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Annual Groundwater Monitoring Report
Calendar Year 2023

Prepared by
Sandia National Laboratories, Albuquerque, NM

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & 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-NA0003525.

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Groundwater Monitoring Program
Sandia National Laboratories, New Mexico
July 2024

Prepared by:
Long-Term Stewardship Program in coordination with
Environmental Restoration Operations

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Acknowledgements

This *Annual Groundwater Monitoring Report, Calendar Year 2023* (Report) is a joint effort between the Sandia National Laboratories, New Mexico (SNL/NM) Environmental Restoration Operations and Long-Term Stewardship (LTS) Programs.

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Abstract

SNL/NM is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., under contract with the U.S. Department of Energy (DOE)'s National Nuclear Security Administration (NNSA). The DOE/NNSA Sandia Field Office administers the contract and oversees contractor operations at SNL/NM.

This Report summarizes the calendar year 2023 groundwater monitoring results for SNL/NM, which were compiled from groundwater data collected from LTS Groundwater Monitoring Program locations, the Chemical Waste Landfill, the Mixed Waste Landfill, and the Technical Area-V Groundwater, Tijeras Arroyo Groundwater, and Burn Site Groundwater Areas of Concern. Reporting the results of environmental monitoring programs is required by the New Mexico Environment Department and DOE Order 231.1B, Admin Chg 1, *Environment, Safety, and Health Reporting*.

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Executive Summary

This document presents the Sandia National Laboratories, New Mexico (SNL/NM) *Annual Groundwater Monitoring Report, Calendar Year 2023* (Report). Located on Kirtland Air Force Base (KAFB) in central New Mexico, SNL/NM is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., under contract with the U.S. Department of Energy (DOE)'s National Nuclear Security Administration (NNSA).

The SNL/NM Environmental Restoration Operations and Long-Term Stewardship (LTS) Programs monitor the groundwater at SNL/NM for the DOE/NNSA. The monitoring is subject to three broad sets of regulations: (1) the *Resource Conservation and Recovery Act Facility Operating Permit for Sandia National Laboratories, EPA ID No. NM5890110518* (RCRA Permit) (New Mexico Environment Department [NMED], January 2015, as modified); the *Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act 74-4-10: Sandia National Laboratories Consent Order* (Consent Order) (NMED, April 2004); and (3) various DOE Directives. DOE/NNSA and SNL/NM personnel have prepared this Report to meet the applicable reporting requirements set forth in the RCRA Permit, Consent Order, and DOE Directives; meet the environmental reporting requirements for the *Sandia National Laboratories, New Mexico 2023 Annual Site Environmental Report* (SNL/NM, August 2023); provide regulators and other stakeholders with updated groundwater data for SNL/NM; and inform the public about the groundwater quality at SNL/NM.

This Report summarizes the calendar year 2023 groundwater monitoring results for SNL/NM. It includes analytical results and other pertinent groundwater data and information.

Chapter 1.0 provides a general site description of SNL/NM, including its geologic and hydrogeologic settings. SNL/NM is located near the east-central edge of the Albuquerque Basin. The Albuquerque Basin (also known as the Middle Rio Grande Basin) is one of a series of north-south trending basins that was formed during the extension of the Rio Grande Rift. The Albuquerque Basin contains the Regional Aquifer, which supplies groundwater to Albuquerque Bernalillo County Water Utility Authority, Veterans Affairs, and KAFB production wells. Part of the Regional Aquifer underlies SNL/NM and its operations, hence the importance of monitoring the groundwater at SNL/NM.

Chapter 1.0 also describes the regulatory criteria, methods, and procedures for both the site-wide and site-specific groundwater monitoring activities at SNL/NM.

The remaining chapters focus on the groundwater monitoring activities performed at the following six monitoring well networks maintained at SNL/NM: LTS Groundwater Monitoring Program (hereafter referred to as the GMP) (Chapter 2.0), Chemical Waste Landfill (CWL) (Chapter 3.0), Mixed Waste Landfill (MWL) (Chapter 4.0), Technical Area-V Groundwater (TAVG) Area of Concern (AOC) (Chapter 5.0), Tijeras Arroyo Groundwater (TAG) AOC (Chapter 6.0), and Burn Site Groundwater (BSG) AOC (Chapter 7.0).

Most of the sites associated with the six monitoring well networks are categorized as Solid Waste Management Units (SWMUs) or AOCs. The RCRA Permit defines a SWMU as any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. The Consent Order defines an AOC as any area that may have had a hazardous waste or hazardous constituent release but is not a SWMU. Monitoring and/or corrective action requirements are generally determined on a SWMU-specific or AOC-specific basis following a site investigation.

As part of the SNL/NM Environmental Management System, the GMP maintains the GMP monitoring well network, which consists of 16 monitoring wells located throughout KAFB in areas not specifically affiliated with SWMUs or AOCs. This network facilitates site-wide monitoring of the groundwater at SNL/NM. The Consent Order defines all groundwater monitoring requirements for the GMP.

The CWL is a remediated, closed, regulated unit undergoing post-closure care in accordance with the *Final Permit Decision and Response to Comments, Post-Closure Care Permit for the Chemical Waste Landfill, Sandia National Laboratories, EPA ID No. NM5890110518, SNL-06-002* (CWL PCCP) (NMED, October 2009, as modified), which took effect on June 2, 2011 (NMED, June 2011). The CWL PCCP defines all groundwater monitoring requirements for the CWL.

The MWL is a SWMU that underwent corrective action in accordance with the Consent Order and was granted Corrective Action Complete with Controls status on March 13, 2016 (NMED, February 2016a). The *Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan* (MWL LTMMP) (SNL/NM, March 2012, as modified), which took effect on January 8, 2014 (NMED, January 2014) and is incorporated into the RCRA Permit (NMED, February 2016b), defines the groundwater monitoring requirements for the MWL.

The three groundwater AOCs (TAVG, TAG, and BSG) are undergoing corrective action in accordance with the Consent Order, which defines the groundwater monitoring requirements for all three. Each AOC investigation must comply with the Consent Order requirements for site characterization and the development of a Corrective Measures Evaluation.

Groundwater Monitoring Activities and Results

In CY 2023, groundwater samples were collected from monitoring wells in all six monitoring well networks. The analytical results for the groundwater samples were compared to the U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) (EPA, March 2018). The analytical results for the groundwater samples collected from GMP monitoring wells were also compared to the maximum allowable concentrations (MACs), which are the State of New Mexico drinking water standards (NMWQCC, December 2018).

This Report includes groundwater monitoring data for both hazardous and radioactive constituents; however, the monitoring data for radionuclides are provided voluntarily by DOE/NNSA and SNL/NM personnel. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement, because such information falls wholly outside the requirements of the Consent Order, as Section III.A of the Consent Order specifies (NMED, April 2004).

Groundwater Monitoring Program

Chapter 2.0 summarizes the CY 2023 groundwater monitoring activities and results for the GMP. All the activities were performed and documented in accordance with the Consent Order (NMED, April 2004).

Groundwater samples were collected from 16 monitoring wells (CCBA-MW2, CTF-MW1, CYN-MW5, Greystone-MW2, MRN-2, MRN-3D, NWTA3-MW3D, OBS-MW1, PL-2, PL-4, SFR-2S, SFR-4T, SWTA3-MW2, SWTA3-MW3, SWTA3-MW4, and TRE-1) and surface water samples were collected from Coyote Springs during the period of January 23 to March 31, 2023. The samples were analyzed for volatile organic compounds (VOCs), total organic halogens, total phenol, total alkalinity, nitrate plus nitrite (NPN) (as nitrogen), total cyanide, high explosive compounds (select wells only), major anions (chloride, bromide, fluoride, and sulfate), Target Analyte List (TAL) metals (all wells) plus uranium (select wells only), mercury, gamma spectroscopy, gross alpha/beta activity, radium-226, and radium-228. Except for beryllium and fluoride, no analytes were detected at concentrations exceeding established EPA MCLs or MACs. Beryllium was detected above the EPA MCL/MAC of 0.004 milligrams per liter (mg/L) in the surface water samples from Coyote Springs at concentrations of 0.00752 mg/L and 0.00756 mg/L. These concentrations are similar to historical concentrations, and the beryllium is considered to be naturally occurring. Fluoride above the MAC of 1.6 mg/L was reported for Coyote Springs and monitoring wells OBS-MW1, SFR-2S, SFR-4T, SWTA3-MW4, and TRE-1 at concentrations ranging from 1.67 mg/L to 2.55 mg/L. These concentrations are similar to historical concentrations, and the fluoride is considered to be naturally occurring.

Water level measurements were obtained quarterly and used to construct the contours of the potentiometric surface of the Regional Aquifer. The contours display a pattern that reflects the impact of the groundwater withdrawal by production wells located in the northwestern part of KAFB and adjacent parts of Albuquerque.

The groundwater elevations at 104 SNL/NM monitoring wells were measured quarterly. The groundwater elevation data for the 104 SNL/NM monitoring wells, as well as 61 additional monitoring wells owned by other agencies (Table 2), were used to construct the base-wide potentiometric surface map of the Regional Aquifer and fractured bedrock aquifer system (Plate 1).

Other GMP groundwater monitoring activities in CY 2023 included submittal of the *Comprehensive Site-Wide Groundwater Monitoring Plan (Revised), Calendar Year 2024* (SNL/NM, April 2023) to the NMED.

Chemical Waste Landfill

Chapter 3.0 summarizes the CY 2023 groundwater monitoring activities and results for the CWL. All the activities were performed and documented in accordance with the CWL PCCP (NMED, October 2009, as modified).

The CWL is a 1.9-acre former disposal site located in the southeastern corner of Technical Area (TA)-III. It was used to dispose of chemical, radioactive, and solid wastes generated by SNL/NM research activities from 1962 to 1985.

Two voluntary corrective measures (VCMs) were performed from 1996 through 2002 to remediate the CWL: Vapor Extraction VCM and Landfill Excavation VCM. Since June 2, 2011, the CWL has been a remediated, closed, regulated unit undergoing post-closure care in accordance with the CWL PCCP (NMED, October 2009, as modified).

The groundwater elevations at four monitoring wells (CWL-BW5, CWL-MW9, CWL-MW10, and CWL-MW11) were measured quarterly and groundwater samples were collected from the same four wells in January and July 2023. The January 2023 groundwater samples were analyzed for trichloroethene (TCE), chromium, nickel, and the enhanced list of VOCs (i.e., 1,1-dichloroethene; 1,1,2-trichloro-1,2,2-trifluoroethane; chloroform; tetrachloroethene; and trichlorofluoromethane). The July 2023 groundwater samples were analyzed for TCE, chromium, and nickel. No analytes were detected at concentrations exceeding established EPA MCLs or CWL PCCP hazardous concentration limits, and the analytical results were comparable to historical values.

Mixed Waste Landfill

Chapter 4.0 summarizes the CY 2023 groundwater monitoring activities and results for the MWL (SWMU 76). All the activities were performed and documented in accordance with the MWL LTTMP (SNL/NM, March 2012, as modified) (NMED, January 2014).

The MWL is a 2.6-acre SWMU that is located in the north-central portion of TA-III and was operational from 1959 through 1988. It consists of a classified area and an unclassified area that received low-level radioactive, hazardous, and mixed wastes. The NMED-selected final remedy, an evapotranspirative vegetative soil cover with a biointrusion barrier, was installed in 2009.

The groundwater elevations at seven monitoring wells (MWL-BW2, MWL-MW4, MWL-MW5, MWL-MW6, MWL-MW7, MWL-MW8, and MWL-MW9) were measured quarterly and groundwater samples were collected from four monitoring wells (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) in May/June and November 2003. The groundwater samples were analyzed for VOCs, metals (cadmium, chromium, nickel, and total uranium), gamma spectroscopy, gross alpha/beta activity, radon-222, and tritium. In addition, groundwater samples were collected in May/June 2023 for three perfluoroalkyl and polyfluoroalkyl substances (PFAS), including perfluorohexane sulfonic acid, perfluorooctane sulfonic acid, and perfluorooctanoic acid, to address the NMED's request to evaluate emerging contaminants and toxic pollutants added to Subsection T of 20.6.2.7 NMAC since January 2015 (NMED, July 2021). No analytes were detected at concentrations exceeding established EPA MCLs or MWL LTMMP trigger levels, and the analytical results were comparable to historical values. There were no detections of the three PFAS in the May/June 2023 groundwater samples.

Technical Area-V Groundwater Area of Concern

Chapter 5.0 summarizes the CY 2023 groundwater monitoring activities and results for the TAVG AOC. All the activities were performed and documented in accordance with the Consent Order (NMED, April 2004).

The TAVG AOC is located in the northeast corner of TA-III. Three wastewater and sanitary waste disposal facilities were used at this AOC from the 1960s to the early 1990s. Both nitrate and TCE have been identified as constituents of concern in the Regional Aquifer at this AOC based on detections above the EPA MCLs.

The groundwater elevations at 17 monitoring wells (LWDS-MW1 and TAV-MW2 through TAV-MW17) were measured quarterly and groundwater samples were collected from the same 17 wells in February/March, April, July/August/September, and October 2023. The groundwater samples were analyzed for VOCs, NPN (as nitrogen), alkalinity, major anions (bromide, chloride, fluoride, and sulfate), filtered metals (arsenic, iron, and manganese), TAL metals plus total uranium, gamma spectroscopy, gross alpha/beta activity, and tritium. New monitoring well TAV-MW17 was also sampled for perchlorate in the second, third, and fourth quarters of CY 2023. Except for nitrate and TCE, no analytes were detected at concentrations exceeding established EPA MCLs. Nitrate concentrations exceeded the EPA MCL of 10 mg/L in samples from two monitoring wells (LWDS-MW1 and TAV-MW10), with a maximum concentration of 13.0 mg/L in the environmental sample collected from monitoring well LWDS-MW1 in August 2023. TCE concentrations exceeded the EPA MCL of 5 micrograms per liter (µg/L) in samples from six monitoring wells (LWDS-MW1, TAV-MW4, TAV-MW6, TAV-MW8, TAV-MW10, and TAV-MW14), with a maximum concentration of 13.3 µg/L in the environmental sample collected from monitoring well LWDS-MW1 in March 2023. The nitrate and TCE concentrations at the other monitoring wells were below the EPA MCLs, and the analytical results were consistent with historical trends.

Other TAVG AOC groundwater monitoring activities in CY 2023 included the decommissioning of three existing monitoring wells (AVN-1, AVN-2, and LWDS-MW2), the installation of a new monitoring well (TAV-MW17), and submittal of the *Decommissioning Plan for Well TAV-INJ1 at the Technical Area-V Groundwater Area of Concern* (SNL/NM, January 2023b) and *Monitoring Well TAV-MW17 Installation and Monitoring Well AVN-1, AVN-2, and LWDS-MW2 Decommissioning Report* (SNL/NM, July 2023) to the NMED.

Tijeras Arroyo Groundwater Area of Concern

Chapter 6.0 summarizes the groundwater monitoring activities and results for the TAG AOC. All the activities were performed and documented in accordance with the Consent Order (NMED, April 2004).

The TAG AOC is located in the north-central portion of KAFB. It covers approximately 1.82 square miles and contains three TAs (I, II, and IV) in which a wide variety of research and development activities, including weapons development, have been conducted. It overlies two water-bearing units: the Perched Groundwater System (PGWS) and the Regional Aquifer. The groundwater in these units may have been impacted by the above activities since the late 1940s and includes numerous potential wastewater sources of nitrate and VOCs. All wastewater discharges ceased in 1992.

The groundwater elevations at 27 monitoring wells were measured quarterly and groundwater samples were collected from 21 monitoring wells (TA1-W-01, TA1-W-02, TA1-W-04, TA1-W-05, TA1-W-06, TA1-W-08, TA2-NW1-595, TA2-W-01, TA2-W-19, TA2-W-24, TA2-W-25, TA2-W-26, TA2-W-27, TA2-W-28, TJA-2, TJA-3, TJA-4, TJA-5, TJA-6, TJA-7, and WYO-3) at various frequencies throughout CY 2023. The groundwater samples were analyzed for VOCs, NPN (as nitrogen), alkalinity, anions, TAL metals plus total uranium, gamma spectroscopy, gross alpha/beta activity, and tritium. Except for nitrate, TCE, and tetrachloroethene (PCE), no analytes were detected at concentrations exceeding established EPA MCLs. Nitrate concentrations exceeded the EPA MCL of 10 mg/L in samples from five PGWS monitoring wells (TA2-W-19, TA2-W-28, TJA-2, TJA-5, and TJA-7), with a maximum concentration of 21.9 mg/L. Merging Zone monitoring well TJA-4 had a nitrate concentration of 31.3 mg/L. None of the samples from the Regional Aquifer wells, exclusive of the Merging Zone, exceeded the nitrate EPA MCL; the maximum nitrate concentration was 4.05 mg/L. Nitrate concentrations in PGWS monitoring wells TA2-W-28 and TJA-7 have generally exceeded the EPA MCL for the life of the wells, whereas nitrate concentrations in PGWS monitoring wells TA2-W-19, TJA-2, and TJA-5 have occasionally exceeded the EPA MCL. Recent nitrate concentrations across the TAG AOC monitoring well network have been consistent with historical trends. TCE and PCE exceeded the EPA MCL of 5 µg/L in PGWS monitoring well TA2-W-26, with concentrations of 16.8 and 7.78 µg/L, respectively, for the December 2023 sample. The TCE and PCE concentrations in PGWS monitoring well TA2-W-26 have been relatively consistent since September 2020. The December 2023 TCE concentration for PGWS monitoring well TJA-7 was 5.43 µg/L. No other monitoring wells had VOC concentrations that exceeded EPA MCLs.

Other TAG AOC groundwater monitoring activities in CY 2023 included routine video logging of 19 monitoring wells, well capacity tests at 2 monitoring wells, and submittal of the *Tijeras Arroyo Groundwater Corrective Measures Implementation Plan* (SNL/NM, June 2023) to the NMED.

Burn Site Groundwater Area of Concern

Chapter 7.0 summarizes the CY 2023 groundwater monitoring activities and results for the BSG AOC. All the activities were performed and documented in accordance with the Consent Order (NMED, April 2004).

The BSG AOC is located in the vicinity of the active Lurance Canyon Burn Site Testing Facility in the far eastern portion of KAFB. It was used from the 1960s through the 1980s for explosives tests and burn tests.

Groundwater investigations were initiated in 1997 at the NMED's request after elevated nitrate concentrations were discovered in the Burn Site Well (a non-potable production well inactive since 2003). The elevated nitrate concentrations in the groundwater are most likely associated with the prior use of ammonium-nitrate slurry at the Burn Site.

The groundwater elevations at 17 monitoring wells were measured quarterly and groundwater samples were collected from 13 monitoring wells (CYN-MW4, CYN-MW7, CYN-MW8, CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12, CYN-MW13, CYN-MW14A, CYN-MW16, CYN-MW17, CYN-MW18, and CYN-MW19) in April/May and October/November 2023. Due to declining groundwater elevations, monitoring well CYN-MW15 could not be sampled during either CY 2023 sampling event. The groundwater samples were analyzed for VOCs, high explosive compounds, total petroleum hydrocarbons-diesel range organics, total petroleum hydrocarbons-gasoline range organics, NPN (as nitrogen), alkalinity, major anions (bromide, chloride, fluoride, and sulfate), TAL metals, gamma spectroscopy, gross alpha/beta activity, isotopic uranium, and tritium. Except for nitrate, no analytes were detected at concentrations exceeding established EPA MCLs. Nitrate concentrations exceeded the EPA MCL of 10 mg/L in samples from five monitoring wells (CYN-MW9, CYN-MW10, CYN-MW12, CYN-MW13, and CYN-MW14A), with a maximum concentration of 33.8 mg/L in the October 2023 environmental sample collected from monitoring well CYN-MW9. The nitrate concentration trends for these monitoring wells have been variable within a narrow range over the past year.

Other BSG AOC groundwater monitoring activities in CY 2023 included submittal of the *Burn Site Groundwater Area of Concern Current Conceptual Model and Corrective Measures Evaluation Report* (SNL/NM, January 2023a) to the NMED.

Future Groundwater Monitoring Events

The groundwater monitoring conducted on a site-wide basis via the GMP and on a site-specific basis at the CWL, MWL, TAVG AOC, TAG AOC, and BSG AOC will continue in CY 2024 in accordance with the applicable regulatory requirements. The CY 2024 groundwater monitoring activities and results will be reported in the CY 2024 AGMR.

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Attachments

Tables

Plate

Data Packages

Abbreviations and Acronyms

ABCWUA	Albuquerque Bernalillo County Water Utility Authority
AGMR	annual groundwater monitoring report
amsl	above mean sea level
AOC	Area of Concern
AOP	administrative operating procedure
ARG	ancestral Rio Grande
bgs	below ground surface
BSG	Burn Site Groundwater
CAC	Corrective Action Complete
CCM	Current Conceptual Model
CFR	Code of Federal Regulations
CFRC	Customer Funded Records Center
CME	Corrective Measures Evaluation
COA	City of Albuquerque
COC	constituent of concern
CSM	Conceptual Site Model
CWL	Chemical Waste Landfill
CY	calendar year
DO	dissolved oxygen
DOE	U.S. Department of Energy
DRO	diesel range organics
EB	equipment blank
EDMS	Environmental Data Management System
EPA	U.S. Environmental Protection Agency
ERP	Environmental Restoration Program (KAFB)
ET	evapotranspirative
FB	field blank
FOP	field operating procedure
GEL	GEL Laboratories, LLC
GMP	Groundwater Monitoring Program
GRO	gasoline range organics
HE	high explosive
HWB	Hazardous Waste Bureau
IMWP	Interim Measures Work Plan
ISB	in-situ bioremediation
JP-4	jet propellant, fuel grade 4
KAFB	Kirtland Air Force Base
LTS	Long-Term Stewardship
LWDS	Liquid Waste Disposal System
MAC	maximum allowable concentration
MCL	maximum contaminant level
MDL	method detection limit
MWL	Mixed Waste Landfill
NMED	New Mexico Environment Department
NNSA	National Nuclear Security Administration
NOD	Notice of Disapproval
NPN	nitrate plus nitrite
OB	Oversight Bureau
ORP	oxidation-reduction potential

Abbreviations and Acronyms (concluded)

PCE	tetrachloroethene
PFAS	perfluoroalkyl and polyfluoroalkyl substances
PFHxS	perfluorohexane sulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonic acid
PGWS	Perched Groundwater System
PQL	practical quantitation limit
QC	quality control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RPD	relative percent difference
SAP	sampling and analysis plan
SC	specific conductivity
SFG	Santa Fe Group
SMO	Sample Management Office
SNL/NM	Sandia National Laboratories, New Mexico
SWMU	Solid Waste Management Unit
TA	Technical Area
TAG	Tijeras Arroyo Groundwater
TAL	Target Analyte List
TAVG	Technical Area-V Groundwater
TB	trip blank
TCE	trichloroethene
TOX	total organic halogens
USGS	U.S. Geological Survey
VA	Veterans Affairs
VCM	voluntary corrective measure
VOC	volatile organic compound

Units

<	less than
%	percent
% Sat	percent saturation
°C	degrees Celsius
µg/L	micrograms per liter (equivalent to ppb)
µmho/cm	micromhos per centimeter
acre-feet	one acre-foot equals 325,851 gal
ft	foot (feet)
ft/day	feet per day
ft/ft	feet per foot
ft/yr	feet per year
gal	gallon(s)
gpm	gallons per minute
Ma	mega annum (million years)
mg/L	milligrams per liter (equivalent to ppm)
mrem/yr	millirems per year
mV	millivolts
NTU	nephelometric turbidity units
pCi/L	picocuries per liter
pH	potential of hydrogen (negative logarithm of the hydrogen ion concentration)
ppbv	parts per billion on a volume to volume basis
rem	roentgen equivalent man
sq mi	square miles
SU	standard units

Well Location Descriptions

12AUP-#	ER Site 12A Underflow Piezometer
ASL-PD	Albuquerque Seismological Laboratory Production (well)
AVN-#	Area-V (North)
BW	Background Well
CCBA-#	Coyote Canyon Blast Area
CTF-#	Coyote Test Field
CWL-#	Chemical Waste Landfill
CYN-#	Canyons (Lurance Canyon area)
Eubank-#	Eubank well
Greystone-#	Greystone well
EX	Well proposed for extraction purposes but used for monitoring purposes only at the KAFB former sewage lagoons. This applies to the well number for ST105-EX01.
HERTF	High Energy Research Test Facility
INJ	injection well
ITRI-MW	Inhalation Toxicology Research Institute
KAFB	Kirtland Air Force Base
LMF-#	Large Melt Facility
LWDS-#	Liquid Waste Disposal System
MRN-#	Magazine Road North
MVMW#	Mountain View Monitoring Well
MW	Monitoring Well
MWL-#	Mixed Waste Landfill
NMED-#	New Mexico Environment Department
NWTA3-#	Northwest Technical Area-III
OBS-#	Old Burn Site
P&A	plugged and abandoned (decommissioned)
PGS-#	Parade Ground South
PL-#	Power Line Road
RG-#	Rio Grande, basin and well designation by the New Mexico Office of the State Engineer
SFR-#	South Fence Road
ST105-MW	KAFB Project ST-105
STW-#	Solar Tower (West)
SWTA3-#	Southwest Technical Area-III
TA1-W-#	Technical Area-I (Well)
TA2-NW-#	Technical Area-II (Northwest)
TA2-SW-#	Technical Area-II (Southwest)
TA2-W-#	Technical Area-II (Well)
TAV-#	Technical Area-V
TAV-INJ	Technical Area-V Injection Well
TJA-#	Tijeras Arroyo
TRE-#	Thunder Road East
TRN-#	Target Road North
TRS-#	Target Road South
TSA-#	Transportation Safeguards Academy
VA-#	Veterans Administration
WYO-#	Wyoming
YALE-MW	Yale Landfill area

Meteorological Towers

A21	SNL/NM Meteorological Station in TA-II
A36	SNL/NM Meteorological Station in TA-III/TA-V
KABQ	National Weather Service Meteorological Station at the Albuquerque International Sunport
LC1	SNL/NM Meteorological Station in Lurance Canyon west of Burn Site
SC1	School House - SNL/NM Meteorological Station in the Manzanita Mountains

1.0 Introduction

The Sandia National Laboratories, New Mexico (SNL/NM) Environmental Restoration Operations and Long-Term Stewardship (LTS) Programs monitor the groundwater at SNL/NM for the U.S. Department of Energy (DOE)'s National Nuclear Security Administration (NNSA). This *Annual Groundwater Monitoring Report, Calendar Year 2023* (Report) summarizes the calendar year (CY) 2023 groundwater monitoring results for SNL/NM. The chapters herein focus on the groundwater monitoring activities performed at the following monitoring well networks maintained at SNL/NM:

- LTS Groundwater Monitoring Program (hereafter referred to as the GMP) (Chapter 2.0)
- Chemical Waste Landfill (CWL) (Chapter 3.0)
- Mixed Waste Landfill (MWL) (Chapter 4.0)
- Technical Area-V Groundwater (TAVG) Area of Concern (AOC) (Chapter 5.0)
- Tijeras Arroyo Groundwater (TAG) AOC (Chapter 6.0)
- Burn Site Groundwater (BSG) AOC (Chapter 7.0)

1.1 Site Description

SNL/NM is located on Kirtland Air Force Base (KAFB), New Mexico. KAFB is a 51,559-acre (80.56-square mile [sq mi]) military installation that includes 20,486 acres withdrawn from the Cibola National Forest through an agreement with the U.S. Forest Service. Located directly southeast of Albuquerque at the foot of the Manzanita Mountains (Figure 1-1), KAFB has an average elevation of 5,384 feet (ft) above mean sea level (amsl) and an elevation range of 5,162 to 7,986 ft amsl.

1.1.1 Climate

The Albuquerque area is characterized by the low precipitation and wide temperature extremes typical of a high-altitude, dry continental climate. The average annual precipitation measured at the Albuquerque International Sunport (National Oceanic and Atmospheric Administration National Weather Service station) is 8.84 inches (Section 2.6.2.1). Most of the precipitation falls between July and September, mainly in the form of brief heavy rain. The evaporation potential is high because of the low humidity and generally warm temperatures.

1.1.2 Geologic Setting

SNL/NM is located near the east-central edge of the Albuquerque Basin. The Albuquerque Basin (also known as the Middle Rio Grande Basin) is one of a series of north-south trending basins that was formed during the extension of the Rio Grande Rift. The basin is approximately 3,000 sq mi. Rift formation began in the late Oligocene and continued into the early Pleistocene, with the primary period of extension occurring between 30 and 5 mega annum (Ma), or million years ago. The tectonic activity, which uplifted the Sandia, Manzanita, and Manzano Mountains, was most prevalent from about 15 to 5 Ma (Thorn et al., 1993). The rift today extends from south central Colorado across New Mexico and into northern Mexico. The vertical displacement between the rock units exposed at the top of Sandia Crest and the equivalent units located at the bottom of the buried basin is more than 6 miles (Lozinsky, 1994).

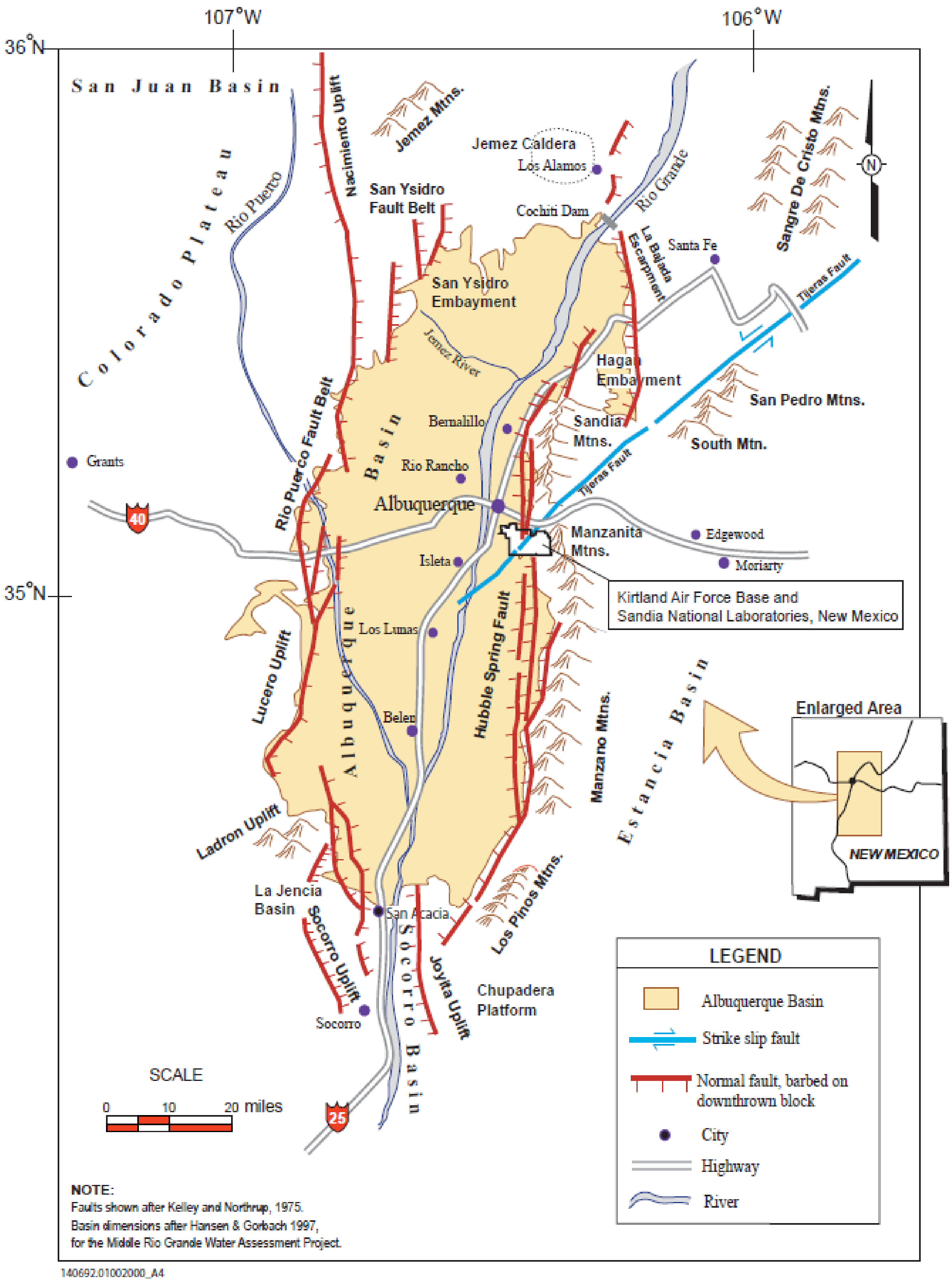

Figure 1-1
Albuquerque Basin, North Central New Mexico

As Figure 1-1 shows, the structural boundaries of the Albuquerque Basin are the:

- Colorado Plateau to the west.
- Nacimiento Uplift and Jemez Mountains to the north.
- La Bajada Escarpment to the northeast.
- Sandia, Manzanita, Manzano, and Los Pinos Mountains to the east.
- Joyita and Socorro uplifts to the south.
- Ladron and Lucero uplifts to the southwest.

As the Rio Grande Rift expanded, the Albuquerque Basin subsided. Over the last 30 Ma, the ancestral Rio Grande meandered across the valley formed by the subsidence and deposited sediments in broad stream channels and floodplains derived from sources to the north. The basin also filled with aeolian deposits and alluvial materials shed from surrounding uplifts (Hawley and Haase, 1992). This sequence of sediments is called the Santa Fe Group (SFG). The thickness of the SFG is up to 16,400 ft at the deepest part of the basin (Lozinsky, 1994). The entire sequence consists of unconsolidated sediments, which thin toward the edge of the basin and are truncated by normal faults at the basin-bounding uplifts. Units overlying the SFG include Pliocene Ortiz gravel and Rio Grande fluvial deposits, which are interbedded with Tertiary and Quaternary basaltic and pyroclastic materials. Based on recent geophysical models, the basin has been further divided into three 2- to 4-mile-deep, interconnected structural depressions from north to south: (1) the Santo Domingo subbasin, (2) the Calabacillas subbasin, and (3) the Belen subbasin. KAFB lies near the intersection of the Calabacillas and Belen subbasins along a broad, northwest elongate structural high called the Mountainview prong, which separates the two subbasins (Grauch and Connell, 2013). These tectonic/sedimentary features contribute greatly to the complex structural setting described below.

There are four primary faults (Figures 1-2 and 1-3) on KAFB: (1) the Sandia Fault, (2) the West Sandia Fault, (3) the Hubbell Spring Fault (West, Central, and East Fault segments), and (4) the Tijeras Fault. The Sandia Fault is thought to be the primary boundary between the Sandia Mountains and the Albuquerque Basin. The Hubbell Spring Fault extends northward from Socorro County and terminates on KAFB near the Tijeras Fault. The Sandia and Hubbell Spring Faults, which are en echelon normal faults with down-to-the-west displacement, trend north-south and bound the basin on the east side.

The Tijeras Fault is an ancient strike-slip fault that developed in the Precambrian or early Paleozoic (approximately 600 Ma) and was reactivated in association with the Laramide Orogeny during the Cretaceous period (Kelley, 1977). The fault demonstrates Quaternary movement at locations northeast of KAFB (Kelson et al., September 1999; GRAM and Lettis, December 1995), has been traced as far north as Madrid, New Mexico, and continues into the Sangre de Cristo Mountains as the Cañoncito Fault. Preferential erosion along the fault formed Tijeras Canyon, which divides the Sandia and Manzanita Mountains.

