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Department of Energy
National Nuclear Security Administration
Sandia Field Office
P.O. Box 5400
Albuquerque, NM 87185

National Nuclear Security Administration

Received
JAN 31 2023
NMED Hazardous Waste Bureau

JAN 26 2023

Mr. Rick Shean
Chief, Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Bldg. 1
Santa Fe, New Mexico 87505

Subject: Submittal of Environmental Restoration Operations Consolidated Quarterly Report, January 2023, Referenced in the Resource Conservation and Recovery Act Facility Operating Permit for Sandia National Laboratories, New Mexico, Environmental Protection Agency Identification Number NM5890110518

Dear Mr. Shean:

The Department of Energy, National Nuclear Security Administration, Sandia Field Office, and National Technology & Engineering Solutions of Sandia, LLC, submit the Subject document dated January 2023. This report addresses all quarterly reporting from July 1 through September 30, 2022, in accordance with the Compliance Order on Consent for Sandia National Laboratories, New Mexico.

If you should have any questions, please contact me at (505) 845-6036 or Dr. Adria Bodour of our staff at (505) 845-6930, or adria.bodour@nnsa.doe.gov.

Sincerely,

Daryl J. Hauck, Ph.D.
Manager

cc w/enclosure:
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Adria Bodour, SFO/ENG

ENVIRONMENTAL RESTORATION OPERATIONS CONSOLIDATED QUARTERLY REPORT, JANUARY 2023

CERTIFICATION STATEMENT

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

Paul E. Shoemaker Digitally signed by Paul E. Shoemaker Date: 2023.01.17 11:15:22 -07'00'

Signature Date

Paul E. Shoemaker
Defense Waste Management Programs
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Operator

and

Signature 1/26/2023
Date

Daryl J. Hauck, Ph.D., Manager
U.S. Department of Energy
National Nuclear Security Administration
Sandia Field Office
Owner

Sandia National Laboratories

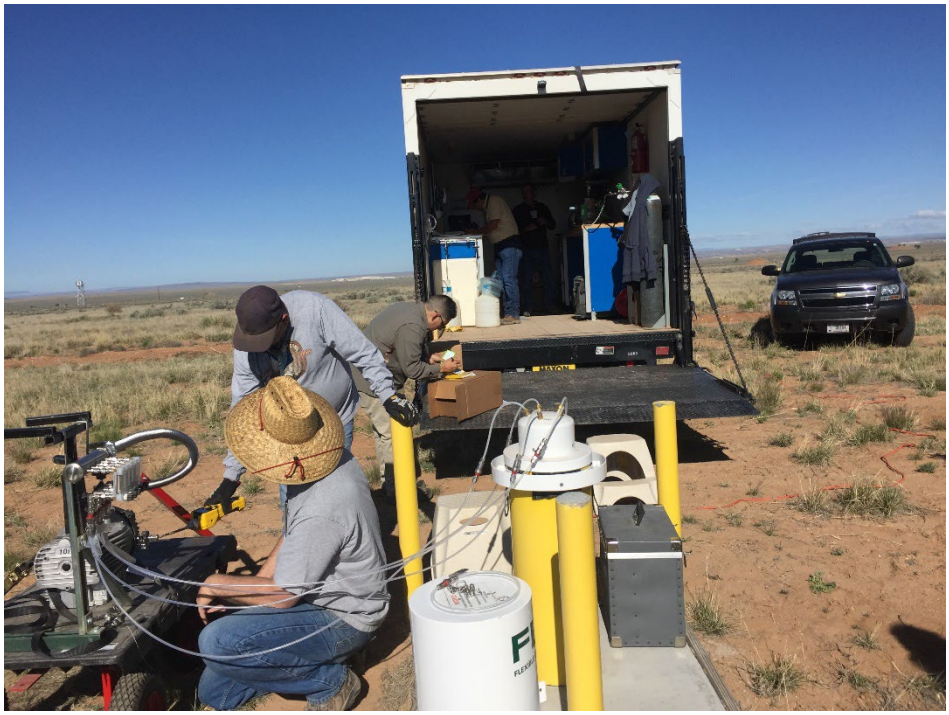
Sandia National Laboratories, New Mexico

