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Sandia National Laboratories, New Mexico  
**Environmental Restoration Operations**  
A U.S. Department of Energy Environmental Cleanup Program  
**Consolidated Quarterly Report**

July – September 2016



**January 2017**



United States Department of Energy  
Sandia Field Office

# **CONSOLIDATED QUARTERLY REPORT**

January 2017

SANDIA NATIONAL LABORATORIES, NEW MEXICO

## **ENVIRONMENTAL RESTORATION OPERATIONS**

U.S. DEPARTMENT OF ENERGY:  
CONTRACTOR:  
PROJECT MANAGER:

SANDIA FIELD OFFICE  
SANDIA CORPORATION  
John R. Cochran

**NUMBER OF POTENTIAL RELEASE SITES SUBJECT TO CORRECTIVE ACTION: 12**

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

**REPORTING PERIOD:** July – September 2016

## **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,  
July – September 2016

Semiannual sampling at the Burn Site Groundwater Area of Concern currently includes perchlorate analyses at one groundwater monitoring well. Due to the semiannual nature of the sampling, no groundwater samples were collected for perchlorate analyses during this reporting period. Therefore, this edition of the ER Quarterly Report does not include Section II “*Perchlorate Screening Quarterly Groundwater Monitoring Report*.”

## ABBREVIATIONS AND ACRONYMS

µg/L	microgram(s) per liter
mg/L	milligrams per liter
AGMR	Annual Groundwater Monitoring Report
AOC	Area of Concern
AVN	Area V (North)
BSG	Burn Site Groundwater
CAC	corrective action complete
CCBA	Coyote Canyon Blast Area
CCM	Current Conceptual Model
CME	Corrective Measures Evaluation
COC	constituent of concern
CTF	Coyote Test Field
CY	Calendar Year
CYN	Canyons (Burn Site Groundwater Area of Concern)
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
GWQB	Ground Water Quality Bureau
HWB	Hazardous Waste Bureau
ISB	in situ bioremediation
LWDS	liquid waste disposal system
MCL	maximum contaminant level
MW	monitoring well
NA	not applicable
NMED	New Mexico Environment Department
NMOSE	New Mexico Office of the State Engineer
NNSA	National Nuclear Security Administration
PGS	Parade Ground South
Sandia	Sandia Corporation
SNL/NM	Sandia National Laboratories, New Mexico
SWMU	Solid Waste Management Unit
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)
TAVG	Technical Area-V Groundwater

TAG	Tijeras Arroyo Groundwater
TAV	Technical Area V (acronym used for well identification numbers in tables only)
TA-V	Technical Area V
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**

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# **SECTION I**

## **ENVIRONMENTAL RESTORATION OPERATIONS CONSOLIDATED**

### **QUARTERLY REPORT, July – September 2016**

#### **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 July, August, and September 2016 quarterly reporting period.

The Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) identified for corrective action at SNL/NM are listed in Table I-1. 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) 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 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 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 Sandia Corporation (Sandia) met with the NMED Hazardous Waste Bureau (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. Due to the semiannual nature of the sampling, no groundwater samples were collected for perchlorate analysis during this reporting period. Therefore, this edition of the ER Quarterly does not include Section II “*Perchlorate Screening Quarterly Groundwater Monitoring Report*.”

The following activities occurred at BSG AOC during July, August, and September 2016:

- Received depth-specific sampling analytical results for the former Burn Site production well. The results for the samples collected from five depths were all non-detect for nitrate plus nitrite.

- Presented an overview of BSG AOC characterization activities to the Albuquerque Bernalillo County Water Utility Authority Water Protection Advisory Board meeting on August 12, 2016.
- Continued working on the logistics for the Aquifer Pumping Test scheduled for March 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 State of New Mexico drinking water standards for TCE and nitrate are 5 micrograms per liter ( $\mu\text{g}/\text{L}$ ) and 10 mg/L (as nitrogen), respectively.