The Tijeras Fault trends southwest from Tijeras Canyon, intersects the northeast boundary of KAFB, and crosses KAFB east and south of Manzano Base. Manzano Base occupies a four-peak uplift defined by the Tijeras Fault on the east side and the Sandia Fault on the west side. The Sandia, Hubbell Spring, and Tijeras Faults converge near the southeast end of Technical Area (TA)-III. This complicated fault system defines the east edge of the Albuquerque basin and is referred to as the Tijeras Fault Complex.

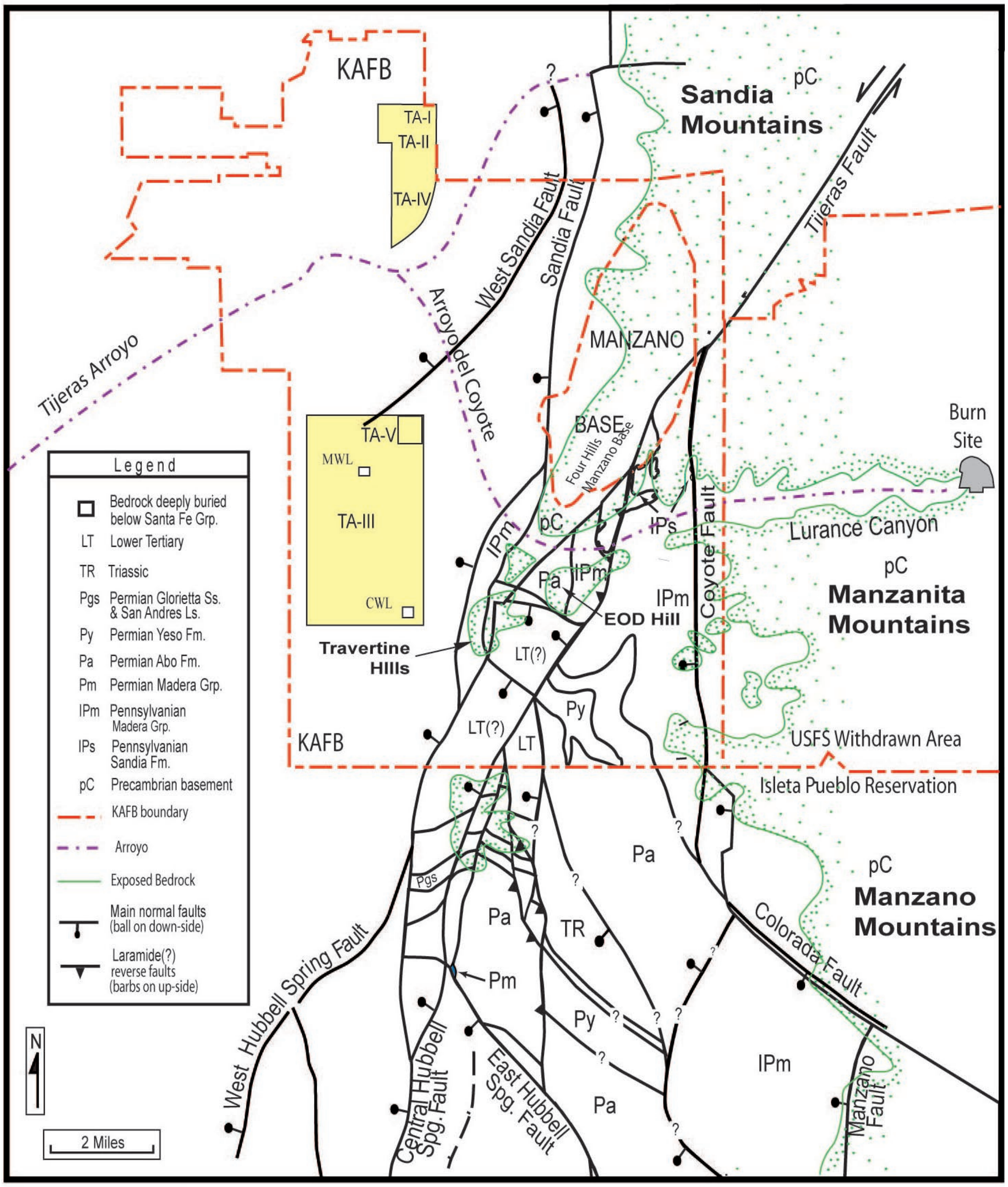

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Figure 1-2
Generalized Geology in the Vicinity of Sandia National Laboratories, New Mexico and Kirtland Air Force Base (Van Hart, June 2003)

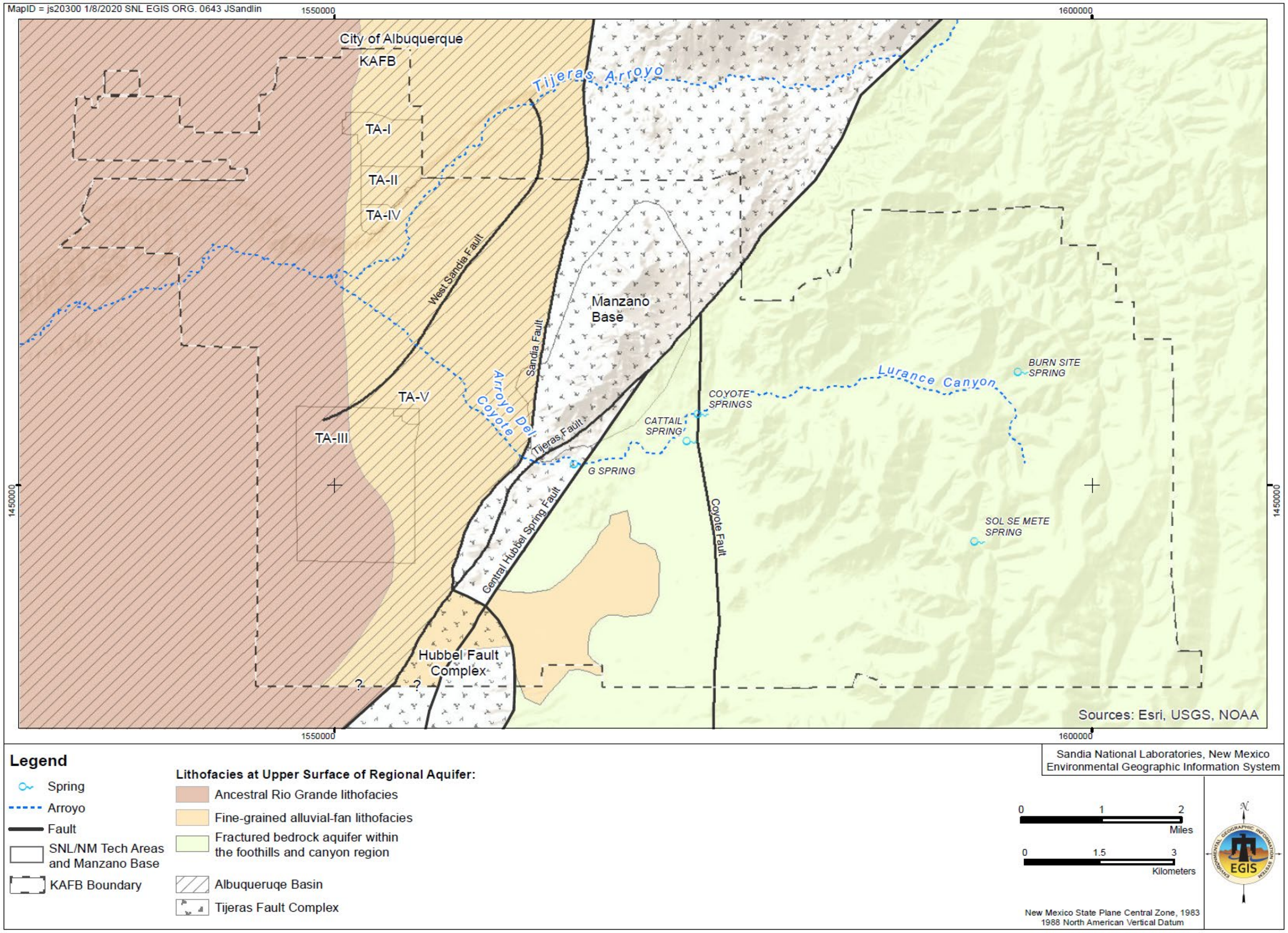

Figure 1-3
Hydrogeologically Distinct Areas Controlled by Faults
(Modified from GRAM and Lettis, December 1995, and Van Hart, June 2003)

1.1.3 Hydrogeology

There are three hydrogeologically distinct areas in the vicinity of KAFB (Figure 1-3): (1) the Albuquerque Basin, (2) the Tijeras Fault Complex, and (3) the foothills and canyon region. The primary division is between the east and west sides of the Tijeras Fault Complex, which is the transitional zone. This division marks the boundary between the Regional Aquifer in the Albuquerque Basin and the fractured bedrock aquifer system in the foothills and canyon region. A Perched Groundwater System (PGWS) (Chapter 6.0) lies above the Regional Aquifer near TA-I, TA-II, and TA-IV in the TAG AOC. The PGWS extends east and southeastward from the former KAFB sewage lagoons to the KAFB Tijeras Arroyo Golf Course and crosses TA-I, TA-II, and TA-IV, where the gradient averages approximately 0.01 feet per foot (ft/ft; ft of vertical change per ft of horizontal distance) in the sediments. Possible recharge sources for the PGWS include the former KAFB sewage lagoons, landscape watering, arroyo surface water, wastewater outfalls, buried septic systems, the KAFB Tijeras Arroyo Golf Course, and possible leakage from water distribution and sewer lines (SNL/NM, February 2018).

East of the Tijeras Fault Complex, a thin layer of alluvium covers the bedrock. The hydrogeology in this area is poorly understood due to the complex geology created by the fault system. In this area, the depth to groundwater ranges from 45 to 360 ft below ground surface (bgs) and most of the non-potable production and monitoring wells are completed in fractured bedrock at relatively shallow depths and produce modest volumes of groundwater.

The groundwater in the fractured bedrock aquifer system generally flows west from the foothills and canyon region toward the Tijeras Fault Complex (Plate 1). The groundwater gradient is relatively steep, 0.03 ft/ft. From the mountain front to Wyoming Boulevard, the gradient averages approximately 0.005 ft/ft in the unconsolidated sediments of the Regional Aquifer, and west of Wyoming Boulevard, the gradient flattens to an average of approximately 0.002 ft/ft in the coarser-grained facies of these unconsolidated sediments.

Historically, the regional groundwater in the Albuquerque Basin flowed westward from the mountains toward the Rio Grande. However, pumping at KAFB, Veterans Affairs, and Albuquerque Bernalillo County Water Utility Authority (ABCWUA) production wells has created a trough in the Regional Aquifer near the northwest corner of KAFB, causing the groundwater to flow northward toward these wells. The impact of the groundwater withdrawal has been observed as minor fluctuations in the groundwater elevations at SNL/NM and KAFB monitoring wells as far southeast as TA-III.

1.1.4 Surface Water Hydrology

The major surface water feature in the vicinity of KAFB is the Rio Grande. Located approximately three miles west of KAFB, the Rio Grande originates in the San Juan Mountains of Colorado and terminates at the Gulf of Mexico, near Brownsville, Texas. Approximately 1,900 miles long, the Rio Grande is the fourth longest river system in the United States.

Except for several springs, surface water within the boundaries of KAFB is found only as ephemeral streams (i.e., arroyos) that flow for short periods after storm events or during the spring melt of mountain snowpack. The primary surface water feature that drains the eastern foothills on KAFB is Tijeras Arroyo. Arroyo del Coyote intersects Tijeras Arroyo just south of TA-IV (about one mile west of the KAFB Tijeras Arroyo Golf Course [Figure 1-3]). Both Tijeras Arroyo and Arroyo del Coyote carry significant runoff after heavy thunderstorms that usually occur from July through September. Above the Tijeras Arroyo-Arroyo del Coyote confluence, Tijeras Arroyo drains about 80 sq mi, while Arroyo del Coyote drains about 39 sq mi (USACE, 1979). The total watershed for Tijeras Arroyo, including the Sandia and Manzanita Mountains and portions of KAFB, is approximately 126 sq mi. All active SNL/NM facilities are located outside the 100-year Tijeras Arroyo and Arroyo del Coyote floodplains.

There are five springs on KAFB associated with the uplifts in the Tijeras Fault Complex and foothills and canyon region (Figure 1-3): (1) Coyote Springs, Cattail Spring, and G Spring within Arroyo del Coyote; (2) Burn Site Spring in Lurance Canyon; and (3) Sol se Mete Spring in the Manzanita Mountains. Coyote Springs and Sol se Mete Spring are perennial (i.e., continuously flowing) springs, while the other springs are ephemeral springs. Hubbell Spring (a perennial spring) is located just south of KAFB on the Pueblo of Isleta (Figure 1-4). The wetland areas created by these springs, though very limited in extent, provide a unique ecological niche in an otherwise arid habitat.

Groundwater recharge near KAFB is primarily derived from the eastern mountain front and the major arroyos. However, the amount of recharge occurring in the foothills and canyon region is not well characterized. The estimated recharge for that portion of Tijeras Arroyo is 2.2 million cubic ft per year (ft/yr; 50 acre-ft/yr) (SNL/NM, February 1998). The estimated recharge for Arroyo del Coyote is 0.4 million cubic ft/yr (9.2 acre-ft/yr). Infiltration studies conducted by the Site-Wide Hydrogeologic Characterization Project determined that due to the high evapotranspiration rate for most areas on KAFB (especially the alluvial fan slopes and other relatively flat areas), recharge from direct precipitation is negligible (SNL/NM, February 1998).

1.2 Groundwater Monitoring

1.2.1 Groundwater Monitoring Agencies

The groundwater at KAFB and SNL/NM is monitored by two agencies, respectively: the U.S. Department of Defense through the KAFB Environmental Restoration Program (ERP) and the DOE/NNSA through the SNL/NM Environmental Restoration Operations and LTS Programs.

The KAFB ERP monitors the groundwater at KAFB through a large monitoring well network associated with several closed landfills and the former KAFB sewage lagoons, as well as additional KAFB wells sited to monitor and characterize several nitrate plumes and an extensive aviation gasoline/jet fuel plume associated with the KAFB Bulk Fuels Facility.

The SNL/NM Environmental Restoration Operations and LTS Programs monitor the groundwater at SNL/NM on a site-wide basis through the GMP monitoring well network and on a site-specific basis through the CWL, MWL, TAVG AOC, TAG AOC, and BSG AOC monitoring well networks. These networks cover locations associated with DOE/NNSA-owned facilities and sites permitted by the U.S. Air Force for DOE/NNSA use. SNL/NM personnel support the monitoring through the groundwater monitoring activities described throughout this Report.

Figure 1-4 and Plate 1 show the monitoring well networks located at KAFB and SNL/NM. Tables 1 and 2 present the construction specifications and CY 2023 groundwater elevation data for the monitoring wells, respectively.

Table 1-1 lists the sampling events conducted at SNL/NM in CY 2023 for groundwater quality monitoring. Table 1-2 presents the analytical results. Table 1-3 lists the detected analytes that exceeded the U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) for drinking water (EPA, March 2018).

Historical groundwater analyses have demonstrated that nitrite concentrations are below laboratory method detection limits (MDLs) and are considered noncontributory to the results of nitrate plus nitrite (NPN) analyses. Therefore, NPN (as nitrogen) results are used in this Report to represent nitrate concentrations.

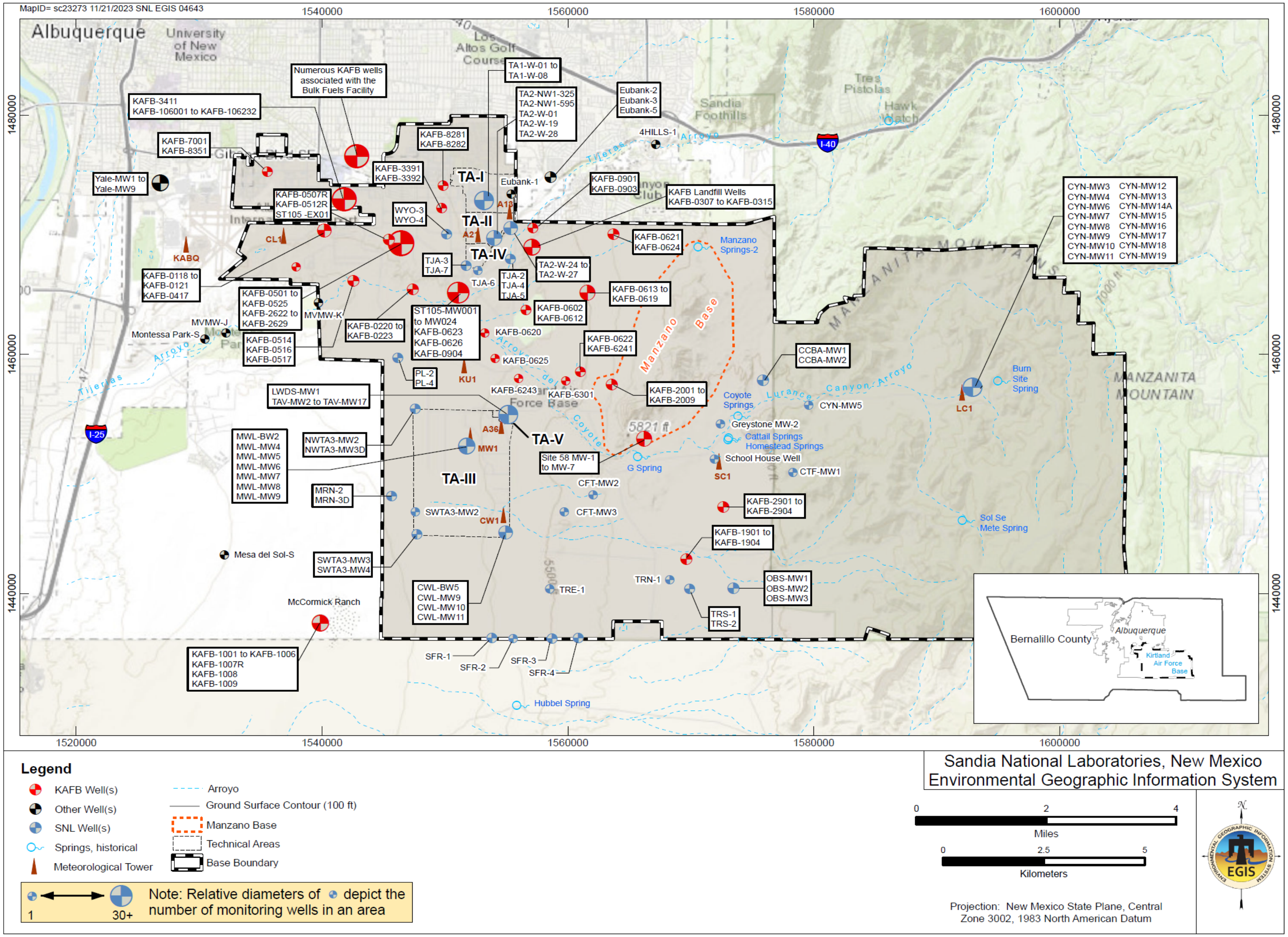

Figure 1-4
Wells and Springs within Sandia National Laboratories, New Mexico and Kirtland Air Force Base

Table 1-1
Sample Collection Dates for Groundwater Quality Monitoring at Sandia National Laboratories, New Mexico, Calendar Year 2023

2023 Sampling Event	GMP	CWL	MWL	TAVG AOC	TAG AOC	BSG AOC
January	✓	✓				
February	✓			✓		
March	✓			✓	✓	
April				✓		✓
May			✓		✓	✓
June			✓		✓	
July		✓		✓		
August				✓	✓	
September				✓	✓	
October				✓		✓
November			✓		✓	✓
December					✓	

Notes:
AOC = Area of Concern
BSG = Burn Site Groundwater
CWL = Chemical Waste Landfill
GMP = Groundwater Monitoring Program
MWL = Mixed Waste Landfill
TAG = Tijeras Arroyo Groundwater
TAVG = Technical Area-V Groundwater

Table 1-2
Summary of Sandia National Laboratories, New Mexico Groundwater Monitoring Analytical Results for Calendar Year 2023

SNL/NM Groundwater Monitoring	
Number of Active Wells/Springs Monitored	76
Number of Analyses Performed	11,042
Percent of Non-detected Results	84%

Analyte	Number of Detections	Number of Non-Detections	Minimum Detected Value	Maximum Detected Value	Mean Detected Value	EPA MCL
Summary of Field Water Quality Parameters (units as indicated below)						
pH in SU	NA	NA	6.07	7.89	7.41	NE
Specific Conductivity in µmho/cm	NA	NA	277.7	3945	690.6	NE
Temperature in °C	NA	NA	10.88	27.62	19.10	NE
Turbidity in NTU	NA	NA	0.02	6.32	0.91	NE
Detected Organic Compounds in µg/L						
Acetone	1	119	2.05	2.05	2.05	NE
Chloroform	16	130	0.360	1.10	0.709	80.0[a]
Dichloroethane, 1,1-	10	131	0.380	7.75	5.32	NE
Dichloroethene, 1,1-	11	135	1.08	3.45	2.27	7.0
Dichloroethene, cis-1,2-	29	112	0.350	6.71	2.22	70.0
Tetrachloroethene	12	134	0.540	11.9	6.21	5.0
Toluene	10	131	0.400	1.16	0.863	1000
Trichlorobenzene, 1,2,4-	1	130	0.490	0.490	0.490	70.0
Trichloroethene	65	86	0.410	22.4	5.29	5.0
Detected Inorganic Parameters in mg/L						
Nitrate plus Nitrite, as N	150	0	0.120	33.8	8.29	10
Bromide	74	0	0.144	2.93	0.590	NE
Chloride	74	0	10.6	491	62.0	NE
Fluoride	74	0	0.141	2.55	0.998	4.0
Sulfate	74	0	16.8	2100	145	NE
Total Organic Halogens	9	12	0.00370	0.172	0.0343	NE
Total Phenols	4	17	0.00397	0.0421	0.0183	NE
Alkalinity as $CaCO_3$	74	0	81.4	1020	212	NE

Refer to Notes at end of table.

Table 1-2 (continued)
Summary of Sandia National Laboratories, New Mexico Groundwater Monitoring Analytical Results for Calendar Year 2023

Analyte	Number of Detects	Number of Non-Detects	Minimum Detected Value	Maximum Detected Value	Mean Detected Value	EPA MCL
Detected Metals in mg/L						
Aluminum	10	64	0.0239	0.237	0.125	NE
Antimony	3	71	0.00118	0.00184	0.00144	0.006
Arsenic	43	31	0.00201	0.00936	0.00300	0.010
Barium	74	0	0.00915	0.236	0.0689	2.0
Beryllium	4	70	0.000250	0.00756	0.00429	0.004
Cadmium	2	82	0.000367	0.000436	0.000402	0.005
Calcium	74	0	36.7	341	89.4	NE
Chromium	6	88	0.00341	0.0321	0.00994	0.100
Cobalt	6	68	0.000330	0.00953	0.00369	NE
Copper	25	49	0.000301	0.000895	0.000503	NE
Iron	33	41	0.0344	0.217	0.0718	NE
Magnesium	74	0	3.55	67	20.3	NE
Manganese	16	58	0.0010	1.43	0.189	NE
Molybdenum	40	0	0.000712	0.0170	0.00376	NE
Nickel	16	78	0.000600	0.0232	0.00402	NE
Potassium	74	0	1.21	29.5	3.79	NE
Selenium	55	19	0.00155	0.0320	0.00478	0.050
Sodium	74	0	14.3	1060	80.1	NE
Thallium	2	72	0.00124	0.00125	0.00125	0.002
Uranium	59	0	0.00101	0.00925	0.00385	0.030
Vanadium	54	20	0.00412	0.0107	0.00717	NE
Zinc	21	53	0.00340	0.164	0.0331	NE

Refer to Notes at end of table.

Table 1-2 (concluded)
Summary of Sandia National Laboratories, New Mexico Groundwater Monitoring Analytical Results for Calendar Year 2023

Analyte	Number of Detects	Number of Non-Detects	Minimum Detected Value	Maximum Detected Value	Mean Detected Value	EPA MCL
Detected Radiochemistry Activities in pCi/L (unless noted otherwise)						
Alpha, gross (corrected)	84	0	-6.63	12.27	1.16	15.0[b]
Beta, gross	81	3	1.68	21.7	5.03	4 mrem/yr
Potassium-40	4	77	44.5	86.5	58.5	NE
Radium-226	14	7	0.249	2.72	0.900	5.0[c]
Radium-228	10	11	0.449	1.26	0.713	5.0[c]
Radon-222	10	0	87.7	450	247	4000
Uranium-233/234	28	0	0.46	36.1	10.9	NE
Uranium-235/236	22	6	0.0425	0.703	0.246	NE
Uranium-238	28	0	0.068	6.62	2.24	NE

Notes:

Only includes analytes/parameters that had validated detections.

[a] = The 80.0 µg/L EPA MCL is for combined trihalomethanes
[b] = The 15.0 pCi/L EPA MCL is for corrected gross alpha activity
[c] = The 5.0 pCi/L EPA MCL is for combined radium-226 and radium-228
4 mrem/yr = Any combination of beta- and/or gamma-emitting radionuclides (as dose rate)
°C = degrees Celsius
% = percent
µg/L = micrograms per liter
µmho/cm = micromhos per centimeter
$CaCO_3$ = calcium carbonate
Corrected = gross alpha results reported as corrected values (uranium activities subtracted out)
MCL = maximum contaminant level (established by the U.S. Environmental Protection Agency [EPA] Primary Drinking Water Regulations [EPA, March 2018])
mg/L = milligrams per liter
mrem/yr = millirems per year
N = nitrogen
NA = not applicable
NE = not established
NTU = nephelometric turbidity units
pCi/L = picocuries per liter
pH = potential of hydrogen (negative logarithm of the hydrogen ion concentration)
rem = roentgen equivalent man
SNL/NM = Sandia National Laboratories, New Mexico
SU = standard units

Table 1-3
Summary of Exceedances for Sandia National Laboratories, New Mexico Groundwater Monitoring Wells and Springs Sampled in Calendar Year 2023

Analyte	Well (Relevant Chapter)	Exceedance	Date
Beryllium EPA MCL = 0.004 mg/L	Coyote Springs (Ch. 2)	0.00752 mg/L[a]	February 2023
	Coyote Springs (Duplicate) (Ch. 2)	0.00756 mg/L[a]	February 2023
Nitrate plus Nitrite (as Nitrogen) EPA MCL = 10 mg/L	CYN-MW9 (Ch. 7)	33.6 mg/L	May 2023
		33.8 mg/L	October 2023
	CYN-MW9 (Duplicate) (Ch. 7)	33.3 mg/L	May 2023
	CYN-MW10 (Ch. 7)	20.9 mg/L	May 2023
		25.8 mg/L	October 2023
	CYN-MW12 (Ch. 7)	16.6 mg/L	May 2023
		15.8 mg/L	October 2023
	CYN-MW13 (Ch. 7)	26.2 mg/L	May 2023
		26.7 mg/L	November 2023
	CYN-MW13 (Duplicate) (Ch. 7)	27.1 mg/L	November 2023
	CYN-MW14A (Ch. 7)	12.3 mg/L	May 2023
		12.1 mg/L	October 2023
	LWDS-MW1 (Ch. 5)	12.1 mg/L	March 2023
		13.0 mg/L	August 2023
	TA2-W-19 (Ch. 6)	12.7 mg/L	March 2023
		12.4 mg/L	June 2023
		12.7 mg/L	September 2023
		12.2 mg/L	November 2023
	TA2-W-19 (Duplicate) (Ch. 6)	12.4 mg/L	November 2023
	TA2-W-28 (Ch. 6)	17.9 mg/L	March 2023
		18.9 mg/L	June 2023
		18.7 mg/L	September 2023
		18.2 mg/L	November 2023
	TA2-W-28 (Duplicate) (Ch. 6)	19.5 mg/L	June 2023
	TAV-MW10 (Ch. 5)	12.8 mg/L	February 2023
		12.6 mg/L	September 2023
	TAV-MW10 (Duplicate) (Ch. 5)	12.6 mg/L	September 2023
	TJA-2 (Ch. 6)	12.0 mg/L	March 2023
		12.5 mg/L	June 2023
		12.3 mg/L	September 2023
		12.5 mg/L	November 2023
	TJA-4 (Ch. 6)	30.5 mg/L	March 2023
		30.3 mg/L	June 2023
		30.3 mg/L	September 2023
		31.3 mg/L	November 2023
	TJA-5 (Ch. 6)	14.5 mg/L	September 2023
	TJA-5 (Duplicate) (Ch. 6)	13.4 mg/L	September 2023
	TJA-7 (Ch. 6)	21.9 mg/L	March 2023
		20.8 mg/L	June 2023
		20.7 mg/L	September 2023
		21.5 mg/L	November 2023
Tetrachloroethene EPA MCL = 5.0 µg/L	TA2-W-26 (Ch. 6)	11.9 µg/L	March 2023
		10.4 µg/L	June 2023
		5.48 µg/L	September 2023
		7.78 µg/L	December 2023
	TA2-W-26 (Duplicate) (Ch. 6)	10.6 µg/L	March 2023
		10.7 µg/L	June 2023
		5.40 µg/L	September 2023
		7.42 µg/L	December 2023

Refer to Notes at end of table.

Table 1-3 (concluded)
Summary of Exceedances for Sandia National Laboratories, New Mexico Groundwater Monitoring Wells and Springs Sampled in Calendar Year 2023

Analyte	Well (Relevant Chapter)	Exceedance	Date
Trichloroethene EPA MCL = 5.0 µg/L	LWDS-MW1 (Ch. 5)	13.3 µg/L	March 2023
		7.71 µg/L	August 2023
	TA2-W-26 (Ch. 6)	22.4 µg/L	March 2023
		21.5 µg/L	June 2023
		13.9 µg/L	September 2023
		16.8 µg/L	December 2023
	TA2-W-26 (Duplicate) (Ch. 6)	20.7 µg/L	March 2023
		21.4 µg/L	June 2023
		13.9 µg/L	September 2023
		16.5 µg/L	December 2023
	TAV-MW4 (Ch. 5)	5.70 µg/L	February 2023
		6.58 µg/L	August 2023
	TAV-MW4 (Duplicate) (Ch. 5)	5.89 µg/L	February 2023
	TAV-MW6 (Ch. 5)	7.68 µg/L	February 2023
		10.3 µg/L	August 2023
	TAV-MW6 (Duplicate) (Ch. 5)	7.40 µg/L	February 2023
	TAV-MW8 (Ch. 5)	5.37 µg/L	February 2023
		5.37 µg/L	August 2023
	TAV-MW10 (Ch. 5)	10.6 µg/L	February 2023
		9.21 µg/L	September 2023
	TAV-MW10 (Duplicate) (Ch. 5)	9.21 µg/L	September 2023
	TAV-MW14 (Ch. 5)	5.15 µg/L	February 2023
	TJA-7 (Ch. 6)	5.52 µg/L	June 2023
		5.43 µg/L	November 2023

Notes:

[a]	= analytical result for filtered water sample (all other analytical results are for unfiltered water samples)
µg/L	= micrograms per liter
Ch.	= Chapter
CYN	= Canyons
EPA	= U.S. Environmental Protection Agency
LWDS	= Liquid Waste Disposal System (monitoring well designation only)
MCL	= maximum contaminant level
mg/L	= milligrams per liter
MW	= Monitoring Well
TA2-W	= Technical Area-II (Well) (monitoring well designation only)
TAV	= Technical Area-V (monitoring well designation only)
TJA	= Tijeras Arroyo (monitoring well designation only)

This Report includes groundwater monitoring data for both hazardous and radioactive constituents; however, the monitoring data for radionuclides are provided voluntarily by DOE/NNSA and SNL/NM personnel. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement, because such information falls wholly outside the requirements of the *Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act 74-4-10: Sandia National Laboratories Consent Order* (Consent Order) (New Mexico Environment Department [NMED], April 2004), as Section III.A of the Consent Order specifies.

Some information in this Report is provided in reports that DOE Order 231.1B, Admin Chg 1, *Environment, Safety, and Health Reporting* (DOE, November 2012), requires. Such reports include the *Sandia National Laboratories, New Mexico 2023 Annual Site Environmental Report* (SNL/NM, August 2023).

1.2.2 Regulatory Criteria

1.2.2.1 Site-Wide Criteria

Groundwater monitoring at SNL/NM is subject to three broad sets of regulations: (1) the *Resource Conservation and Recovery Act Facility Operating Permit for Sandia National Laboratories, EPA ID No. NM5890110518* (RCRA Permit) (NMED, January 2015, as modified); (2) the Consent Order (NMED, April 2004), which is an enforceable agreement between the NMED, DOE/NNSA, and SNL/NM that took effect on April 29, 2004; and (3) various DOE Directives.

Potential release sites at SNL/NM are identified, characterized, and remediated (if required) under the RCRA Permit. In 1984, the Resource Conservation and Recovery Act was significantly amended by the Hazardous and Solid Waste Amendments, which specifically addressed remediation of legacy contamination, including groundwater at Solid Waste Management Units (SWMUs). The RCRA Permit defines a SWMU as any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. SWMUs at SNL/NM are regulated under the RCRA Permit, with monitoring and/or corrective action requirements generally determined on a SWMU-specific basis following a site investigation.

Per Section III.W.1. of the Consent Order, corrective actions for hazardous waste and hazardous constituent releases at SNL/NM are conducted under the Consent Order rather than under the RCRA Permit. Of note, this provision does not apply to the following four items, which fall under the RCRA Permit: (1) new releases from operating units, (2) closure and post-closure at operating units, (3) implementation of controls for any SWMU on the RCRA Permit's Corrective Action Complete (CAC) with Controls list, and (4) any hazardous waste or hazardous constituent releases that occur after the Consent Order is no longer in effect.

1.2.2.2 Site-Specific Criteria

<u>*Groundwater Monitoring Program*</u>

All GMP groundwater monitoring activities are performed and documented in accordance with the Consent Order. The sampling activities comply with the Consent Order requirements for facility investigation and periodic monitoring. The analytical results for groundwater samples collected from GMP monitoring wells are compared to both the EPA MCLs and the maximum allowable concentrations (MACs) for drinking water, where established. The MACs are the State of New Mexico drinking water standards (NMWQCC, December 2018).

Chemical Waste Landfill

The CWL is a remediated, closed, regulated unit undergoing post-closure care in accordance with the *Final Permit Decision and Response to Comments, Post-Closure Care Permit for the Chemical Waste Landfill, Sandia National Laboratories, EPA ID No. NM5890110518, SNL-06-002* (CWL PCCP) (NMED, October 2009, as modified), which took effect on June 2, 2011 (NMED, June 2011). All CWL groundwater monitoring activities are performed and documented in accordance with the CWL PCCP.