Environmental Restoration Operations

A U.S. Department of Energy Environmental Cleanup Program

Consolidated Quarterly Report

July – September 2022



January 2023

U.S. DEPARTMENT OF ENERGY

National Nuclear Security Administration

United States Department of Energy
Sandia Field Office

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CONSOLIDATED QUARTERLY REPORT

January 2023

SANDIA NATIONAL LABORATORIES, NEW MEXICO

ENVIRONMENTAL RESTORATION OPERATIONS

U.S. DEPARTMENT OF ENERGY:	SANDIA FIELD OFFICE
CONTRACTOR:	NATIONAL TECHNOLOGY AND ENGINEERING SOLUTIONS OF SANDIA, LLC
PROJECT MANAGER:	Michael D. Barthel

NUMBER OF POTENTIAL RELEASE SITES SUBJECT TO CORRECTIVE ACTION: 6

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

REPORTING PERIOD: July – September 2022

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 Compliance Order on Consent. Table I-1 lists the six sites remaining in the corrective action process. This ER Quarterly Report presents activities and data as follows:

SECTION I: Environmental Restoration Operations Consolidated Quarterly Report, July - September 2022

SECTION II: Because there is no perchlorate sampling collection to report this quarter, this edition of the ER Quarterly Report does not include any analysis of data in Section II "Perchlorate Screening Quarterly Groundwater Monitoring Report."

ABBREVIATIONS AND ACRONYMS

µg/L	microgram(s) per liter
AGMR	Annual Groundwater Monitoring Report
AOC	Area of Concern
BSG	Burn Site Groundwater
CCM	Current Conceptual Model
CME	Corrective Measures Evaluation
COC	constituent of concern
CY	Calendar Year
DOE	U.S. Department of Energy
DP	Discharge Permit
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration Operations
ER Quarterly Report	Environmental Restoration Operations Consolidated Quarterly Report
GWQB	Ground Water Quality Bureau
HWB	Hazardous Waste Bureau
ISB	in-situ bioremediation
MCL	maximum contaminant level
mg/L	milligrams per liter
NMED	New Mexico Environment Department
NNSA	National Nuclear Security Administration
PGWS	Perched Groundwater System
SNL/NM	Sandia National Laboratories, New Mexico
SWMU	Solid Waste Management Unit
TAG	Tijeras Arroyo Groundwater
TA-V	Technical Area-V
TAVG	Technical Area-V Groundwater
TCE	trichloroethene
TSWP	Treatability Study Work Plan

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SECTION I
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LIST OF TABLES

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SECTION I
ENVIRONMENTAL RESTORATION OPERATIONS CONSOLIDATED QUARTERLY REPORT, July – September 2022

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 - September 2022 reporting period.

Table I-1 lists the Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) currently identified for corrective action at SNL/NM. This section of the ER Quarterly Report summarizes the work completed during this reporting period at sites undergoing corrective action. Corrective action activities were conducted during this reporting period at the three groundwater AOCs:

- Burn Site Groundwater (BSG) AOC,
- Technical Area-V (TA-V) Groundwater (TAVG) AOC, and
- Tijeras Arroyo Groundwater (TAG) AOC.

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 Technical Area-III.

There were no SWMUs or AOCs in the corrective action complete regulatory process during this reporting period. Corrective action complete status has been approved for all SWMUs within the surface boundaries of each of the three groundwater AOCs.

2.0 Environmental Restoration Operations Work Completed

The following subsections identify the constituents of concern (COCs), summarize the corrective action milestones, and describe the ER work completed during the July – September 2022 reporting period at the three groundwater AOCs.

