Modification request for CAC status, which was prepared and submitted to the NMED HWB on May 16, 2016 (DOE May 2016).

2.2.2 Solid Waste Management Unit 502

On February 29, 2016, the NMED HWB approved the November 2013 SWMU 502 Voluntary Corrective Action Report and noted that a permit modification for CAC status for SWMU 502 may be requested (NMED February 2016). Section I.2.2.3 describes the Class 3 Permit Modification request for CAC status, which was prepared and submitted to the NMED HWB on May 16, 2016 (DOE May 2016).

2.2.3 Class 3 Permit Modification Request

A Class 3 Permit Modification to designate six SWMUs as approved for CAC status (DOE May 2016) was requested in a letter dated May 16, 2016. The following SWMUs were included in the request:

- SWMU 8 Open Dump (Coyote Canyon Blast Area)
- SWMU 58 Coyote Canyon Blast Area
- SWMU 68 Old Burn Site
- SWMU 149 Building 9930 Septic System (Coyote Test Field)
- SWMU 154 Building 9960 Septic System and Seepage Pits (Coyote Test Field)
- SWMU 502 Building 9938 Surface Discharge Site

The DOE/NNSA and SNL/NM personnel held a 60-day public comment period from May 25 through July 24, 2016 and hosted a public meeting with information about the SWMUs on June 21, 2016. Information about the public notices, public meeting, meeting attendance list, and summary information about the six SWMUs was provided to the NMED HWB in a letter transmitted on September 8, 2016 (DOE September 2016).

3.0 References

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, Santa Fe, New Mexico, April 29.

New Mexico Environment Department (NMED), February 2015. Letter to G. Beausoleil (U.S. Department of Energy NNSA/Sandia Field Office) and P. Davies (Sandia National Laboratories, New Mexico), *Approval Annual Groundwater Monitoring Report, Calendar Year 2013, June 2014, Sandia National Laboratories, EPA ID# NM5890110518, HWB SNL 14 013, NMED, Hazardous Waste Bureau, Santa Fe, New Mexico*, February 4, 2015.

New Mexico Environment Department (NMED), January 2016. Letter to J. Harrell (U.S. Department of Energy NNSA/Sandia Field Office) and P. Davies (Sandia National Laboratories, New Mexico), "Certificates of Completion for the Solid Waste Management Units 68, 149, 154, 8 and 58, September 2015, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-15-018," NMED, Hazardous Waste Bureau, Santa Fe, New Mexico, January 19, 2016.

New Mexico Environment Department (NMED), February 2016. Letter to J. Harrell (U.S. Department of Energy NNSA/Sandia Field Office) and P. Davies (Sandia National Laboratories, New Mexico), "Approval Investigation Report for Voluntary Correction Action at Solid Waste Management Unit 502 Building 9938 Surface Discharge Site for Sandia National Laboratories/New Mexico, October 2013, Sandia National Laboratories EPA ID# NM5890110518, SNL-15-013," NMED, Hazardous Waste Bureau, Santa Fe, New Mexico, February 29, 2016.

New Mexico Environment Department (NMED), April 2016. Letter to J.P. Harrell (U.S. Department of Energy, NNSA/Sandia Field Office) and M. W. Hazen (Sandia National Laboratories, New Mexico), "Summary of Agreements and Proposed Milestones Pursuant to the Meeting of July 20, 2015, March 30, 2016, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-16-MISC," NMED, Hazardous Waste Bureau, Santa Fe, New Mexico, April 14, 2016.

New Mexico Environment Department (NMED), May 2016. Letter to J. Harrell (U.S. Department of Energy NNSA/Sandia Field Office) and P. Davies (Sandia National Laboratories, New Mexico), "Approval Revised Treatability Study Work Plan for In-Situ Bioremediation at the Technical Area-V Groundwater Area of Concern, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-15-020," NMED, Hazardous Waste Bureau, Santa Fe, New Mexico, May 10, 2016.

New Mexico Environment Department (NMED), March 2017. Draft Ground Water Discharge Permit, Sandia National Laboratories/New Mexico, Discharge Permit-1845, https://cloud.env.nm.gov/water/resources/_translator.php/3wdGf2YvWP7JR8htsQErkMxbvE56mnoqDRp2BQAIXXbigeEtSCEhgT9cBlqLEUu1/EFByl4kPzyL7Ef7vl9VSca+7+vnjhZ1yev7hDmQZ/AZE2JleTMw5gqapMkeI9n8osMNnw1flrU=.pdf, NMED, Ground Water Quality Bureau, Santa Fe, New Mexico, March 3, 2017.

NMED, see New Mexico Environment Department

Sandia National Laboratories, New Mexico (SNL/NM), March 2016. *Revised Treatability Study Work Plan for In-Situ Bioremediation at the Technical Area-V Groundwater Area of Concern, Sandia National Laboratories, Albuquerque, New Mexico*.

Sandia National Laboratories, New Mexico (SNL/NM), June 2016. *Annual Groundwater Monitoring Report, Calendar Year 2015, June 2016, Sandia National Laboratories,* Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories, New Mexico (SNL/NM), December 2016. *Tijeras Arroyo Groundwater Current Conceptual Model and Corrective Measures Evaluation Report*, Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

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

U.S. Department of Energy (DOE), September 2015. Letter to J.E. Kieling (New Mexico Environment Department), "Request for Certificates of Completion from the New Mexico Environment Department for Solid Waste Management Units (SWMUs) 68 and 149 (without controls) and SWMUs 154, 8, and 58 (with controls)," EPA ID# NM5890110518, DOE, National Nuclear Security Administration, Sandia Field Office, Albuquerque, New Mexico, September 4, 2015.

U.S. Department of Energy (DOE), May 2016. "Request for Class 3 Modification to the Resource Conservation and Recovery Act Facility Operating Permit for Sandia National Laboratories/New Mexico," EPA ID# NM5890110518, May 16, 2016.

U.S. Department of Energy (DOE), July 2016. Letter to S. Huddleson (New Mexico Environment Department), "Discharge Permit Application for Sandia National Laboratories/New Mexico Technical Area-V Treatability Study Injection Wells, DP-1845," DOE, National Nuclear Security Administration, Sandia Field Office, Albuquerque, New Mexico, July 25, 2016.

U.S. Department of Energy (DOE), September 2016. "Documentation of Public Notices, Meetings, and Comments Related to Request for Class 3 Modification to the Resource Conservation and Recovery Act Facility Operating Permit for Sandia National Laboratories/New Mexico," EPA ID NM5890110518, September 8, 2016.

U.S. Department of Energy (DOE), November 2016a. Letter to K. Jones (New Mexico Environment Department), "DP-1845, Technical Area-V Treatability Study Injection Wells Affidavit of Public Notice Completion," DOE, National Nuclear Security Administration, Sandia Field Office, Albuquerque, New Mexico, November 16, 2016.

U.S. Department of Energy (DOE), November 2016b. Letter to J.E. Kieling (New Mexico Environment Department), "Tijeras Arroyo Groundwater Current Conceptual Model and Corrective Measures Evaluation Report, December 2016," November 23, 2016.