Mixed Waste Landfill

The MWL is a SWMU that underwent corrective action in accordance with the Consent Order and was granted CAC with Controls status on March 13, 2016 (NMED, February 2016a). All MWL groundwater monitoring activities are performed and documented in accordance with the *Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan* (SNL/NM, March 2012, as modified), which took effect on January 8, 2014 (NMED, January 2014) and is incorporated into the RCRA Permit (NMED, February 2016b).

Groundwater Areas of Concern

The three groundwater AOCs (TAVG, TAG, and BSG) are areas that may have had a hazardous waste or hazardous constituent release but are not SWMUs (NMED, April 2004, Section III.B.). These three AOCs are undergoing corrective action, with all AOC groundwater monitoring activities performed and documented in accordance with the Consent Order. Each AOC investigation must comply with the Consent Order requirements for site characterization and the development of a Corrective Measures Evaluation.

The NMED hazardous Waste Bureau is the regulatory agency responsible for enforcing the Consent Order requirements for each AOC (SNL/NM, June 2004, July 2004, December 2004). In addition to groundwater monitoring requirements, the Consent Order sets forth requirements for installing and decommissioning monitoring wells, as well as recommendations for informing the public about each AOC's status. Recent efforts to inform the public about each AOC's status include presentations at DOE/NNSA in-person and virtual public meetings held in April 2023 and October 2023, respectively.

1.3 Field and Analytical Methods and Procedures

This section describes how the CY 2023 groundwater data for SNL/NM were collected and analyzed. The methods and procedures cited are consistent with those the EPA sets forth in its *RCRA Ground-Water Monitoring Technical Enforcement Guidance Document* (EPA, 1986a) and, unless otherwise specified, were implemented by SNL/NM personnel. Chapters 2.0 through 7.0 present the site-specific variances in the methods and procedures.

1.3.1 Field Methods and Measurements

1.3.1.1 Groundwater Elevation

Water level measurements were obtained per the process outlined in field operating procedure (FOP) 03-02, *Groundwater Level Data Acquisition and Management* (SNL/NM, August 2021), to determine groundwater flow directions, hydraulic gradients, and groundwater elevations. Chapters 2.0 through 7.0 present the water level information. The groundwater elevation data were used to construct the CY 2023 potentiometric surface maps and hydrographs.

1.3.1.2 Well Purging and Water Quality Measurements

A portable Bennett groundwater sampling system was used to collect groundwater samples from the monitoring wells. The minimum purge requirement for the portable piston pump is one saturated screen volume (including annulus).The field water quality parameters measured (Table 1-4) consisted of dissolved oxygen (DO), oxidation-reduction potential (ORP), potential of hydrogen (pH), specific conductivity (SC), temperature, and turbidity. The field water quality parameter measurements for each well were recorded during purging per the process outlined in FOP 05-01, *Groundwater Monitoring Well Sampling and Field Analytical Measurements* (SNL/NM, January 2021a). Temperature, SC, ORP, pH, and DO were measured with an In-Situ Aqua TROLL 600 multiparameter water quality sonde. Turbidity was measured with a HACH Model 2100Q turbidity meter.

Table 1-4
Field Water Quality Parameters Measured at Monitoring Wells

Field Parameter	Comments
Dissolved Oxygen	Percentage of saturation value and/or measured in mg/L.
Oxidation-Reduction Potential	Measured in mV.
pH	Stability measure: Four consecutive measurements within 0.1 pH units.
Sample Flow Rate	Measured in gpm.
Specific Conductivity (µmho/cm)	Stability measure: Four consecutive measurements within 5%.
Temperature (°C)	Stability measure: Four consecutive measurements within 1°C.
Turbidity (NTU)	Stability measure: Four consecutive measurements within 10% or less than 5 NTU.

Notes:
°C = degrees Celsius
% = percent
µmho/cm = micromhos per centimeter
gpm = gallons per minute
mg/L = milligrams per liter
mV = millivolts
NTU = nephelometric turbidity unit
pH = potential of hydrogen (negative logarithm of the hydrogen ion concentration)

The amount of water required to stabilize the field water quality parameters is fairly consistent for a particular monitoring well; however, the aquifer's ability to produce water can vary greatly from well to well. Per the site-specific mini-sampling and analysis plans (SAPs) (Chapters 2.0 through 7.0), purging continued until temperature, SC, pH, and turbidity met the following stability criteria:

- Temperature: Four consecutive readings within 1.0 degree Celsius of each other.
- SC: Four consecutive readings within 5 percent of each other.
- pH: Four consecutive readings within 0.1 units of each other.
- Turbidity: Four consecutive readings within 10 percent of each other or less than 5 nephelometric turbidity units.

Due to severely low hydraulic conductivities, several monitoring wells purged dry during purging. These wells were allowed to recover overnight before sample collection to ensure collection of the most representative groundwater samples possible given the low yields. The field measurement logs documenting the well purging details and field water quality parameter measurements for each sampling event were submitted to the SNL/NM Customer Funded Records Center (CFRC) for retention.

1.3.1.3 Pump Decontamination

The sampling pump and tubing bundle associated with the portable Bennett groundwater sampling system were decontaminated per the process outlined in FOP 05-03, *Groundwater Monitoring Equipment Decontamination* (SNL/NM, January 2021b), before they were placed in each monitoring well. Equipment blank (EB) samples (Section 1.3.4.2) were collected to verify decontamination.

1.3.1.4 Sample Collection

The groundwater samples were collected with a nitrogen gas-powered portable piston pump (Bennett) per the process outlined in FOP 05-01, *Groundwater Monitoring Well Sampling and Field Analytical Measurements* (SNL/NM, January 2021a). The sample containers were filled directly from the pump discharge line and water sampling manifold.

1.3.1.5 Sample Handling and Shipment

The groundwater samples were submitted to the SNL/NM Sample Management Office (SMO) for processing and shipment to an off-site laboratory for analysis. The SMO staff obtains sample containers, issues sample control and tracking numbers, tracks chain-of-custody forms, and reviews analytical laboratory data packages to determine method, contract, and regulatory project-specific compliance.

The off-site laboratory analyzed the groundwater samples using the applicable EPA and DOE-specified methods and protocols (Section 1.3.2) and reported the associated quality control (QC) data, which were reviewed against the quality assurance requirements specified in SMO-05-03, *Procedure for Completing the Contract Verification* (SNL/NM, April 2022), and administrative operating procedure (AOP) 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL/NM, June 2020, June 2023). Data Packages 1 through 6 provide the data validation reports and Level C or higher analytical laboratory data packages.

1.3.1.6 Waste Management

All waste generated by the sampling activities was managed per the process outlined in FOP 05-04, *Groundwater Monitoring Waste Management* (SNL/NM, January 2021c). The purge and decontamination wastewater was containerized and stored in the hazardous waste central accumulation area. All wastewater was discharged to the sanitary sewer in accordance with ABCWUA and project-specific regulatory requirements after the waste characterization data were compared to the ABCWUA discharge limits and a discharge approval was issued in accordance with Sandia corporate policy.

1.3.2 Analytical Methods

Tables 1-5 and 1-6 list the EPA and DOE-specified methods and protocols used to analyze the groundwater samples.

Table 1-5
Chemical Analytical Methods

Analyte	Analytical Method[a]
Alkalinity (total, bicarbonate, and carbonate)	SM 2320B
Anions	SW846-9056A
Filtered Metals (including Cations)	SW846-6020B/7470A
HE Compounds	SW846-8330B
NPN	EPA 353.2
PFHxS, PFOS, PFOA	EPA 537.1M
TAL Metals	SW846-6020B/7470A
Total Cyanide	SW846-9012B
Total Organic Halogens	SW846-9020B
TPH Diesel Range Organics	SW846-8015D
TPH Gasoline Range Organics	SW846-8015A/B
Total Phenol	SW846-9066
VOCs	SW846-8260D

Notes:

[a]**Analytical Method References**

Rice, E.W.,Baird, R.B., Eaton, A.D., and Clesceri. L.S. (2012). *Standard Methods for the Examination of Water and Wastewater*, 23rd ed. American Public Health Association, American Water Works Association, and Water Environment Federation.

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U.S. Environmental Protection Agency. (March 2020, as updated). *Method 537.1, Determination of Selected Per- and Polyfluorinated Alkyl Substances in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS)*, EPA/600/R-20/006, Version 2.0 [modified for groundwater].

EPA = U.S. Environmental Protection Agency
HE = high explosive
NPN = nitrate plus nitrite (reported as nitrogen)
PFHxS = perfluorohexane sulfonic acid
PFOS = perfluorooctane sulfonic acid
PFOA = perfluorooctanoic acid
SM = Standard Method
SW = Solid Waste
TAL = Target Analyte List
TPH = total petroleum hydrocarbons
VOC = volatile organic compound

Table 1-6
Radiochemical Analytical Methods

Analyte	Analytical Method[a]
Gamma Spectroscopy (short list[b])	EPA 901.1
Gross Alpha/Beta Activity	EPA 900.0
Isotopic Uranium	HASL-300
Radon-222	SM7500 Rn B
Radium-226	EPA 903.1M
Radium-228	EPA 904.0
Tritium	EPA 906.0M

Notes:
[a]**Analytical Method References**
Rice, E.W., Baird, R.B., Eaton, A.D., and Clesceri, L.S. (2012). *Standard Methods for the Examination of Water and Wastewater*, 23rd ed. American Public Health Association, American Water Works Association, and Water Environment Federation.
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[b]Gamma spectroscopy short list (americium-241, cesium-137, cobalt-60, and potassium-40)
DOE = U.S. Department of Energy
EPA = U.S. Environmental Protection Agency
HASL = Health and Safety Laboratory
SM = Standard Method

1.3.3 Quality Control Samples

Field and laboratory QC samples were prepared and analyzed along with the groundwater samples (also referred to as environmental samples) to determine the accuracy and precision of the analytical methods and to detect inadvertent sample contamination that may have occurred during the sampling and analysis process. Table 1-7 lists the types of QC samples that accompanied the groundwater samples in the sampling and analysis process.

Upon receipt at SNL/NM, all analytical results were reviewed and qualified per the guidelines provided in AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL/NM, June 2020, June 2023). The analytical results (Chapter 2.0 through Chapter 7.0 attachments) include the validation qualifiers. The data validation reports for each sampling event (Data Packages 1 through 6) were submitted to the CFRC for retention.

1.3.4 Field Quality Control Samples

The field QC samples included environmental duplicate, EB, field blank (FB), and trip blank (TB) samples. They were submitted for analysis with the groundwater samples per the processes outlined in the site-specific mini-SAPs (Chapters 2.0 through 7.0).

1.3.4.1 Environmental Duplicate Samples

Environmental duplicate samples were collected to estimate the overall reproducibility of the sampling and analysis process. The environmental duplicate sample was collected immediately after the original environmental sample to reduce variability caused by time and/or sampling mechanics. The environmental duplicate sample results (for concentrations above the MDLs in the environmental and environmental duplicate samples only) were used to calculate relative percent differences.

Chapters 2.0 through 7.0 summarize the CY 2023 environmental duplicate sample results.

Table 1-7
Quality Control Sample Types for Groundwater Sampling and Analysis

QC Sample Type	Purpose
Field QC	
Duplicate samples	Establish the precision of the sampling process.
Equipment blanks	Verify the effectiveness of sampling pump and tubing bundle decontamination to ensure that cross-contamination between wells did not occur.
Field blanks	Determine whether contamination of the VOC samples from ambient field conditions occurred.
Trip blanks	Determine whether VOC contamination occurred during sample collection, handling, shipment, storage, or analysis.
Laboratory QC	
Batch matrix spike and matrix spike duplicate samples	Measure the percent recovery and RPD of chemical spikes added to an existing sample to determine the sample matrix effect. The matrix is groundwater.
LCS	Monitor the accuracy and precision of the laboratory's analytical method using laboratory-prepared samples spiked with a known concentration of an analyte. These samples are analyzed in the same batch with the groundwater samples. LCS results are reported as a percent recovery.
Method blanks	Determine whether contaminants were inadvertently introduced during the sample preparation and handling process in the laboratory.
Sample replicate	Determine precision for non-organic analyses.
Surrogate spike	Demonstrate matrix compatibility with the chosen method of analysis of organic compounds.

Notes:
GRO = gasoline range organics
LCS = laboratory control sample
QC = quality control
RPD = relative percent difference
VOC = volatile organic compound

1.3.4.2 Equipment Blank Samples

EB samples were collected periodically to verify sampling pump and tubing bundle decontamination (Section 1.3.1.3). They were analyzed for the same constituents as the groundwater samples.

Chapters 2.0 through 7.0 summarize the CY 2023 EB sample results.

1.3.4.3 Field Blank Samples

FB samples were collected to determine whether sample contamination from ambient field conditions occurred. They were prepared by pouring deionized water into sample containers at the sample point (i.e., inside the sampling truck at each well location) to simulate the transfer of water from the sampling system to the sample container.

FB samples are contained in 40-milliliter glass vials and are commonly analyzed for volatile organic compounds (VOCs) and gasoline range organics (GRO).

Chapters 2.0 through 7.0 summarize the CY 2023 FB sample results.

1.3.4.4 Trip Blank Samples

TB samples were submitted to determine whether sample contamination during sample collection, transport, storage, or analysis occurred.

TB samples are submitted whenever groundwater samples are collected for VOC and/or GRO analyses. They consist of laboratory reagent-grade water with hydrochloric acid preservative contained in 40-milliliter glass vials. These containers are prepared by the off-site laboratory and accompany the empty laboratory-supplied sample containers. TB samples accompany each groundwater sample shipment and are analyzed for VOCs and/or GRO.

Chapters 2.0 through 7.0 summarize the CY 2023 TB sample results.

1.3.5 Laboratory Quality Control Samples

Laboratory and method-required batch QC samples were prepared to determine whether sample contamination from laboratory processes occurred.

Laboratory and method-required batch QC samples are used to assist with data validation and defensibility and include laboratory control samples, replicate samples, matrix spike and matrix spike duplicates, method blank samples, and surrogate spike samples. The internal laboratory QC samples are analyzed concurrently with the groundwater samples.

Upon receipt at SNL/NM, all analytical results were reviewed and qualified per the guidelines provided in AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL/NM, June 2020, June 2023). The analytical results (Chapter 2.0 through 7.0 attachments) include the laboratory qualifiers.

Chapter 1.0
Introduction References

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2.0 Long-Term Stewardship Groundwater Monitoring Program

2.1 Introduction

This chapter summarizes the calendar year (CY) 2023 groundwater monitoring activities and results for the Long-Term Stewardship Groundwater Monitoring Program (hereafter referred to as the GMP). The activities included groundwater and surface water sampling, sample analysis, and water level and groundwater elevation measurements.

As part of the Sandia National Laboratories, New Mexico (SNL/NM) Environmental Management System, the GMP maintains the GMP monitoring well network, which consists of 16 monitoring wells located throughout Kirtland Air Force Base (KAFB) in areas not specifically affiliated with Solid Waste Management Units (SWMUs) or Areas of Concern (AOCs). This network facilitates site-wide monitoring of the groundwater at SNL/NM.

Historically, the GMP monitoring well network consisted of 12 monitoring wells but was expanded to 16 monitoring wells in CY 2019 with the addition of existing monitoring wells CCBA-MW2, CTF-MW1, CYN-MW5, and OBS-MW1 (Figure 2-1). These four wells had been installed for investigations associated with specific SWMUs previously granted Corrective Action Complete status. The SNL/NM Environmental Restoration Operations Program transferred these four wells to the GMP in CY 2019 because they filled data gaps in the geographic distribution of the GMP monitoring well network by adding more locations in the fractured bedrock aquifer system.

Groundwater monitoring via the GMP began in 2007 and continues for the purpose of establishing background groundwater quality and understanding the general hydrogeologic system beneath SNL/NM. In support of this purpose, SNL/NM personnel:

- Evaluate groundwater quality sampling and analysis and groundwater elevation measurements.
- Record and maintain groundwater information in a digital database.
- Maintain documents and records and ensure that necessary reports are submitted to the appropriate agencies in a timely manner.
- Prepare and maintain administrative and field operating procedures for groundwater monitoring activities.
- Assist well owners with well installation, inspection, maintenance, plugging, and abandonment.
- Establish and implement well registration and construction data tracking requirements.
- Work with the Surface Water Discharge Program and other SNL/NM organizations to prevent groundwater contamination.
- Provide regulators and other stakeholders with updated groundwater data for SNL/NM through annual groundwater monitoring reports (AGMRs).
- Support compliance activities at the three groundwater AOCs (Technical Area-V, Tijeras Arroyo, and Burn Site) and background locations.

The GMP's objectives are to:

- Establish baseline groundwater quality and groundwater flow information for the Regional Aquifer, Perched Groundwater System (PGWS), and fractured bedrock aquifer system at SNL/NM.
- Determine the impact, if any, of operations at SNL/NM on groundwater quality and quantity.
- Demonstrate compliance with federal, state, and local groundwater requirements.

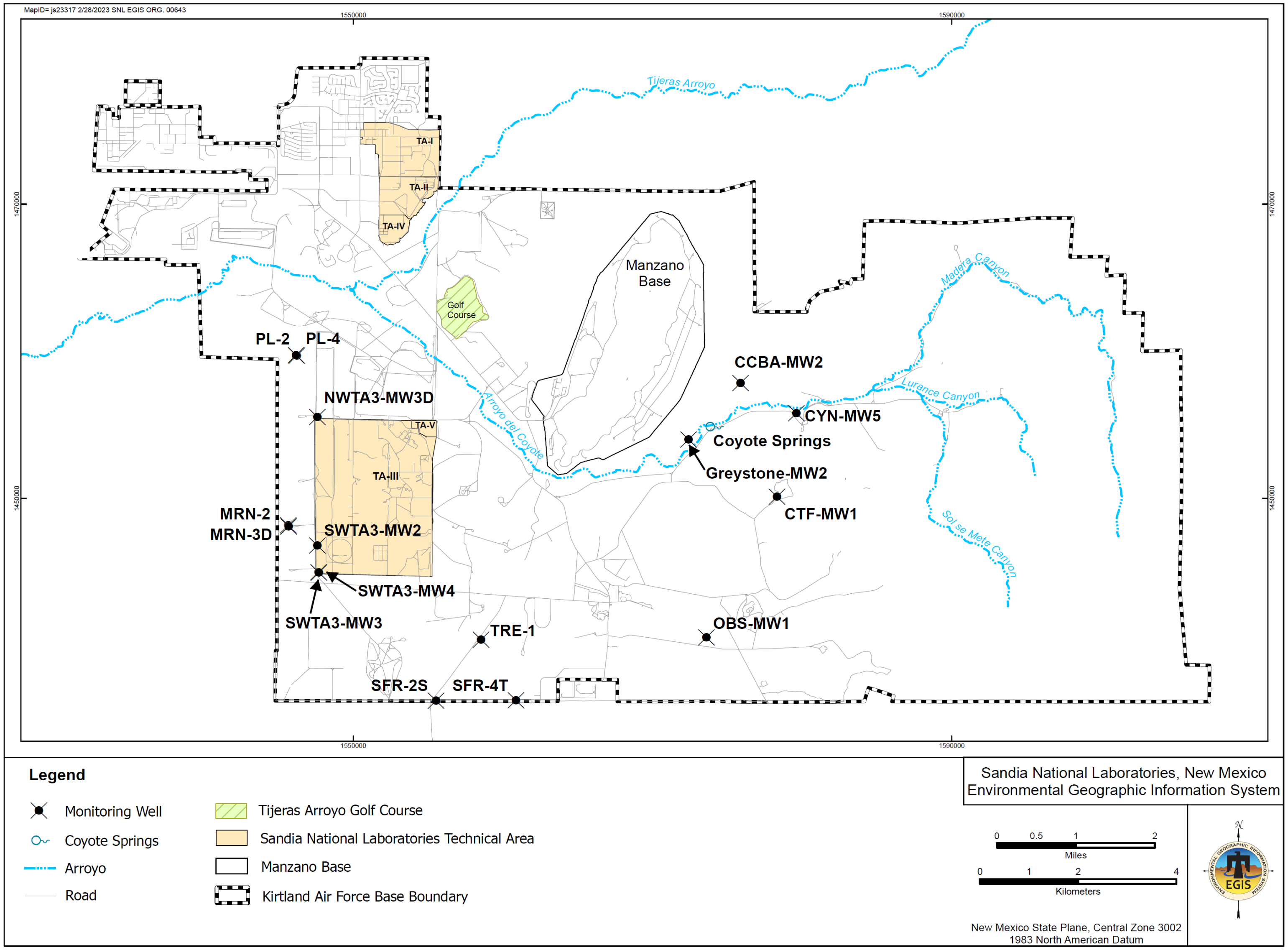

Figure 2-1
Groundwater Monitoring Program Monitoring Well Network

The GMP is responsible for tracking the information for all SNL/NM monitoring wells. The GMP Well Registry and Oversight Task was established to ensure that SNL/NM monitoring wells are constructed and maintained per the guidelines the New Mexico Office of the State Engineer specifies in *Rules and Regulations Governing Well Driller Licensing; Construction, Repair and Plugging of Wells* (NMOSE, August 2005) and the *Well Plugging Handbook* (NMOSE, June 2020). The GMP Lead works with SNL/NM personnel to review new well installation plans, record construction information, track well ownership and maintenance records, perform annual well inspections, and consult with well owners when plugging and abandoning or replacing obsolete wells. The goal is to provide full lifecycle management of all SNL/NM monitoring wells, as well as deep boreholes.

2.2 Regulatory Criteria

As part of the SNL/NM Environmental Management System, the GMP is subject to the following SNL/NM requirements for program success:

- Meet all applicable federal, state, and DOE requirements.
- Document the history of GMP activities for future site management.
- Document SNL/NM's baseline groundwater quality.

Groundwater monitoring via the GMP is subject to the *Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act 74-4-10: Sandia National Laboratories Consent Order* (Consent Order) (New Mexico Environment Department [NMED], April 2004). Among other sampling requirements, the Consent Order requires that new monitoring wells be monitored for perchlorate quarterly until they have four consecutive non-detects at or below the screening level of 4 micrograms per liter (µg/L) (NMED, April 2004, Section IV.B.). If perchlorate above 4 µg/L is detected in a new monitoring well, DOE/NNSA and SNL/NM personnel will continue to monitor the well at a frequency negotiated with the NMED and determine the nature and extent of perchlorate contamination (NMED, April 2004, Section VI.K.1.b.). If contaminants have been released into the environment and corrective measures are necessary to protect human health and the environment, DOE/NNSA and SNL/NM personnel will complete a Corrective Measures Evaluation and proceed as the Consent Order directs (NMED, April 2004, Section VII.C.).

Per the DOE/NNSA Sandia Field Office's agreement with the NMED DOE Oversight Bureau (OB), the GMP splits a percentage of the groundwater samples it collects and gives the duplicate samples to the OB. Laboratories under contract to the OB analyze the duplicate samples. The OB then provides independent verification of the results. Table 2-1 presents the quality standards that apply to all groundwater samples.

This chapter and its attachments include groundwater monitoring data for both hazardous and radioactive constituents; however, the monitoring data for radionuclides (gamma spectroscopy, gross alpha/beta activity, radium-226, radium-228, and isotopic uranium) are provided voluntarily by DOE/NNSA and SNL/NM personnel. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement, because such information falls wholly outside the requirements of the Consent Order (NMED, April 2004), as Section III.A of the Consent Order specifies.

Table 2-1
Groundwater Quality Regulations

Regulation/Requirements	Standards and Guides	Regulating Agency
National Primary Drinking Water Regulations (40 CFR Part 141)	MCL	EPA (EPA, March 2018)
NMWQCC [a] Standards for Groundwater (20.6.2.3103A NMAC Human Health Standards)	MAC	NMED (NMWQCC, December 2018)

Notes:
[a] MACs for human health are identified in the analytical results tables in Attachment 2A.
CFR = Code of Federal Regulations
EPA = U.S. Environmental Protection Agency
MAC = maximum allowable concentration
MCL = maximum contaminant level
NMAC = New Mexico Administrative Code
NMED = New Mexico Environment Department
NMWQCC = New Mexico Water Quality Control Commission

2.3 Scope of Activities

GMP groundwater monitoring activities in CY 2023 included:

- Annual collection and analysis of groundwater and surface water samples from 16 monitoring wells and Coyote Springs (Figure 2-1), respectively.
- Water level and groundwater elevation measurements.
- Preparation of hydrographs (Attachment 2B) and a base-wide potentiometric surface map (Plate 1).
- Submittal of the *Comprehensive Site-Wide Groundwater Monitoring Plan (Revised), Calendar Year 2024* (SNL/NM, April 2023) to the NMED.

2.3.1 Groundwater Quality Monitoring

The annual groundwater sampling event was conducted during the period of January 23 to March 31, 2023. Groundwater samples (also referred to as environmental samples) were collected from monitoring wells CCBA-MW2, CTF-MW1, CYN-MW5, Greystone-MW2, MRN-2, MRN-3D, NWTA3-MW3D, OBS-MW1, PL-2, PL-4, SFR-2S, SFR-4T, SWTA3-MW2, SWTA3-MW3, SWTA3-MW4, and TRE-1 with a submersible piston pump. Surface water samples were collected from Coyote Springs with a portable peristaltic pump. The samples collected from the 17 locations were analyzed for the following analytes:

- Safe Drinking Water Act list of volatile organic compounds (VOCs)
- Total organic halogens (TOX)
- Total phenol
- Total alkalinity as calcium carbonate
- Nitrate plus nitrite (NPN)
- Total cyanide
- High explosive (HE) compounds, select wells only
- Major anions (chloride, bromide, fluoride, and sulfate)
- Target Analyte List (TAL) metals, all wells; plus uranium, select wells only

- Mercury, unfiltered
- Gamma spectroscopy (short list: americium-241, cesium-137, cobalt-60, and potassium-40)
- Gross alpha/beta activity
- Radium-226 and radium-228
- Isotopic uranium (uranium-233/234, uranium-235/236, and uranium-238), select wells only

Excluding those for VOC, HE, and total mercury fractions, the samples were filtered at the various sampling locations with 0.45-micron inline filters. Mercury was analyzed for both dissolved (filtered) and total (unfiltered) fractions. The environmental samples collected from SFR-2S, SFR-4T, SWTA3-MW2, SWTA3-MW3, SWTA3-MW4, and TRE-1 were analyzed for HE compounds. These monitoring wells are located in or downgradient of the Coyote Canyon Test Field and are associated with the Dynamic Explosives Test Site. Isotopic uranium samples were collected from Coyote Springs, CCBA-MW2, CTF-MW1, CYN-MW5, Greystone-MW2, OBS-MW1, SFR-2S, SFR-4T, and TRE-1. Total uranium samples were collected from MRN-2, MRN-3D, NWTA3-MW3D, PL-2, PL-4, SWTA3-MW2, SWTA3-MW3, and SWTA3-MW4. The environmental duplicate samples collected from Coyote Springs, CCBA-MW2, SFR-4T, and SWTA3-MW4 were submitted for analyses of the same parameters as the environmental samples.

The water levels in designated monitoring wells were measured quarterly and used to construct the contours of the potentiometric surface of the Regional Aquifer. The contours display a pattern that reflects the impact of the groundwater withdrawal by production wells located in the northwestern part of KAFB and adjacent parts of Albuquerque.

Groundwater elevation monitoring was conducted to assess the physical changes in the groundwater system over time, including changes in the potentiometric surface, gradients, quantity of water available, and direction and velocity of groundwater movement. The groundwater elevations at 104 SNL/NM monitoring wells were measured quarterly (elevations are measured either quarterly or annually, depending on the owner's requirements or the response characteristics of the groundwater system at each well location due to climate, aquifer properties, pumping, or other stresses). In addition, groundwater elevation data were solicited from the KAFB Environmental Restoration Program, City of Albuquerque (COA) Environmental Health Department, and U.S. Geological Survey. The groundwater elevation data for the 104 SNL/NM monitoring wells, as well as 61 additional monitoring wells owned by other agencies (Table 2), were used to construct Plate 1. Plate 1 shows the groundwater elevations at the wells and presents a base-wide potentiometric surface map of the Regional Aquifer and fractured bedrock aquifer system.

The primary factors that influence groundwater elevation fluctuations base wide are groundwater recharge and withdrawal. The primary source of groundwater recharge is precipitation and the primary source of groundwater withdrawal is KAFB, Albuquerque Bernalillo County Water Utility Authority (ABCWUA), and Veterans Affairs (VA) production wells. Annual precipitation and groundwater production data were collected to determine the impact of groundwater recharge and withdrawal on groundwater elevations base wide in CY 2023.

2.3.2 Monitoring Well Installation

No new monitoring wells were installed or added to the GMP monitoring well network in CY 2023.

2.4 Field Methods and Measurements

Section 1.3 describes how the CY 2023 groundwater data for the GMP were collected and analyzed.

2.5 Analytical Methods

GEL Laboratories, LLC (GEL) analyzed the groundwater samples using the applicable U.S. Environmental Protection Agency (EPA) and DOE-specified methods and protocols identified in Section 1.3.2 (Tables 1-5 and 1-6).

2.6 Summary of Calendar Year 2023 Monitoring Results

The following sections summarize the CY 2023 groundwater monitoring results for the GMP. Attachment 2A (Tables 2A-1 through 2A-8) presents the analytical results and field water quality parameter measurements for the annual groundwater sampling event. All analytical results (Tables 2A-1 through 2A-7) were reviewed and qualified during the data validation process and include the laboratory and validation qualifiers. Attachment 2B (Figures 2B-1 through 2B-15) presents hydrographs, precipitation data, and production well data. Attachment 2C (Figures 2C-1 through 2C-7) presents the time-trend plots for specific parameters exceeding regulatory standards at monitoring wells OBS-MW1, SFR-2S, SFR-4T, SWTA3-MW4, and TRE-1, as well as Coyote Springs.

2.6.1 Analytical Results

The groundwater and surface water samples were submitted to GEL for both chemical and radiological analysis. GEL analyzed the samples using the applicable EPA and DOE-specified methods and protocols. The analytical results were compared to the EPA maximum contaminant levels (MCLs) (EPA, March 2018) and the maximum allowable concentrations (MACs), which are the State of New Mexico drinking water standards (NMWQCC, December 2018). The analytical reports from GEL, including certificates of analyses, analytical methods, laboratory method detection limits (MDLs), practical quantitation limits (PQLs), minimum detectable activity values, critical levels for radiochemistry analyses, dates of analyses, results of quality control (QC) analyses, and data validation findings, were submitted to the SNL/NM Customer Funded Records Center (CFRC) and archived in the SNL/NM Environmental Data Management System (EDMS). The analytical results, including the laboratory and validation qualifiers, were also submitted to the CFRC and archived in EDMS.

Table 2A-1 presents the analytical results for VOCs and HE compounds. No HE compounds were detected above the MDLs. Except for chloroform and methylene chloride, no VOCs were detected above the MDLs. Chloroform was reported for monitoring well TRE-1 at a concentration of 0.610 micrograms per liter (µg/L). The EPA MCL for total trihalomethane compounds, which includes chloroform, is 80.0 µg/L. The MAC for chloroform is 100 µg/L. Methylene chloride in eight samples was qualified as not detected at the PQL during data validation because it was reported at concentrations below the PQL in the environmental and associated method blank or trip blank (TB) samples. Table 2A-2 lists the MDLs for the VOC and HE compounds.

Table 2A-3 presents the analytical results for NPN. NPN was detected above the MDLs in all water samples and ranged from 0.247 milligrams per liter (mg/L) to 7.80 mg/L. The results were below the EPA MCL/MAC of 10 mg/L.

Table 2A-4 presents the analytical results for alkalinity, major anion (bromide, chloride, fluoride, and sulfate), TOX, total phenol, and total cyanide. Except for fluoride, no analytes were detected above established EPA MCLs or MACs. Fluoride above the MAC of 1.6 mg/L was reported for Coyote Springs and monitoring wells OBS-MW1, SFR-2S, SFR-4T, SWTA3-MW4, and TRE-1, with the concentrations ranging from 1.67 mg/L to 2.55 mg/L. However, these results did not exceed the EPA MCL of 4.0 mg/L. Fluoride in groundwater is considered to be naturally occurring (geogenic). Figures 2C-1 through 2C-6 present the time-trend plots for fluoride concentrations at Coyote Springs and OBS-MW1, SFR-2S, SFR-4T, SWTA3-MW4, and TRE- 1.

The detected alkalinity, major anion, TOX, and total phenol concentrations are consistent with historical concentrations. TOX in the CCBA-MW2, SFR-4T, and SWTA3-MW4 samples was qualified as not detected at the PQL during data validation because it was reported at concentrations below the PQL in the environmental and associated equipment blank (EB) samples. Total phenol was detected in the CCBA-MW2, PL-4, SFR-4T, and SWTA3-MW4 samples. Total cyanide was not detected in any samples.

Table 2A-5 presents the analytical results for mercury. Mercury was not detected in any total/unfiltered samples.

Table 2A-6 presents the analytical results for TAL metals and total uranium. Other than beryllium, no metal parameters were detected above established EPA MCLs or MACs in any samples. Beryllium was detected above the EPA MCL/MAC of 0.004 mg/L in the environmental sample and environmental duplicate sample from Coyote Springs, with concentrations of 0.00752 mg/L and 0.00756 mg/L, respectively. Beryllium at Coyote Springs is considered to be naturally occurring (geogenic). Figure 2C-7 presents the time-trend plot for beryllium concentrations at Coyote Springs and demonstrates that the CY 2023 beryllium result is consistent with prior years. Copper in the Greystone-MW2 sample and SFR-4T duplicate sample was qualified as not detected at the PQL during data validation because it was reported at concentrations below the PQL in the environmental samples and associated EB samples.

Table 2A-7 presents the analytical results for gamma spectroscopy short list (americium-241, cesium-137, cobalt-60, and potassium-40), gross alpha/beta activity, isotopic uranium, radium-226, and radium-228. All results were below established EPA MCLs and MACs. The potassium-40 result for monitoring well CYN-MW5 and the cesium-137 result for monitoring well OBS-MW1 were rejected because the peak did not meet identification criteria. Potassium-40 in the SWTA3-MW4 environmental sample was qualified as not usable because it was reported as a negative value with an absolute value greater than 2 times the minimum detectable activity.

Isotopic uranium (uranium-233/234, uranium-235/236, and uranium-238) analyses were performed on samples from monitoring wells that previously had high gross alpha activity or are located where the groundwater is in contact with bedrock that contains minerals high in naturally occurring radioisotopes. Isotopic uranium was analyzed for Coyote Springs and monitoring wells CCBA-MW2, CTF-MW1, CYN- MW5, Greystone-MW2, OBS-MW1, SFR-2S, SFR-4T, and TRE-1. There are no established EPA MCLs or MACs for uranium isotopes.

Gross alpha activity was measured as a radiological screening tool in accordance with the *National Primary Drinking Water Regulations* (40 CFR Part 141, December 1975, as updated). Naturally occurring uranium was measured independently (total uranium concentration determined by metals analysis described above), and the gross alpha activity measurements were corrected by subtracting the total uranium activity from the uncorrected gross alpha results. An SNL/NM health physicist further reviewed the results to assure that the samples were nonradioactive. The corrected gross alpha activity results were below the EPA MCL of 15 picocuries per liter.

Table 2A-8 presents the field water quality parameter measurements obtained during purging of each monitoring well (Section 1.3.1.2) during the annual groundwater sampling event. The field water quality parameters measured consisted of dissolved oxygen, oxidation-reduction potential, potential of hydrogen, specific conductivity, temperature, and turbidity. These parameters were measured to evaluate water chemistry stability and ensure the collection of representative groundwater samples.