2.1 Sites Undergoing Corrective Action

In a letter dated April 14, 2016, the New Mexico Environment Department (NMED) Hazardous Waste Bureau (HWB) defined the scope and milestones for corrective action at three groundwater AOCs (BSG AOC, TAVG AOC, and TAG AOC) (NMED April 2016). Sections I.2.1.1 through I.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 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 groundwater monitoring wells (NMED April 2004). The EPA MCL and State of New Mexico groundwater standard for nitrate (as nitrogen) is 10 milligrams per liter (mg/L). SNL/NM personnel are preparing a Current Conceptual Model (CCM) and Corrective Measures Evaluation (CME) Report for delivery to the NMED HWB in 2023.

The following activity occurred at the BSG AOC during the July - September 2022 reporting period:

- No groundwater sampling was conducted at the BSG AOC groundwater monitoring wells during this reporting period. Table I-2 presents the identification and the sampling frequency for BSG AOC groundwater monitoring wells. The complete analytical results for Calendar Year (CY) 2022 groundwater monitoring will be presented in the SNL/NM CY 2022 Annual Groundwater Monitoring Report (AGMR), which is anticipated to be submitted to the NMED HWB in the summer of 2023.

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 EPA MCLs in samples collected from monitoring wells (NMED April 2004). The EPA MCLs and the State of New Mexico groundwater standards for TCE and nitrate (as nitrogen) are 5 micrograms per liter (µg/L) and 10 mg/L, respectively.

Personnel from the U.S. Department of Energy/National Nuclear Security Administration (DOE/NNSA), DOE Headquarters Office of Environmental Management, SNL/NM, and NMED HWB worked together to address the groundwater contamination at the TAVG

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

To implement the ISB Treatability Study, SNL/NM personnel planned to install up to three injection wells (TAV-INJ1, TAV-INJ2, and TAV-INJ3) at TA-V near the highest contaminant concentrations in groundwater detected in monitoring wells TAV-MW6, TAV-MW10, and LWDS-MW1, respectively. Substrate solution containing essential food, nutrients, and biodegradation bacteria would be gravity-injected to groundwater via the injection well(s).

The NMED HWB approved the Revised Treatability Study Work Plan (TSWP) (SNL/NM March 2016) in May 2016 (NMED May 2016). In accordance with the Revised TSWP, Phase I of the ISB Treatability Study included a pilot test, followed by a full-scale test at the first injection well (TAV-INJ1). If implemented, Phase II of the ISB Treatability Study would have included well installation and full-scale tests at the second and third injection wells (TAV-INJ2 and TAV-INJ3). The decision to install the Phase II injection wells would be dependent upon the findings of the Phase I full-scale test.

The NMED Ground Water Quality Bureau (GWQB) required a groundwater Discharge Permit (DP) for operation of the injection wells. The NMED GWQB issued DP-1845 to DOE/NNSA for the SNL/NM ISB Treatability Study injection wells on May 26, 2017 (NMED May 2017a). The term of DP-1845 was from May 30, 2017 to May 29, 2022. As required by DP-1845, DOE/NNSA and SNL/NM personnel submitted separate quarterly reports to the NMED GWQB until the end of the Phase I Treatability Study in May 2021.

SNL/NM personnel started the Phase I Treatability Study at injection well TAV-INJ1 and monitoring well TAV-MW6 in November 2017 and completed the Phase I Treatability Study in May 2021. As the Phase I Treatability Study concluded, in order to terminate DP-1845, the oversight of the five wells regulated under DP-1845 (TAV-INJ1, LWDS-MW1, TAV-MW6, TAV-MW7, and TAV-MW10) was transferred from NMED GWQB to NMED HWB (DOE August 2021; NMED October 2021). Injection well TAV-INJ1 was re-designated as a groundwater quality monitoring well starting in the third quarter of CY 2021 and became the 19th well of the TAVG monitoring network (18 active monitoring wells plus well TAV-INJ1; Table I-2). Consequently, DP-1845 was terminated by the NMED GWQB in February 2022 (NMED February 2022).