Personnel from the DOE/NNSA, DOE Headquarters Office of Environmental Management, Sandia, and NMED worked together to address the groundwater contamination at TAVG AOC. A meeting was held at 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. The results of the TS/IM will be used to provide updated Current Conceptual Model (CCM) and Corrective Measures Evaluation (CME) reports for TAVG, which are due to NMED by May 20, 2022 (NMED April 2016).

For the TS/IM, up to three injection wells (TAV-INJ1, TAV-IN2, 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 bioaugmentation 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 bioaugmentation bacteria will be gravity-injected to groundwater via injection wells.

The Revised Treatability Study Work Plan (TSWP) (SNL/NM March 2016) was reviewed and approved by NMED on May 10, 2016 (NMED May 2016). The Revised TSWP includes 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. Well installation will occur

before implementation of the TS/IM. The Consolidated Quarterly Reports will continue to document the progress of the TS/IM.

As described in Chapter 6 of the Revised TSWP, DOE/NNSA and Sandia will initiate a new groundwater monitoring plan for TAVG AOC (SNL/NM March 2016). The new groundwater monitoring plan will be implemented in the first quarter of calendar year (CY) 2017 to obtain a complete CY of quarterly data consistent with data from previous years.

The following activities occurred at TAVG AOC during July, August, and September 2016:

- DOE/NNSA and Sandia submitted the Permit to Drill applications for installing two groundwater monitoring wells (TAV-MW15 and TAV-MW16) and an injection well (TAV-INJ1) to the New Mexico Office of the State Engineer (NMOSE) in July 2016 (DOE July 2016a). NMOSE subsequently approved all three applications in August 2016 (NMOSE August 2016). With the Permits to Drill, Sandia is preparing to install monitoring wells TAV-MW15 and TAV-MW16.
- DOE/NNSA and Sandia submitted the Discharge Permit Application for TA-V Treatability Study injection wells to NMED Ground Water Quality Bureau (GWQB) in July 2016 (DOE July 2016b). NMED GWQB subsequently determined the Application was administratively complete and indicated that DOE/NNSA and Sandia should proceed with the public notice requirements (NMED September 2016). DOE/NNSA and Sandia are completing the public notice requirements for the Discharge Permit Application. Injection well TAV-INJ1 is planned for installation after the Discharge Permit is approved.
- Groundwater sampling was conducted in July and August 2016. The well identification and the frequency that these wells were sampled are presented in Table I-2. The analytical results for groundwater monitoring will be presented in the CY 2016 Annual Groundwater Monitoring Report, which will be delivered to NMED in the summer of 2017.
- ER personnel presented an overview of TA-V ISB Treatability Study to the Albuquerque Bernalillo County Water Utility Authority Water Protection Advisory Board meeting on August 12, 2016.
- NMED GWQB visited TA-V on September 27 in conjunction with their preparation of the draft Discharge Permit for TA-V Treatability Study injection wells.

### 2.1.3 **Tijeras Arroyo Groundwater Area of Concern**

Nitrate is the COC for the TAG AOC due to continued exceedances of the EPA MCL in groundwater samples collected from several monitoring wells that are completed in the Perched Groundwater System and one monitoring well completed in the Regional Aquifer. TCE was previously identified as a COC for the Perched Groundwater System. However, TCE is no longer considered to be a COC for two reasons: (1) the area where TCE exceedances occurred has naturally dewatered, and (2) the last reported TCE concentration of 3.82 µg/L (October 2015) was less than the EPA MCL of 5 µg/L. 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.

The following activities occurred at TAG AOC during July, August, and September 2016:

- Groundwater sampling at the TAG AOC was conducted in August and September 2016. The well identification and the frequency these wells were sampled are presented in Table I-2. The analytical results from groundwater monitoring will be presented in the SNL/NM CY 2016 Annual Groundwater Monitoring Report, which will be submitted to NMED in the summer of 2017.
- Preparation of an updated CCM and CME Report for the TAG AOC continued this quarter. The report is scheduled to be delivered to NMED's HWB before the December 2, 2016 deadline in accordance with NMED's *“Agreements and Proposed Milestones”* letter of April 14, 2016 (NMED April 2016).