2.6.2 Groundwater Elevation Measurements

The groundwater elevations at 104 SNL/NM monitoring wells were measured quarterly. The groundwater elevation data for the 104 SNL/NM monitoring wells, as well as 61 additional monitoring wells owned by other agencies (Table 2), were used to construct Plate 1. The SNL/NM groundwater elevation data were archived in EDMS.

Table 2-2 lists, by respective organization, the total number of monitoring wells at which groundwater elevations were measured. Table 2 presents the groundwater elevation data used to construct Plate 1.

Table 2-2
Groundwater Elevations Measured by Sandia National Laboratories, New Mexico and Other Organizations in Calendar Year 2023

Total Wells	Measuring Organization	Well Owner	Location
104	GMP	DOE/NNSA	SNL/NM monitoring wells (GMP, CWL, MWL, TAVG, TAG, BSG)
53	KAFB	KAFB	ERP Long-term Monitoring Program
5	COA EHD	COA	Eubank Landfill north of KAFB and Yale Landfill west of KAFB
1	GMP	COA	Eubank-1, west of Eubank Landfill
1	USGS	NMOSE	Mesa Del Sol-S well
1	USGS	COA	Montessa Park-S well

Notes:
BSG = Burn Site Groundwater
COA = City of Albuquerque
CWL = Chemical Waste Landfill
DOE = U.S. Department of Energy
EHD = Environmental Health Department
ERP = Environmental Restoration Program
GMP = Groundwater Monitoring Program
KAFB = Kirtland Air Force Base
MWL = Mixed Waste Landfill
NMOSE = New Mexico Office of the State Engineer
NNSA = National Nuclear Security Administration
SNL/NM = Sandia National Laboratories, New Mexico
TAG = Tijeras Arroyo Groundwater
TAVG = Technical Area-V Groundwater
USGS = U.S. Geological Survey

2.6.2.1 Groundwater Recharge and Withdrawal

The primary factors that influence groundwater elevation fluctuations base wide are groundwater recharge from precipitation and groundwater withdrawal by production wells.

Annual Precipitation

The Albuquerque Basin climate is semiarid. Long-term average precipitation ranges from 8.84 inches per year (30-year norm based on 1991-2020 data) at the Albuquerque International Sunport to 35 inches per year at Sandia Crest, located approximately 15 miles to the northeast. In an average year, New Mexico receives most of its precipitation between July and September due to the development of the North American Monsoon. This precipitation comes in the form of brief heavy rain. In CY 2023, the wettest months were March, September, November, and December.

Precipitation data relevant to the KAFB hydrogeologic setting were collected from five rain gauges. The following five meteorological towers (four on site and one off site) were used to evaluate the precipitation pattern for KAFB:

- A21 tower located in Technical Area (TA)-II (Figure 1-4).
- A36 tower located in TA-III/V (Figure 1-4).
- LC1 tower located in Lurance Canyon, west of the Burn Site (Figure 1-4). This location was established in 2019; therefore, no annual data from years prior to 2020 are available.
- SC1 tower located near the Schoolhouse Well in the Manzanita Mountain foothills (Figure 1-4).
- National Weather Service meteorological station KABQ, located at the Albuquerque International Sunport, northwest corner of KAFB (Figure 1-4).

Table 2-3 presents the CY 2023 precipitation data, along with the CY 2022 precipitation data for comparison. The difference in precipitation totals from the five locations shows the isolated nature of rain showers in the Albuquerque area. The 5.77 inches of precipitation measured at KABQ in CY 2023 are substantially less than the 9.31 inches measured the prior year and are 3.07 inches below the 30-year (1991-2020) norm of 8.84 inches. Figure 2B-11 shows the CY 2023 monthly distribution of precipitation at the five locations, along with the 30-year average at KABQ. Figure 2B-12 shows the annual distribution of precipitation at four of the five locations for the period of January 2013 to December 2023.

Table 2-3
Precipitation Data for Kirtland Air Force Base, Calendar Years 2022 and 2023

Year	Meteorological Station				
	A21	A36	LC1	SC1	KABQ
CY 2022	9.46	9.84	15.79	13.14	9.31
CY 2023	6.62	6.45	9.23	7.64	5.77

Notes:
Data are in inches of rainfall.
A21 = SNL/NM meteorological station in Technical Area-II
A36 = SNL/NM meteorological station in Technical Area-III/V
CY = calendar year
KABQ = National Weather Service meteorological station at the Albuquerque International Sunport
LC1 = SNL/NM meteorological station in Lurance Canyon, west of the Burn Site, installed in 2019
SC1 = SNL/NM meteorological station in the Manzanita Mountain Foothills
SNL/NM = Sandia National Laboratories, New Mexico

Groundwater Withdrawal

The KAFB production wells are screened over a depth of approximately 500 to 2,000 feet (ft) below ground surface (bgs) and extract groundwater from the Regional Aquifer in the upper and middle unit of the Santa Fe Group (SFG). During CY 2023, KAFB pumped groundwater for consumptive use primarily from three production wells (KAFB-4, KAFB-14, and KAFB-20) (Figure 2B-14).

KAFB supplies the water for SNL/NM and other DOE/NNSA facilities located on KAFB. Figure 2B-13 shows the CY 2023 monthly totals for the KAFB production wells. The highest level of production occurred in July at 123 million gallons (gal); the lowest occurred in February at 32 million gal. The variability in production is in response to seasonal demand, as reflected in the cyclic fluctuation of groundwater elevations at monitoring wells, and is evident on the hydrographs (Section 2.6.2.2). Figure 2B-14 shows the CY 2023 monthly production for each KAFB production well. Figure 2B-15 shows the trend of total annual groundwater production at KAFB since 2013. Table 2-4 compares the CY 2023 production to the prior year.

Table 2-4
Total Kirtland Air Force Base Groundwater Production, Calendar Years 2022 and 2023

Units	CY 2022	CY 2023
Million gal	784	837
Acre-feet	2,407	2,569

Notes:
acre-feet = 325,851 gal
CY = calendar year
gal = gallons

2.6.2.2 Groundwater Elevations

Groundwater elevation data were used to prepare the following potentiometric surface maps and hydrographs.

<u>*Base-Wide Potentiometric Surface Map*</u>

The groundwater elevation data from Table 2 were used to construct the CY 2023 base-wide potentiometric surface map of the Regional Aquifer and fractured bedrock aquifer system (Plate 1). Water level measurements from February, March, May, October, and December 2023 were used to interpret the groundwater elevation data and construct the contours. Even though various well owners measure water levels on differing schedules, the use of several months of data is considered temporally concordant because water levels in the monitoring wells across KAFB are typically not seasonally affected.

The base-wide map (Plate 1) represents the potentiometric surface of the Regional Aquifer and incorporates monitoring wells completed at the water table west of the Tijeras Fault Zone and in the fractured bedrock aquifer system east of the fault zone (Figure 1-3). West of the Tijeras Fault Zone, the Regional Aquifer is under unconfined (water table) to semiconfined conditions and is present within the SFG, which consists of fine-grained, alluvial-fan lithofacies and the coarser-grained ancestral Rio Grande (ARG) lithofacies (Figure 1-3). Within and east of the Tijeras Fault Zone, the Regional Aquifer is typically under confined conditions (positive pressure head [upward vertical gradient]) and is primarily present within fractured Paleozoic bedrock (primarily limestone and sandstone) and Precambrian bedrock (primarily granite and metamorphic rocks). The fault zone partially restricts groundwater underflow from the bedrock recharging the unconsolidated basin-fill deposits (the SFG) of the Albuquerque Basin.

In general, groundwater flows westward away from the Manzanita Mountains and toward the Rio Grande. An extensive trough is present in the water table along the western edge of KAFB due to cumulative drawdown caused by KAFB, VA, and ABCWUA production wells near the northern boundary of KAFB. As a result, water levels across much of KAFB declined steadily until 2008. Since 2008, hydrographs for Regional Aquifer wells in the northern part of KAFB have shown an increasing trend in groundwater elevations. Presumably, this is in response to the ABCWUA transitioning to surface water withdrawals from the Rio Grande for potable water supplies and decreasing dependence on ABCWUA production wells. The water table trough extends as far south as the Pueblo of Isleta. The flat gradient in the middle of the trough indicates flow through the highly permeable sediments of the ARG fluvial deposits, which are the most productive aquifer material in the area.

Relatively steeper gradients in the eastern part of KAFB are due to less permeable materials, higher ground surface elevations along the eastern mountain front of the Albuquerque Basin, and the presence of various faults (Plate 1).

<u>*Perched Groundwater System Potentiometric Surface Map*</u>

During the 1993 installation of monitoring wells in TA-II for groundwater characterization, a shallow water-bearing zone (subsequently known as the PGWS) was encountered at a depth of 300 ft bgs. This was 200 ft above the Regional Aquifer. The installation of additional monitoring wells completed in the PGWS defined the lateral extent of the system, which is approximately 4.4 square miles. The western edge initially trended along the west side of the former KAFB sewage lagoons. The northern edge coincides with the northern boundary of TA-I. To the east, the PGWS is defined by KAFB monitoring wells along the west side of the active KAFB Landfill, and the southern tip appears to be south of the Tijeras Arroyo Golf Course along the northeastern side of Pennsylvania Avenue, where it merges with the Regional Aquifer. The area covered by the PGWS comprises much of the TAG AOC, and the groundwater elevation data for monitoring wells completed in the PGWS were used to construct the CY 2023 potentiometric surface map of the PGWS (Chapter 6.0).

GMP Monitoring Well Hydrographs

This section summarizes historical and recent trends in groundwater elevations in the vicinity of SNL/NM, as demonstrated on the hydrographs for the 16 GMP monitoring wells (Figures 2B-1 through 2B-10). Historical data from quarterly and annual groundwater elevation measurements through CY 2023 were used to plot the hydrographs. Except for Greystone-MW2, the groundwater elevation data for these monitoring wells are representative of groundwater in the Regional Aquifer and fractured bedrock aquifer system across KAFB. Specific information gleaned from the hydrographs includes the following:

- **Greystone-MW2 (Figure 2B-1)**—Overall declining trend of approximately 0.25 ft per year (ft/yr) with superimposed seasonal effects of 1 to 2 ft that have a maximum water table elevation in the spring season. The well is located in Lurance Canyon and has a shallow screen set in unconsolidated alluvium. There are no production wells in the area; however, the well is located 1,600 ft downgradient of the heavily vegetated Coyote Springs, and the seasonal effects may reflect evapotranspiration impacts from the cottonwood trees at the springs.
- **MRN-2 and MRN-3D (Figure 2B-2)**—Declining trend until early 2011; groundwater elevations stabilized between 2011 and 2014; increasing trend of approximately 0.5 ft/yr from 2014 to 2020; stabilized to slightly increasing since 2020.
- **NWTA3-MW3D, PL-2, and PL-4 (Figure 2B-3)**—Declining trend until late 2010/early 2011; groundwater elevations stabilized between 2011 and 2014; increasing trend of approximately 1 ft/yr from 2014 to 2020; stabilized to slightly increasing since 2020.
- **SFR-2S and TRE-1 (Figure 2B-4)**—Slight declining trend of approximately 0.15 to 0.25 ft/yr since 2004.
- **SFR-4T (Figure 2B-5)**—Cyclical pattern with artificial yearly fluctuations of 20 to 30 ft since 2001; yearly minimums are associated with SNL/NM sampling events and subsequent 3 to 9 months of water level recovery; overall declining trend of peaks of approximately 0.25 ft/yr.
- **SWTA3-MW2, SWTA3-MW3, and SWTA3-MW4 (Figure 2B-6)**—Moderate declining trend until late 2011; since then, groundwater elevations have stabilized for several years and have shown an increasing trend of approximately 0.6 ft/yr since 2014.
- **OBS-MW1 (Figure 2B-7)**—Stable groundwater elevations since 2011.
- **CCBA-MW2 (Figure 2B-8)**—Slight declining trend of approximately 0.14 ft/yr since 2011.
- **CTF-MW1 (Figure 2B-9)**—Slight declining trend of approximately 0.31 ft/yr over the life of the well.
- **CYN-MW5 (Figure 2B-10)**—Slight declining trend of approximately 0.14 ft/yr over the life of the well.

Base-Wide Map with Hydrographs for Select Monitoring Wells

This section discusses the spatial differences in hydrologic conditions in monitoring wells completed in the Regional Aquifer and fractured bedrock aquifer system. Figure 2-2 is a base-wide map that shows geographic differences in groundwater elevations over time. The map does not show all the SNL/NM monitoring wells/hydrographs but rather representative examples based on their geographic distribution. All the hydrographs have the same vertical scale (50 ft) and horizontal scale (32 years), regardless of the monitoring well's age. The well locations are generalized, and the marked locations may represent one or more monitoring wells, depending on the specific hydrograph. For a base-wide map such as this, the emphasis is on the overall shape of the trend lines and, as such, it may be difficult to read the vertical or horizontal scales on the individual hydrographs. Readers are referred to the updated, more detailed, more legible site-specific hydrographs (Chapter 2.0 through 7.0 attachments).

Figure 2-2 superimposes the hydrographs over a base map of the fractured bedrock aquifer system and the lithofacies at the upper surface (water table) of the Regional Aquifer (Figure 1-3). Specific information gleaned from the hydrographs includes the following:

- The monitoring wells furthest to the east in the fractured bedrock aquifer system (e.g., CYN-MW4) exhibit the greatest variability, with notable responses to long-term precipitation trends and steeply declining groundwater elevations possibly due to long-term regional drought conditions.
- Other monitoring wells in the fractured bedrock aquifer system (e.g., CTF-MW1) exhibit less variability and only slightly to moderately declining groundwater elevations.
- The monitoring wells in the fine-grained, alluvial-fan lithofacies of the Regional Aquifer (e.g., Chemical Waste Landfill monitoring wells) exhibit slightly to moderately declining groundwater elevations.
- The monitoring wells in the ARG lithofacies of the Regional Aquifer in the southwestern part of KAFB (e.g., SWTA3-series monitoring wells) exhibit moderately declining groundwater elevations until 2010 and then moderately increasing groundwater elevations.
- The monitoring wells in the coarser-grained lithofacies of the Regional Aquifer in the northwestern part of KAFB (e.g., TA1-W-05) exhibit slightly declining groundwater elevations until 2010 and then moderately increasing groundwater elevations with a strong overprinting of seasonal fluctuations from nearby production well pumping centers.

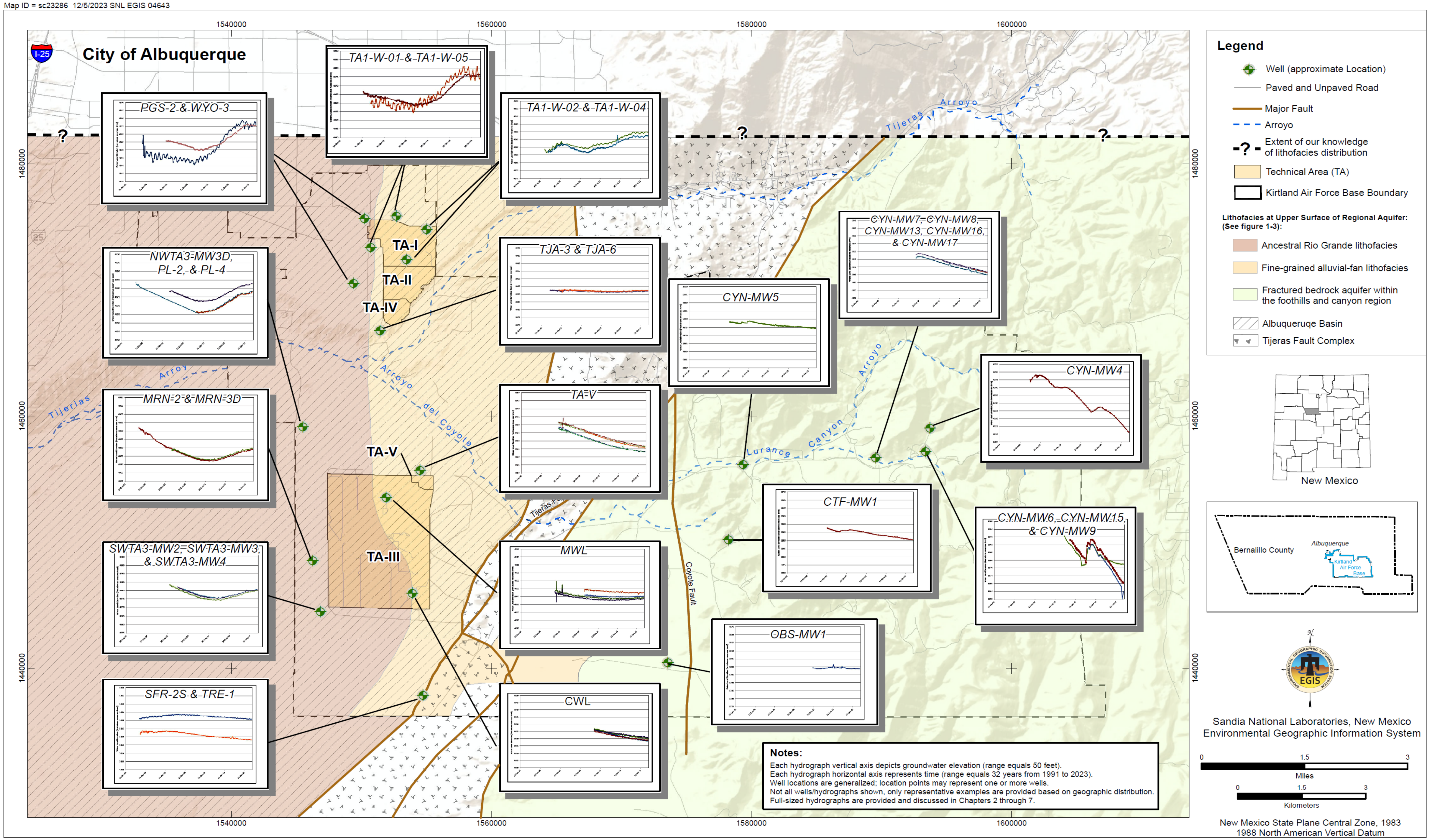

Figure 2-2
Geographic Distribution of Hydrographs for Wells in the Regional Aquifer and Fractured Bedrock Aquifer System at Sandia National Laboratories, New Mexico (base map derived from Figure 1-3)

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2.7 Quality Control Results

The following sections summarize the CY 2023 field and laboratory QC sample results. Section 1.3 describes how the field and laboratory QC samples were collected and prepared. Table 1-7 (Section 1.3.4) lists each field and laboratory QC sample type and purpose.

2.7.1 Field Quality Control Samples

The field QC samples included environmental duplicate, EB, field blank (FB), and TB samples.

Environmental duplicate samples were collected from Coyote Springs and monitoring wells CCBA-MW2, SFR-4T, and SWTA3-MW4 and were analyzed for the same parameters as the environmental samples. Relative percent differences (RPDs) were calculated for the analytes detected above the MDL in the environmental and environmental duplicate samples. Except for TOX in the Coyote Springs environmental-duplicate pair (Attachment A, Table 2A-4), the environmental samples showed good agreement with the environmental duplicate samples based on RPDs less than or equal to 35 for the calculated parameters. The RPD for TOX in the Coyote Springs environmental-duplicate pair was 127. However, this was considered an estimated value because the analysis was performed outside of the analytical holding time requirement and, therefore, TOX was qualified during data validation as estimated concentrations in the environmental and environmental duplicate samples.

EB samples were collected before sampling of monitoring wells CCBA-MW2, SFR-4T, and SWTA3-MW4 began and were submitted for all analyses. The EB samples contained alkalinity, bromodichloromethane, chloroform, chloride, dibromochloromethane, radium, sodium, sulfate, and TOX above the MDLs. No corrective action for alkalinity, bromodichloromethane, chloroform, chloride, dibromochloromethane, sodium, or sulfate was required because these parameters were either not detected or detected in the associated environmental samples at concentrations greater than five times the EB result. TOX in the CCBA-MW2, SFR-4T, and SWTA3-MW4 samples was qualified as not detected during data validation because it was reported in the environmental and associated EB samples at a concentration less than the PQL.

Four FB samples were collected for VOC analysis. The FB samples were prepared by pouring deionized water into sample containers at monitoring wells CTF-MW1, NWTA3-MW3D, SFR-2S, and SWTA3-MW3. Bromodichloromethane, chloroform, and dibromochloromethane were validation detections above the MDLs in all the FB samples. No corrective action was necessary because these compounds were not detected in the associated environmental samples.

A total of 21 TB samples were submitted with the groundwater samples for VOC analysis. Methylene chloride was reported as validated detections at concentrations less than the PQL in six TB samples. The associated environmental samples with methylene chloride at concentrations less than the PQL were qualified as not detected during data validation.

2.7.2 Laboratory Quality Control Samples

The laboratory QC samples were prepared at the laboratory and included method blank samples, laboratory control samples, matrix spike and matrix spike duplicates, replicate samples, and surrogate spike samples. Although some analytical results were qualified during the data validation process, the data were deemed acceptable, except for potassium-40. The potassium-40 result reported for the CYN-MW5 and SWTA3-MW4 samples and several EB samples was rejected by GEL and during validation because the peak did not meet identification criteria. The cesium-137 result reported for the OBS-MW1 sample was rejected by GEL and during validation because the peak did not meet identification criteria.

2.8 Variances and Nonconformances

No modifications to or deviations from the *LTS Consolidated Groundwater Monitoring Program Mini-Sampling and Analysis Plan (SAP) for FY23 Groundwater Surveillance Task* (SNL/NM, January 2023) were identified during the CY 2023 sampling activities.

2.9 Summary and Conclusions

The annual groundwater sampling event was conducted during the period of January 23 to March 31, 2023. Groundwater samples were collected from 16 monitoring wells and surface water samples were collected from Coyote Springs. The analytical results were similar to the results reported for prior years:

- No VOCs or HE compounds were detected at concentrations above established EPA MCLs or MACs in any samples.
- NPN was detected above the MDLs in all water samples and ranged from 0.247 mg/L to 7.80 mg/L. The results were below the EPA MCL/MAC of 10 mg/L.
- Fluoride above the MAC of 1.6 mg/L (NMWQCC, December 2018) was reported for Coyote Springs and monitoring wells OBS-MW1, SFR-2S, SFR-4T, SWTA3-MW4, and TRE-1, with the concentrations ranging from 1.67 mg/L to 2.55 mg/L. However, these results did not exceed the EPA MCL of 4.0 mg/L. Fluoride in groundwater is considered to be naturally occurring (geogenic).
- Other than beryllium, no metals were detected above established EPA MCLs or MACs in any groundwater samples. Beryllium was detected above the EPA MCL/MAC of 0.004 mg/L in the environmental sample and environmental duplicate sample from Coyote Springs, with concentrations of 0.00752 mg/L and 0.00756 mg/L, respectively. Beryllium at Coyote Springs is considered to be naturally occurring (geogenic), and this result is consistent with results from prior years.

The groundwater elevations at 104 SNL/NM monitoring wells were measured quarterly. The groundwater elevation data for the 104 SNL/NM monitoring wells, as well as 61 additional monitoring wells owned by other agencies (Table 2), were used to construct the base-wide potentiometric surface map of the Regional Aquifer and fractured bedrock aquifer system (Plate 1). Overall, the contours display a pattern that reflects (1) the impact of the groundwater withdrawal by production wells located in the northwestern part of KAFB and adjacent parts of Albuquerque, and (2) the basin margin topography to the east. The groundwater elevations at monitoring wells over most of KAFB are declining in response to regional drought conditions, whereas monitoring wells in the northwestern part of KAFB show aquifer recovery due to decreased pumping at production wells.

2.10 Summary of Future Activities

GMP groundwater monitoring activities in CY 2024 will include:

- Annual collection and analysis of groundwater samples from monitoring wells CCBA-MW2, CTF- MW1, CYN-MW5, Greystone-MW2, MRN-2, MRN-3D, NWTA3-MW3D, OBS-MW1, PL-2, PL-4, SFR-2S, SFR-4T, SWTA3-MW2, SWTA3-MW3, SWTA3-MW4, and TRE-1 and surface water samples from Coyote Springs during the first quarter of CY 2024. The analytes will consist of the same suite analyzed in CY 2023.
- Quarterly groundwater elevation measurements at 105 monitoring wells (104 SNL/NM monitoring wells and one COA-owned monitoring well).
- Annual reporting of the CY 2024 groundwater monitoring activities and results in the CY 2024 AGMR.
- Submittal of the *Comprehensive Site-Wide Groundwater Monitoring Plan, Calendar Year 2025* to the NMED in April 2024.

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Attachment 2A
Groundwater Monitoring Program Analytical Results Tables

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Attachment 2A Tables

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Table 2A-1
Summary of Detected Volatile Organic Compounds and High Explosive Compounds, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL / MAC[d] (µg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW2 07-Feb-23	Methylene Chloride	0.520	0.500	5.00	5.00	5.00	J	5.0UJ	119347-001	SW846-8260D
CTF-MW1 08-Feb-23	Methylene Chloride	0.550	0.500	5.00	5.00	5.00	J	5.0U	119337-001	SW846-8260D
CYN-MW5 09-Feb-23	Methylene Chloride	0.590	0.500	5.00	5.00	5.00	J	5.0U	119339-001	SW846-8260D
Greystone-MW2 10-Feb-23	Methylene Chloride	0.520	0.500	5.00	5.00	5.00	J	5.0U	119341-001	SW846-8260D
MRN-2 27-Jan-23	Methylene Chloride	2.37	0.500	5.00	5.00	5.00	B, J	5.0U	119316-001	SW846-8260D
NWTA3-MW3D 30-Jan-23	Methylene Chloride	2.28	0.500	5.00	5.00	5.00	B, J	5.0U	119321-001	SW846-8260D
SFR-2S 31-Jan-23	Methylene Chloride	2.08	0.500	5.00	5.00	5.00	B, J	5.0U	119329-001	SW846-8260D
TRE-1 06-Feb-23	Chloroform	0.610	0.333	1.00	80.0	100	J		119343-001	SW846-8260D
	Methylene Chloride	0.750	0.500	5.00	5.00	5.00	J	5.0UJ	119343-001	SW846-8260D

Refer to Notes on page 2A-46.

Table 2A-2
Method Detection Limits for Volatile Organic Compounds and High Explosive Compounds, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Analyte	MDL[b] (µg/L)	Analytical Method[g]	Analyte	MDL[b] (µg/L)	Analytical Method[g]
1,1,1,2-Tetrachloroethane	0.333	SW846-8260D	Ethylbenzene	0.333	SW846-8260D
1,1,1-Trichloroethane	0.333	SW846-8260D	Hexachlorobutadiene	0.333	SW846-8260D
1,1,2,2-Tetrachloroethane	0.333	SW846-8260D	Isopropylbenzene	0.333	SW846-8260D
1,1,2-Trichloroethane	0.333	SW846-8260D	Methylene chloride	0.500	SW846-8260D
1,1-Dichloroethane	0.333	SW846-8260D	Naphthalene	0.333	SW846-8260D
1,1-Dichloroethene	0.333	SW846-8260D	Styrene	0.333	SW846-8260D
1,1-Dichloropropene	0.333	SW846-8260D	Tert-butyl methyl ether	0.333	SW846-8260D
1,2,3-Trichlorobenzene	0.333	SW846-8260D	Tetrachloroethene	0.333	SW846-8260D
1,2,3-Trichloropropane	0.333	SW846-8260D	Toluene	0.333	SW846-8260D
1,2,4-Trichlorobenzene	0.333	SW846-8260D	Trichloroethene	0.333	SW846-8260D
1,2,4-Trimethylbenzene	0.333	SW846-8260D	Trichlorofluoromethane	0.333	SW846-8260D
1,2-Dibromo-3-chloropropane	0.333	SW846-8260D	Vinyl chloride	0.333	SW846-8260D
1,2-Dibromoethane	0.333	SW846-8260D	cis-1,2-Dichloroethene	0.333	SW846-8260D
1,2-Dichlorobenzene	0.333	SW846-8260D	cis-1,3-Dichloropropene	0.333	SW846-8260D
1,2-Dichloroethane	0.333	SW846-8260D	m-,p-Xylene	0.500	SW846-8260D
1,2-Dichloropropane	0.333	SW846-8260D	n-Butylbenzene	0.333	SW846-8260D
1,3,5-Trimethylbenzene	0.500	SW846-8260D	n-Propylbenzene	0.333	SW846-8260D
1,3-Dichlorobenzene	0.333	SW846-8260D	o-Xylene	0.333	SW846-8260D
1,3-Dichloropropane	0.333	SW846-8260D	sec-Butylbenzene	0.333	SW846-8260D
1,4-Dichlorobenzene	0.333	SW846-8260D	tert-Butylbenzene	0.333	SW846-8260D
2,2-Dichloropropane	0.333	SW846-8260D	trans-1,2-Dichloroethene	0.333	SW846-8260D
2-Chlorotoluene	0.333	SW846-8260D	trans-1,3-Dichloropropene	0.333	SW846-8260D
4-Chlorotoluene	0.333	SW846-8260D	1,3,5-Trinitrobenzene	0.0823 – 0.0903	SW846-8330B
4-Isopropyltoluene	0.333	SW846-8260D	1,3-Dinitrobenzene	0.0823 – 0.0903	SW846-8330B
Benzene	0.333	SW846-8260D	2,4,6-Trinitrotoluene	0.0823 – 0.0903	SW846-8330B
Bromobenzene	0.333	SW846-8260D	2,4-Dinitrotoluene	0.0823 – 0.0903	SW846-8330B
Bromochloromethane	0.333	SW846-8260D	2,6-Dinitrotoluene	0.0823 – 0.0903	SW846-8330B
Bromodichloromethane	0.333	SW846-8260D	2-Amino-4,6-dinitrotoluene	0.0823 – 0.0903	SW846-8330B
Bromoform	0.333	SW846-8260D	2-Nitrotoluene	0.0844 – 0.0926	SW846-8330B
Carbon tetrachloride	0.333	SW846-8260D	3-Nitrotoluene	0.0823 – 0.0903	SW846-8330B
Chlorobenzene	0.333	SW846-8260D	4-Amino-2,6-dinitrotoluene	0.0823 – 0.0903	SW846-8330B
Chloroethane	0.333	SW846-8260D	4-Nitrotoluene	0.154 – 0.169	SW846-8330B
Chloroform	0.333	SW846-8260D	HMX	0.0823 – 0.0903	SW846-8330B
Chloromethane	0.333	SW846-8260D	Nitrobenzene	0.0823 – 0.0903	SW846-8330B
Dibromochloromethane	0.333	SW846-8260D	Pentaerythritol tetranitrate	0.103 – 0.113	SW846-8330B
Dibromomethane	0.333	SW846-8260D	RDX	0.0823 – 0.0903	SW846-8330B
Dichlorodifluoromethane	0.355	SW846-8260D	Tetryl	0.0823 – 0.0903	SW846-8330B

Refer to Notes on page 2A-46.

Table 2A-3
Summary of Nitrate Plus Nitrite Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
Coyote Springs 03-Feb-23	Nitrate plus nitrite	0.655	0.0850	0.250	10.0			119325-005	EPA 353.2
Coyote Springs (Duplicate) 03-Feb-23	Nitrate plus nitrite	0.655	0.0850	0.250	10.0			119326-005	EPA 353.2
CCBA-MW2 07-Feb-23	Nitrate plus nitrite	3.49	0.170	0.500	10.0			119347-005	EPA 353.2
CCBA-MW2 (Duplicate) 07-Feb-23	Nitrate plus nitrite	3.46	0.170	0.500	10.0			119348-005	EPA 353.2
CTF-MW1 08-Feb-23	Nitrate plus nitrite	7.80	0.850	2.50	10.0			119337-005	EPA 353.2
CYN-MW5 09-Feb-23	Nitrate plus nitrite	2.24	0.170	0.500	10.0			119339-005	EPA 353.2
Greystone-MW2 10-Feb-23	Nitrate plus nitrite	4.43	0.425	1.25	10.0			119341-005	EPA 353.2
MRN-2 27-Jan-23	Nitrate plus nitrite	3.93	0.170	0.500	10.0			119316-005	EPA 353.2
MRN-3D 26-Jan-23	Nitrate plus nitrite	2.60	0.0850	0.250	10.0			119314-005	EPA 353.2
NWTA3-MW3D 30-Jan-23	Nitrate plus nitrite	0.909	0.0170	0.0500	10.0		J	119321-005	EPA 353.2
OBS-MW1 02-Feb-23	Nitrate plus nitrite	1.85	0.0850	0.250	10.0			119323-005	EPA 353.2
PL-2 30-Mar-23	Nitrate plus nitrite	2.87	0.170	0.500	10.0			119310-005	EPA 353.2
PL-4 31-Mar-23	Nitrate plus nitrite	5.26	0.170	0.500	10.0			119312-006	EPA 353.2
SFR-2S 31-Jan-23	Nitrate plus nitrite	0.995	0.0850	0.250	10.0			119329-006	EPA 353.2
SFR-4T 01-Feb-23	Nitrate plus nitrite	0.247	0.0170	0.0500	10.0		J	119333-006	EPA 353.2
SFR-4T (Duplicate) 01-Feb-23	Nitrate plus nitrite	0.247	0.0170	0.0500	10.0		J	119334-006	EPA 353.2
SWTA3-MW2 23-Jan-23	Nitrate plus nitrite	1.05	0.0170	0.0500	10.0			119300-006	EPA 353.2

Refer to Notes on page 2A-46.

Table 2A-3 (concluded)
Summary of Nitrate Plus Nitrite Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
SWTA3-MW3 24-Jan-23	Nitrate plus nitrite	0.795	0.0170	0.0500	10.0			119303-006	EPA 353.2
SWTA3-MW4 25-Jan-23	Nitrate plus nitrite	1.09	0.0850	0.250	10.0			119307-006	EPA 353.2
SWTA3-MW4 (Duplicate) 25-Jan-23	Nitrate plus nitrite	1.09	0.0850	0.250	10.0			119308-006	EPA 353.2
TRE-1 06-Feb-23	Nitrate plus nitrite	2.44	0.170	0.500	10.0			119343-006	EPA 353.2

Refer to Notes on page 2A-46.