After the Phase I Treatability Study concluded in May 2021, DOE/NNSA and SNL/NM personnel continued quarterly monitoring of wells TAV-INJ1 and TAV-MW6 (i.e., treatment zone of the Phase I Treatability Study) for one year from the third quarter of CY 2021 to the second quarter of CY 2022 (DOE August 2021; NMED October 2021). This one-year additional sampling was concluded in April 2022 and the monitoring results were provided in the October 2022 ER Quarterly Report (SNL/NM October 2022).

The operation and results of the Phase I Treatability Study were summarized in the Phase I Treatability Study Report (SNL/NM March 2022) that was submitted to the NMED HWB in April 2022 (DOE April 2022a). The NMED HWB subsequently approved the Phase I Treatability Study Report in June 2022 and concurred with the recommendation not to proceed to Phase II of the Treatability Study (NMED June 2022).

DOE/NNSA and SNL/NM personnel requested an extension for submittal of the TAVG AOC CCM/CME Report, which was initially due to the NMED HWB by May 20, 2022 (DOE April 2022b). The extension request was approved by the NMED HWB on May 24, 2022 (NMED May 2022). The updated CCM/CME Report will incorporate the Phase I Treatability Study findings and the results of the one-year additional sampling. The updated CCM/CME Report is now due to the NMED HWB by May 20, 2024.

The following activities occurred at the TAVG AOC during the July - September 2022 reporting period:

- As the one-year additional sampling of wells TAV-INJ1 and TAV-MW6 was concluded in April 2022, DOE/NNSA and SNL/NM personnel requested to decommission well TAV-INJ1 and revert monitoring well TAV-MW6 to follow the requirements of the TAVG monitoring network (DOE July 2022). The NMED HWB subsequently approved the request (NMED September 2022).
- As recommended in the Phase I Treatability Study Report (SNL/NM March 2022), DOE/NNSA and SNL/NM personnel requested to modify the sampling plan of the TAVG monitoring network (DOE August 2022).
- Table I-2 presents the sampling frequency for the 19 wells currently in the TAVG monitoring network. Two wells (AVN-1 and TAV-MW3) were scheduled to be sampled in the April – June quarter but their sampling was postponed to July 2022 due to Stage III fire restrictions implemented at SNL/NM. Eleven wells that are regularly scheduled for the July – September quarter were sampled in August 2022 (Table I-2, minus well TAV-INJ1 which is to be decommissioned). Other than the analytical results for wells TAV-INJ1 and TAV-MW6 for the first and second quarters of CY 2022, which were already provided in corresponding ER Quarterly Reports, the analytical results for CY 2022 groundwater monitoring will be presented in the SNL/NM CY 2022 AGMR, which is anticipated to be submitted to the NMED HWB in the summer of 2023.

2.1.3 Tijeras Arroyo Groundwater Area of Concern

Two COCs, nitrate and TCE, were identified for the TAG AOC (NMED April 2004). Nitrate was identified as a COC based on exceedances of the EPA MCL in samples collected from monitoring wells completed in the Perched Groundwater System (PGWS) and in the Merging Zone above the Regional Aquifer. TCE was identified as a COC for only the PGWS. No TCE concentrations in Regional Aquifer samples have exceeded the EPA MCL. The EPA MCLs and State of New Mexico groundwater standards for TCE and nitrate (as nitrogen) are 5 µg/L and 10 mg/L, respectively.

On August 5, 2022, the NMED HWB issued a "Public Notice and Opportunity to Request a Public Hearing Remedy Selection for TAG AOC." The Public Notice contained a "Fact Sheet / Statement of Basis." The Public Notice was based on the Revised TAG CCM and CME Report that was submitted to the NMED HWB in February 2018. The Report proposed three remedial alternatives for the elevated nitrate concentrations in the PGWS. The public-comment period was scheduled to end on October 4, 2022.

Table I-2 presents the CY 2022 sampling frequency for the TAG monitoring wells. During the July - September 2022 reporting period, groundwater samples were collected from 21 monitoring wells. This group of wells consisted of those scheduled for routine annual sampling and those that were not sampled in the previous quarter due to the Stage III fire restrictions. Twenty-one of the 23 wells listed in Table I-2 were sampled; well PGS-2 was not sampled due to grout instrusion and well TA1-W-03 was not sampled because the well is dry. A discussion of the analytical results will be presented in the SNL/NM CY 2022 AGMR, which is anticipated to be submitted to the NMED HWB in the summer of 2023.