## 2.2 **Sites in Corrective Action Complete Regulatory Process**

After NMED certifies completion of corrective action activities at a SWMU or an AOC, a Class 3 Modification to the Permit is requested 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 process is a regulatory process.

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

In February 2015, NMED 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 NMED on September 4, 2015 (DOE September 2015). In January 2016, NMED granted the certificates of completion for these SWMUs (NMED January 2016).

SWMUs 8 and 58, 68, 149, and 154 are included in the Class 3 Permit Modification request for CAC status, submitted to the NMED on May 16, 2016 (DOE May 2016).

#### **2.2.2 Solid Waste Management Unit 502**

On February 29, 2016, the NMED approved the November 2013 Voluntary Corrective Action Report and noted that the DOE and Sandia may request a permit modification for CAC status for SWMU 502 (NMED February 2016).

SWMU 502 is included in the Class 3 Permit Modification request for CAC status, submitted to the NMED May 16, 2016 (DOE May 2016).

#### **2.2.3 Class 3 Permit Modification Request**

In a letter dated May 16, 2016, the DOE/NNSA and Sandia requested a Class 3 Modification to the Permit to designate six SWMUs as approved for CAC status (DOE May 2016). These include:

- 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 Sandia held a 60-day public comment period from May 25 through July 24, 2016 and held 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 in a letter transmitted on September 8, 2016 (DOE September 2016).

### 3.0 **References**

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), September 2016. Letter to J.W. Todd (U.S. Department of Energy, NNSA/Sandia Field Office), “Administrative Completeness Determination and Applicant’s Public Notice Requirements, DP-1845, Sandia National Laboratories/New Mexico, Technical Area-V Treatability Study Injection Wells,” NMED, Ground Water Quality Bureau, Santa Fe, New Mexico, September 27, 2016.

NMED, see New Mexico Environment Department

New Mexico Office of the State Engineer (NMOSE), August 2016. Permit to Explore/Remediate (Permit Number RG-90065), POD# 126, 127, 128 for well ID# TAV-MW15, TAV-MW16, and TAV-INJ1, respectively. NMOSE, Albuquerque, New Mexico, August 2, 2016.

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.*

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 2016a. Letter to W. Canon (New Mexico Office of the State Engineer), "New Mexico Office of the State Engineer Permit Applications for the Installation of Groundwater Monitoring Wells TAV-MW15 and TAV-MW16, and Groundwater Injection Well TAV-INJ1 at Sandia National Laboratories/New Mexico," DOE, National Nuclear Security Administration, Sandia Field Office, Albuquerque, New Mexico, July 15, 2016.

U.S. Department of Energy (DOE), July 2016b. 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.

# Tables

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

<b>Solid Waste Management Units and Areas of Concern</b>	
<b>Site Number</b>	<b>Site Description</b>
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
<b>Total</b>	<b>12</b>

**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 2016 <sup>a</sup>	Quarter of Sampling in CY 2016	Location of Analytical Results	Location of Perchlorate Analytical Results	Monitoring Wells in Network
TAVG AOC	Quarterly	1,2,3,4	AGMR	NA	AVN-1, LWDS-MW1, LWDS-MW2, TAV-MW2, TAV-MW3, TAV-MW4, TAV-MW5, TAV-MW6, TAV-MW7, TAV-MW8, TAV-MW9, TAV-MW10, TAV-MW11, TAV-MW12, TAV-MW13, TAV-MW14
BSG AOC	Semiannually	2,4	AGMR	NA	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	PGS-2, TA1-W-01, TA1-W-02, TA1-W-03, TA1-W-04, TA1-W-05, TA1-W-06, TA1-W-08, TA2-NW1-595, TA2-W-01, TA2-W-19, TA2-W-26, TA2-W-27, TA2-W-28, TJA-2, TJA-3, TJA-4, TJA-6, TJA-7, WYO-3, WYO-4

**Notes**

<sup>a</sup>Not all wells in a particular investigation are sampled at the same frequency; this represents the maximum frequency of sampling at a site.

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.
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.
TAVG	= Technical Area-V Groundwater (Area of Concern).
TJA	= Tijeras Arroyo.
WYO	= Wyoming.