Table 2A-4
Summary of Alkalinity, Anion, Total Organic Halogens, Total Phenol, and Total Cyanide Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
Coyote Springs 03-Feb-23	Total Organic Halogens	0.0386	0.0167	0.0500	NE	NE	H, J	J-	119325-002	SW846-9020B
	Bromide	2.19	0.670	2.00	NE	NE		J	119325-007	SW846-9056A
	Chloride	491	6.70	20.0	NE	NE		J	119325-007	SW846-9056A
	Fluoride	**2.27**	0.330	1.00	4.00	1.60		J	119325-007	SW846-9056A
	Sulfate	131	1.33	4.00	NE	NE			119325-007	SW846-9056A
	Alkalinity as $CaCO_3$	996	1.45	4.00	NE	NE		J	119325-004	SM2320B
	Total Phenol	ND	0.00167	0.00500	NE	NE	U	0.005UJ	119325-003	SW846-9066
	Total Cyanide	ND	0.00167	0.00500	0.200	0.200	U	UJ	119325-006	SW846-9012B
Coyote Springs (Duplicate) 03-Feb-23	Total Organic Halogens	0.172	0.0167	0.0500	NE	NE	H	J-	119326-002	SW846-9020B
	Bromide	2.15	0.670	2.00	NE	NE		J	119326-014	SW846-9056A
	Chloride	480	6.70	20.0	NE	NE		J	119326-014	SW846-9056A
	Fluoride	**2.21**	0.330	1.00	4.00	1.60		J	119326-014	SW846-9056A
	Sulfate	129	1.33	4.00	NE	NE			119326-014	SW846-9056A
	Alkalinity as $CaCO_3$	1020	1.45	4.00	NE	NE		J	119326-004	SM2320B
	Total Phenol	ND	0.00167	0.00500	NE	NE	U	0.005UJ	119326-003	SW846-9066
	Total Cyanide	ND	0.00167	0.00500	0.200	0.200	U	UJ	119326-006	SW846-9012B
CCBA-MW2 07-Feb-23	Total Organic Halogens	0.00368	0.00333	0.0100	NE	NE	J	0.01U	119347-002	SW846-9020B
	Bromide	0.536	0.0670	0.200	NE	NE			119347-007	SW846-9056A
	Chloride	36.5	0.670	2.00	NE	NE			119347-007	SW846-9056A
	Fluoride	1.60	0.0330	0.100	4.00	1.60			119347-007	SW846-9056A
	Sulfate	92.6	1.33	4.00	NE	NE			119347-007	SW846-9056A
	Alkalinity as $CaCO_3$	179	1.45	4.00	NE	NE			119347-004	SM2320B
	Total Phenol	0.0230	0.00167	0.00500	NE	NE		J-	119347-003	SW846-9066
	Total Cyanide	ND	0.00167	0.00500	0.200	0.200	U	UJ	119347-006	SW846-9012B
CCBA-MW2 (Duplicate) 07-Feb-23	Total Organic Halogens	0.00350	0.00333	0.0100	NE	NE	H, J, N	0.01UJ	119348-002	SW846-9020B
	Bromide	0.534	0.0670	0.200	NE	NE			119348-007	SW846-9056A
	Chloride	35.6	0.670	2.00	NE	NE			119348-007	SW846-9056A
	Fluoride	1.60	0.0330	0.100	4.00	1.60			119348-007	SW846-9056A
	Sulfate	90.6	1.33	4.00	NE	NE			119348-007	SW846-9056A
	Alkalinity as $CaCO_3$	178	1.45	4.00	NE	NE			119348-004	SM2320B
	Total Phenol	ND	0.00167	0.00500	NE	NE	U	0.005UJ	119348-003	SW846-9066
	Total Cyanide	ND	0.00167	0.00500	0.200	0.200	U	UJ	119348-006	SW846-9012B

Refer to Notes on page 2A-46.

Table 2A-4 (continued)
Summary of Alkalinity, Anion, Total Organic Halogens, Total Phenol, and Total Cyanide Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW1	Total Organic Halogens	0.00722	0.00333	0.0100	NE	NE	J, N	J-	119337-002	SW846-9020B
08-Feb-23	Bromide	0.537	0.0670	0.200	NE	NE			119337-007	SW846-9056A
	Chloride	36.9	0.670	2.00	NE	NE			119337-007	SW846-9056A
	Fluoride	1.51	0.0330	0.100	4.00	1.60			119337-007	SW846-9056A
	Sulfate	78.5	1.33	4.00	NE	NE			119337-007	SW846-9056A
	Alkalinity as $CaCO_3$	194	1.45	4.00	NE	NE			119337-004	SM2320B
	Total Phenol	ND	0.00167	0.00500	NE	NE	U	0.005UJ	119337-003	SW846-9066
	Total Cyanide	ND	0.00167	0.00500	0.200	0.200	U	UJ	119337-006	SW846-9012B
CYN-MW5	Total Organic Halogens	ND	0.00333	0.0100	NE	NE	H, N, U	UJ	119339-002	SW846-9020B
09-Feb-23	Bromide	0.167	0.0670	0.200	NE	NE	J		119339-007	SW846-9056A
	Chloride	14.8	0.134	0.400	NE	NE			119339-007	SW846-9056A
	Fluoride	0.318	0.0330	0.100	4.00	1.60			119339-007	SW846-9056A
	Sulfate	28.9	0.266	0.800	NE	NE			119339-007	SW846-9056A
	Alkalinity as $CaCO_3$	132	1.45	4.00	NE	NE			119339-004	SM2320B
	Total Phenol	ND	0.00167	0.00500	NE	NE	U	0.005UJ	119339-003	SW846-9066
	Total Cyanide	ND	0.00167	0.00500	0.200	0.200	U	UJ	119339-006	SW846-9012B
Greystone-MW2	Total Organic Halogens	0.0317	0.0167	0.0500	NE	NE	H, J, N	J-	119341-002	SW846-9020B
10-Feb-23	Bromide	0.614	0.134	0.400	NE	NE			119341-007	SW846-9056A
	Chloride	119	1.34	4.00	NE	NE			119341-007	SW846-9056A
	Fluoride	0.842	0.0330	0.100	4.00	1.60			119341-007	SW846-9056A
	Sulfate	50.5	2.66	8.00	NE	NE			119341-007	SW846-9056A
	Alkalinity as $CaCO_3$	406	1.45	4.00	NE	NE		J	119341-004	SM2320B
	Total Phenol	ND	0.00167	0.00500	NE	NE	U	0.005UJ	119341-003	SW846-9066
	Total Cyanide	ND	0.00167	0.00500	0.200	0.200	U	UJ	119341-006	SW846-9012B
MRN-2	Total Organic Halogens	0.00764	0.00333	0.0100	NE	NE	J		119316-002	SW846-9020B
27-Jan-23	Bromide	0.186	0.0670	0.200	NE	NE	J		119316-007	SW846-9056A
	Chloride	12.6	0.335	1.00	NE	NE			119316-007	SW846-9056A
	Fluoride	0.612	0.0330	0.100	4.00	1.60			119316-007	SW846-9056A
	Sulfate	49.6	0.665	2.00	NE	NE			119316-007	SW846-9056A
	Alkalinity as $CaCO_3$	141	1.45	4.00	NE	NE			119316-004	SM2320B
	Total Phenol	ND	0.00167	0.00500	NE	NE	U	0.005UJ	119316-003	SW846-9066
	Total Cyanide	ND	0.00167	0.00500	0.200	0.200	U	UJ	119316-006	SW846-9012B

Refer to Notes on page 2A-46.

Table 2A-4 (continued)
Summary of Alkalinity, Anion, Total Organic Halogens, Total Phenol, and Total Cyanide Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MRN-3D	Total Organic Halogens	ND	0.00333	0.0100	NE	NE	U		119314-002	SW846-9020B
26-Jan-23	Bromide	0.200	0.0670	0.200	NE	NE			119314-007	SW846-9056A
	Chloride	13.6	0.335	1.00	NE	NE			119314-007	SW846-9056A
	Fluoride	0.514	0.0330	0.100	4.00	1.60			119314-007	SW846-9056A
	Sulfate	70.4	0.665	2.00	NE	NE			119314-007	SW846-9056A
	Alkalinity as $CaCO_3$	154	1.45	4.00	NE	NE			119314-004	SM2320B
	Total Phenol	ND	0.00167	0.00500	NE	NE	U	0.005UJ	119314-003	SW846-9066
	Total Cyanide	ND	0.00167	0.00500	0.200	0.200	U	UJ	119314-006	SW846-9012B
NWTA3-MW3D	Total Organic Halogens	0.00374	0.00333	0.0100	NE	NE	J		119321-002	SW846-9020B
30-Jan-23	Bromide	0.150	0.0670	0.200	NE	NE	J		119321-007	SW846-9056A
	Chloride	10.6	0.335	1.00	NE	NE			119321-007	SW846-9056A
	Fluoride	0.717	0.0330	0.100	4.00	1.60			119321-007	SW846-9056A
	Sulfate	52.2	0.665	2.00	NE	NE			119321-007	SW846-9056A
	Alkalinity as $CaCO_3$	132	1.45	4.00	NE	NE			119321-004	SM2320B
	Total Phenol	ND	0.00167	0.00500	NE	NE	U	0.005UJ	119321-003	SW846-9066
	Total Cyanide	ND	0.00167	0.00500	0.200	0.200	U	UJ	119321-006	SW846-9012B
OBS-MW1	Total Organic Halogens	0.00376	0.00333	0.0100	NE	NE	J		119323-002	SW846-9020B
02-Feb-23	Bromide	0.409	0.0670	0.200	NE	NE			119323-007	SW846-9056A
	Chloride	26.1	0.670	2.00	NE	NE			119323-007	SW846-9056A
	Fluoride	**2.29**	0.0330	0.100	4.00	1.60			119323-007	SW846-9056A
	Sulfate	87.0	1.33	4.00	NE	NE			119323-007	SW846-9056A
	Alkalinity as $CaCO_3$	177	1.45	4.00	NE	NE			119323-004	SM2320B
	Total Phenol	ND	0.00167	0.00500	NE	NE	U	0.005UJ	119323-003	SW846-9066
	Total Cyanide	ND	0.00167	0.00500	0.200	0.200	U	UJ	119323-006	SW846-9012B
PL-2	Total Organic Halogens	ND	0.00333	0.0100	NE	NE	U		119310-002	SW846-9020B
30-Mar-23	Bromide	0.202	0.0670	0.200	NE	NE			119310-007	SW846-9056A
	Chloride	14.3	0.335	1.00	NE	NE			119310-007	SW846-9056A
	Fluoride	0.512	0.0330	0.100	4.00	1.60			119310-007	SW846-9056A
	Sulfate	72.0	0.665	2.00	NE	NE			119310-007	SW846-9056A
	Alkalinity as $CaCO_3$	151	1.45	4.00	NE	NE			119310-004	SM2320B
	Total Phenol	ND	0.00167	0.00500	NE	NE	U		119310-003	SW846-9066
	Total Cyanide	ND	0.00167	0.00500	0.200	0.200	U	UJ	119310-006	SW846-9012B

Refer to Notes on page 2A-46.

Table 2A-4 (continued)
Summary of Alkalinity, Anion, Total Organic Halogens, Total Phenol, and Total Cyanide Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
PL-4	Total Organic Halogens	ND	0.00333	0.0100	NE	NE	U		119312-003	SW846-9020B
31-Mar-23	Bromide	0.219	0.0670	0.200	NE	NE			119312-008	SW846-9056A
	Chloride	15.5	0.335	1.00	NE	NE			119312-008	SW846-9056A
	Fluoride	0.375	0.0330	0.100	4.00	1.60			119312-008	SW846-9056A
	Sulfate	70.4	0.665	2.00	NE	NE			119312-008	SW846-9056A
	Alkalinity as $CaCO_3$	164	1.45	4.00	NE	NE			119312-005	SM2320B
	Total Phenol	0.0421	0.00167	0.00500	NE	NE			119312-004	SW846-9066
	Total Cyanide	ND	0.00167	0.00500	0.200	0.200	U	UJ	119312-007	SW846-9012B
SFR-2S	Total Organic Halogens	0.00408	0.00333	0.0100	NE	NE	J		119329-003	SW846-9020B
31-Jan-23	Bromide	0.703	0.335	1.00	NE	NE	J		119329-008	SW846-9056A
	Chloride	119	3.35	10.0	NE	NE			119329-008	SW846-9056A
	Fluoride	**1.69**	0.0330	0.100	4.00	1.60			119329-008	SW846-9056A
	Sulfate	72.1	0.665	2.00	NE	NE			119329-008	SW846-9056A
	Alkalinity as $CaCO_3$	358	2.90	8.00	NE	NE			119329-005	SM2320B
	Total Phenol	ND	0.00167	0.00500	NE	NE	U	0.005UJ	119329-004	SW846-9066
	Total Cyanide	ND	0.00167	0.00500	0.200	0.200	U	UJ	119329-007	SW846-9012B
SFR-4T	Total Organic Halogens	0.00664	0.00333	0.0100	NE	NE	J	0.01U	119333-003	SW846-9020B
01-Feb-23	Bromide	1.55	0.0670	0.200	NE	NE			119333-008	SW846-9056A
	Chloride	211	13.4	40.0	NE	NE			119333-008	SW846-9056A
	Fluoride	**2.55**	0.0330	0.100	4.00	1.60			119333-008	SW846-9056A
	Sulfate	2010	26.6	80.0	NE	NE		J	119333-008	SW846-9056A
	Alkalinity as $CaCO_3$	106	1.45	4.00	NE	NE			119333-005	SM2320B
	Total Phenol	0.00397	0.00167	0.00500	NE	NE	J	J-	119333-004	SW846-9066
	Total Cyanide	ND	0.00167	0.00500	0.200	0.200	U	UJ	119333-007	SW846-9012B
SFR-4T	Total Organic Halogens	0.0177	0.0167	0.0500	NE	NE	H, J	0.05UJ	119334-003	SW846-9020B
(Duplicate)	Bromide	1.56	0.0670	0.200	NE	NE			119334-008	SW846-9056A
01-Feb-23	Chloride	211	13.4	40.0	NE	NE			119334-008	SW846-9056A
	Fluoride	**2.54**	0.0330	0.100	4.00	1.60			119334-008	SW846-9056A
	Sulfate	2100	26.6	80.0	NE	NE		J	119334-008	SW846-9056A
	Alkalinity as $CaCO_3$	107	1.45	4.00	NE	NE			119334-005	SM2320B
	Total Phenol	ND	0.00167	0.00500	NE	NE	U	0.005UJ	119334-004	SW846-9066
	Total Cyanide	ND	0.00167	0.00500	0.200	0.200	U	UJ	119334-007	SW846-9012B

Refer to Notes on page 2A-46.

Table 2A-4 (continued)
Summary of Alkalinity, Anion, Total Organic Halogens, Total Phenol, and Total Cyanide Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
SWTA3-MW2 23-Jan-23	Total Organic Halogens	ND	0.00333	0.0100	NE	NE	U		119300-003	SW846-9020B
	Bromide	0.172	0.0670	0.200	NE	NE	J		119300-008	SW846-9056A
	Chloride	17.1	0.335	1.00	NE	NE			119300-008	SW846-9056A
	Fluoride	0.980	0.0330	0.100	4.00	1.60			119300-008	SW846-9056A
	Sulfate	52.6	0.665	2.00	NE	NE			119300-008	SW846-9056A
	Alkalinity as $CaCO_3$	158	1.45	4.00	NE	NE			119300-005	SM2320B
	Total Phenol	ND	0.00167	0.00500	NE	NE	U		119300-004	SW846-9066
	Total Cyanide	ND	0.00167	0.00500	0.200	0.200	U	UJ	119300-007	SW846-9012B
SWTA3-MW3 24-Jan-23	Total Organic Halogens	ND	0.00333	0.0100	NE	NE	U		119303-003	SW846-9020B
	Bromide	0.167	0.0670	0.200	NE	NE	J		119303-008	SW846-9056A
	Chloride	14.3	0.335	1.00	NE	NE			119303-008	SW846-9056A
	Fluoride	1.27	0.0330	0.100	4.00	1.60			119303-008	SW846-9056A
	Sulfate	59.0	0.665	2.00	NE	NE			119303-008	SW846-9056A
	Alkalinity as $CaCO_3$	164	1.45	4.00	NE	NE			119303-005	SM2320B
	Total Phenol	ND	0.00167	0.00500	NE	NE	U		119303-004	SW846-9066
	Total Cyanide	ND	0.00167	0.00500	0.200	0.200	U	UJ	119303-007	SW846-9012B
SWTA3-MW4 25-Jan-23	Total Organic Halogens	0.00370	0.00333	0.0100	NE	NE	H, J	0.01U	119307-003	SW846-9020B
	Bromide	0.193	0.0670	0.200	NE	NE	J		119307-008	SW846-9056A
	Chloride	16.6	0.335	1.00	NE	NE			119307-008	SW846-9056A
	Fluoride	**1.70**	0.0330	0.100	4.00	1.60			119307-008	SW846-9056A
	Sulfate	51.9	0.665	2.00	NE	NE			119307-008	SW846-9056A
	Alkalinity as $CaCO_3$	169	1.45	4.00	NE	NE			119307-005	SM2320B
	Total Phenol	0.00400	0.00167	0.00500	NE	NE	J	J-	119307-004	SW846-9066
	Total Cyanide	ND	0.00167	0.00500	0.200	0.200	U	UJ	119307-007	SW846-9012B
SWTA3-MW4 (Duplicate) 25-Jan-23	Total Organic Halogens	ND	0.00333	0.0100	NE	NE	H, U		119308-003	SW846-9020B
	Bromide	0.187	0.0670	0.200	NE	NE	J		119308-008	SW846-9056A
	Chloride	16.7	0.335	1.00	NE	NE			119308-008	SW846-9056A
	Fluoride	**1.70**	0.0330	0.100	4.00	1.60			119308-008	SW846-9056A
	Sulfate	52.6	0.665	2.00	NE	NE			119308-008	SW846-9056A
	Alkalinity as $CaCO_3$	167	1.45	4.00	NE	NE			119308-005	SM2320B
	Total Phenol	ND	0.00167	0.00500	NE	NE	U	0.005UJ	119308-004	SW846-9066
	Total Cyanide	ND	0.00167	0.00500	0.200	0.200	U	UJ	119308-007	SW846-9012B

Refer to Notes on page 2A-46.

Table 2A-4 (concluded)
Summary of Alkalinity, Anion, Total Organic Halogens, Total Phenol, and Total Cyanide Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TRE-1 06-Feb-23	Total Organic Halogens	0.0404	0.00333	0.0100	NE	NE			119343-003	SW846-9020B
	Bromide	0.210	0.0670	0.200	NE	NE			119343-008	SW846-9056A
	Chloride	140	1.34	4.00	NE	NE			119343-008	SW846-9056A
	Fluoride	**1.67**	0.0330	0.100	4.0	1.60			119343-008	SW846-9056A
	Sulfate	114	2.66	8.00	NE	NE			119343-008	SW846-9056A
	Alkalinity as $CaCO_3$	480	1.45	4.00	NE	NE			119343-005	SM2320B
	Total Phenol	ND	0.00167	0.00500	NE	NE	U	0.005UJ	119343-004	SW846-9066
	Total Cyanide	ND	0.00167	0.00500	0.200	0.200	U	UJ	119343-007	SW846-9012B

Refer to Notes on page 2A-46.

Table 2A-5
Summary of Mercury Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
Coyote Springs 03-Feb-23	ND	0.0000670	0.000200	0.002	U		119325-009	SW846-7470A
Coyote Springs (Duplicate) 03-Feb-23	ND	0.0000670	0.000200	0.002	U		119326-008	SW846-7470A
CCBA-MW2 07-Feb-23	ND	0.0000670	0.000200	0.002	U		119347-009	SW846-7470A
CCBA-MW2 (Duplicate) 07-Feb-23	ND	0.0000670	0.000200	0.002	U		119348-009	SW846-7470A
CTF-MW1 08-Feb-23	ND	0.0000670	0.000200	0.002	U		119337-009	SW846-7470A
CYN-MW5 09-Feb-23	ND	0.0000670	0.000200	0.002	U		119339-009	SW846-7470A
Greystone-MW2 10-Feb-23	ND	0.0000670	0.000200	0.002	U		119341-009	SW846-7470A
MRN-2 27-Jan-23	ND	0.0000670	0.000200	0.002	U		119316-009	SW846-7470A
MRN-3D 26-Jan-23	ND	0.0000670	0.000200	0.002	U		119314-009	SW846-7470A
NWTA3-MW3D 30-Jan-23	ND	0.0000670	0.000200	0.002	U		119321-009	SW846-7470A
OBS-MW1 02-Feb-23	ND	0.0000670	0.000200	0.002	U		119323-009	SW846-7470A
PL-2 30-Mar-23	ND	0.0000670	0.000200	0.002	U		119310-009	SW846-7470A
PL-4 31-Mar-23	ND	0.0000670	0.000200	0.002	U		119312-010	SW846-7470A
SFR-2S 31-Jan-23	ND	0.0000670	0.000200	0.002	U		119329-010	SW846-7470A
SFR-4T 01-Feb-23	ND	0.0000670	0.000200	0.002	U		119333-010	SW846-7470A
SFR-4T (Duplicate) 01-Feb-23	ND	0.0000670	0.000200	0.002	U		119334-010	SW846-7470A
SWTA3-MW2 23-Jan-23	ND	0.0000670	0.000200	0.002	U		119300-010	SW846-7470A
SWTA3-MW3 24-Jan-23	ND	0.0000670	0.000200	0.002	U		119303-010	SW846-7470A

Refer to Notes on page 2A-46.

Table 2A-5 (concluded)
Summary of Mercury Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
SWTA3-MW4 25-Jan-23	ND	0.0000670	0.000200	0.002	U		119307-010	SW846-7470A
SWTA3-MW4 (Duplicate) 25-Jan-23	ND	0.0000670	0.000200	0.002	U		119308-010	SW846-7470A
TRE-1 06-Feb-23	ND	0.0000670	0.000200	0.002	U		119343-010	SW846-7470A

Refer to Notes on page 2A-46.

Table 2A-6
Summary of Target Analyte List Metals and Uranium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
Coyote Springs	Aluminum	0.205	0.0193	0.0500	NE	NE			119325-008	SW846-3005A/6020B
03-Feb-23	Antimony	ND	0.00100	0.00300	0.006	0.006	U		119325-008	SW846-3005A/6020B
	Arsenic	0.00936	0.00200	0.00500	0.010	0.010			119325-008	SW846-3005A/6020B
	Barium	0.0405	0.000670	0.00400	2.00	2.00			119325-008	SW846-3005A/6020B
	Beryllium	**0.00752**	0.000200	0.000500	0.004	0.004			119325-008	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	0.005	U		119325-008	SW846-3005A/6020B
	Calcium	278	0.800	2.00	NE	NE			119325-008	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	0.050	U		119325-008	SW846-3005A/6020B
	Cobalt	0.00953	0.000300	0.00100	NE	NE			119325-008	SW846-3005A/6020B
	Copper	0.000506	0.000300	0.00200	NE	NE	J		119325-008	SW846-3005A/6020B
	Iron	0.0792	0.0330	0.100	NE	NE	J		119325-008	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	0.015	U		119325-008	SW846-3005A/6020B
	Magnesium	65.2	0.100	0.300	NE	NE		J	119325-008	SW846-3005A/6020B
	Manganese	1.40	0.0100	0.0500	NE	NE			119325-008	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	0.002	U		119325-008	SW846-7470A
	Nickel	0.0231	0.000600	0.00200	NE	NE			119325-008	SW846-3005A/6020B
	Potassium	29.3	0.0800	0.300	NE	NE			119325-008	SW846-3005A/6020B
	Selenium	ND	0.00150	0.00500	0.050	0.050	U		119325-008	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	0.050	U		119325-008	SW846-3005A/6020B
	Sodium	418	0.800	2.50	NE	NE			119325-008	SW846-3005A/6020B
	Thallium	0.00125	0.000600	0.00200	0.002	0.002	J		119325-008	SW846-3005A/6020B
	Vanadium	ND	0.00330	0.0200	NE	NE	U		119325-008	SW846-3005A/6020B
	Zinc	0.0428	0.00330	0.0200	NE	NE			119325-008	SW846-3005A/6020B

Refer to Notes on page 2A-46.

Table 2A-6 (continued)
Summary of Target Analyte List Metals and Uranium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
Coyote Springs	Aluminum	0.208	0.0193	0.0500	NE	NE			119326-007	SW846-3005A/6020B
(Duplicate)	Antimony	ND	0.00100	0.00300	0.006	0.006	U		119326-007	SW846-3005A/6020B
03-Feb-23	Arsenic	0.00918	0.00200	0.00500	0.010	0.010			119326-007	SW846-3005A/6020B
	Barium	0.0405	0.000670	0.00400	2.00	2.00			119326-007	SW846-3005A/6020B
	Beryllium	**0.00756**	0.000200	0.000500	0.004	0.004			119326-007	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	0.005	U		119326-007	SW846-3005A/6020B
	Calcium	284	0.800	2.00	NE	NE			119326-007	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	0.050	U		119326-007	SW846-3005A/6020B
	Cobalt	0.00951	0.000300	0.00100	NE	NE			119326-007	SW846-3005A/6020B
	Copper	0.000480	0.000300	0.00200	NE	NE	J		119326-007	SW846-3005A/6020B
	Iron	0.0811	0.0330	0.100	NE	NE	J		119326-007	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	0.015	U		119326-007	SW846-3005A/6020B
	Magnesium	67.0	0.100	0.300	NE	NE		J	119326-007	SW846-3005A/6020B
	Manganese	1.43	0.0100	0.0500	NE	NE			119326-007	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	0.002	U		119326-007	SW846-7470A
	Nickel	0.0232	0.000600	0.00200	NE	NE			119326-007	SW846-3005A/6020B
	Potassium	29.5	0.0800	0.300	NE	NE			119326-007	SW846-3005A/6020B
	Selenium	ND	0.00150	0.00500	0.050	0.050	U		119326-007	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	0.050	U		119326-007	SW846-3005A/6020B
	Sodium	425	0.800	2.50	NE	NE			119326-007	SW846-3005A/6020B
	Thallium	0.00124	0.000600	0.00200	0.002	0.002	J		119326-007	SW846-3005A/6020B
	Vanadium	ND	0.00330	0.0200	NE	NE	U		119326-007	SW846-3005A/6020B
	Zinc	0.0428	0.00330	0.0200	NE	NE			119326-007	SW846-3005A/6020B

Refer to Notes on page 2A-46.

Table 2A-6 (continued)
Summary of Target Analyte List Metals and Uranium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW2	Aluminum	ND	0.0193	0.0500	NE	NE	U		119347-008	SW846-3005A/6020B
07-Feb-23	Antimony	ND	0.00100	0.00300	0.006	0.006	U		119347-008	SW846-3005A/6020B
	Arsenic	0.00251	0.00200	0.00500	0.010	0.010	J		119347-008	SW846-3005A/6020B
	Barium	0.0463	0.000670	0.00400	2.00	2.00			119347-008	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	0.004	U		119347-008	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	0.005	U		119347-008	SW846-3005A/6020B
	Calcium	71.6	0.800	2.00	NE	NE			119347-008	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	0.050	U		119347-008	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	NE	U		119347-008	SW846-3005A/6020B
	Copper	ND	0.000300	0.00200	NE	NE	U		119347-008	SW846-3005A/6020B
	Iron	ND	0.0330	0.100	NE	NE	U		119347-008	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	0.015	U		119347-008	SW846-3005A/6020B
	Magnesium	15.8	0.0100	0.0300	NE	NE			119347-008	SW846-3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	NE	U		119347-008	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	0.002	U		119347-008	SW846-7470A
	Nickel	ND	0.000600	0.00200	NE	NE	U		119347-008	SW846-3005A/6020B
	Potassium	1.21	0.0800	0.300	NE	NE			119347-008	SW846-3005A/6020B
	Selenium	0.00369	0.00150	0.00500	0.050	0.050	J		119347-008	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	0.050	U		119347-008	SW846-3005A/6020B
	Sodium	49.0	0.800	2.50	NE	NE			119347-008	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	0.002	U		119347-008	SW846-3005A/6020B
	Vanadium	0.0107	0.00330	0.0200	NE	NE	J		119347-008	SW846-3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	NE	U		119347-008	SW846-3005A/6020B

Refer to Notes on page 2A-46.

Table 2A-6 (continued)
Summary of Target Analyte List Metals and Uranium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW2	Aluminum	ND	0.0193	0.0500	NE	NE	U		119348-008	SW846-3005A/6020B
(Duplicate)	Antimony	ND	0.00100	0.00300	0.006	0.006	U		119348-008	SW846-3005A/6020B
07-Feb-23	Arsenic	0.00228	0.00200	0.00500	0.010	0.010	J		119348-008	SW846-3005A/6020B
	Barium	0.0467	0.000670	0.00400	2.00	2.00			119348-008	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	0.004	U		119348-008	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	0.005	U		119348-008	SW846-3005A/6020B
	Calcium	74.1	0.800	2.00	NE	NE			119348-008	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	0.050	U		119348-008	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	NE	U		119348-008	SW846-3005A/6020B
	Copper	ND	0.000300	0.00200	NE	NE	U		119348-008	SW846-3005A/6020B
	Iron	ND	0.0330	0.100	NE	NE	U		119348-008	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	0.015	U		119348-008	SW846-3005A/6020B
	Magnesium	16.1	0.0100	0.0300	NE	NE			119348-008	SW846-3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	NE	U		119348-008	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	0.002	U		119348-008	SW846-7470A
	Nickel	ND	0.000600	0.00200	NE	NE	U		119348-008	SW846-3005A/6020B
	Potassium	1.22	0.0800	0.300	NE	NE			119348-008	SW846-3005A/6020B
	Selenium	0.00395	0.00150	0.00500	0.050	0.050	J		119348-008	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	0.050	U		119348-008	SW846-3005A/6020B
	Sodium	49.7	0.800	2.50	NE	NE			119348-008	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	0.002	U		119348-008	SW846-3005A/6020B
	Vanadium	0.0107	0.00330	0.0200	NE	NE	J		119348-008	SW846-3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	NE	U		119348-008	SW846-3005A/6020B

Refer to Notes on page 2A-46.

Table 2A-6 (continued)
Summary of Target Analyte List Metals and Uranium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CTF-MW1	Aluminum	ND	0.0193	0.0500	NE	NE	U		119337-008	SW846-3005A/6020B
08-Feb-23	Antimony	ND	0.00100	0.00300	0.006	0.006	U		119337-008	SW846-3005A/6020B
	Arsenic	0.00291	0.00200	0.00500	0.010	0.010	J		119337-008	SW846-3005A/6020B
	Barium	0.0482	0.000670	0.00400	2.00	2.00			119337-008	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	0.004	U		119337-008	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	0.005	U		119337-008	SW846-3005A/6020B
	Calcium	88.7	0.800	2.00	NE	NE			119337-008	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	0.050	U		119337-008	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	NE	U		119337-008	SW846-3005A/6020B
	Copper	ND	0.000300	0.00200	NE	NE	U		119337-008	SW846-3005A/6020B
	Iron	ND	0.0330	0.100	NE	NE	U		119337-008	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	0.015	U		119337-008	SW846-3005A/6020B
	Magnesium	19.2	0.0100	0.0300	NE	NE			119337-008	SW846-3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	NE	U		119337-008	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	0.002	U		119337-008	SW846-7470A
	Nickel	ND	0.000600	0.00200	NE	NE	U		119337-008	SW846-3005A/6020B
	Potassium	1.68	0.0800	0.300	NE	NE			119337-008	SW846-3005A/6020B
	Selenium	0.00447	0.00150	0.00500	0.050	0.050	J		119337-008	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	0.050	U		119337-008	SW846-3005A/6020B
	Sodium	31.6	0.0800	0.250	NE	NE			119337-008	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	0.002	U		119337-008	SW846-3005A/6020B
	Vanadium	ND	0.00330	0.0200	NE	NE	U		119337-008	SW846-3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	NE	U		119337-008	SW846-3005A/6020B

Refer to Notes on page 2A-46.

Table 2A-6 (continued)
Summary of Target Analyte List Metals and Uranium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW5	Aluminum	ND	0.0193	0.0500	NE	NE	U		119339-008	SW846-3005A/6020B
09-Feb-23	Antimony	ND	0.00100	0.00300	0.006	0.006	U		119339-008	SW846-3005A/6020B
	Arsenic	0.00570	0.00200	0.00500	0.010	0.010			119339-008	SW846-3005A/6020B
	Barium	0.167	0.000670	0.00400	2.00	2.00			119339-008	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	0.004	U		119339-008	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	0.005	U		119339-008	SW846-3005A/6020B
	Calcium	51.0	0.800	2.00	NE	NE			119339-008	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	0.050	U		119339-008	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	NE	U		119339-008	SW846-3005A/6020B
	Copper	ND	0.000300	0.00200	NE	NE	U		119339-008	SW846-3005A/6020B
	Iron	ND	0.0330	0.100	NE	NE	U		119339-008	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	0.015	U		119339-008	SW846-3005A/6020B
	Magnesium	9.41	0.0100	0.0300	NE	NE			119339-008	SW846-3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	NE	U		119339-008	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	0.002	U		119339-008	SW846-7470A
	Nickel	0.000854	0.000600	0.00200	NE	NE	J		119339-008	SW846-3005A/6020B
	Potassium	2.05	0.0800	0.300	NE	NE			119339-008	SW846-3005A/6020B
	Selenium	ND	0.00150	0.00500	0.050	0.050	U		119339-008	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	0.050	U		119339-008	SW846-3005A/6020B
	Sodium	14.3	0.0800	0.250	NE	NE			119339-008	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	0.002	U		119339-008	SW846-3005A/6020B
	Vanadium	ND	0.00330	0.0200	NE	NE	U		119339-008	SW846-3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	NE	U		119339-008	SW846-3005A/6020B

Refer to Notes on page 2A-46.