2.2 Sites in Corrective Action Complete Regulatory Process

There are currently no SWMUs or AOCs at SNL/NM in the corrective action complete regulatory process.

3.0 References

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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), May 2017a. "Ground Water Discharge Permit, Sandia National Laboratories/New Mexico, Discharge Permit-1845," NMED Ground Water Quality Bureau, Santa Fe, New Mexico. May 26, 2017.

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New Mexico Environment Department (NMED), October 2021. Letter to D. Hauck (U.S. Department of Energy NNSA/Sandia Field Office) and P. Shoemaker (Sandia National Laboratories), "Approval with Modification: Transition of Five Groundwater Monitoring Wells as Condition to Terminate Discharge Permit (DP)-1845 under the New Mexico Environment Department (NMED) Ground Water Quality Bureau (GWQB) to NMED Hazardous Waste Bureau (HWB), Sandia National Laboratories, New Mexico, EPA ID# NM5890110518, HWB-SNL-21-MISC," NMED Hazardous Waste Bureau, Santa Fe, New Mexico. October 12, 2021.

New Mexico Environment Department (NMED), February 2022. Letter to D. Hauck (U.S. Department of Energy NNSA/Sandia Field Office), "Termination of Discharge Permit, DP-1845, Sandia National Laboratories/New Mexico Technical Area-V Groundwater Remediation Treatability Study," NMED Ground Water Quality Bureau, Santa Fe, New Mexico. February 4, 2022.

New Mexico Environment Department (NMED), May 2022. Letter to D. Hauck (U.S. Department of Energy NNSA/Sandia Field Office) and P. Shoemaker (Sandia National Laboratories), "Approval: Extension Request for Submittal of the Current Conceptual Model and Corrective Measures Evaluation Report at the Technical Area-V Groundwater Area of Concern, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-22-MISC," NMED Hazardous Waste Bureau, Santa Fe, New Mexico. May 24, 2022.

New Mexico Environment Department (NMED), June 2022. Letter to D. Hauck (U.S. Department of Energy NNSA/Sandia Field Office) and P. Shoemaker (Sandia National Laboratories), "Approval: Phase I Treatability Study Report for In-Situ Bioremediation at the Technical Area-V Groundwater Area of Concern, March 2022, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-22-007," NMED Hazardous Waste Bureau, Santa Fe, New Mexico. June 30, 2022.

New Mexico Environment Department (NMED), September 2022. Letter to D. Hauck (U.S. Department of Energy NNSA/Sandia Field Office) and P. Shoemaker (Sandia National Laboratories), "Approval: Formal Request to Decommission Injection Well TAV-INJ1 and Revert Groundwater Well TAV-MW6 to the Technical Area-V Groundwater Area of Concern Monitoring Network, Sandia National Laboratories, New Mexico, EPA ID# NM5890110518, HWB-SNL-22-MISC," NMED Hazardous Waste Bureau, Santa Fe, New Mexico. September 13, 2022.

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Sandia National Laboratories, New Mexico (SNL/NM), March 2022. "Phase I Treatability Study Report for In-Situ Bioremediation at the Technical Area-V Groundwater Area of Concern," Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

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U.S. Department of Energy (DOE), November 2021. Letter to A. Romero (New Mexico Environment Department), "Request to New Mexico Environment Department (NMED) Ground Water Quality Bureau (GWQB) to Terminate Discharge Permit (DP)-1845." November 18, 2021.

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U.S. Department of Energy (DOE), July 2022. Letter to R. Shean (New Mexico Environment Department), "Formal Request to Decommission Injection Well TAV-INJ1 and Revert Groundwater Well TAV-MW6 to the Technical Area-V Groundwater Area of Concern Monitoring Network at Sandia National Laboratories, New Mexico, Environmental Protection Agency Identification Number NM5890110518." July 20, 2022.