Tables

Table I-1
Solid Waste Management Units and Areas of Concern
Where Corrective Action is Not Complete

Solid Waste Management Units and Areas of Concern	
Site Number	**Site Description**
8	Open Dump (CCBA)
58	CCBA
68	Old Burn Site
83	Long Sled Track
84	Gun Facilities
149	Building 9930 Septic System (CTF)
154	Building 9960 Septic System and Seepage Pits (CTF)
240	Short Sled Track
NA	Tijeras Arroyo Groundwater Investigation (TAG AOC)
NA	TA-V Groundwater Investigation (TAVG AOC)
NA	Burn Site Groundwater Investigation (BSG AOC)
502	Building 9938 Surface Discharge Site
Total	**12**

Notes

AOC = Area of Concern.
BSG = Burn Site Groundwater.
CCBA = Coyote Canyon Blast Area.
CTF = Coyote Test Field.
NA = Not applicable. A site number was not assigned.
TA = Technical Area.
TAG = Tijeras Arroyo Groundwater.
TA-V = Technical Area-V.
TAVG = Technical Area-V Groundwater.

Table I-2
Groundwater Sampling and Analysis

Investigation Site	Sampling Frequency in CY 2017	Quarter of Sampling in CY 2017	Location of Analytical Results	Location of Perchlorate Analytical Results	Monitoring Wells in Network
TAVG AOC	Quarterly	1,2,3,4	AGMR	Section II of ER Consolidated Quarterly Report	LWDS-MW1, TAV-MW2, TAV-MW4, TAV-MW6, TAV-MW8, TAV-MW10, TAV-MW11, TAV-MW12, TAV-MW14, TAV-MW15, TAV-MW16
	Semiannually	2,4	AGMR	NA	TAV-MW7
	Annually	2	AGMR	NA	AVN-1, LWDS-MW2, TAV-MW3, TAV-MW5, TAV-MW9, TAV-MW13
BSG AOC	Semiannually	2,4	AGMR	Section II of ER Consolidated Quarterly Report	CYN-MW4, CYN-MW7, CYN-MW8, CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12, CYN-MW13, CYN-MW14A, CYN-MW15
TAG AOC	Quarterly	1,2,3,4	AGMR	NA	TA2-W-19, TA2-W-26, TA2-W-28, TJA-2, TJA-3, TJA-4, TJA-7, WYO-4
	Semiannually	1,3	AGMR	NA	TA1-W-06, TA2-W-01, TA2-W-27, TJA-6
	Annually	3	AGMR	NA	PGS-2, TA1-W-01, TA1-W-02, TA1-W-03, TA1-W-04, TA1-W-05, TA1-W-08, TA2-NW1-595, WYO-3

Notes

AGMR = Annual Groundwater Monitoring Report.
AOC = Area of Concern.
AVN = Area V (North).
BSG = Burn Site Groundwater (Area of Concern).
CY = Calendar Year.
CYN = Lurance Canyon.
ER = Environmental Restoration Operations.
LWDS = Liquid Waste Disposal System.
MW = Monitoring Well.
NA = Not applicable. No wells in the site network are currently being sampled and analyzed for perchlorate.
PGS = Parade Ground South.
TA1-W = Technical Area-I (Well).
TA2-NW = Technical Area-II (Northwest).
TA2-W = Technical Area-II (Well).
TAG = Tijeras Arroyo Groundwater (Area of Concern).
TAV = Technical Area-V (acronym used for well identification numbers only).
TAVG = Technical Area-V Groundwater (Area of Concern).
TJA = Tijeras Arroyo.
WYO = Wyoming.

SECTION II
TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF TABLES (Concluded)

APPENDICES

SECTION II
PERCHLORATE SCREENING QUARTERLY GROUNDWATER MONITORING REPORT, January – March 2017

1.0 Introduction

Section IV.B of the Compliance Order on Consent (the Consent Order), between the New Mexico Environment Department (NMED), the U.S. Department of Energy (DOE), and Sandia National Laboratories, New Mexico (SNL/NM), effective on April 29, 2004, stipulates that a select group of groundwater monitoring wells at SNL/NM be sampled for perchlorate (NMED April 2004). This section of the Environmental Restoration Operations (ER) Consolidated Quarterly Report (ER Quarterly Report) summarizes the perchlorate screening groundwater monitoring completed during the first quarter of calendar year (CY) 2017 (January, February, and March 2017) in response to the requirements of the Consent Order. The outline of this report is based on the required elements of a "Periodic Monitoring Report" described in Section X.D. of the Consent Order (NMED April 2004).

In November 2005, DOE/National Nuclear Security Administration (NNSA) and SNL/NM personnel submitted a letter report on the status of perchlorate screening in groundwater at SNL/NM monitoring wells (SNL/NM November 2005). The letter report summarized previous correspondence and sampling results and outlined proposed future work to comply with NMED requirements for perchlorate screening of groundwater. As specified in the letter report, quarterly reports are submitted for wells active in the perchlorate screening monitoring well network.

Based on the NMED response (NMED January 2006), DOE/NNSA and SNL/NM personnel submit each quarterly report within 90 days following the quarter that the data represent. In November 2008, DOE/NNSA and SNL/NM personnel 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) Area of Concern (AOC) monitoring well that has been under the sampling and reporting requirements of the Consent Order since the well was installed, which remains at a semiannual frequency for sampling and reporting. Due to declining water levels, CYN-MW6 has insufficient water to routinely sample and the replacement monitoring well (CYN-MW15) was installed in December 2014; the negotiated semiannual sampling frequency transferred to this well.

In September 2011, DOE/NNSA and SNL/NM personnel requested an extension of the submittal dates by one month for ER Quarterly Reports (SNL/NM September 2011). The request was approved by the NMED (September 2011), which allows DOE/NNSA and SNL/NM personnel to submit perchlorate quarterly reports within 120 days following the quarter that the data represent.

This report is the forty-second perchlorate screening quarterly report to be submitted since the November 2005 letter report; the previous reports were submitted for fourth quarter of CY 2005 through the fourth quarter of CY 2016 (SNL/NM February 2006 and April 2017).

2.0 Scope of Activities

This report provides first quarter of CY 2017 (January, February, and March 2017) perchlorate screening groundwater monitoring analytical results for the wells currently active in the perchlorate screening program as shown on Figure II-1 and listed in Table II-1. In accordance with the requirements of Table XI-1 of the Consent 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 Consent 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. Table II-2 includes wells discussed in previous perchlorate screening reports.

SNL/NM personnel performed groundwater sampling for perchlorate at monitoring wells TAV-MW15 and TAV-MW16 in February 2017 (Table II-1). Groundwater sampling activities were conducted in accordance with procedures outlined in the *Technical Area-V Groundwater Monitoring, Mini-SAP for Second Quarter, Fiscal Year 2017* (SNL/NM January 2017).