Table 2A-6 (continued)
Summary of Target Analyte List Metals and Uranium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
Greystone-MW2	Aluminum	ND	0.0193	0.0500	NE	NE	U		119341-008	SW846-3005A/6020B
10-Feb-23	Antimony	ND	0.00100	0.00300	0.006	0.006	U		119341-008	SW846-3005A/6020B
	Arsenic	0.00495	0.00200	0.00500	0.010	0.010	J		119341-008	SW846-3005A/6020B
	Barium	0.145	0.000670	0.00400	2.00	2.00			119341-008	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	0.004	U		119341-008	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	0.005	U		119341-008	SW846-3005A/6020B
	Calcium	151	0.800	2.00	NE	NE			119341-008	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	0.050	U		119341-008	SW846-3005A/6020B
	Cobalt	0.000590	0.000300	0.00100	NE	NE	J		119341-008	SW846-3005A/6020B
	Copper	0.000303	0.000300	0.00200	NE	NE	B, J	0.002U	119341-008	SW846-3005A/6020B
	Iron	ND	0.0330	0.100	NE	NE	U		119341-008	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	0.015	U		119341-008	SW846-3005A/6020B
	Magnesium	28.8	0.0100	0.0300	NE	NE			119341-008	SW846-3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	NE	U		119341-008	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	0.002	U		119341-008	SW846-7470A
	Nickel	ND	0.000600	0.00200	NE	NE	U		119341-008	SW846-3005A/6020B
	Potassium	5.31	0.0800	0.300	NE	NE			119341-008	SW846-3005A/6020B
	Selenium	0.00158	0.00150	0.00500	0.050	0.050	J		119341-008	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	0.050	U		119341-008	SW846-3005A/6020B
	Sodium	98.2	0.800	2.50	NE	NE			119341-008	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	0.002	U		119341-008	SW846-3005A/6020B
	Vanadium	0.00428	0.00330	0.0200	NE	NE	J		119341-008	SW846-3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	NE	U		119341-008	SW846-3005A/6020B

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Table 2A-6 (continued)
Summary of Target Analyte List Metals and Uranium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MRN-2	Aluminum	ND	0.0193	0.0500	NE	NE	U		119316-008	SW846-3005A/6020B
27-Jan-23	Antimony	ND	0.00100	0.00300	0.006	0.006	U		119316-008	SW846-3005A/6020B
	Arsenic	0.00374	0.00200	0.00500	0.010	0.010	J		119316-008	SW846-3005A/6020B
	Barium	0.0597	0.000670	0.00400	2.00	2.00			119316-008	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	0.004	U		119316-008	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	0.005	U		119316-008	SW846-3005A/6020B
	Calcium	49.3	0.0800	0.200	NE	NE			119316-008	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	0.050	U		119316-008	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	NE	U		119316-008	SW846-3005A/6020B
	Copper	0.000895	0.000300	0.00200	NE	NE	J		119316-008	SW846-3005A/6020B
	Iron	ND	0.0330	0.100	NE	NE	U		119316-008	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	0.015	U		119316-008	SW846-3005A/6020B
	Magnesium	16.2	0.0100	0.0300	NE	NE			119316-008	SW846-3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	NE	U		119316-008	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	0.002	U		119316-008	SW846-7470A
	Nickel	ND	0.000600	0.00200	NE	NE	U		119316-008	SW846-3005A/6020B
	Potassium	3.40	0.0800	0.300	NE	NE			119316-008	SW846-3005A/6020B
	Selenium	ND	0.00150	0.00500	0.050	0.050	U		119316-008	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	0.050	U		119316-008	SW846-3005A/6020B
	Sodium	25.2	0.0800	0.250	NE	NE			119316-008	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	0.002	U		119316-008	SW846-3005A/6020B
	Uranium	0.00292	0.0000670	0.000200	0.03	0.03			119316-008	SW846-3005A/6020B
	Vanadium	0.0107	0.00330	0.0200	NE	NE	J		119316-008	SW846-3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	NE	U		119316-008	SW846-3005A/6020B

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Table 2A-6 (continued)
Summary of Target Analyte List Metals and Uranium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MRN-3D	Aluminum	ND	0.0193	0.0500	NE	NE	U		119314-008	SW846-3005A/6020B
26-Jan-23	Antimony	ND	0.00100	0.00300	0.006	0.006	U		119314-008	SW846-3005A/6020B
	Arsenic	0.00255	0.00200	0.00500	0.010	0.010	J		119314-008	SW846-3005A/6020B
	Barium	0.109	0.000670	0.00400	2.00	2.00			119314-008	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	0.004	U		119314-008	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	0.005	U		119314-008	SW846-3005A/6020B
	Calcium	57.4	0.800	2.00	NE	NE			119314-008	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	0.050	U		119314-008	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	NE	U		119314-008	SW846-3005A/6020B
	Copper	ND	0.000300	0.00200	NE	NE	U		119314-008	SW846-3005A/6020B
	Iron	ND	0.0330	0.100	NE	NE	U		119314-008	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	0.015	U		119314-008	SW846-3005A/6020B
	Magnesium	14.9	0.0100	0.0300	NE	NE		J	119314-008	SW846-3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	NE	U		119314-008	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	0.002	U		119314-008	SW846-7470A
	Nickel	ND	0.000600	0.00200	NE	NE	U		119314-008	SW846-3005A/6020B
	Potassium	3.73	0.0800	0.300	NE	NE	N		119314-008	SW846-3005A/6020B
	Selenium	ND	0.00150	0.00500	0.050	0.050	U		119314-008	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	0.050	U		119314-008	SW846-3005A/6020B
	Sodium	28.7	0.0800	0.250	NE	NE			119314-008	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	0.002	U		119314-008	SW846-3005A/6020B
	Uranium	0.00332	0.0000670	0.000200	0.03	0.03			119314-008	SW846-3005A/6020B
	Vanadium	0.00770	0.00330	0.0200	NE	NE	J		119314-008	SW846-3005A/6020B
	Zinc	0.0641	0.00330	0.0200	NE	NE			119314-008	SW846-3005A/6020B

Refer to Notes on page 2A-46.

Table 2A-6 (continued)
Summary of Target Analyte List Metals and Uranium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
NWTA3-MW3D	Aluminum	ND	0.0193	0.0500	NE	NE	U		119321-008	SW846-3005A/6020B
30-Jan-23	Antimony	ND	0.00100	0.00300	0.006	0.006	U		119321-008	SW846-3005A/6020B
	Arsenic	0.00297	0.00200	0.00500	0.010	0.010	J		119321-008	SW846-3005A/6020B
	Barium	0.0929	0.000670	0.00400	2.00	2.00			119321-008	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	0.004	U		119321-008	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	0.005	U		119321-008	SW846-3005A/6020B
	Calcium	40.3	0.0800	0.200	NE	NE			119321-008	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	0.050	U		119321-008	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	NE	U		119321-008	SW846-3005A/6020B
	Copper	ND	0.000300	0.00200	NE	NE	U		119321-008	SW846-3005A/6020B
	Iron	ND	0.0330	0.100	NE	NE	U		119321-008	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	0.015	U		119321-008	SW846-3005A/6020B
	Magnesium	8.69	0.0100	0.0300	NE	NE			119321-008	SW846-3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	NE	U		119321-008	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	0.002	U		119321-008	SW846-7470A
	Nickel	ND	0.000600	0.00200	NE	NE	U		119321-008	SW846-3005A/6020B
	Potassium	3.71	0.0800	0.300	NE	NE			119321-008	SW846-3005A/6020B
	Selenium	ND	0.00150	0.00500	0.050	0.050	U		119321-008	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	0.050	U		119321-008	SW846-3005A/6020B
	Sodium	39.0	0.0800	0.250	NE	NE			119321-008	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	0.002	U		119321-008	SW846-3005A/6020B
	Uranium	0.00344	0.0000670	0.000200	0.03	0.03			119321-008	SW846-3005A/6020B
	Vanadium	0.00987	0.00330	0.0200	NE	NE	J		119321-008	SW846-3005A/6020B
	Zinc	0.0443	0.00330	0.0200	NE	NE			119321-008	SW846-3005A/6020B

Refer to Notes on page 2A-46.

Table 2A-6 (continued)
Summary of Target Analyte List Metals and Uranium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
OBS-MW1	Aluminum	ND	0.0193	0.0500	NE	NE	U		119323-008	SW846-3005A/6020B
02-Feb-23	Antimony	ND	0.00100	0.00300	0.006	0.006	U		119323-008	SW846-3005A/6020B
	Arsenic	ND	0.00200	0.00500	0.010	0.010	U		119323-008	SW846-3005A/6020B
	Barium	0.0200	0.000670	0.00400	2.00	2.00			119323-008	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	0.004	U		119323-008	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	0.005	U		119323-008	SW846-3005A/6020B
	Calcium	79.2	0.800	2.00	NE	NE			119323-008	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	0.050	U		119323-008	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	NE	U		119323-008	SW846-3005A/6020B
	Copper	ND	0.000300	0.00200	NE	NE	U		119323-008	SW846-3005A/6020B
	Iron	ND	0.0330	0.100	NE	NE	U		119323-008	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	0.015	U		119323-008	SW846-3005A/6020B
	Magnesium	18.8	0.0100	0.0300	NE	NE		J	119323-008	SW846-3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	NE	U		119323-008	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	0.002	U		119323-008	SW846-7470A
	Nickel	ND	0.000600	0.00200	NE	NE	U		119323-008	SW846-3005A/6020B
	Potassium	1.68	0.0800	0.300	NE	NE			119323-008	SW846-3005A/6020B
	Selenium	0.00316	0.00150	0.00500	0.050	0.050	J		119323-008	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	0.050	U		119323-008	SW846-3005A/6020B
	Sodium	25.7	0.0800	0.250	NE	NE			119323-008	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	0.002	U		119323-008	SW846-3005A/6020B
	Vanadium	ND	0.00330	0.0200	NE	NE	U		119323-008	SW846-3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	NE	U		119323-008	SW846-3005A/6020B

Refer to Notes on page 2A-46.

Table 2A-6 (continued)
Summary of Target Analyte List Metals and Uranium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
PL-2	Aluminum	ND	0.0193	0.0500	NE	NE	U		119310-008	SW846-3005A/6020B
30-Mar-23	Antimony	0.00184	0.00100	0.00300	0.006	0.006	J		119310-008	SW846-3005A/6020B
	Arsenic	ND	0.00200	0.00500	0.010	0.010	U		119310-008	SW846-3005A/6020B
	Barium	0.0795	0.000670	0.00400	2.00	2.00			119310-008	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	0.004	U		119310-008	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	0.005	U		119310-008	SW846-3005A/6020B
	Calcium	59.8	0.800	2.00	NE	NE			119310-008	SW846-3005A/6020B
	Chromium	0.00407	0.00300	0.0100	0.100	0.050	J		119310-008	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	NE	U		119310-008	SW846-3005A/6020B
	Copper	ND	0.000300	0.00200	NE	NE	U		119310-008	SW846-3005A/6020B
	Iron	ND	0.0330	0.100	NE	NE	U		119310-008	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	0.015	U		119310-008	SW846-3005A/6020B
	Magnesium	9.86	0.0100	0.0300	NE	NE			119310-008	SW846-3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	NE	U		119310-008	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	0.002	U		119310-008	SW846-7470A
	Nickel	0.00383	0.000600	0.00200	NE	NE			119310-008	SW846-3005A/6020B
	Potassium	3.66	0.0800	0.300	NE	NE			119310-008	SW846-3005A/6020B
	Selenium	0.00155	0.00150	0.00500	0.050	0.050	J		119310-008	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	0.050	U		119310-008	SW846-3005A/6020B
	Sodium	28.7	0.0800	0.250	NE	NE			119310-008	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	0.002	U		119310-008	SW846-3005A/6020B
	Uranium	0.00339	0.0000670	0.000200	0.03	0.03			119310-008	SW846-3005A/6020B
	Vanadium	0.00839	0.00330	0.0200	NE	NE	J		119310-008	SW846-3005A/6020B
	Zinc	0.0114	0.00330	0.0200	NE	NE	J		119310-008	SW846-3005A/6020B

Refer to Notes on page 2A-46.

Table 2A-6 (continued)
Summary of Target Analyte List Metals and Uranium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
PL-4	Aluminum	ND	0.0193	0.0500	NE	NE	U		119312-009	SW846-3005A/6020B
31-Mar-23	Antimony	ND	0.00100	0.00300	0.006	0.006	U		119312-009	SW846-3005A/6020B
	Arsenic	ND	0.00200	0.00500	0.010	0.010	U		119312-009	SW846-3005A/6020B
	Barium	0.0799	0.000670	0.00400	2.00	2.00			119312-009	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	0.004	U		119312-009	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	0.005	U		119312-009	SW846-3005A/6020B
	Calcium	66.9	0.800	2.00	NE	NE			119312-009	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	0.050	U		119312-009	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	NE	U		119312-009	SW846-3005A/6020B
	Copper	ND	0.000300	0.00200	NE	NE	U		119312-009	SW846-3005A/6020B
	Iron	0.0352	0.0330	0.100	NE	NE	J		119312-009	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	0.015	U		119312-009	SW846-3005A/6020B
	Magnesium	12.0	0.0100	0.0300	NE	NE			119312-009	SW846-3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	NE	U		119312-009	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	0.002	U		119312-009	SW846-7470A
	Nickel	ND	0.000600	0.00200	NE	NE	U		119312-009	SW846-3005A/6020B
	Potassium	5.05	0.0800	0.300	NE	NE			119312-009	SW846-3005A/6020B
	Selenium	0.00156	0.00150	0.00500	0.050	0.050	J		119312-009	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	0.050	U		119312-009	SW846-3005A/6020B
	Sodium	24.2	0.0800	0.250	NE	NE			119312-009	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	0.002	U		119312-009	SW846-3005A/6020B
	Uranium	0.00343	0.0000670	0.000200	0.03	0.03			119312-009	SW846-3005A/6020B
	Vanadium	0.00667	0.00330	0.0200	NE	NE	J		119312-009	SW846-3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	NE	U		119312-009	SW846-3005A/6020B

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Table 2A-6 (continued)
Summary of Target Analyte List Metals and Uranium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
SFR-2S	Aluminum	ND	0.0193	0.0500	NE	NE	U		119329-009	SW846-3005A/6020B
31-Jan-23	Antimony	ND	0.00100	0.00300	0.006	0.006	U		119329-009	SW846-3005A/6020B
	Arsenic	0.00250	0.00200	0.00500	0.010	0.010	J		119329-009	SW846-3005A/6020B
	Barium	0.0565	0.000670	0.00400	2.00	2.00			119329-009	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	0.004	U		119329-009	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	0.005	U		119329-009	SW846-3005A/6020B
	Calcium	116	0.800	2.00	NE	NE			119329-009	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	0.050	U		119329-009	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	NE	U		119329-009	SW846-3005A/6020B
	Copper	0.000358	0.000300	0.00200	NE	NE	J		119329-009	SW846-3005A/6020B
	Iron	ND	0.0330	0.100	NE	NE	U		119329-009	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	0.015	U		119329-009	SW846-3005A/6020B
	Magnesium	37.7	0.0100	0.0300	NE	NE			119329-009	SW846-3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	NE	U		119329-009	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	0.002	U		119329-009	SW846-7470A
	Nickel	0.00361	0.000600	0.00200	NE	NE			119329-009	SW846-3005A/6020B
	Potassium	7.37	0.0800	0.300	NE	NE			119329-009	SW846-3005A/6020B
	Selenium	0.00209	0.00150	0.00500	0.050	0.050	J		119329-009	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	0.050	U		119329-009	SW846-3005A/6020B
	Sodium	81.2	0.800	2.50	NE	NE			119329-009	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	0.002	U		119329-009	SW846-3005A/6020B
	Vanadium	0.00502	0.00330	0.0200	NE	NE	J		119329-009	SW846-3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	NE	U		119329-009	SW846-3005A/6020B

Refer to Notes on page 2A-46.

Table 2A-6 (continued)
Summary of Target Analyte List Metals and Uranium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
SFR-4T	Aluminum	ND	0.0965	0.250	NE	NE	U		119333-009	SW846-3005A/6020B
01-Feb-23	Antimony	ND	0.00500	0.0150	0.006	0.006	U		119333-009	SW846-3005A/6020B
	Arsenic	ND	0.0100	0.0250	0.010	0.010	U		119333-009	SW846-3005A/6020B
	Barium	0.00915	0.00335	0.0200	2.00	2.00	J		119333-009	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	0.004	U		119333-009	SW846-3005A/6020B
	Cadmium	ND	0.00150	0.00500	0.005	0.005	U		119333-009	SW846-3005A/6020B
	Calcium	66.7	0.400	1.00	NE	NE			119333-009	SW846-3005A/6020B
	Chromium	ND	0.0150	0.0500	0.100	0.050	U		119333-009	SW846-3005A/6020B
	Cobalt	ND	0.00150	0.00500	NE	NE	U		119333-009	SW846-3005A/6020B
	Copper	ND	0.00150	0.0100	NE	NE	U		119333-009	SW846-3005A/6020B
	Iron	ND	0.165	0.500	NE	NE	U		119333-009	SW846-3005A/6020B
	Lead	ND	0.00250	0.0100	NE	0.015	U		119333-009	SW846-3005A/6020B
	Magnesium	3.65	0.0100	0.0300	NE	NE			119333-009	SW846-3005A/6020B
	Manganese	ND	0.00500	0.0250	NE	NE	U		119333-009	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	0.002	U		119333-009	SW846-7470A
	Nickel	ND	0.00300	0.0100	NE	NE	U		119333-009	SW846-3005A/6020B
	Potassium	2.65	0.400	1.50	NE	NE			119333-009	SW846-3005A/6020B
	Selenium	ND	0.00750	0.0250	0.050	0.050	U		119333-009	SW846-3005A/6020B
	Silver	ND	0.00150	0.00500	NE	0.050	U		119333-009	SW846-3005A/6020B
	Sodium	1060	4.00	12.5	NE	NE			119333-009	SW846-3005A/6020B
	Thallium	ND	0.00300	0.0100	0.002	0.002	U		119333-009	SW846-3005A/6020B
	Vanadium	ND	0.0165	0.100	NE	NE	U		119333-009	SW846-3005A/6020B
	Zinc	0.164	0.0165	0.100	NE	NE			119333-009	SW846-3005A/6020B

Refer to Notes on page 2A-46.

Table 2A-6 (continued)
Summary of Target Analyte List Metals and Uranium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
SFR-4T	Aluminum	ND	0.0193	0.0500	NE	NE	U		119334-009	SW846-3005A/6020B
(Duplicate)	Antimony	0.00131	0.00100	0.00300	0.006	0.006	J		119334-009	SW846-3005A/6020B
01-Feb-23	Arsenic	ND	0.0100	0.0250	0.010	0.010	U		119334-009	SW846-3005A/6020B
	Barium	0.00942	0.000670	0.00400	2.00	2.00			119334-009	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	0.004	U		119334-009	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	0.005	U		119334-009	SW846-3005A/6020B
	Calcium	64.3	0.400	1.00	NE	NE			119334-009	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	0.050	U		119334-009	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	NE	U		119334-009	SW846-3005A/6020B
	Copper	0.000379	0.000300	0.00200	NE	NE	B, J	0.002U	119334-009	SW846-3005A/6020B
	Iron	ND	0.0330	0.100	NE	NE	U		119334-009	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	0.015	U		119334-009	SW846-3005A/6020B
	Magnesium	3.55	0.0100	0.0300	NE	NE			119334-009	SW846-3005A/6020B
	Manganese	0.00183	0.00100	0.00500	NE	NE	J		119334-009	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	0.002	U		119334-009	SW846-7470A
	Nickel	0.00101	0.000600	0.00200	NE	NE	J		119334-009	SW846-3005A/6020B
	Potassium	2.63	0.0800	0.300	NE	NE			119334-009	SW846-3005A/6020B
	Selenium	ND	0.00150	0.00500	0.050	0.050	U		119334-009	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	0.050	U		119334-009	SW846-3005A/6020B
	Sodium	1050	4.00	12.5	NE	NE			119334-009	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	0.002	U		119334-009	SW846-3005A/6020B
	Vanadium	ND	0.00330	0.0200	NE	NE	U		119334-009	SW846-3005A/6020B
	Zinc	0.142	0.00330	0.0200	NE	NE			119334-009	SW846-3005A/6020B

Refer to Notes on page 2A-46.

Table 2A-6 (continued)
Summary of Target Analyte List Metals and Uranium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
SWTA3-MW2	Aluminum	ND	0.0193	0.0500	NE	NE	U		119300-009	SW846-3005A/6020B
23-Jan-23	Antimony	ND	0.00100	0.00300	0.006	0.006	U		119300-009	SW846-3005A/6020B
	Arsenic	ND	0.00200	0.00500	0.010	0.010	U		119300-009	SW846-3005A/6020B
	Barium	0.0782	0.000670	0.00400	2.00	2.00			119300-009	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	0.004	U		119300-009	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	0.005	U		119300-009	SW846-3005A/6020B
	Calcium	45.0	0.0800	0.200	NE	NE		J	119300-009	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	0.050	U		119300-009	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	NE	U		119300-009	SW846-3005A/6020B
	Copper	ND	0.000300	0.00200	NE	NE	U		119300-009	SW846-3005A/6020B
	Iron	ND	0.0330	0.100	NE	NE	U		119300-009	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	0.015	U		119300-009	SW846-3005A/6020B
	Magnesium	16.3	0.0100	0.0300	NE	NE			119300-009	SW846-3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	NE	U		119300-009	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	0.002	U		119300-009	SW846-7470A
	Nickel	ND	0.000600	0.00200	NE	NE	U		119300-009	SW846-3005A/6020B
	Potassium	4.59	0.0800	0.300	NE	NE			119300-009	SW846-3005A/6020B
	Selenium	ND	0.00150	0.00500	0.050	0.050	U		119300-009	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	0.050	U		119300-009	SW846-3005A/6020B
	Sodium	43.7	0.0800	0.250	NE	NE			119300-009	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	0.002	U		119300-009	SW846-3005A/6020B
	Uranium	0.00340	0.0000670	0.000200	0.03	0.03			119300-009	SW846-3005A/6020B
	Vanadium	0.00674	0.00330	0.0200	NE	NE	J		119300-009	SW846-3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	NE	U		119300-009	SW846-3005A/6020B

Refer to Notes on page 2A-46.

Table 2A-6 (continued)
Summary of Target Analyte List Metals and Uranium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
SWTA3-MW3	Aluminum	ND	0.0193	0.0500	NE	NE	U		119303-009	SW846-3005A/6020B
24-Jan-23	Antimony	ND	0.00100	0.00300	0.006	0.006	U		119303-009	SW846-3005A/6020B
	Arsenic	0.00213	0.00200	0.00500	0.010	0.010	J		119303-009	SW846-3005A/6020B
	Barium	0.0602	0.000670	0.00400	2.00	2.00			119303-009	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	0.004	U		119303-009	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	0.005	U		119303-009	SW846-3005A/6020B
	Calcium	40.0	0.0800	0.200	NE	NE			119303-009	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	0.050	U		119303-009	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	NE	U		119303-009	SW846-3005A/6020B
	Copper	ND	0.000300	0.00200	NE	NE	U		119303-009	SW846-3005A/6020B
	Iron	ND	0.0330	0.100	NE	NE	U		119303-009	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	0.015	U		119303-009	SW846-3005A/6020B
	Magnesium	11.9	0.0100	0.0300	NE	NE			119303-009	SW846-3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	NE	U		119303-009	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	0.002	U		119303-009	SW846-7470A
	Nickel	ND	0.000600	0.00200	NE	NE	U		119303-009	SW846-3005A/6020B
	Potassium	4.88	0.0800	0.300	NE	NE			119303-009	SW846-3005A/6020B
	Selenium	ND	0.00150	0.00500	0.050	0.050	U		119303-009	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	0.050	U		119303-009	SW846-3005A/6020B
	Sodium	50.5	0.800	2.50	NE	NE			119303-009	SW846-3005A/6020B
	Thallium	ND	0.000600	0.002000	0.002	0.002	U		119303-009	SW846-3005A/6020B
	Uranium	0.00244	0.0000670	0.000200	0.03	0.03			119303-009	SW846-3005A/6020B
	Vanadium	0.00914	0.003300	0.0200	NE	NE	J		119303-009	SW846-3005A/6020B
	Zinc	0.0844	0.003300	0.0200	NE	NE			119303-009	SW846-3005A/6020B

Refer to Notes on page 2A-46.

Table 2A-6 (continued)
Summary of Target Analyte List Metals and Uranium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
SWTA3-MW4	Aluminum	ND	0.0193	0.0500	NE	NE	U		119307-009	SW846-3005A/6020B
25-Jan-23	Antimony	ND	0.00100	0.00300	0.006	0.006	U		119307-009	SW846-3005A/6020B
	Arsenic	0.00267	0.00200	0.00500	0.010	0.010	J		119307-009	SW846-3005A/6020B
	Barium	0.0524	0.000670	0.00400	2.00	2.00			119307-009	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	0.004	U		119307-009	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	0.005	U		119307-009	SW846-3005A/6020B
	Calcium	36.7	0.0800	0.200	NE	NE			119307-009	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	0.050	U		119307-009	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	NE	U		119307-009	SW846-3005A/6020B
	Copper	ND	0.000300	0.00200	NE	NE	U		119307-009	SW846-3005A/6020B
	Iron	ND	0.0330	0.100	NE	NE	U		119307-009	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	0.015	U		119307-009	SW846-3005A/6020B
	Magnesium	11.5	0.0100	0.0300	NE	NE			119307-009	SW846-3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	NE	U		119307-009	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	0.002	U		119307-009	SW846-7470A
	Nickel	ND	0.000600	0.00200	NE	NE	U		119307-009	SW846-3005A/6020B
	Potassium	3.93	0.0800	0.300	NE	NE	N		119307-009	SW846-3005A/6020B
	Selenium	ND	0.00150	0.00500	0.050	0.050	U		119307-009	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	0.050	U		119307-009	SW846-3005A/6020B
	Sodium	60.7	0.800	2.50	NE	NE		J	119307-009	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	0.002	U		119307-009	SW846-3005A/6020B
	Uranium	0.00211	0.0000670	0.000200	0.03	0.03			119307-009	SW846-3005A/6020B
	Vanadium	0.0105	0.00330	0.0200	NE	NE	J		119307-009	SW846-3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	NE	U		119307-009	SW846-3005A/6020B

Refer to Notes on page 2A-46.

Table 2A-6 (continued)
Summary of Target Analyte List Metals and Uranium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
SWTA3-MW4	Aluminum	ND	0.0193	0.0500	NE	NE	U		119308-009	SW846-3005A/6020B
(Duplicate)	Antimony	ND	0.00100	0.00300	0.006	0.006	U		119308-009	SW846-3005A/6020B
25-Jan-23	Arsenic	0.00253	0.00200	0.00500	0.010	0.010	J		119308-009	SW846-3005A/6020B
	Barium	0.0504	0.000670	0.00400	2.00	2.00			119308-009	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	0.004	U		119308-009	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	0.005	U		119308-009	SW846-3005A/6020B
	Calcium	37.2	0.0800	0.200	NE	NE			119308-009	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	0.050	U		119308-009	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	NE	U		119308-009	SW846-3005A/6020B
	Copper	ND	0.000300	0.00200	NE	NE	U		119308-009	SW846-3005A/6020B
	Iron	ND	0.0330	0.100	NE	NE	U		119308-009	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	0.015	U		119308-009	SW846-3005A/6020B
	Magnesium	11.3	0.0100	0.0300	NE	NE			119308-009	SW846-3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	NE	U		119308-009	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	0.002	U		119308-009	SW846-7470A
	Nickel	ND	0.000600	0.00200	NE	NE	U		119308-009	SW846-3005A/6020B
	Potassium	3.96	0.0800	0.300	NE	NE	N		119308-009	SW846-3005A/6020B
	Selenium	ND	0.00150	0.00500	0.050	0.050	U		119308-009	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	0.050	U		119308-009	SW846-3005A/6020B
	Sodium	58.7	0.800	2.50	NE	NE		J	119308-009	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	0.002	U		119308-009	SW846-3005A/6020B
	Uranium	0.00208	0.0000670	0.000200	0.03	0.03			119308-009	SW846-3005A/6020B
	Vanadium	0.0103	0.00330	0.0200	NE	NE	J		119308-009	SW846-3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	NE	U		119308-009	SW846-3005A/6020B

Refer to Notes on page 2A-46.

Table 2A-6 (concluded)
Summary of Target Analyte List Metals and Uranium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL / MAC[d] (mg/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TRE-1	Aluminum	ND	0.0193	0.0500	NE	NE	U		119343-009	SW846-3005A/6020B
06-Feb-23	Antimony	ND	0.00100	0.00300	0.006	0.006	U		119343-009	SW846-3005A/6020B
	Arsenic	ND	0.00200	0.00500	0.010	0.010	U		119343-009	SW846-3005A/6020B
	Barium	0.0453	0.000670	0.00400	2.00	2.00			119343-009	SW846-3005A/6020B
	Beryllium	0.000246	0.000200	0.000500	0.004	0.004	J		119343-009	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	0.005	U		119343-009	SW846-3005A/6020B
	Calcium	166	1.60	4.00	NE	NE			119343-009	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	0.050	U		119343-009	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	NE	U		119343-009	SW846-3005A/6020B
	Copper	ND	0.000300	0.00200	NE	NE	U		119343-009	SW846-3005A/6020B
	Iron	0.0616	0.0330	0.100	NE	NE	J		119343-009	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	0.015	U		119343-009	SW846-3005A/6020B
	Magnesium	36.9	0.0100	0.0300	NE	NE			119343-009	SW846-3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	NE	U		119343-009	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	0.002	U		119343-009	SW846-7470A
	Nickel	ND	0.000600	0.00200	NE	NE	U		119343-009	SW846-3005A/6020B
	Potassium	7.05	0.0800	0.300	NE	NE			119343-009	SW846-3005A/6020B
	Selenium	0.00244	0.00150	0.00500	0.050	0.050	J		119343-009	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	0.050	U		119343-009	SW846-3005A/6020B
	Sodium	112	1.60	5.00	NE	NE			119343-009	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	0.002	U		119343-009	SW846-3005A/6020B
	Vanadium	0.00492	0.00330	0.0200	NE	NE	J		119343-009	SW846-3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	NE	U		119343-009	SW846-3005A/6020B

Refer to Notes on page 2A-46.

Table 2A-7
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Isotopic Uranium, and Radium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL / MAC[d]		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
Coyote Springs 03-Feb-23	Americium-241	7.67 ± 15.8	27.4	13.3	NE	NE	U	BD	119325-010	EPA 901.1
	Cesium-137	0.623 ± 1.90	3.48	1.64	NE	NE	U	BD	119325-010	EPA 901.1
	Cobalt-60	0.777 ± 2.17	3.98	1.85	NE	NE	U	BD	119325-010	EPA 901.1
	Potassium-40	23.7 ± 57.9	29.0	13.0	NE	NE	U	BD	119325-010	EPA 901.1
	Gross Alpha	-1.88	NA	NA	15 pCi/L	NE	NA	None	119325-011	EPA 900.0/SW846-9310
	Gross Beta	17.4 ± 4.54	6.79	3.28	4 mrem/yr	NE		J	119325-011	EPA 900.0/SW846-9310
	Uranium-233/234	11.3 ± 1.17	0.0902	0.0404	NE	NE			119325-014	DOE EML HASL-300
	Uranium-235/236	0.248 ± 0.0697	0.0637	0.0259	NE	NE			119325-014	DOE EML HASL-300
	Uranium-238	2.53 ± 0.307	0.0915	0.0410	NE	NE			119325-014	DOE EML HASL-300
	Radium-226	0.389 ± 0.458	0.745	0.275	5 pCi/L	5 pCi/L	U	BD	119325-012	EPA 903.1M
	Radium-228	0.543 ± 0.278	0.343	0.154	5 pCi/L	5 pCi/L		J	119325-013	EPA 904.0/SW846-9320M
Coyote Springs (Duplicate) 03-Feb-23	Americium-241	7.00 ± 10.2	16.7	8.02	NE	NE	U	BD	119326-009	EPA 901.1
	Cesium-137	1.10 ± 1.76	3.16	1.49	NE	NE	U	BD	119326-009	EPA 901.1
	Cobalt-60	0.140 ± 1.65	3.15	1.43	NE	NE	U	BD	119326-009	EPA 901.1
	Potassium-40	17.5 ± 43.4	57.2	27.1	NE	NE	U	BD	119326-009	EPA 901.1
	Gross Alpha	-4.82	NA	NA	15 pCi/L	NE	NA	None	119326-010	EPA 900.0/SW846-9310
	Gross Beta	21.7 ± 5.81	8.90	4.33	4 mrem/yr	NE		J	119326-010	EPA 900.0/SW846-9310
	Uranium-233/234	11.0 ± 1.18	0.105	0.0472	NE	NE			119326-013	DOE EML HASL-300
	Uranium-235/236	0.132 ± 0.0562	0.0744	0.0303	NE	NE		J	119326-013	DOE EML HASL-300
	Uranium-238	2.43 ± 0.313	0.107	0.0479	NE	NE			119326-013	DOE EML HASL-300
	Radium-226	0.776 ± 0.495	0.569	0.205	5 pCi/L	5 pCi/L		J	119326-011	EPA 903.1M
	Radium-228	0.769 ± 0.418	0.564	0.263	5 pCi/L	5 pCi/L		J	119326-012	EPA 904.0/SW846-9320M
CCBA-MW2 07-Feb-23	Americium-241	-1.40 ± 8.22	11.0	5.37	NE	NE	U	BD	119347-010	EPA 901.1
	Cesium-137	1.46 ± 2.23	3.43	1.64	NE	NE	U	BD	119347-010	EPA 901.1
	Cobalt-60	-1.45 ± 2.18	3.49	1.63	NE	NE	U	BD	119347-010	EPA 901.1
	Potassium-40	-33.8 ± 43.3	50.4	24.0	NE	NE	U	BD	119347-010	EPA 901.1
	Gross Alpha	3.29	NA	NA	15 pCi/L	NE	NA	None	119347-011	EPA 900.0/SW846-9310
	Gross Beta	3.71 ± 1.03	1.59	0.776	4 mrem/yr	NE		J	119347-011	EPA 900.0/SW846-9310
	Uranium-233/234	7.22 ± 0.691	0.0594	0.0266	NE	NE			119347-014	DOE EML HASL-300
	Uranium-235/236	0.158 ± 0.0467	0.0419	0.0171	NE	NE			119347-014	DOE EML HASL-300
	Uranium-238	1.73 ± 0.198	0.0602	0.0270	NE	NE			119347-014	DOE EML HASL-300
	Radium-226	1.79 ± 0.777	0.424	0.114	5 pCi/L	5 pCi/L		NJ+	119347-012	EPA 903.1M
	Radium-228	1.26 ± 0.488	0.490	0.225	5 pCi/L	5 pCi/L		NJ+	119347-013	EPA 904.0/SW846-9320M

Refer to Notes on page 2A-46.

Table 2A-7 (continued)
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Isotopic Uranium, and Radium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL / MAC[d]		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CCBA-MW2	Americium-241	8.49 ± 10.2	15.8	7.70	NE	NE	U	BD	119348-010	EPA 901.1
(Duplicate)	Cesium-137	0.361 ± 2.42	3.03	1.44	NE	NE	U	BD	119348-010	EPA 901.1
07-Feb-23	Cobalt-60	0.776 ± 1.97	3.62	1.69	NE	NE	U	BD	119348-010	EPA 901.1
	Potassium-40	19.1 ± 54.2	33.1	15.4	NE	NE	U	BD	119348-010	EPA 901.1
	Gross Alpha	0.94	NA	NA	15 pCi/L	NE	NA	None	119348-011	EPA 900.0/SW846-9310
	Gross Beta	4.36 ± 1.25	1.97	0.966	4 mrem/yr	NE		J	119348-011	EPA 900.0/SW846-9310
	Uranium-233/234	7.59 ± 0.716	0.0564	0.0252	NE	NE			119348-014	DOE EML HASL-300
	Uranium-235/236	0.182 ± 0.0471	0.0398	0.0162	NE	NE			119348-014	DOE EML HASL-300
	Uranium-238	1.79 ± 0.200	0.0571	0.0256	NE	NE			119348-014	DOE EML HASL-300
	Radium-226	0.837 ± 0.550	0.567	0.176	5 pCi/L	5 pCi/L		NJ+	119348-012	EPA 903.1M
	Radium-228	0.460 ± 0.320	0.472	0.219	5 pCi/L	5 pCi/L	U	BD	119348-013	EPA 904.0/SW846-9320M
CTF-MW1	Americium-241	-0.786 ± 14.7	22.2	10.8	NE	NE	U	BD	119337-010	EPA 901.1
08-Feb-23	Cesium-137	-0.275 ± 4.51	5.66	2.72	NE	NE	U	BD	119337-010	EPA 901.1
	Cobalt-60	-0.0897 ± 2.23	4.08	1.87	NE	NE	U	BD	119337-010	EPA 901.1
	Potassium-40	-39.8 ± 52.1	51.0	23.8	NE	NE	U	BD	119337-010	EPA 901.1
	Gross Alpha	3.74	NA	NA	15 pCi/L	NE	NA	None	119337-011	EPA 900.0/SW846-9310
	Gross Beta	4.89 ± 1.30	2.00	0.977	4 mrem/yr	NE		J	119337-011	EPA 900.0/SW846-9310
	Uranium-233/234	23.6 ± 2.24	0.0745	0.0333	NE	NE			119337-014	DOE EML HASL-300
	Uranium-235/236	0.628 ± 0.110	0.0526	0.0214	NE	NE			119337-014	DOE EML HASL-300
	Uranium-238	3.63 ± 0.392	0.0755	0.0338	NE	NE			119337-014	DOE EML HASL-300
	Radium-226	0.705 ± 0.463	0.478	0.148	5 pCi/L	5 pCi/L		J	119337-012	EPA 903.1M
	Radium-228	-0.0422 ± 0.241	0.458	0.206	5 pCi/L	5 pCi/L	U	BD	119337-013	EPA 904.0/SW846-9320M
CYN-MW5	Americium-241	-1.20 ± 2.98	5.13	2.49	NE	NE	U	BD	119339-010	EPA 901.1
09-Feb-23	Cesium-137	-1.07 ± 2.37	3.87	1.81	NE	NE	U	BD	119339-010	EPA 901.1
	Cobalt-60	0.717 ± 2.46	4.54	2.08	NE	NE	U	BD	119339-010	EPA 901.1
	Potassium-40	53.5 ± 52.4	42.9	19.5	NE	NE	X	R	119339-010	EPA 901.1
	Gross Alpha	1.21	NA	NA	15 pCi/L	NE	NA	None	119339-011	EPA 900.0/SW846-9310
	Gross Beta	3.29 ± 0.765	1.16	0.567	4 mrem/yr	NE		J	119339-011	EPA 900.0/SW846-9310
	Uranium-233/234	0.899 ± 0.121	0.0588	0.0263	NE	NE			119339-014	DOE EML HASL-300
	Uranium-235/236	0.0425 ± 0.0257	0.0415	0.0169	NE	NE		J	119339-014	DOE EML HASL-300
	Uranium-238	0.213 ± 0.0477	0.0596	0.0267	NE	NE			119339-014	DOE EML HASL-300
	Radium-226	1.38 ± 0.684	0.529	0.164	5 pCi/L	5 pCi/L		J	119339-012	EPA 903.1M
	Radium-228	0.855 ± 0.384	0.448	0.206	5 pCi/L	5 pCi/L		J	119339-013	EPA 904.0/SW846-9320M

Refer to Notes on page 2A-46.