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Tables

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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**
83	Long Sled Track
84	Gun Facilities
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)

Notes:

AOC = Area of Concern.
BSG = Burn Site Groundwater.
NA = Not applicable. A site number was not assigned.
TAG = Tijeras Arroyo Groundwater.
TA-V = Technical Area-V.
TAVG = Technical Area-V Groundwater.

Table I-2
Groundwater Sampling and Analysis Schedule[a]

Investigation Site	Sampling Frequency in CY 2022	Quarter of Sampling in CY 2022	Monitoring Wells in Network
TAVG AOC	Quarterly	1,2,3,4	LWDS-MW1, TAV-INJ1[b], TAV-MW2, TAV-MW4, TAV-MW6, TAV-MW8, TAV-MW10, TAV-MW11, TAV-MW12, TAV-MW14, TAV-MW15, TAV-MW16
	Semiannually	2,4	TAV-MW7
	Annually	2	AVN-1[b], LWDS-MW2[b], TAV-MW3, TAV-MW5, TAV-MW9, TAV-MW13
BSG AOC	Semiannually	2,4	CYN-MW4, CYN-MW7, CYN-MW8, CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12, CYN-MW13, CYN-MW14A, CYN-MW15, CYN-MW16, CYN-MW17, CYN-MW18, CYN-MW19
TAG AOC[c]	Quarterly	1,2,3,4	TA2-W-19, TA2-W-26, TA2-W-28, TJA-2, TJA-3, TJA-4, TJA-7
	Semiannually	1,3	TA1-W-06, TA2-W-01, TA2-W-27, TJA-6
	Annually	3	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
	Voluntarily	3	TA2-W-24, TA2-W-25, TJA-5

Notes:

[a] All analytical results will be presented in CY 2022 Annual Groundwater Monitoring Report, except for wells TAV-INJ1 and TAV-MW6 for the first and second quarters of CY 2022. Results from these two wells have been provided in corresponding ER Quarterly Reports and will not be included in the CY 2022 Annual Groundwater Monitoring Report.

[b] To be decommissioned.

[c] Monitoring well WYO-4 was removed from the TAG sampling schedule in response to the August 2017 meeting with NMED HWB personnel. Well PGS-2 is not sampled because grout has intruded through the well screen. Well TA1-W-03 is not sampled because the well is dry.

AOC = Area of Concern.
AVN = Area-V (North) (acronym used for well identification only).
BSG = Burn Site Groundwater (Area of Concern).
CY = Calendar Year.
CYN = Canyons (Burn Site Groundwater Area of Concern; acronym used for well identification only).
ER = Environmental Restoration.
HWB = Hazardous Waste Bureau.
INJ = Injection well (acronym used for well identification only).
LWDS = Liquid waste disposal system (acronym used for well identification only).
MW = Monitoring well (acronym used for well identification only).
NMED = New Mexico Environment Department.
PGS = Parade Ground South (acronym used for well identification only).
TA1-W = Technical Area-I (Well) (acronym used for well identification only).
TA2-NW = Technical Area-II (Northwest) (acronym used for well identification only).
TA2-W = Technical Area-II (Well) (acronym used for well identification only).
TAG = Tijeras Arroyo Groundwater (Area of Concern).
TAV = Technical Area-V (acronym used for well identification only).
TAVG = Technical Area-V Groundwater (Area of Concern).
TJA = Tijeras Arroyo (acronym used for well identification only).
WYO = Wyoming (acronym used for well identification only).

SECTION II
PERCHLORATE SCREENING QUARTERLY GROUNDWATER MONITORING REPORT, July – September 2022

Currently there are no wells in the perchlorate groundwater sampling and analysis program. Therefore, this edition of the Environmental Restoration Operations Consolidated Quarterly Report does not include any analysis of data in this section. When new groundwater monitoring wells are installed in the future, they will require perchlorate monitoring and the corresponding analytical results will be reported in subsequent Environmental Restoration Operations Consolidated Quarterly Reports.

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Sandia National Laboratories