As described in the Mini-Sampling and Analysis Plan (SAP), groundwater sampling was performed in accordance with current SNL/NM Environmental Management, Long-Term Stewardship Project Field Operating Procedures (FOPs). A portable Bennett™ groundwater sampling system was used to collect the groundwater samples. The sampling pump and tubing bundle were decontaminated prior to placement into the monitoring well in accordance with procedures described in FOP 05-03, "Groundwater Monitoring Equipment Decontamination" (SNL/NM January 2015a). The well was purged a minimum of one

saturated screen volume before sampling in accordance with FOP 05-01, "Groundwater Monitoring Well Sampling and Field Analytical Measurements" (SNL/NM January 2015b). 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 the groundwater sample. Groundwater temperature, SC, ORP, DO, and pH were measured with an YSI™ Model EXO1 water quality meter. Turbidity was measured with a HACH™ Model 2100Q turbidity meter. Purging continued until four stable measurements for turbidity, pH, temperature, and SC were obtained. Groundwater stability is considered acceptable when the following parameters are achieved:

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

Field measurement logs documenting details of well purging and water quality measurements have been submitted to the SNL/NM Customer Funded Record Center.

The groundwater samples were submitted to GEL Laboratories LLC (GEL) for chemical analysis of perchlorate using U.S. Environmental Protection Agency (EPA) Method 314.0 (EPA November 1999). Table II-3 provides the sample identification, Analysis Request/Chain-of-Custody form number, and the associated groundwater investigation. The analytical report from GEL, including certificates of analyses (COA) (Appendix A), analytical methods, MDLs, practical quantitation limits, dates of analyses, and results of quality control (QC) analyses and data validation findings (Appendix B), have been submitted to the SNL/NM Customer Funded Record Center.

3.0 Regulatory Criteria

For a given monitoring well, four consecutive ND results using the screening level/MDL of 4 µg/L are considered by the NMED as evidence of the absence of perchlorate, such that additional monitoring for perchlorate in that well is not required. If perchlorate is detected using the screening level/MDL of 4 µg/L in a specific well, then monitoring will continue at that well at a frequency negotiated with the NMED. The Consent Order (NMED April 2004) also requires that for detections equal to or greater than 4 µg/L, DOE/NNSA and SNL/NM

personnel will evaluate the nature and extent of perchlorate contamination and incorporate the results of this evaluation into a Corrective Measures Evaluation (CME), based on a screening level/MDL of 4 µg/L. Section VII.C of the Consent Order clarifies that the CME process will be initiated where there is a documented release to the environment, and where corrective measures are necessary to protect human health and the environment.

3.1 Burn Site Groundwater Area of Concern

In March 2007, NMED sent a letter of approval, which required DOE/NNSA and SNL/NM personnel to "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 four quarters of monitoring results, DOE/Sandia submitted a letter to the NMED in April 2007 (SNL/NM April 2007) recommending further characterization through continued quarterly monitoring of monitoring well CYN-MW6 for four additional quarters, ending in December 2007, to ensure appropriate characterization of this well. In January 2008, DOE/NNSA and SNL/NM personnel 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 monitoring well CYN-MW6, and to show that the requirement "to determine the nature and extent of contamination" (NMED March 2007) has been met, DOE/NNSA and SNL/NM personnel provided supporting information to the NMED (SNL/NM March 2008). Perchlorate in surface soil has been characterized at several Solid Waste Management Units (SWMUs) in the study area (SNL/NM June 2006 and March 2008–Appendix C). Based on these data, DOE/NNSA and SNL/NM personnel consider the nature and extent of perchlorate in groundwater at the BSG AOC to be sufficiently characterized. Since 2004, groundwater samples from four other monitoring wells in the vicinity of the BSG AOC have been analyzed for perchlorate, including monitoring wells CYN-MW1D, CYN-MW5, CYN-MW7, and CYN-MW8. All 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 Consent 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 monitoring well 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). For another point of comparison, NMED risk assessment guidance has a tap water standard for perchlorate of

13.8 µg/L (NMED March 2015); therefore, the historical maximum concentration detected is 35 percent less than the NMED standard.

Because perchlorate concentrations in samples from monitoring well CYN-MW6 have exceeded the screening level, DOE/NNSA and SNL/NM personnel initiated a negotiation process with the NMED (SNL/NM March 2007) to determine the frequency of continued monitoring. In November 2008, DOE/NNSA and SNL/NM personnel received approval from the NMED to proceed with semiannual monitoring of perchlorate in monitoring well CYN-MW6 and proceed with semiannual reporting of all perchlorate results (NMED November 2008). Upon further consideration, the NMED once more required that DOE/NNSA and SNL/NM personnel resume quarterly reporting of perchlorate results with the exception of monitoring well CYN-MW6 (NMED April 2009). Due to declining water levels, CYN-MW6 has insufficient water to routinely sample and was replaced; the last sample collected at CYN-MW6 was on October 15, 2012. The replacement monitoring well (CYN-MW15) was installed in December 2014 and assumed the negotiated semiannual monitoring frequency. Monitoring well CYN-MW14A was also installed in December 2014; this well was considered to be a new monitoring well that requires quarterly sampling due to its deep screen interval.

In April 2009, NMED sent a letter that required DOE/NNSA and SNL/NM personnel to characterize the nature and extent of the perchlorate contamination in soil and groundwater in the BSG AOC (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.

3.2 Tijeras Arroyo Groundwater and Technical Area-V Groundwater Areas of Concern

The April 2009 letter from the NMED to DOE/NNSA and SNL/NM personnel was not limited to the BSG AOC (NMED April 2009). In the April 2009 letter, the NMED had also requested that DOE/NNSA and SNL/NM personnel monitor perchlorate concentrations for a minimum of four quarters at five monitoring wells in the Tijeras Arroyo Groundwater (TAG) AOC and at four monitoring wells in the Technical Area-V Groundwater (TAVG) AOC (NMED April 2009). All nine wells from these two AOCs have been sampled for four consecutive monitoring events with no perchlorate detections being reported; therefore, these nine wells have been removed from the perchlorate sampling list. A TAG monitoring well (TA2-SW1-320) was damaged and was replaced by well, TA2-W-28 in December 2014. The replacement well was installed for the purpose of monitoring the same depth interval as damaged well TA2-SW1-320. Because well TA2-SW1-320 was not one of the four TAG wells selected for perchlorate sampling, replacement well TA2-W-28 does not require perchlorate sampling. Two recently installed wells in the TAVG AOC are

considered “new” wells and require at least four quarters of perchlorate analyses, and therefore are discussed in this report.

3.3 March 2006 and January 2008 Permit Modification Requests

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 sites and the corresponding requests are described in Section I.2.2 of this ER Quarterly Report. The NMED letter required work plans and groundwater monitoring at the following SWMUs:

- SWMU 8/58—Installation of at least two groundwater monitoring wells west of and near Features YY and OO, and submittal and approval of a work plan.

- SWMU 49—Annual sampling of existing monitoring well CYN-MW5.