Table 2A-7 (continued)
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Isotopic Uranium, and Radium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL / MAC[d]		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
Greystone-MW2 10-Feb-23	Americium-241	11.1 ± 16.7	27.8	13.5	NE	NE	U	BD	119341-010	EPA 901.1
	Cesium-137	1.57 ± 2.14	3.36	1.59	NE	NE	U	BD	119341-010	EPA 901.1
	Cobalt-60	-0.612 ± 2.13	3.75	1.73	NE	NE	U	BD	119341-010	EPA 901.1
	Potassium-40	31.8 ± 51.1	36.4	16.8	NE	NE	U	BD	119341-010	EPA 901.1
	Gross Alpha	-2.58	NA	NA	15 pCi/L	NE	NA	None	119341-011	EPA 900.0/SW846-9310
	Gross Beta	6.15 ± 1.56	2.28	1.10	4 mrem/yr	NE	*	J	119341-011	EPA 900.0/SW846-9310
	Uranium-233/234	9.87 ± 0.945	0.0655	0.0293	NE	NE			119341-014	DOE EML HASL-300
	Uranium-235/236	0.250 ± 0.0620	0.0463	0.0188	NE	NE			119341-014	DOE EML HASL-300
	Uranium-238	2.22 ± 0.249	0.0664	0.0298	NE	NE			119341-014	DOE EML HASL-300
	Radium-226	0.701 ± 0.452	0.575	0.218	5 pCi/L	5 pCi/L		J	119341-012	EPA 903.1M
	Radium-228	0.660 ± 0.350	0.446	0.201	5 pCi/L	5 pCi/L		J	119341-013	EPA 904.0/SW846-9320M
MRN-2 27-Jan-23	Americium-241	0.936 ± 6.27	10.2	4.92	NE	NE	U	BD	119316-010	EPA 901.1
	Cesium-137	-2.82 ± 3.09	2.94	1.39	NE	NE	U	BD	119316-010	EPA 901.1
	Cobalt-60	2.07 ± 1.83	3.25	1.50	NE	NE	U	BD	119316-010	EPA 901.1
	Potassium-40	20.2 ± 37.9	26.3	11.9	NE	NE	U	BD	119316-010	EPA 901.1
	Gross Alpha	1.66	NA	NA	15 pCi/L	NE	NA	None	119316-011	EPA 900.0/SW846-9310
	Gross Beta	3.38 ± 0.957	1.48	0.721	4 mrem/yr	NE		J	119316-011	EPA 900.0/SW846-9310
	Radium-226	0.251 ± 0.265	0.420	0.163	5 pCi/L	5 pCi/L	U	BD	119316-012	EPA 903.1M
	Radium-228	0.296 ± 0.291	0.467	0.220	5 pCi/L	5 pCi/L	U	BD	119316-013	EPA 904.0/SW846-9320M
MRN-3D 26-Jan-23	Americium-241	0.895 ± 8.41	14.6	7.07	NE	NE	U	BD	119314-010	EPA 901.1
	Cesium-137	0.0257 ± 1.66	2.90	1.37	NE	NE	U	BD	119314-010	EPA 901.1
	Cobalt-60	1.53 ± 1.77	3.24	1.50	NE	NE	U	BD	119314-010	EPA 901.1
	Potassium-40	-39.9 ± 44.8	49.7	23.7	NE	NE	U	BD	119314-010	EPA 901.1
	Gross Alpha	2.52	NA	NA	15 pCi/L	NE	NA	None	119314-011	EPA 900.0/SW846-9310
	Gross Beta	4.27 ± 1.10	1.69	0.824	4 mrem/yr	NE		J	119314-011	EPA 900.0/SW846-9310
	Radium-226	0.394 ± 0.233	0.252	0.0864	5 pCi/L	5 pCi/L		J	119314-012	EPA 903.1M
	Radium-228	0.418 ± 0.329	0.504	0.235	5 pCi/L	5 pCi/L	U	BD	119314-013	EPA 904.0/SW846-9320M

Refer to Notes on page 2A-46.

Table 2A-7 (continued)
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Isotopic Uranium, and Radium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL / MAC[d] (pCi/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
NWTA3-MW3D	Americium-241	-3.66 ± 15.1	24.3	11.7	NE	NE	U	BD	119321-010	EPA 901.1
30-Jan-23	Cesium-137	0.557 ± 1.63	2.94	1.38	NE	NE	U	BD	119321-010	EPA 901.1
	Cobalt-60	-1.19 ± 1.74	0.85	1.28	NE	NE	U	BD	119321-010	EPA 901.1
	Potassium-40	23.2 ± 41.7	29.5	13.3	NE	NE	U	BD	119321-010	EPA 901.1
	Gross Alpha	1.68	NA	NA	15 pCi/L	NE	NA	None	119321-011	EPA 900.0/SW846-9310
	Gross Beta	4.43 ± 0.601	0.764	0.370	4 mrem/yr	NE		J	119321-011	EPA 900.0/SW846-9310
	Radium-226	0.507 ± 0.253	0.194	0.0590	5 pCi/L	5 pCi/L		J	119321-012	EPA 903.1M
	Radium-228	0.163 ± 0.267	0.454	0.208	5 pCi/L	5 pCi/L	U	BD	119321-013	EPA 904.0/SW846-9320M
OBS-MW1	Americium-241	2.73 ± 9.08	15.1	7.35	NE	NE	U	BD	119323-010	EPA 901.1
02-Feb-23	Cesium-137	4.47 ± 4.14	3.34	1.59	NE	NE	X	R	119323-010	EPA 901.1
	Cobalt-60	1.25 ± 2.21	4.01	1.87	NE	NE	U	BD	119323-010	EPA 901.1
	Potassium-40	34.1 ± 51.6	36.8	17.0	NE	NE	U	BD	119323-010	EPA 901.1
	Gross Alpha	-4.16	NA	NA	15 pCi/L	NE	NA	None	119323-011	EPA 900.0/SW846-9310
	Gross Beta	5.60 ± 0.813	1.03	0.497	4 mrem/yr	NE			119323-011	EPA 900.0/SW846-9310
	Uranium-233/234	17.3 ± 1.73	0.0888	0.0397	NE	NE			119323-014	DOE EML HASL-300
	Uranium-235/236	0.415 ± 0.0925	0.0627	0.0255	NE	NE			119323-014	DOE EML HASL-300
	Uranium-238	3.34 ± 0.384	0.0900	0.0403	NE	NE			119323-014	DOE EML HASL-300
	Radium-226	0.348 ± 0.344	0.485	0.150	5 pCi/L	5 pCi/L	U	BD	119323-012	EPA 903.1M
	Radium-228	0.595 ± 0.390	0.573	0.269	5 pCi/L	5 pCi/L		J	119323-013	EPA 904.0/SW846-9320M
PL-2	Americium-241	1.36 ± 8.48	13.9	6.71	NE	NE	U	BD	119310-010	EPA 901.1
30-Mar-23	Cesium-137	1.35 ± 1.66	2.85	1.36	NE	NE	U	BD	119310-010	EPA 901.1
	Cobalt-60	1.47 ± 1.69	2.84	1.31	NE	NE	U	BD	119310-010	EPA 901.1
	Potassium-40	20.6 ± 38.9	24.4	11.2	NE	NE	U	BD	119310-010	EPA 901.1
	Gross Alpha	0.85	NA	NA	15 pCi/L	NE	NA	None	119310-011	EPA 900.0/SW846-9310
	Gross Beta	2.95 ± 0.685	0.955	0.458	4 mrem/yr	NE	N, *	J+	119310-011	EPA 900.0/SW846-9310
	Radium-226	2.72 ± 0.920	0.515	0.169	5 pCi/L	5 pCi/L		J	119310-012	EPA 903.1M
	Radium-228	0.302 ± 0.280	0.436	0.192	5 pCi/L	5 pCi/L	U	BD	119310-013	EPA 904.0/SW846-9320M

Refer to Notes on page 2A-46.

Table 2A-7 (continued)
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Isotopic Uranium, and Radium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL / MAC[d] (pCi/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
PL-4	Americium-241	-2.41 ± 7.86	13.3	6.45	NE	NE	U	BD	119312-011	EPA 901.1
31-Mar-23	Cesium-137	-0.485 ± 1.56	2.63	1.25	NE	NE	U	BD	119312-011	EPA 901.1
	Cobalt-60	0.363 ± 1.51	2.80	1.30	NE	NE	U	BD	119312-011	EPA 901.1
	Potassium-40	12.6 ± 56.1	22.7	10.3	NE	NE	U	BD	119312-011	EPA 901.1
	Gross Alpha	1.63	NA	NA	15 pCi/L	NE	NA	None	119312-012	EPA 900.0/SW846-9310
	Gross Beta	4.55 ± 0.693	0.939	0.454	4 mrem/yr	NE	N, *	J+	119312-012	EPA 900.0/SW846-9310
	Radium-226	0.667 ± 0.438	0.426	0.122	5 pCi/L	5 pCi/L		J	119312-013	EPA 903.1M
	Radium-228	0.449 ± 0.274	0.352	0.150	5 pCi/L	5 pCi/L		J	119312-014	EPA 904.0/SW846-9320M
SFR-2S	Americium-241	-7.60 ± 8.16	8.13	3.94	NE	NE	U	BD	119329-011	EPA 901.1
31-Jan-23	Cesium-137	-0.233 ± 1.72	2.94	1.40	NE	NE	U	BD	119329-011	EPA 901.1
	Cobalt-60	0.401 ± 1.66	3.05	1.41	NE	NE	U	BD	119329-011	EPA 901.1
	Potassium-40	-27.0 ± 42.1	50.7	24.2	NE	NE	U	BD	119329-011	EPA 901.1
	Gross Alpha	-4.11	NA	NA	15 pCi/L	NE	NA	None	119329-012	EPA 900.0/SW846-9310
	Gross Beta	9.99 ± 1.81	2.41	1.16	4 mrem/yr	NE			119329-012	EPA 900.0/SW846-9310
	Uranium-233/234	19.7 ± 1.95	0.0853	0.0381	NE	NE			119329-015	DOE EML HASL-300
	Uranium-235/236	0.362 ± 0.0846	0.0602	0.0245	NE	NE			119329-015	DOE EML HASL-300
	Uranium-238	5.45 ± 0.584	0.0864	0.0387	NE	NE			119329-015	DOE EML HASL-300
	Radium-226	0.000 ± 0.241	0.606	0.202	5 pCi/L	5 pCi/L	U	BD	119329-013	EPA 903.1M
	Radium-228	0.0130 ± 0.216	0.392	0.180	5 pCi/L	5 pCi/L	U	BD	119329-014	EPA 904.0/SW846-9320M
SFR-4T	Americium-241	8.84 ± 9.76	14.8	7.21	NE	NE	U	BD	119333-011	EPA 901.1
01-Feb-23	Cesium-137	-2.05 ± 2.45	2.73	1.29	NE	NE	U	BD	119333-011	EPA 901.1
	Cobalt-60	-0.570 ± 1.62	2.85	1.31	NE	NE	U	BD	119333-011	EPA 901.1
	Potassium-40	8.91 ± 53.9	29.6	13.6	NE	NE	U	BD	119333-011	EPA 901.1
	Gross Alpha	-0.57	NA	NA	15 pCi/L	NE	NA	None	119333-012	EPA 900.0/SW846-9310
	Gross Beta	0.785 ± 4.41	7.57	3.64	4 mrem/yr	NE	U	BD	119333-012	EPA 900.0/SW846-9310
	Uranium-233/234	0.464 ± 0.0828	0.0666	0.0298	NE	NE			119333-015	DOE EML HASL-300
	Uranium-235/236	0.0193 ± 0.0179	0.0470	0.0192	NE	NE	U	BD	119333-015	DOE EML HASL-300
	Uranium-238	0.0675 ± 0.0276	0.0675	0.0302	NE	NE		J	119333-015	DOE EML HASL-300
	Radium-226	0.447 ± 0.442	0.623	0.193	5 pCi/L	5 pCi/L	U	BD	119333-013	EPA 903.1M
	Radium-228	0.295 ± 0.249	0.384	0.174	5 pCi/L	5 pCi/L	U	BD	119333-014	EPA 904.0/SW846-9320M

Refer to Notes on page 2A-46.

Table 2A-7 (continued)
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Isotopic Uranium, and Radium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL / MAC[d] (pCi/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
SFR-4T (Duplicate) 01-Feb-23	Americium-241	10.8 ± 14.2	24.3	11.7	NE	NE	U	BD	119334-011	EPA 901.1
	Cesium-137	-1.22 ± 1.61	2.51	1.17	NE	NE	U	BD	119334-011	EPA 901.1
	Cobalt-60	0.484 ± 1.77	3.37	1.54	NE	NE	U	BD	119334-011	EPA 901.1
	Potassium-40	86.5 ± 46.9	28.5	12.8	NE	NE			119334-011	EPA 901.1
	Gross Alpha	12.27	NA	NA	15 pCi/L	NE	NA	None	119334-012	EPA 900.0/SW846-9310
	Gross Beta	-4.05 ± 6.52	11.4	5.55	4 mrem/yr	NE	U	BD	119334-012	EPA 900.0/SW846-9310
	Uranium-233/234	0.475 ± 0.0772	0.0562	0.0251	NE	NE			119334-015	DOE EML HASL-300
	Uranium-235/236	0.0352 ± 0.0234	0.0397	0.0162	NE	NE	U	BD	119334-015	DOE EML HASL-300
	Uranium-238	0.121 ± 0.0341	0.0570	0.0255	NE	NE		J	119334-015	DOE EML HASL-300
	Radium-226	0.986 ± 0.540	0.416	0.111	5 pCi/L	5 pCi/L		J	119334-013	EPA 903.1M
	Radium-228	0.639 ± 0.372	0.522	0.244	5 pCi/L	5 pCi/L		J	119334-014	EPA 904.0/SW846-9320M
SWTA3-MW2 23-Jan-23	Americium-241	-2.55 ± 7.67	11.0	5.32	NE	NE	U	BD	119300-011	EPA 901.1
	Cesium-137	-3.19 ± 4.29	4.35	2.09	NE	NE	U	BD	119300-011	EPA 901.1
	Cobalt-60	0.202 ± 1.74	3.21	1.47	NE	NE	U	BD	119300-011	EPA 901.1
	Potassium-40	-13.9 ± 42.0	43.5	20.4	NE	NE	U	BD	119300-011	EPA 901.1
	Gross Alpha	2.94	NA	NA	15 pCi/L	NE	NA	None	119300-012	EPA 900.0/SW846-9310
	Gross Beta	6.19 ± 0.941	1.31	0.638	4 mrem/yr	NE		J	119300-012	EPA 900.0/SW846-9310
	Radium-226	0.422 ± 0.242	0.215	0.0654	5 pCi/L	5 pCi/L		J	119300-013	EPA 903.1M
	Radium-228	0.209 ± 0.247	0.405	0.189	5 pCi/L	5 pCi/L	U	BD	119300-014	EPA 904.0/SW846-9320M
SWTA3-MW3 24-Jan-23	Americium-241	10.5 ± 17.5	27.2	13.2	NE	NE	U	BD	119303-011	EPA 901.1
	Cesium-137	-3.70 ± 3.68	3.63	1.72	NE	NE	U	BD	119303-011	EPA 901.1
	Cobalt-60	-0.751 ± 2.19	3.77	1.74	NE	NE	U	BD	119303-011	EPA 901.1
	Potassium-40	-11.2 ± 35.7	49.9	23.5	NE	NE	U	BD	119303-011	EPA 901.1
	Gross Alpha	1.19	NA	NA	15 pCi/L	NE	NA	None	119303-012	EPA 900.0/SW846-9310
	Gross Beta	4.52 ± 0.837	1.16	0.561	4 mrem/yr	NE		J	119303-012	EPA 900.0/SW846-9310
	Radium-226	0.466 ± 0.316	0.443	0.180	5 pCi/L	5 pCi/L		J	119303-013	EPA 903.1M
	Radium-228	-0.228 ± 0.277	0.532	0.248	5 pCi/L	5 pCi/L	U	BD	119303-014	EPA 904.0/SW846-9320M

Refer to Notes on page 2A-46.

Table 2A-7 (concluded)
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Isotopic Uranium, and Radium Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL / MAC[d] (pCi/L)		Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
SWTA3-MW4 25-Jan-23	Americium-241	-1.94 ± 6.25	11.2	5.34	NE	NE	U	BD	119307-011	EPA 901.1
	Cesium-137	0.520 ± 1.48	2.63	1.23	NE	NE	U	BD	119307-011	EPA 901.1
	Cobalt-60	-0.466 ± 1.36	2.34	1.04	NE	NE	U	BD	119307-011	EPA 901.1
	Potassium-40	-78.0 ± 51.6	38.9	18.1	NE	NE	U	R	119307-011	EPA 901.1
	Gross Alpha	2.41	NA	NA	15 pCi/L	NE	NA	None	119307-012	EPA 900.0/SW846-9310
	Gross Beta	7.49 ± 1.11	1.56	0.761	4 mrem/yr	NE		J	119307-012	EPA 900.0/SW846-9310
	Radium-226	0.249 ± 0.198	0.239	0.0725	5 pCi/L	5 pCi/L		NJ+	119307-013	EPA 903.1M
	Radium-228	0.575 ± 0.359	0.512	0.238	5 pCi/L	5 pCi/L		J	119307-014	EPA 904.0/SW846-9320M
SWTA3-MW4 (Duplicate) 25-Jan-23	Americium-241	-4.88 ± 14.2	14.1	6.80	NE	NE	U	BD	119308-011	EPA 901.1
	Cesium-137	0.208 ± 1.79	3.18	1.51	NE	NE	U	BD	119308-011	EPA 901.1
	Cobalt-60	0.837 ± 1.63	3.12	1.42	NE	NE	U	BD	119308-011	EPA 901.1
	Potassium-40	30.5 ± 39.0	34.2	15.8	NE	NE	U	BD	119308-011	EPA 901.1
	Gross Alpha	1.14	NA	NA	15 pCi/L	NE	NA	None	119308-012	EPA 900.0/SW846-9310
	Gross Beta	4.02 ± 0.820	1.14	0.551	4 mrem/yr	NE		J	119308-012	EPA 900.0/SW846-9310
	Radium-226	0.325 ± 0.260	0.382	0.154	5 pCi/L	5 pCi/L	U	BD	119308-013	EPA 903.1M
	Radium-228	-0.0676 ± 0.241	0.450	0.208	5 pCi/L	5 pCi/L	U	BD	119308-014	EPA 904.0/SW846-9320M
TRE-1 06-Feb-23	Americium-241	-2.19 ± 9.30	16.2	7.88	NE	NE	U	BD	119343-011	EPA 901.1
	Cesium-137	2.47 ± 2.34	3.28	1.56	NE	NE	U	BD	119343-011	EPA 901.1
	Cobalt-60	-1.80 ± 2.33	2.85	1.29	NE	NE	U	BD	119343-011	EPA 901.1
	Potassium-40	-11.5 ± 39.5	47.1	22.2	NE	NE	U	BD	119343-011	EPA 901.1
	Gross Alpha	-6.52	NA	NA	15 pCi/L	NE	NA	None	119343-012	EPA 900.0/SW846-9310
	Gross Beta	6.52 ± 1.80	2.61	1.26	4 mrem/yr	NE		J	119343-012	EPA 900.0/SW846-9310
	Uranium-233/234	25.3 ± 2.42	0.0748	0.0334	NE	NE			119343-015	DOE EML HASL-300
	Uranium-235/236	0.703 ± 0.119	0.0528	0.0215	NE	NE			119343-015	DOE EML HASL-300
	Uranium-238	6.62 ± 0.674	0.0758	0.0339	NE	NE			119343-015	DOE EML HASL-300
	Radium-226	0.309 ± 0.330	0.462	0.124	5 pCi/L	5 pCi/L	U	BD	119343-013	EPA 903.1M
	Radium-228	0.782 ± 0.381	0.472	0.217	5 pCi/L	5 pCi/L		J	119343-014	EPA 904.0/SW846-9320M

Refer to Notes on page 2A-46.

Table 2A-8
Summary of Field Water Quality Parameter Measurements[h], Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Sample Date	Temperature (^0C)	Specific Conductivity (µmho/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
Coyote Springs	03-Feb-23	10.88	2159.0	226.5	6.11	0.80	24.44	2.28
CCBA-MW2	07-Feb-23	14.38	494.28	204.3	7.56	0.58	66.16	5.73
CTF-MW1	08-Feb-23	16.03	571.17	198.0	7.35	0.80	73.34	6.39
CYN-MW5	09-Feb-23	12.60	277.67	205.1	6.07	0.69	43.43	4.08
Greystone-MW2	10-Feb-23	14.35	971.94	194.4	7.15	0.70	71.83	6.36
MRN-2	27-Jan-23	16.70	338.21	201.5	7.73	0.67	73.74	6.31
MRN-3D	26-Jan-23	19.40	428.97	203.6	7.57	1.38	34.27	2.75
NWTA3-MW3D	30-Jan-23	19.20	350.50	170.1	7.68	0.76	44.72	3.57
OBS-MW1	02-Feb-23	14.70	475.94	192.7	7.50	0.52	37.80	3.26
PL-2	30-Mar-23	18.39	429.11	163.9	7.75	0.60	76.10	6.02
PL-4	31-Mar-23	17.99	461.45	170.9	7.49	0.67	81.44	6.43
SFR-2S	31-Jan-23	15.99	952.51	137.0	6.93	0.99	81.80	6.97
SFR-4T	01-Feb-23	17.21	3945.0	193.7	7.89	1.63	6.82	0.55
SWTA3-MW2	23-Jan-23	16.24	374.43	203.9	7.75	1.44	45.64	3.83
SWTA3-MW3	24-Jan-23	19.53	412.48	206.6	7.72	3.72	47.90	3.82
SWTA3-MW4	25-Jan-23	18.24	390.44	183.5	7.78	0.83	49.50	4.08
TRE-1	06-Feb-23	17.61	1176.7	208.8	6.76	0.63	81.22	6.43

Refer to Notes on page 2A-46.

Notes for Long-Term Stewardship Groundwater Monitoring Program Analytical Results Tables

%	= percent
$CaCO_3$	= calcium carbonate
CFR	= Code of Federal Regulations
EPA	= U.S. Environmental Protection Agency
HMX	= octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
ID	= identifier
µg/L	= micrograms per liter
mg/L	= milligrams per liter
mrem/yr	= millirem per year
NMAC	= New Mexico Administrative Code
No.	= number
pCi/L	= picocuries per liter
RDX	= hexahydro-1,3,5-trinitro-1,3,5-triazine
Tetryl	= methyl-2,4,6-trinitrophenylnitramine

[a]Result or Activity

Result applies to Tables 2A-1 and 2A-3 through 2A-6. Activity applies to Table 2A-7.

Activity	= Gross alpha activity measurements were corrected by subtracting the total uranium activity (40 CFR Part 141). Activities of zero or less are considered not detected.
Bold	= Value exceeds the established MCL or MAC.
ND	= not detected (at MDL)

[b]MDL or MDA

The MDL applies to Tables 2A-1 through 2A-6. MDA applies to Table 2A-7.

MDA	= The minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level.
MDL	= Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix specific.
NA	= Not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

[c]PQL or Critical Level

The PQL applies to Tables 2A-1 and 2A-3 through 2A-6. Critical Level applies to Table 2A-7.

Critical Level	= The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix specific.
PQL	= Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.
NA	= Not applicable for gross alpha activities. The critical level could not be calculated as the gross alpha activity was corrected by subtracting the total uranium activity.

[d]MCL or MAC

Regulatory limits: The MCL is listed first, followed by the MAC. A single value is listed when the MCL and MAC are equal (for example, nitrate plus nitrite).

MAC = Maximum allowable concentration. MACs were established for groundwater for the contaminants specified in *Environmental Protection*, Human Health Standards, 20.6.2.3103A NMAC, (NMWQCC, December 2018).

MCL = Maximum contaminant level. Established by the EPA Office of Water, National Primary Drinking Water Standards (EPA, March 2018).

- The total for trihalomethanes (including chloroform) is 80 mg/L.

The following are the MCLs for gross alpha particles, beta particles, and radium in community water systems:

- 15 pCi/L = gross alpha particle activity, excluding total uranium (40 CFR Part 141)
- 4 mrem/yr = any combination of beta and/or gamma emitting radionuclides (as dose rate)
- 5 pCi/L = combined radium-226 and radium-228

NE = not established

Notes for Long-Term Stewardship Groundwater Monitoring Program Analytical Results Tables (continued)

[e]Laboratory Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

B	= The analyte was detected in the blank above the effective MDL.
H	= Analytical holding time was exceeded.
J	= Estimated value; the analyte concentration fell above the effective MDL and below the effective PQL.
N	= Results associated with a spike analysis that was outside control limits.
NA	= not applicable
U	= Analyte is absent or below the method detection limit.
X	= Data rejected due to peak not meeting identification criteria.
*	= Recovery or relative percent difference (RPD) not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPDs are not applicable where the concentration fails below the effective PQL.

[f]Validation Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

BD	= Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J	= The associated value is an estimated quantity.
J+	= The associated numerical value is an estimated quantity with a suspected positive bias.
J-	= The associated numerical value is an estimated quantity with a suspected negative bias.
NJ+	= Presumptive evidence of the presence of the material at an estimated quantity with a suspected positive bias.
None	= No data validation for corrected gross alpha activity.
U	= The analyte was analyzed for but was not detected. The associated numerical value is the sample PQL.
UJ	= The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R	= The data are unusable, and resampling or reanalysis are necessary for verification.

[g]Analytical Method References

Rice, E.W., Baird, R.B., Eaton, A.D., and Clesceri, L.S. (2012). *Standard Methods for the Examination of Water and Wastewater*, 23rd ed.American Public Health Association, American Water Works Association, and Water Environment Federation.

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U.S. Environmental Protection Agency. (1980). *Prescribed Procedures for Measurement of Radioactivity in Drinking Water,* EPA-600/4-80-032.

DOE	= U.S. Department of Energy
HASL	= Health and Safety Laboratory
SM	= Standard Method
SW	= Solid Waste

[h]Field Water Quality Measurements

Field measurements were collected prior to sampling.

°C	= degrees Celsius
% Sat	= percent saturation
µmho/cm	= micromhos per centimeter
mg/L	= milligrams per liter
mV	= millivolts
NTU	= nephelometric turbidity units
pH	= potential of hydrogen (negative logarithm of the hydrogen ion concentration)

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Attachment 2B
Groundwater Monitoring Program Hydrographs and Charts

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Attachment 2B Hydrographs and Charts

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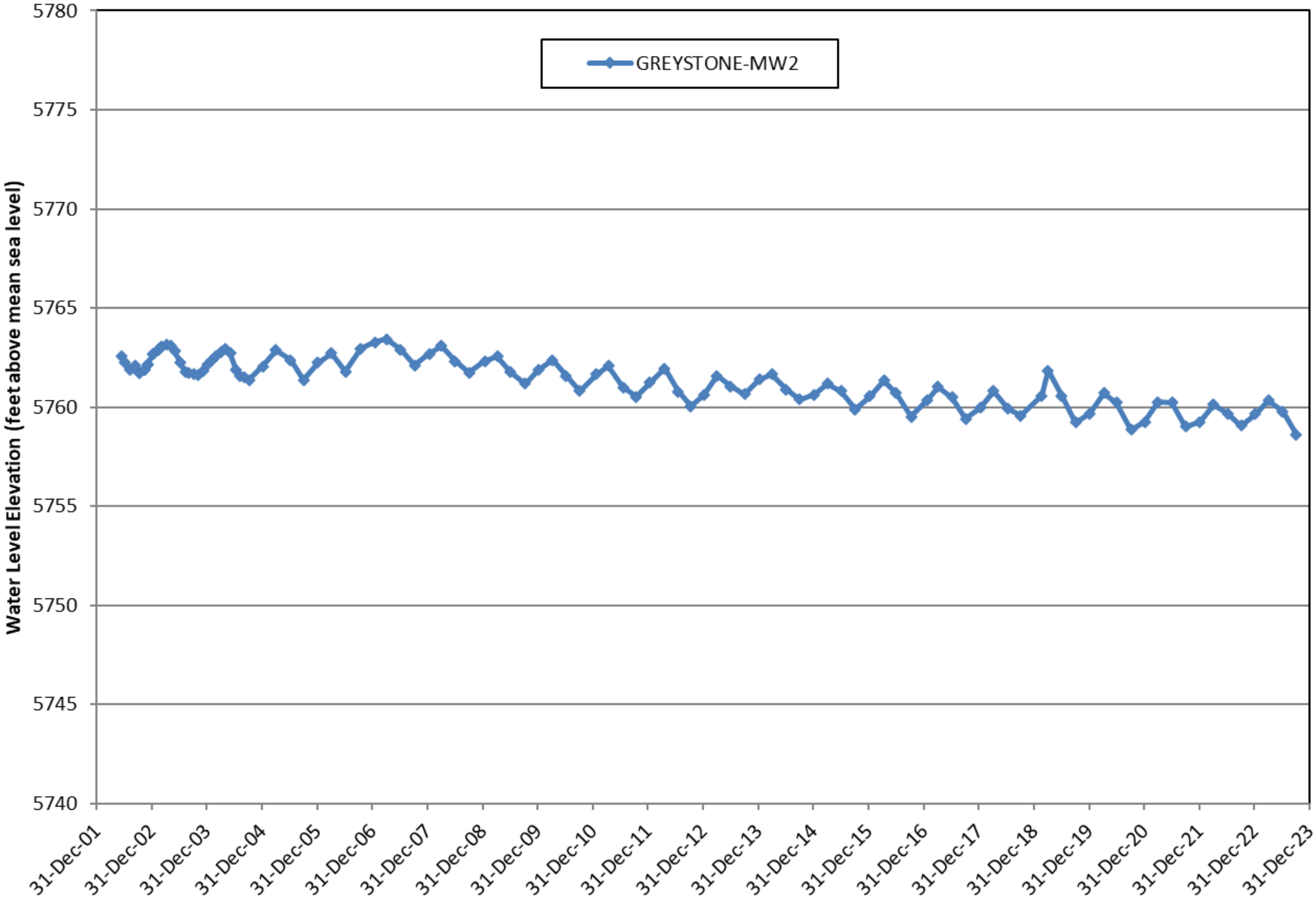

Figure 2B-1
Groundwater Monitoring Program Study Wells (1 of 10)

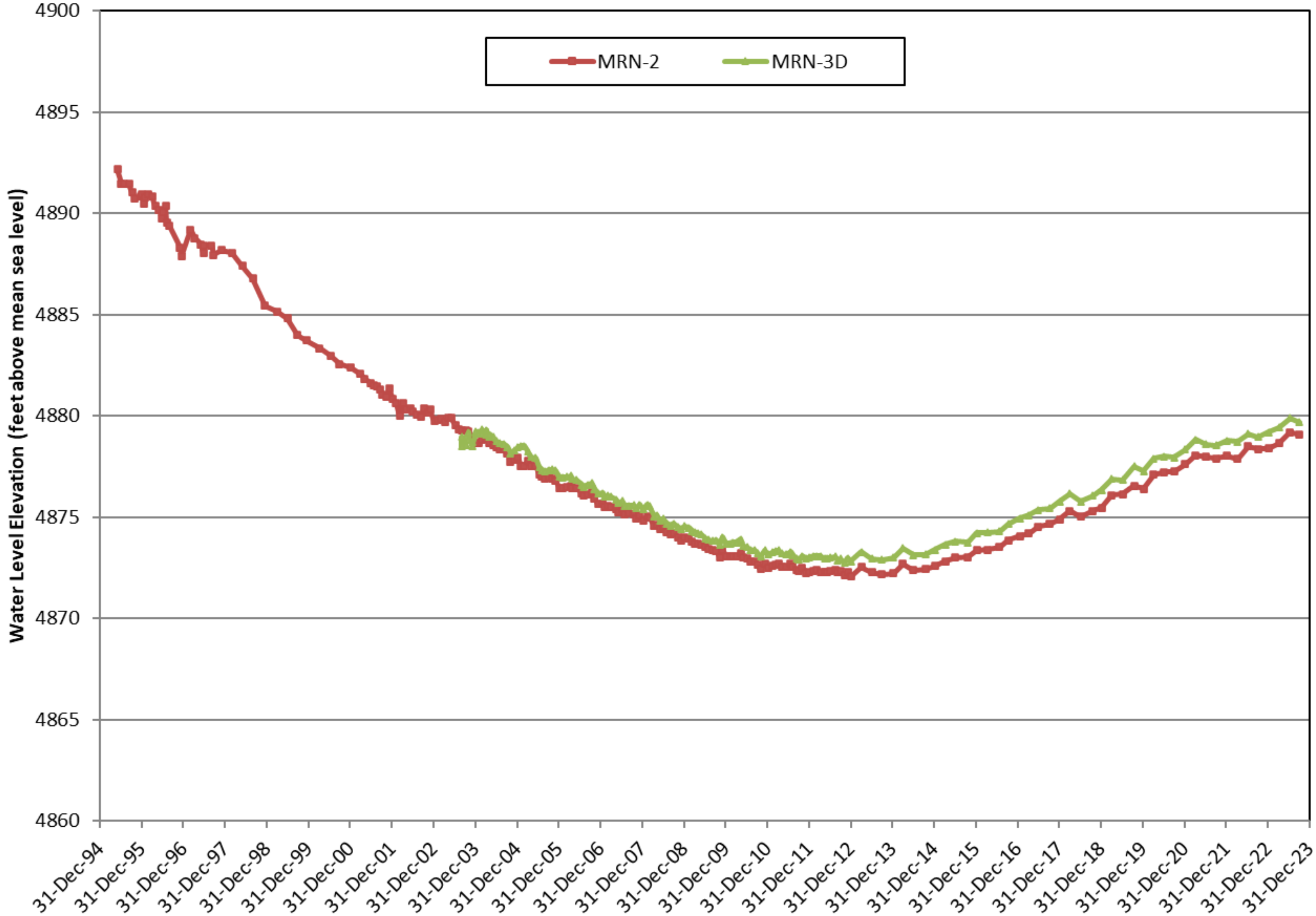

Figure 2B-2
Groundwater Monitoring Program Study Wells (2 of 10)