- SWMU 68—Installation of monitoring wells near the burn pan and associated ditch/surface impoundments, and submittal and approval of a work plan.

- 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/NNSA and SNL/NM personnel submitted a SAP for monitoring wells CTF-MW2 and CTF-MW3 (SNL/NM June 2010) that was subsequently approved with modifications by the NMED (December 2010). All of these wells have been sampled for the required number of monitoring events, with no perchlorate detections, and have since been removed from the perchlorate sampling list.

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

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

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

To fulfill requirements of the April 2010 NMED letter, DOE/NNSA and SNL/NM personnel submitted SWMU 68 and SWMUs 8/58 Groundwater Characterization Work Plans that included a Well Installation Plan/SAP for monitoring wells CCBA-MW1, CCBA-MW2, OBS-MW1, OBS-MW2, and OBS-MW3 (SNL/NM September 2010) that was subsequently approved with modification by the NMED (January 2011). All of these wells have been sampled for eight or more consecutive monitoring events with no perchlorate detections and have since been removed from the perchlorate sampling list.

4.0 Monitoring Results

Table II-3 summarizes the details of samples collected from monitoring wells TAV-MW15 and TAV-MW16 in the first quarter of CY 2017. Table II-4 summarizes the perchlorate results for these two wells. Appendix A provides the analytical laboratory COA for the first quarter of CY 2017 perchlorate data. Perchlorate was not detected above the screening level/MDL of 4.0 µg/L in groundwater samples.

Table II-5 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 4 (SNL/NM June 2014). 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. Appendix B provides the data validation sample findings summary sheets for the perchlorate data.

No variances or nonconformances in perchlorate sampling field activities, or field conditions from requirements in the groundwater monitoring Mini-SAP (SNL/NM January 2017), were identified during the first quarter of CY 2017 sampling activities.

5.0 Summary and Conclusions

Based on analytical data presented in Table II-4 and in previous reports, the following statements can be made:

- No perchlorate was detected in groundwater samples from newly installed monitoring wells TAV-MW15 and TAV-MW16.

- Since June 2004 (the start of sampling as required by the Consent Order), perchlorate was detected above the screening level/MDL (4 μg/L) in groundwater samples from only one well (CYN-MW6) and its replacement well (CYN-MW15) in the perchlorate screening monitoring well network.

- DOE/NNSA and SNL/NM personnel will continue semiannual monitoring of perchlorate for monitoring well CYN-MW15, and quarterly monitoring of perchlorate for monitoring wells TAV-MW15 and TAV-MW16.

6.0 References

EPA, see U.S. Environmental Protection Agency.

New Mexico Environment Department (NMED), April 2004. "Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act § 74-4-10: Sandia National Laboratories Consent Order," New Mexico Environment Department, April 29, 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 P. Wagner (SSO/NNSA) and P. Davies (SNL/NM) from J. Bearzi (NMED/HWB), 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.

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 P. Wagner (SSO/NNSA) and P. Davies (SNL/NM) from J. Bearzi (NMED/HWB), March 23, 2007.

New Mexico Environment Department (NMED), November 2008. "RE: Perchlorate Issues." E-mail correspondence to J. Cochran (SNL/NM) from S. Brandwein (NMED), November 7, 2008.

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

New Mexico Environment Department (NMED), February 2010. "RE: Notice of Conditional Approval, Burn Site Groundwater Characterization Work Plan, November 2009, Sandia National Laboratories, EPA ID# NM5890110518, SNL-09-017." Letter to P. Wagner (SSO/NNSA) and M. Walck (SNL/NM) from J. Bearzi (NMED/HWB), February 12, 2010.

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

New Mexico Environment Department (NMED), December 2010. "Approval with Modifications, Response to April 8, 2010 Letter, Groundwater Monitoring Plan for SWMUs 149 and 154," December 21, 2010.

New Mexico Environment Department (NMED), January 2011. "Notice of Approval with Modification: Groundwater Monitoring Well Installation Work Plans for SWMUs 8/58 and 68, September 2010," January 28, 2011.

New Mexico Environment Department (NMED), September 2011. "RE: Request to Modify Schedule for Reporting of Activities and Groundwater Data in Future Consolidated Quarterly Reports for Environmental Restoration Operations, Sandia National Laboratories, EPA ID# NM5890110518," September 15, 2011.

New Mexico Environment Department (NMED), March 2015. "Risk Assessment Guidance for Site Investigations and Remediation," December 2014 (Updated March 2015): https://www.env.nm.gov/HWB/guidance.html (accessed September 2015).

NMED, see New Mexico Environment Department.

Sandia National Laboratories, New Mexico (SNL/NM), November 2005. Letter Report to J. Bearzi (New Mexico Environment Department), "Letter Report on the Status of Perchlorate Screening in Groundwater at Sandia Monitoring Wells," Environmental Restoration Project, Sandia National Laboratories, New Mexico, 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)," Environmental Restoration Project, Sandia National Laboratories, New Mexico.

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

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

Sandia National Laboratories, New Mexico (SNL/NM), April 2007. Letter to J. Bearzi (New Mexico Environment Department [NMED] Hazardous Waste Bureau) from P. Wagner (Sandia Site Office/NNSA), "Response to NMED approval letter of March 23, 2007, entitled RE: Notice of Approval: Perchlorate Screening Quarterly Monitoring Report, Second Quarter of CY 2006 (April, May, and June) September 20, 2006. Sandia National Laboratories, EPA ID# NM5890110518. HWB-SNL-06-011," Environmental Restoration Project, Sandia National Laboratories, New Mexico, April 19, 2007.

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

Sandia National Laboratories, New Mexico (SNL/NM), November 2009. "Burn Site Groundwater Characterization Work Plan: Installation of Groundwater Monitoring Wells CYN-MW9, CYN-MW10, CYN-MW11 and Collection of Subsurface Soil Samples, November 2009," Environmental Restoration Operations, Sandia National Laboratories, New Mexico.

Sandia National Laboratories, New Mexico (SNL/NM), June 2010. "U.S. Department of Energy/Sandia Corporation Response to the New Mexico Environment Department 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,*" Sandia National Laboratories, New Mexico.

Sandia National Laboratories, New Mexico (SNL/NM), September 2010. "SWMU 68 and SWMUs 8/58 Groundwater Characterization Work Plans – U.S. Department of Energy/Sandia Corporation Response to the New Mexico Environment Department 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*," Sandia National Laboratories, New Mexico.

Sandia National Laboratories, New Mexico (SNL/NM), September 2011. "Request to Modify Schedule for Reporting of Activities and Groundwater Data in Future Consolidated Quarterly Reports for Environmental Restoration Operations," Environmental Restoration Operations, Sandia National Laboratories, New Mexico.

Sandia National Laboratories, New Mexico (SNL/NM), June 2014. "Data Validation Procedure for Chemical and Radiochemical Data," Administrative Operating Procedure 00-03, Revision 4, Sample Management Office, Sandia National Laboratories, New Mexico.

Sandia National Laboratories, New Mexico (SNL/NM), January 2015a. "Groundwater Monitoring Equipment Decontamination," Field Operating Procedure 05-03, Revision 05, Long-Term Environmental Stewardship, Environmental Management Department, Sandia National Laboratories, New Mexico.

Sandia National Laboratories, New Mexico (SNL/NM), January 2015b. "Groundwater Monitoring Well Sampling and Field Analytical Measurements," Field Operating Procedure 05-01, Revision 05, Long-Term Environmental Stewardship, Environmental Management Department, Sandia National Laboratories, New Mexico.

Sandia National Laboratories, New Mexico (SNL/NM), April 2017. *Consolidated Quarterly Report, October through December 2016, Section II: Perchlorate Screening Quarterly Monitoring Report*, Environmental Restoration Operations, Sandia National Laboratories, New Mexico.

Sandia National Laboratories, New Mexico (SNL/NM), January 2017. *Technical Area-V Groundwater Monitoring, Mini-SAP for Second Quarter, Fiscal Year 2017*, Environmental Restoration Operations, Sandia National Laboratories, New Mexico.

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

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

This page intentionally left blank.

Figures

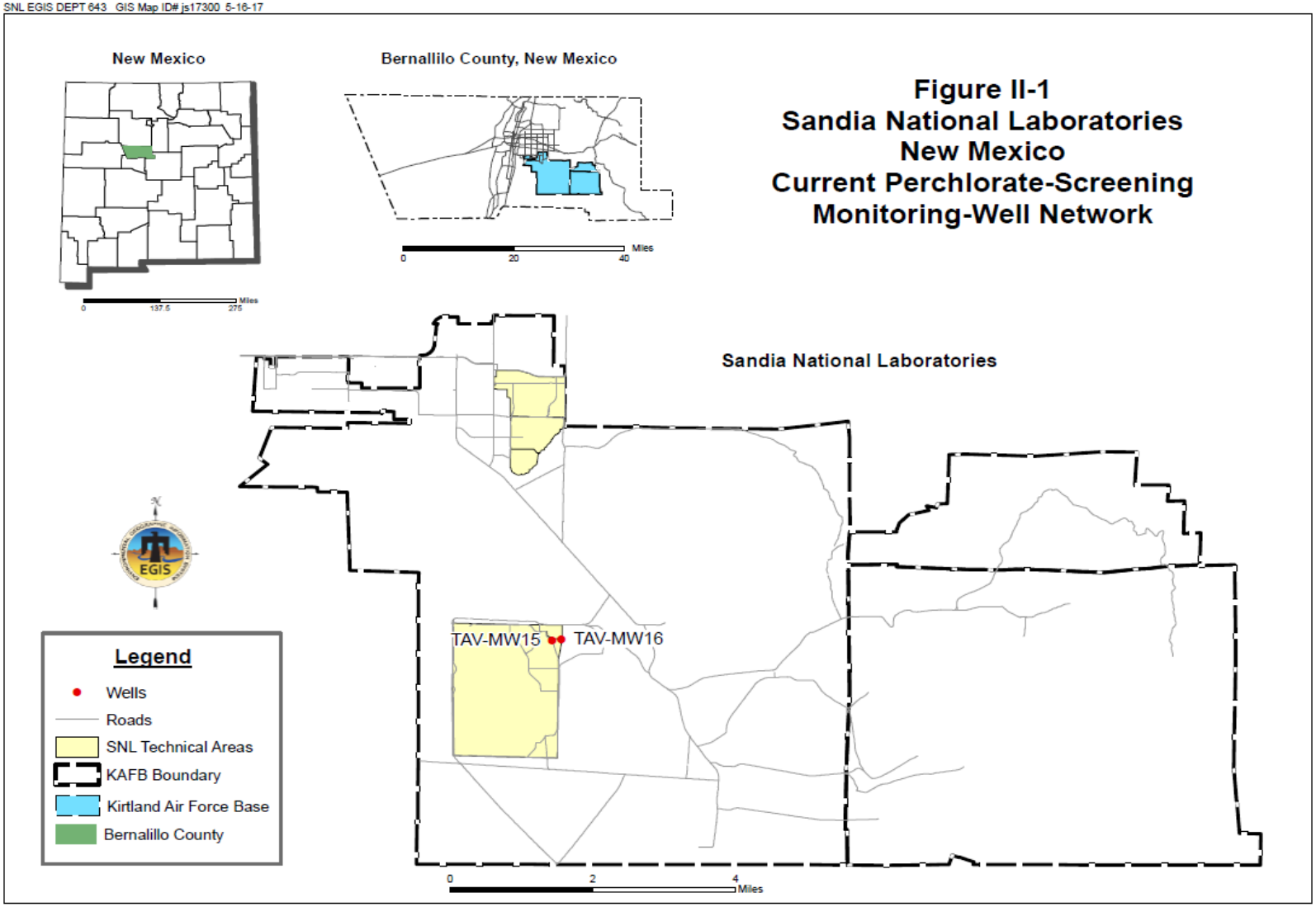

Figure II-1
Sandia National Laboratories, New Mexico
Current Perchlorate Screening Monitoring Well Network, January – March 2017

Tables

Table II-1
Current Perchlorate Screening Monitoring Well Network
First Quarter, CY 2017

Well	Date Sampled	Number of Consecutive Sampling Events[a]	Remaining Number of Sampling Events	Sampling Equipment
TAV-MW15	15-Feb-17	1	3	Bennett™ Pump
TAV-MW16	16-Feb-17	1	3	Bennett™ Pump

Notes

[a]Includes this sampling event.

CY = Calendar Year.
MDL = Method Detection Limit.
MW = Monitoring well.
TAV = Technical Area-V.

Table II-2
Monitoring Wells Discussed in Previous Perchlorate Screening Reports

Well
CCBA-MW1
CCBA-MW2
CTF-MW1
CTF-MW2
CTF-MW3
CYN-MW1D
CYN-MW5
CYN-MW6
CYN-MW7
CYN-MW8
CYN-MW9
CYN-MW10
CYN-MW11
CYN-MW12
CYN-MW14A
CYN-MW15
LWDS-MW1
MRN-2
MRN-3D
MWL-BW1
MWL-BW2
MWL-MW1
MWL-MW7
MWL-MW8
MWL-MW9
NWTA3-MW2
OBS-MW1
OBS-MW2
OBS-MW3
SWTA3-MW4
TA1-W-03
TA1-W-06
TA1-W-08
TA2-W-01
TA2-W-27
TAV-MW11
TAV-MW12
TAV-MW13
TAV-MW14

Notes

BW = Background well.
CCBA = Coyote Canyon Blast Area.
CTF = Coyote Test Field.
CYN = Canyons (Burn Site Groundwater Area of Concern).
LWDS = Liquid Waste Disposal System.
MRN = Magazine Road North.
MW = Monitoring well.
MWL = Mixed Waste Landfill.
NWTA = Northwest Technical Area (III).
OBS = Old Burn Site.
SWTA = Southwest Technical Area (III).
TA1-W = Technical Area I (Well).
TA2-W = Technical Area II (Well).
TAV = Technical Area-V.

Table II-3
Sample Details for First Quarter, CY 2017 Perchlorate Sampling

Well	Sample Identification	AR/COC Number	Associated Groundwater Investigation
TAV-MW15	101786-003	617667	TAVG AOC
TAV-MW16	101788-003	617668	

Notes

AOC = Area of Concern.
AR/COC = Analysis Request/Chain-of-Custody.
CY = Calendar Year.
MW = Monitoring well.
TAV = Technical Area-V.
TAVG = Technical Area-V Groundwater (Area of Concern).

Table II-4
Summary of Perchlorate Screening Analytical Results for the Current Monitoring Well Network as of First Quarter, CY 2017

Well	Sample Date	AR/COC Number	Sample Number	Result (µg/L)	MDL (µg/L)	PQL (µg/L)	MCL (µg/L)	Laboratory Qualifier[a]	Validation Qualifier[b]	Analytical Method[c]	Comments
Technical Area-V Groundwater Area of Concern											
TAV-MW15	15-Feb-17	617667	101786-003	ND	4.0	12	NE	U		EPA 314.0	
TAV-MW16	16-Feb-17	617668	101788-003	ND	4.0	12	NE	U		EPA 314.0	

Notes

[a]Laboratory Qualifier
If cell is blank, then all quality control samples meet acceptance criteria with respect to submitted samples and no qualifier was assigned.
U = Analyte is absent or below the method detection limit.

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

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

µg/L = Micrograms per liter.
AR/COC = Analysis Request/Chain-of-Custody.
CFR = Code of Federal Regulations.
CY = Calendar Year.
EPA = U.S. Environmental Protection Agency.
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.
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.
ND = Nondetect (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 the indicated method under routine laboratory operating conditions.
TAV = Technical Area-V.

Table II-5
Perchlorate Screening Groundwater Monitoring
Field Water Quality Measurements[a], First Quarter, CY 2017

Well	Sample Date	Temperature (°C)	Specific Conductivity (µmhos/cm)	Oxidation-Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
Technical Area-V Groundwater Area of Concern								
TAV-MW15	15-Feb-17	20.21	745.7	236.4	7.46	4.89	59.7	5.38
TAV-MW16	16-Feb-17	20.04	830.2	239.7	7.23	2.72	61.0	5.49

Notes

[a]Field measurements obtained immediately before the groundwater sample was collected.

°C = Degrees Celsius.
% Sat = Percent saturation.
µmhos/cm = Micromhos per centimeter.
CY = Calendar Year.
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.

This page intentionally left blank.

Appendix A
Analytical Laboratory Certificates of Analysis for the Perchlorate Data

SMO 2012-ARCOC (4-2012)

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

AOP 95-16

Internal Lab

Batch No. N/A

SMO Use

AR/COC 617667

Project Name:	ER TAV GWM	Date Samples Shipped:	2/15/17	SMO Authorization:	☐ Waste Characterization
Project/Task Manager:	Jun Li	Carrier/Waybill No.	260884	SMO Contact Phone: SMO	☐ RMA
Project/Task Number:	176092.01.10	Lab Contact:	Edie Kent/843-769-7385	Wendy Palencia/505-844-3132	☐ Released by COC No.
Service Order:	CF550-17	Lab Destination:	GEL	Send Report to SMO:	☑ 4° Celsius
		Contract No.:	1303873	Stephanie Montaño/505.284.2553	Bill to: Sandia National Laboratories (Accounts Payable), P.O. Box 5800, MS-0154 Albuquerque, NM 87185-0154
Tech Area:					
Building:	Room:	Operational Site:			

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
101785	001	TAV-FB 1	540	2/15/17 10:57	DIW	G	3x40 ml	HCl	G	FB	VOC, TCL (SW846-8260B)	416768 001
101786	001	TAV-MW15	540	2/15/17 10:57	GW	G	3x40 ml	HCl	G	SA	VOC, TCL (SW846-8260B)	002
101786	002	TAV-MW15	540	2/15/17 10:59	GW	P	125 ml	H2SO4	G	SA	NPN (EPA 353.2)	003
101786	003	TAV-MW15	540	2/15/17 11:00	GW	P	250 ml	None	G	SA	PERCHLORATE (EPA 314.0)	004
101786	004	TAV-MW15	540	2/15/17 11:01	GW	P	500 ml	HNO3	G	SA	METALS, TAL + TOTAL-U (SW846-6010/6020/7470)	005
101786	005	TAV-MW15	540	2/15/17 11:03	FGW	P	500 ml	HNO3	G	SA	METALS (SW846-6020): As, Fe, Mn	416770 001
101786	006	TAV-MW15	540	2/15/17 11:04	GW	P	125 ml	None	G	SA	ANIONS-Br,Cl,F,SO4 (SW846-9056)	416768 006
101786	007	TAV-MW15	540	2/15/17 11:05	GW	P	500 ml	None	G	SA	Alk TOT as CaCo3, HCO3-, and CO3-2 (SM2320B)	007
101786	008	TAV-MW15	540	2/15/17 11:06	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	008
101786	009	TAV-MW15	540	2/15/17 11:07	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	009

Last Chain:	☐ Yes	Sample Tracking SMO Use	Special Instructions/QC Requirements:
Validation Req'd:	☑ Yes	Date Entered:	EDD ☑ Yes
Background:	☐ Yes	Entered by:	Turnaround Time ☐ 7-Day* ☐ 15-Day* ☑ 30-Day
Confirmatory:	☐ Yes	QC inits.:	Negotiated TAT ☐
			Sample Disposal ☐ Return to Client ☑ Disposal by Lab
			Return Samples By:
			Comments: If perchlorate detected, then request verification analysis using analytical method SW846-6850.

Conditions on Receipt

Lab Use

Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell
	Robert Lynch		RL	SNL/04141/505-844-4013/505-250-7090
	William Gibson		WG	SNL/04141/505-239-7367/505-239-7367
	Alfred Santillanes		AS	SNL/04141/505-284-6870/505-228-0710

Relinquished by		Org.	4141	Date	2/15/17	Time	1120	Relinquished by	Org.	Date	Time
Received by		Org.	4131	Date	2/15/17	Time	1120	Received by	Org.	Date	Time
Relinquished by		Org.	4131	Date	2/15/17	Time	1215	Relinquished by	Org.	Date	Time
Received by		Org.		Date	2-16-17	Time	7:30	Received by	Org.	Date	Time

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

SMO 2012-ARCOC (4-2012)

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

AOP 95-16

AR/COC 617667

Project Name:	ER TAV GWM	Project/Task Manager:	Jun Li	Project/Task No.:	176092.01.10
Tech Area:					
Building:	Room:				

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab use Lab Sample ID
101786	010	TAV-MW15	540	2/15/17 11:08	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	010
101787	001	TAV-TB 1	540	2/15/17 10:57	DIW	G	3x40 ml	HCl	G	TB	VOC, TCL (SW846-8260B)	011

Recipient Initials SB

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

Certificate of Analysis

Report Date: March 16, 2017

Company :	Sandia National Laboratories
Address :	1515 Eubank SE,ORG 4142 BLDG. 1090/120, MS 1103 Albuquerque, New Mexico 87123
Contact:	Ms. Wendy Palencia
Project:	Groundwater, Level C Package

Client Sample ID:	101786-003	Project:	SNLSGWater
Sample ID:	416768004	Client ID:	SNLS004
Matrix:	AQUEOUS		
Collect Date:	15-FEB-17 11:00		
Receive Date:	16-FEB-17	Client Desc.:	TAV-MW15
Collector:	Client	Vol. Recv.:	

Parameter	Qualifier	Result	DL	RL	Units	PF	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	03/08/17	1601	1641004	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 314.0 DOE-AL	

Notes:

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

SMO 2012-ARCOC (4-2012)

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

AOP 95-16

Internal Lab

Batch No. N/A

SMO Use

AR/COC 617668

Project Name:	ER TAV GWM	Date Samples Shipped	2/16/17	SMO Authorization:	☐ Waste Characterization
Project/Task Manager:	Jun Li	Carrier/Waybill No.	260947	SMO Contact Phone:	☐ RMA
Project/Task Number:	176092.01.10	Lab Contact:	Edie Kent/843-769-7385	Wendy Palencia/505-844-3132	☐ Released by COC No.
Service Order:	CF550-17	Lab Destination:	GEL	Send Report to SMO:	☑ 4° Celsius
		Contract No.:	1303873	Stephanie Montaño/505.284.2553	Bill to: Sandia National Laboratories (Accounts Payable),
Tech Area:					P.O. Box 5800, MS-0154
Building:	Room:	Operational Site:			Albuquerque, NM 87185-0154

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
101788	001	TAV-MW16	552	2/16/17 10:42	GW	G	3x40 ml	HCl	G	SA	VOC, TCL (SW846-8260B)	416768 012
101788	002	TAV-MW16	552	2/16/17 10:44	GW	P	125 ml	H2SO4	G	SA	NPN (EPA 353.2)	013
101788	003	TAV-MW16	552	2/16/17 10:45	GW	P	250 ml	None	G	SA	PERCHLORATE (EPA 314.0)	014
101788	004	TAV-MW16	552	2/16/17 10:46	GW	P	500 ml	HNO3	G	SA	METALS, TAL + TOTAL-U (SW846-6010/6020/7470)	015
101788	005	TAV-MW16	552	2/16/17 10:48	FGW	P	500 ml	HNO3	G	SA	METALS (SW846-6020): As, Fe, Mn	416770 002
101788	006	TAV-MW16	552	2/16/17 10:49	GW	P	125 ml	None	G	SA	ANIONS-Br,Cl,F,SO4 (SW846-9056)	416768 016
101788	007	TAV-MW16	552	2/16/17 10:50	GW	P	500 ml	None	G	SA	Alk TOT as CaCo3, HCO3-, and CO3-2 (SM2320B)	017
101788	008	TAV-MW16	552	2/16/17 10:51	GW	P	1 L	HNO3	G	SA	GAMMA SPEC, SHORT LIST (EPA 901)	018
101788	009	TAV-MW16	552	2/16/17 10:52	GW	P	1 L	HNO3	G	SA	GROSS-ALPHA/BETA (EPA 900)	019
101788	010	TAV-MW16	552	2/16/17 10:53	GW	AG	250 ml	NONE	G	SA	TRITIUM (EPA 906)	020

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

Special Instructions/QC Requirements:

EDD ☑ Yes

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

Negotiated TAT ☐

Sample Disposal ☐ Return to Client ☑ Disposal by Lab

Return Samples By:

Comments: If perchlorate detected, then request verification analysis using analytical method SW846-6850.

Conditions on Receipt

Lab Use

Sample Team Members	Name	Signature	Init.	Company/Organization/Phone/Cell
	Robert Lynch		RL	SNL/04141/505-844-4013/505-250-7090
	William Gibson		WG	SNL/04141/505-239-7367/505-239-7367
	Alfred Santillanes		AS	SNL/04141/505-284-6870/505-228-0710

Relinquished by		Org. 4141	Date 2/16/17	Time 1104	Relinquished by	Org.	Date	Time
Received by		Org. 4131	Date 2/16/17	Time 1104	Received by	Org.	Date	Time
Relinquished by		Org. 4131	Date 2/16/17	Time 1226	Relinquished by	Org.	Date	Time
Received by		Org.	Date 2-17-17	Time 7:55	Received by	Org.	Date	Time

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

SMO 2012-ARCOC (4-2012)

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

AOP 95-16

AR/COC 617668

Project Name:	ER TAV GWM	Project/Task Manager:	Jun Li	Project/Task No.:	176092.01.10
Tech Area:					
Building:	Room:				

Sample No.	Fraction	Sample Location Detail	Depth (ft)	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab use Lab Sample ID
101789	001	TAV-TB 2	552	2/16/17 10:42	DIW	G	3x40 ml	HCl	G	TB	VOC, TCL (SW846-8260B)	021
								7				

Recipient Initials TGSB

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

Certificate of Analysis

Report Date: March 16, 2017

Company :	Sandia National Laboratories
Address :	1515 Eubank SE,ORG 4142 BLDG. 1090/120, MS 1103 Albuquerque, New Mexico 87123
Contact:	Ms. Wendy Palencia
Project:	Groundwater, Level C Package

Client Sample ID:	101788-003	Project:	SNLSGWater
Sample ID:	416768014	Client ID:	SNLS004
Matrix:	AQUEOUS		
Collect Date:	16-FEB-17 10:45		
Receive Date:	17-FEB-17	Client Desc.:	TAV-MW16
Collector:	Client	Vol. Recv.:	

Parameter	Qualifier	Result	DL	RL	Units	PF	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 03/08/17	1621	1641004	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 314.0 DOE-AL	

Notes:

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

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

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

Memorandum

Date: April 12, 2017

To: File

From: Linda Thal

Subject: Inorganic Data Review and Validation – SNL
Site: ER TA-V GWM
ARCOC: 617667 and 617668
SDG: 416768
Laboratory: GEL
Project/Task: 176092.01.10
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 4.

Summary

Two samples were prepared and analyzed with accepted procedures using methods EPA 314.0 (perchlorate), EPA 9056 (anions by IC), EPA 353.2 (nitrate/nitrite) and SM 2320B (total alkalinity). Data were reported for all required analytes. No problems were identified with the data package that resulted in the qualification of data.

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

Holding Times and Preservation

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

Calibration

All initial and continuing calibration met QC acceptance criteria.

Blanks

No target analytes were detected in the blanks.

Laboratory Control Sample (LCS)

All LCS acceptance criteria were met.

Matrix Spike and Matrix Spike Duplicate (MS/MSD)

All MS/MSD and PS recoveries met QC acceptance criteria. It should be noted that the PS analysis for nitrate/nitrite was performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

Laboratory Replicate

The replicate analyses met all QC acceptance criteria. It should be noted that the replicate analysis for nitrate/nitrite was performed on an SNL sample of similar matrix from another SDG. No data will be qualified.

Detection Limits/Dilutions

All detection limits were properly reported and correctly adjusted for dilutions.

Anions:
Samples 416768006 and -016 were diluted 20X for chloride and sulfate due to over-range analyte concentrations.

Nitrate/Nitrite:
Samples -003 and -013 were diluted 5X due to over-range analyte concentrations.

Other QC

No other specific issues that affect data quality were identified.

Reviewed by: Mary Donivan **Level:** I **Date:** 04/12/17

Sample Findings Summary

AR/COC: 617667, 617668

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
EPA 900.0/SW846 9310			
	101786-009/TAV-MW15	ALPHA (12587-46-1)	J, MS1
	101786-009/TAV-MW15	BETA (12587-47-2)	J, FR7,MS1
	101788-009/TAV-MW16	ALPHA (12587-46-1)	J, MS1
	101788-009/TAV-MW16	BETA (12587-47-2)	J, MS1
EPA 901.1			
	101786-008/TAV-MW15	Americium-241 (14596-10-2)	BD, FR3
	101786-008/TAV-MW15	Cesium-137 (10045-97-3)	BD, FR3
	101786-008/TAV-MW15	Cobalt-60 (10198-40-0)	BD, FR3
	101786-008/TAV-MW15	Potassium-40 (13966-00-2)	BD, FR3
	101788-008/TAV-MW16	Americium-241 (14596-10-2)	BD, FR3
	101788-008/TAV-MW16	Cesium-137 (10045-97-3)	BD, FR3
	101788-008/TAV-MW16	Cobalt-60 (10198-40-0)	BD, FR3
	101788-008/TAV-MW16	Potassium-40 (13966-00-2)	BD, FR3
EPA 906.0 Modified			
	101786-010/TAV-MW15	Tritium (10028-17-8)	BD, FR3
	101788-010/TAV-MW16	Tritium (10028-17-8)	BD, FR3
SW846 3005/6020 DOE-AL			
	101786-004/TAV-MW15	Aluminum (7429-90-5)	R, X1
	101786-004/TAV-MW15	Antimony (7440-36-0)	R, X1
	101786-004/TAV-MW15	Arsenic (7440-38-2)	R, X1
	101786-004/TAV-MW15	Barium (7440-39-3)	R, X1
	101786-004/TAV-MW15	Beryllium (7440-41-7)	R, X1
	101786-004/TAV-MW15	Cadmium (7440-43-9)	R, X1
	101786-004/TAV-MW15	Calcium (7440-70-2)	R, X1
	101786-004/TAV-MW15	Chromium (7440-47-3)	R, X1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	101786-004/TAV-MW15	Cobalt (7440-48-4)	R, X1
	101786-004/TAV-MW15	Copper (7440-50-8)	R, X1
	101786-004/TAV-MW15	Iron (7439-89-6)	R, X1
	101786-004/TAV-MW15	Lead (7439-92-1)	R, X1
	101786-004/TAV-MW15	Magnesium (7439-95-4)	R, X1
	101786-004/TAV-MW15	Manganese (7439-96-5)	R, X1
	101786-004/TAV-MW15	Nickel (7440-02-0)	R, X1
	101786-004/TAV-MW15	Potassium (7440-09-7)	R, X1
	101786-004/TAV-MW15	Selenium (7782-49-2)	R, X1
	101786-004/TAV-MW15	Silver (7440-22-4)	R, X1
	101786-004/TAV-MW15	Sodium (7440-23-5)	R, X1
	101786-004/TAV-MW15	Thallium (7440-28-0)	R, X1
	101786-004/TAV-MW15	Vanadium (7440-62-2)	R, X1
	101786-004/TAV-MW15	Zinc (7440-66-6)	R, X1
	101786-004/TAV-MW15-Relog from 416768005	Nickel (7440-02-0)	0.0029U, B
	101786-005/TAV-MW15	Arsenic (7440-38-2)	UJ, MS1,RP1
	101786-005/TAV-MW15	Iron (7439-89-6)	J, MS1,RP1
	101786-005/TAV-MW15	Manganese (7439-96-5)	J, MS1,RP1
	101788-004/TAV-MW16	Aluminum (7429-90-5)	R, X1
	101788-004/TAV-MW16	Antimony (7440-36-0)	R, X1
	101788-004/TAV-MW16	Arsenic (7440-38-2)	R, X1
	101788-004/TAV-MW16	Barium (7440-39-3)	R, X1
	101788-004/TAV-MW16	Beryllium (7440-41-7)	R, X1
	101788-004/TAV-MW16	Cadmium (7440-43-9)	R, X1
	101788-004/TAV-MW16	Calcium (7440-70-2)	R, X1
	101788-004/TAV-MW16	Chromium (7440-47-3)	R, X1
	101788-004/TAV-MW16	Cobalt (7440-48-4)	R, X1
	101788-004/TAV-MW16	Copper (7440-50-8)	R, X1

Analytical Method	Sample ID	Analyte Name (CAS#)	Qualifier, RC
	101788-004/TAV-MW16	Iron (7439-89-6)	R, X1
	101788-004/TAV-MW16	Lead (7439-92-1)	R, X1
	101788-004/TAV-MW16	Magnesium (7439-95-4)	R, X1
	101788-004/TAV-MW16	Manganese (7439-96-5)	R, X1
	101788-004/TAV-MW16	Nickel (7440-02-0)	R, X1
	101788-004/TAV-MW16	Potassium (7440-09-7)	R, X1
	101788-004/TAV-MW16	Selenium (7782-49-2)	R, X1
	101788-004/TAV-MW16	Silver (7440-22-4)	R, X1
	101788-004/TAV-MW16	Sodium (7440-23-5)	R, X1
	101788-004/TAV-MW16	Thallium (7440-28-0)	R, X1
	101788-004/TAV-MW16	Uranium (U)	R, X1
	101788-004/TAV-MW16	Vanadium (7440-62-2)	R, X1
	101788-004/TAV-MW16	Zinc (7440-66-6)	R, X1
	101788-004/TAV-MW16-Relog from 416768015	Nickel (7440-02-0)	0.0029U, B
	101788-005/TAV-MW16	Arsenic (7440-38-2)	UJ, MS1,RP1
	101788-005/TAV-MW16	Iron (7439-89-6)	J, MS1,RP1
	101788-005/TAV-MW16	Manganese (7439-96-5)	J, MS1,RP1
SW846 7470A			
	101786-004/TAV-MW15	Mercury (7439-97-6)	R, X1
	101786-004/TAV-MW15-Relog from 416768005	Mercury (7439-97-6)	UJ, H1
	101788-004/TAV-MW16	Mercury (7439-97-6)	R, X1
	101788-004/TAV-MW16-Relog from 416768015	Mercury (7439-97-6)	UJ, H1

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

Sandia National Laboratories