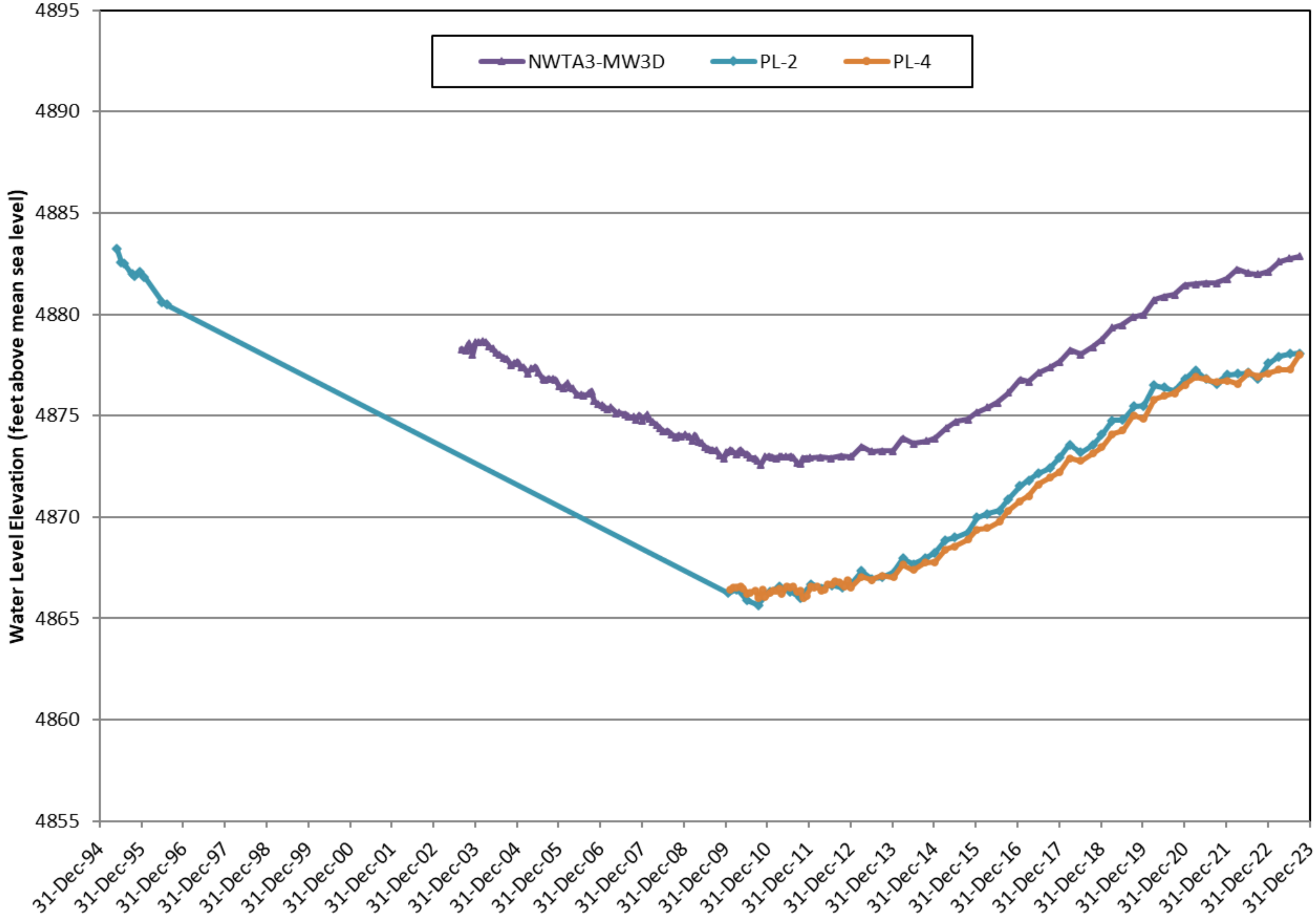

Figure 2B-3
Groundwater Monitoring Program Study Wells (3 of 10)

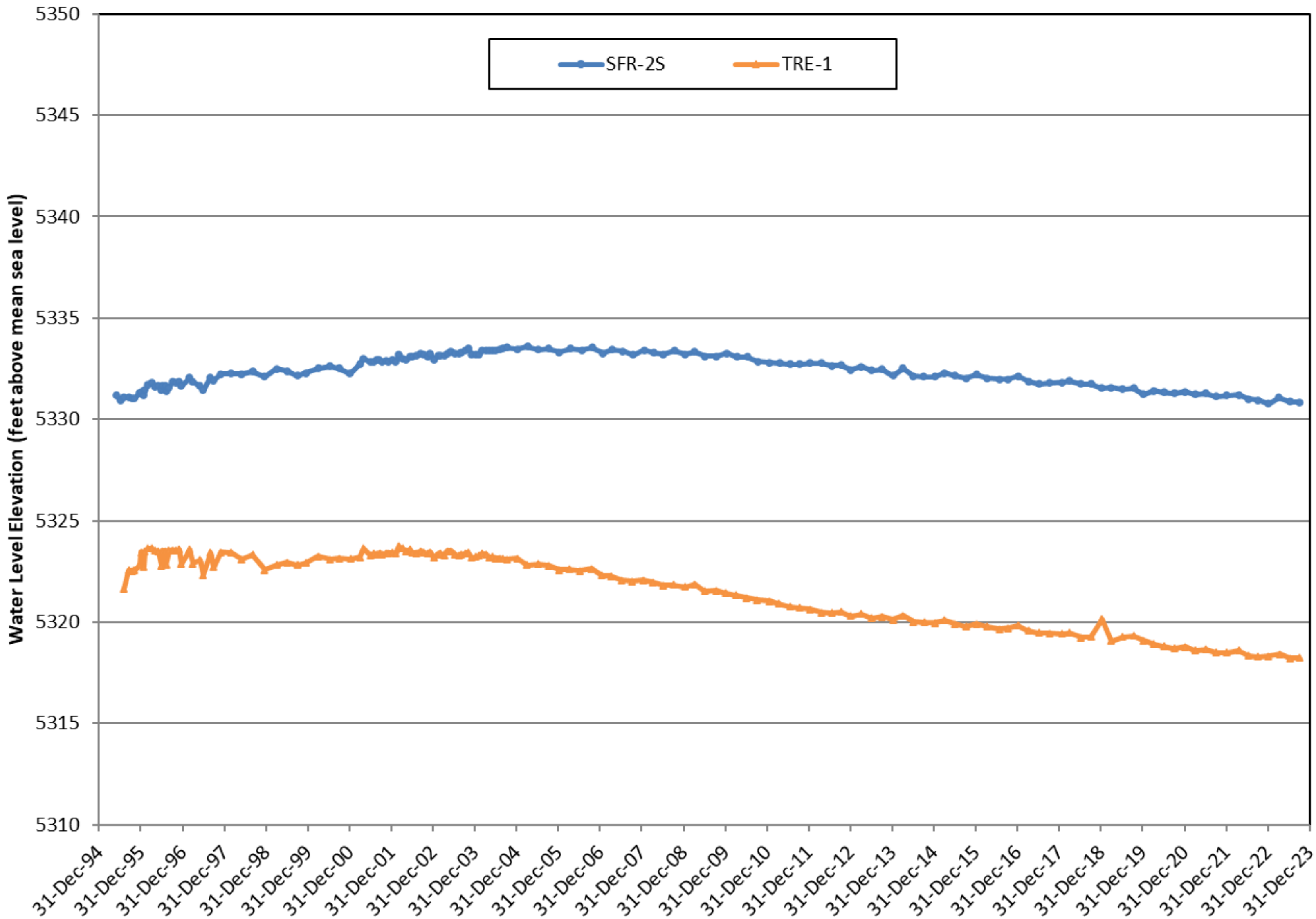

Figure 2B-4
Groundwater Monitoring Program Study Wells (4 of 10)

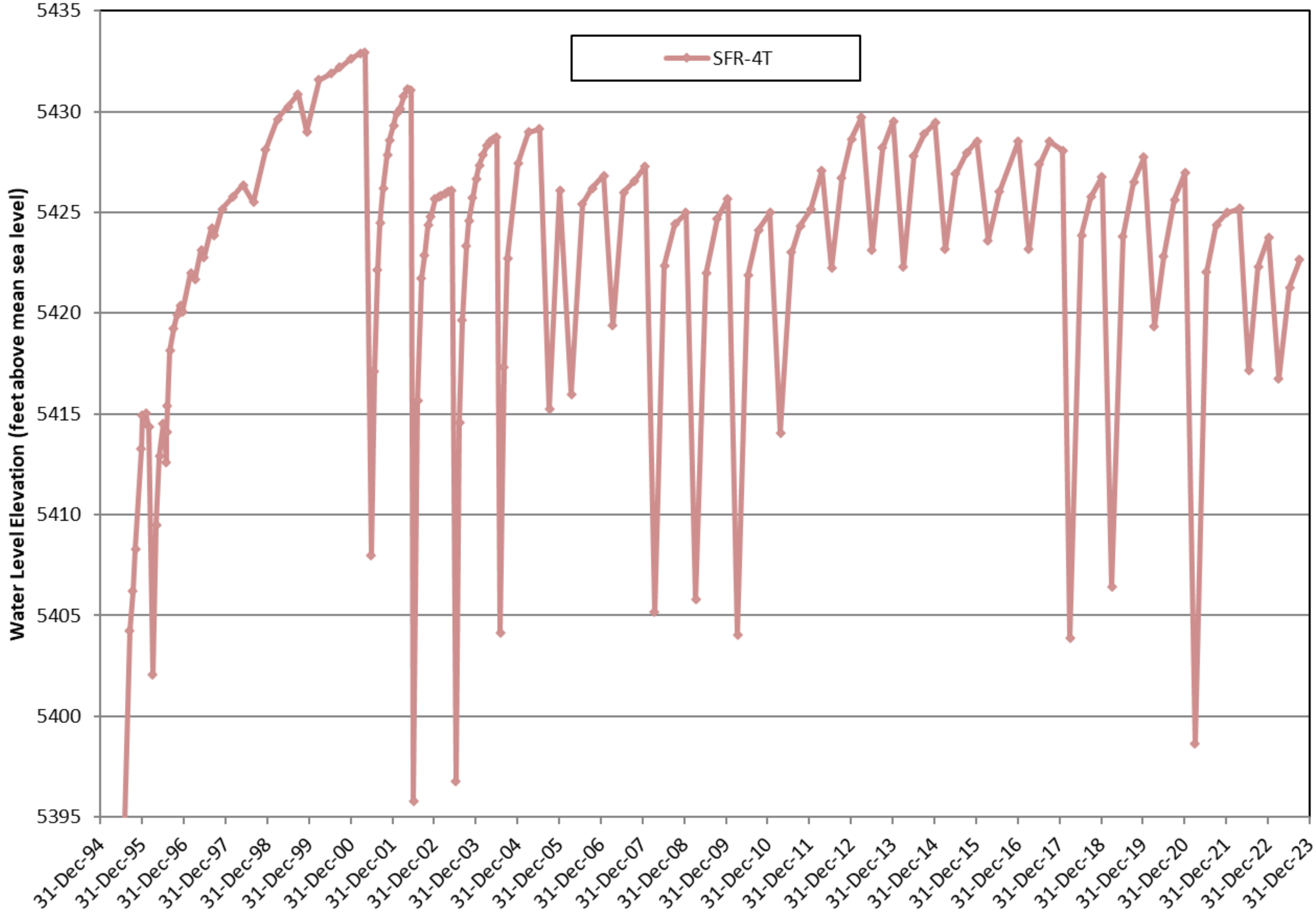

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Figure 2B-5
Groundwater Monitoring Program Study Wells (5 of 10)

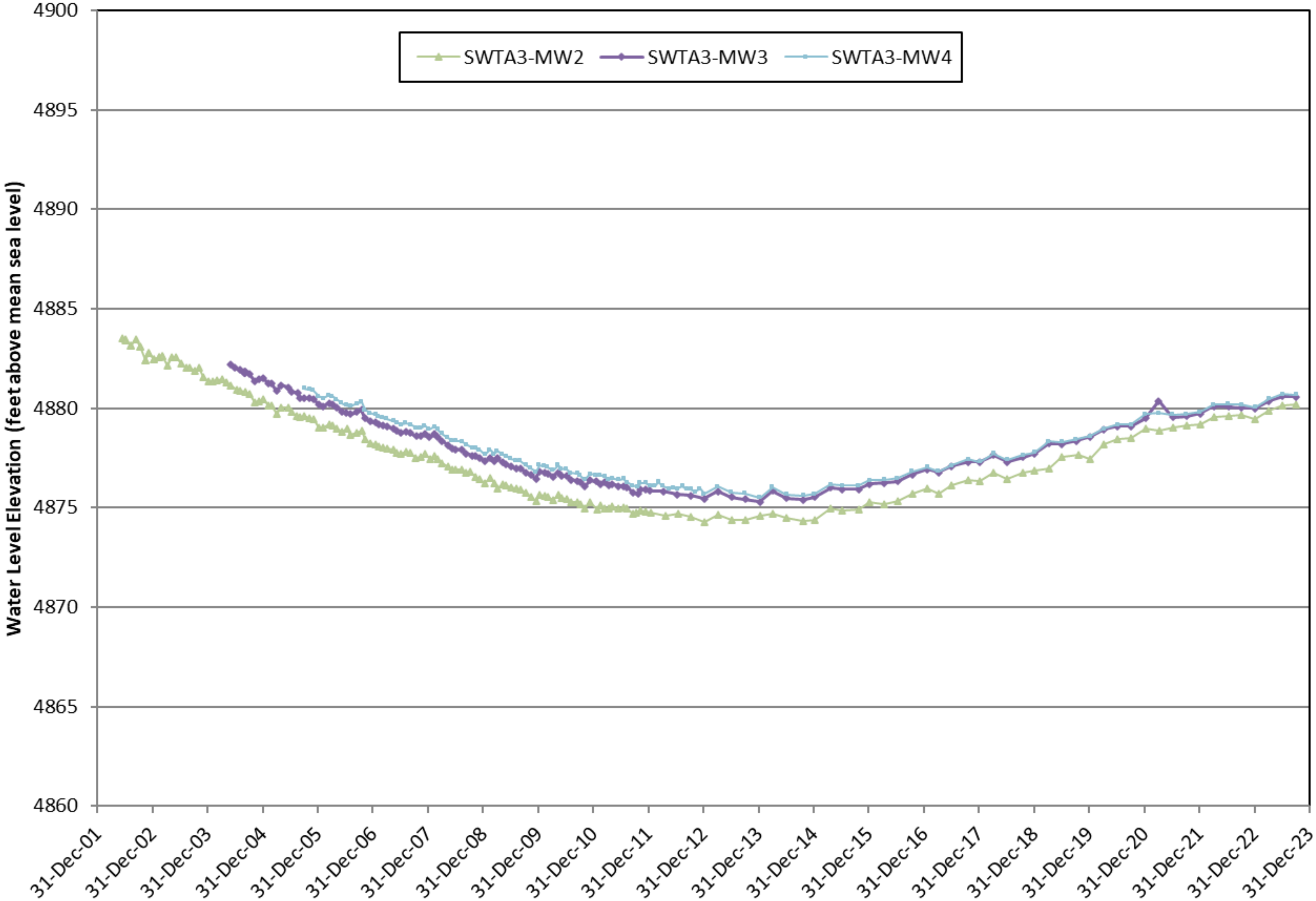

Figure 2B-6
Groundwater Monitoring Program Study Wells (6 of 10)

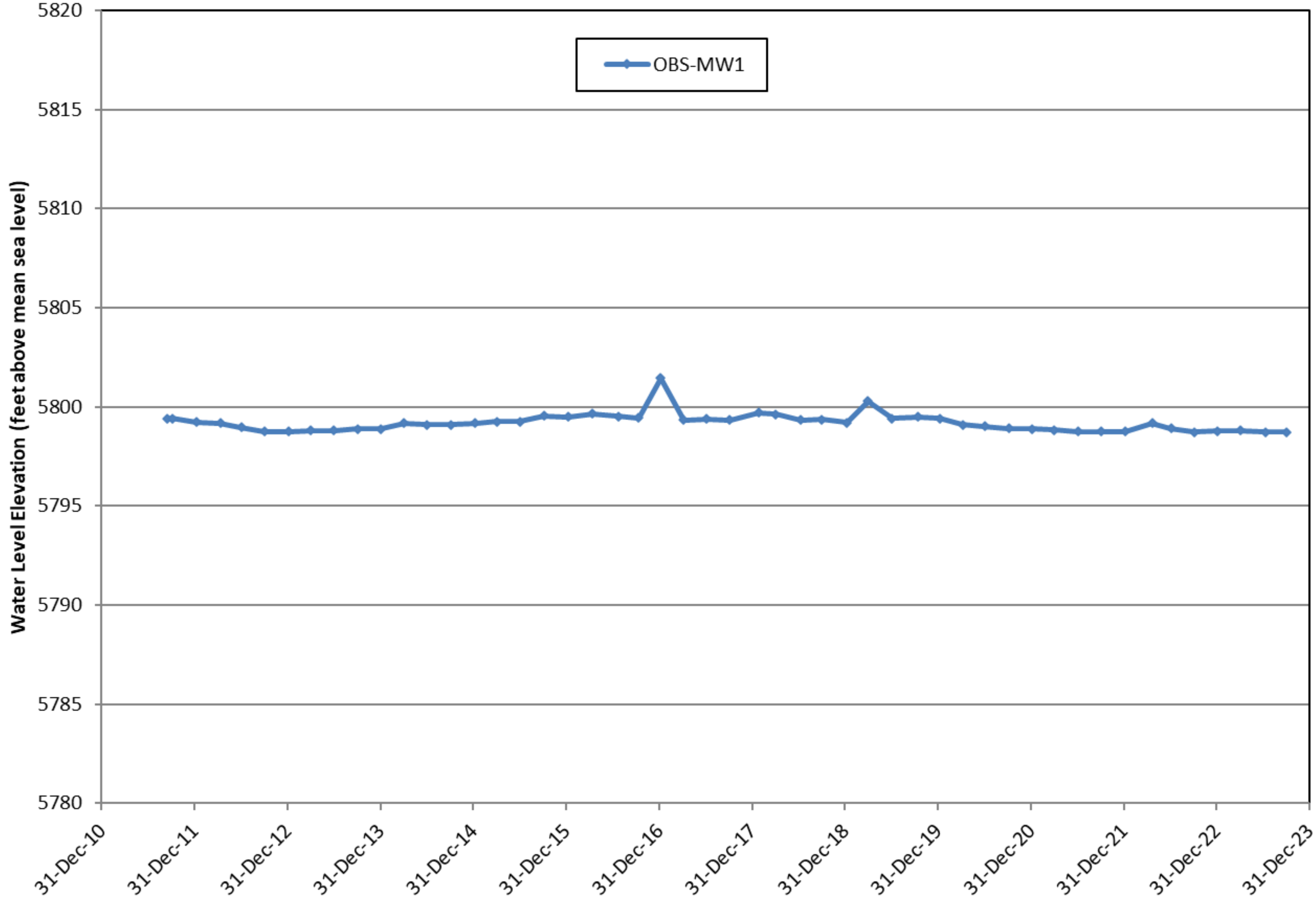

Figure 2B-7
Groundwater Monitoring Program Study Wells (7 of 10)

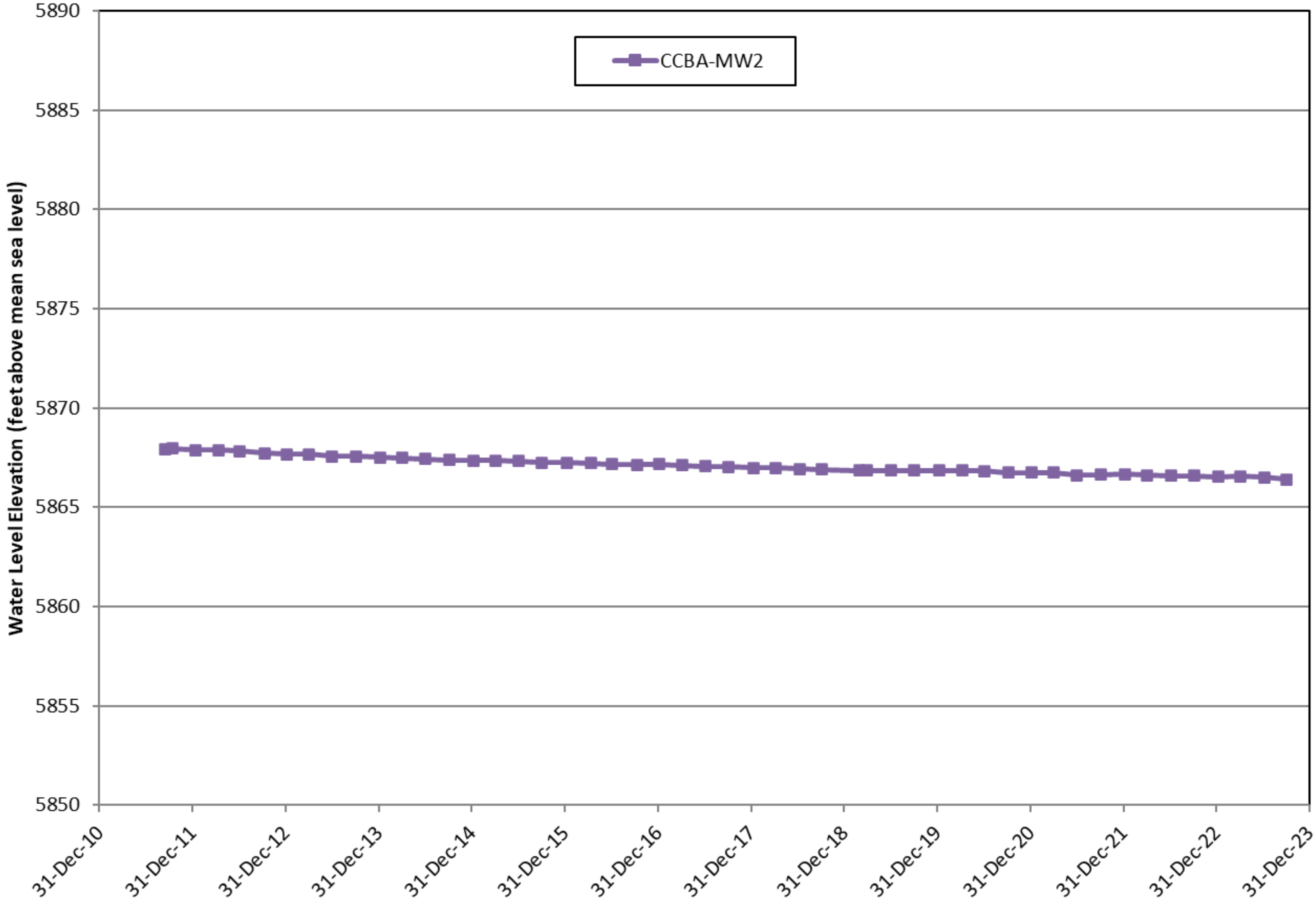

Figure 2B-8
Groundwater Monitoring Program Study Wells (8 of 10)

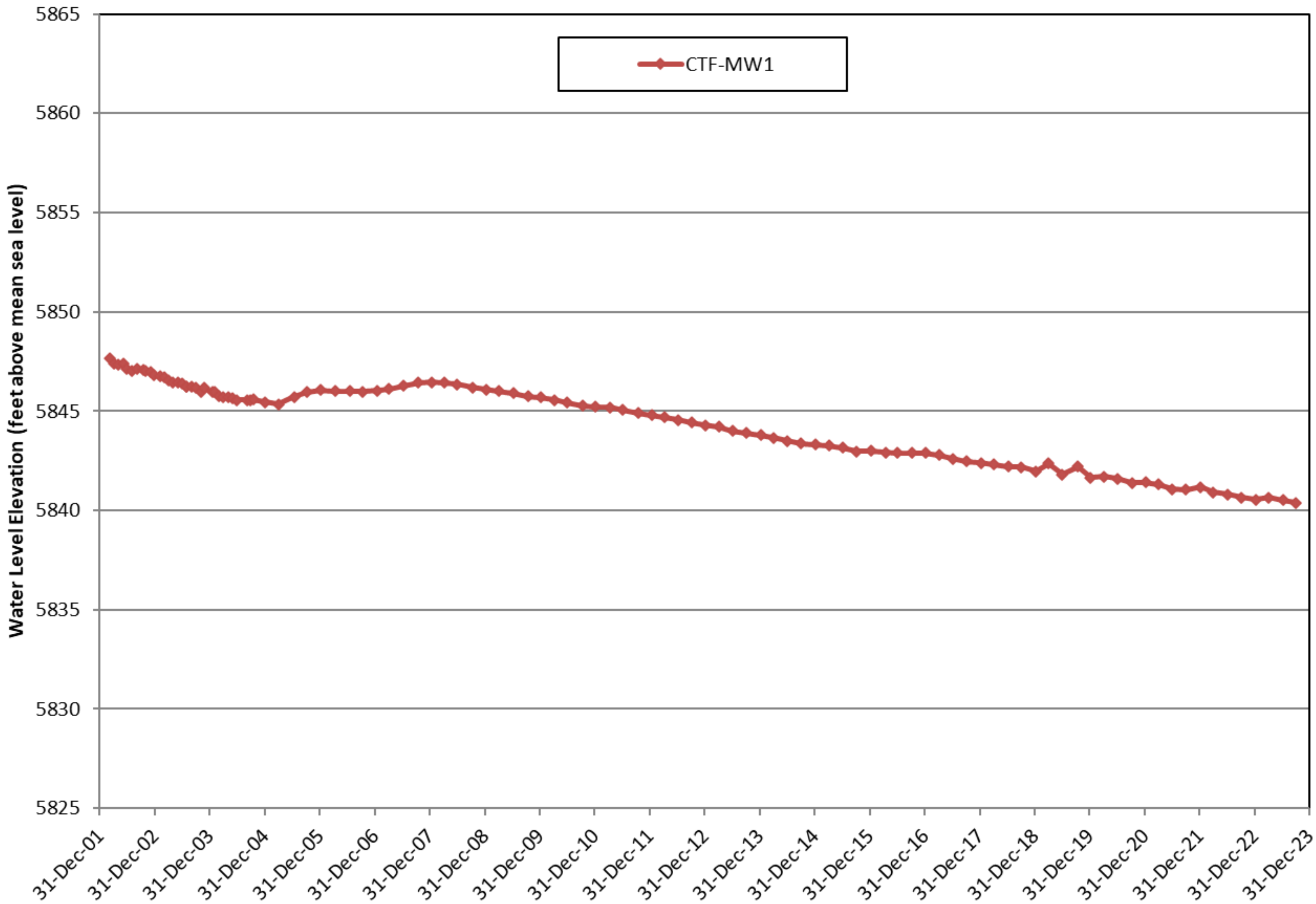

Figure 2B-9
Groundwater Monitoring Program Study Wells (9 of 10)

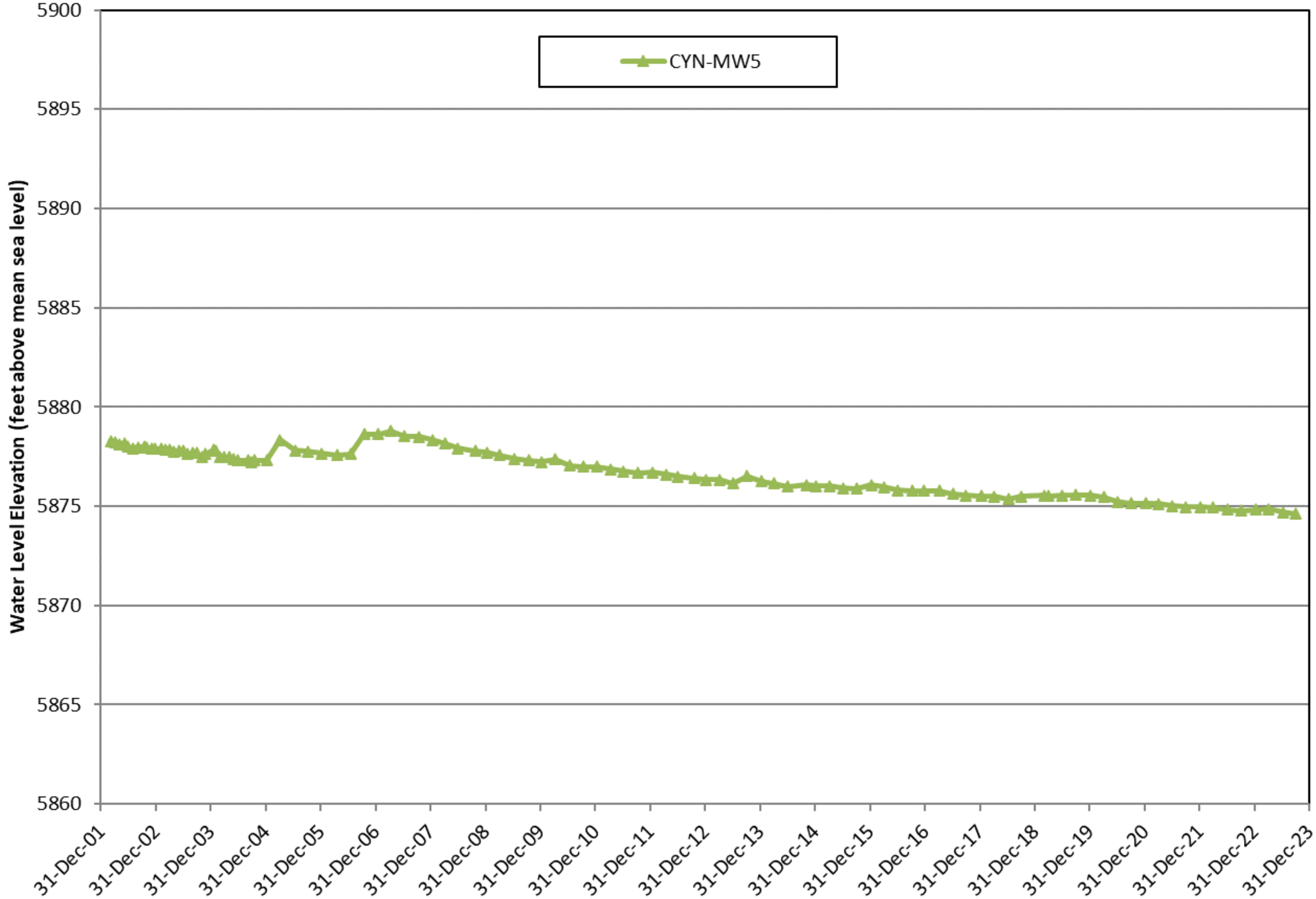

Figure 2B-10
Groundwater Monitoring Program Study Wells (10 of 10)

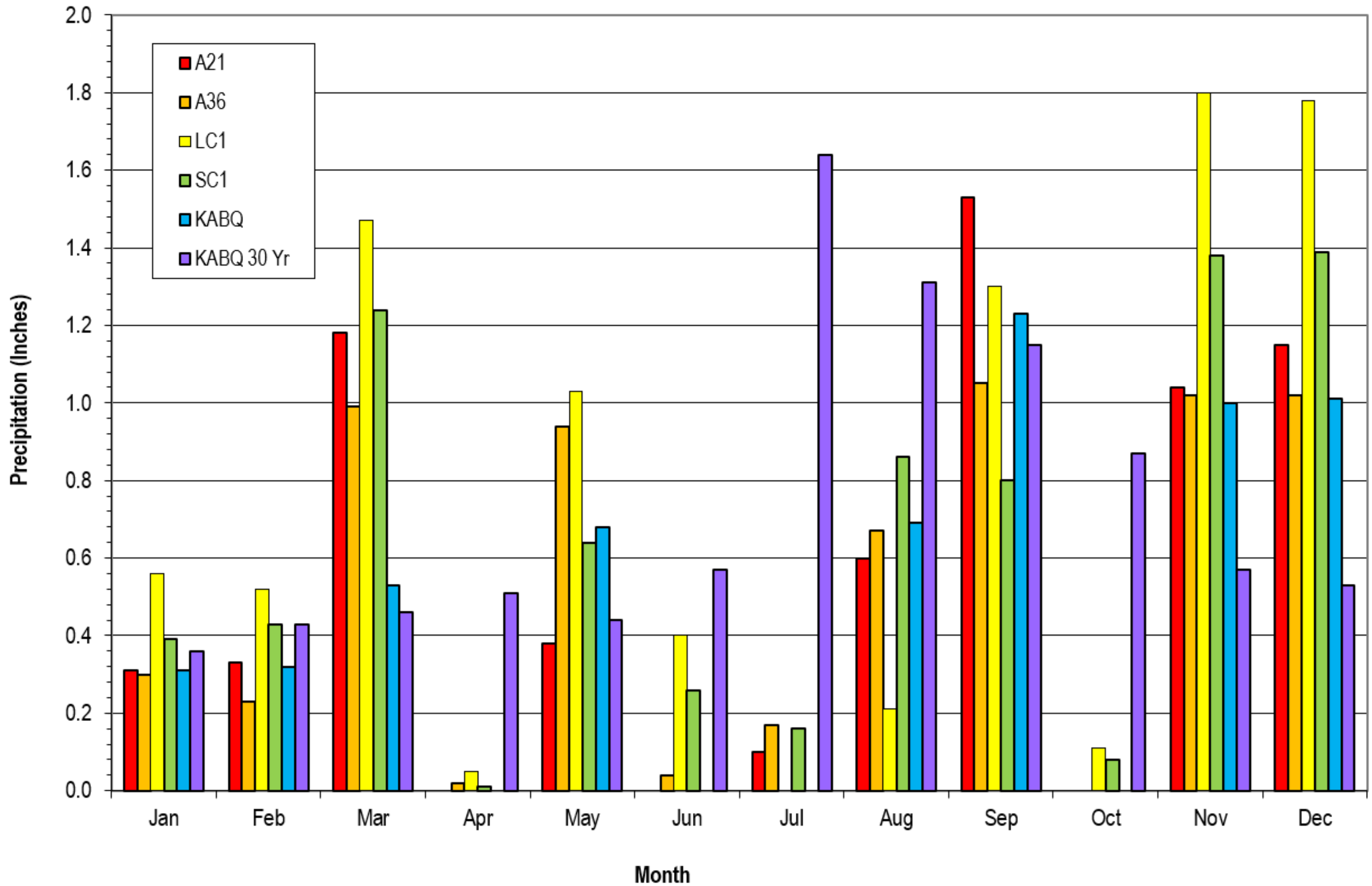

Figure 2B-11
Precipitation Data for Sandia National Laboratories, New Mexico, Calendar Year 2023

Figure 2B-12
Annual Precipitation Data for Sandia National Laboratories, New Mexico, January 2013 to December 2023

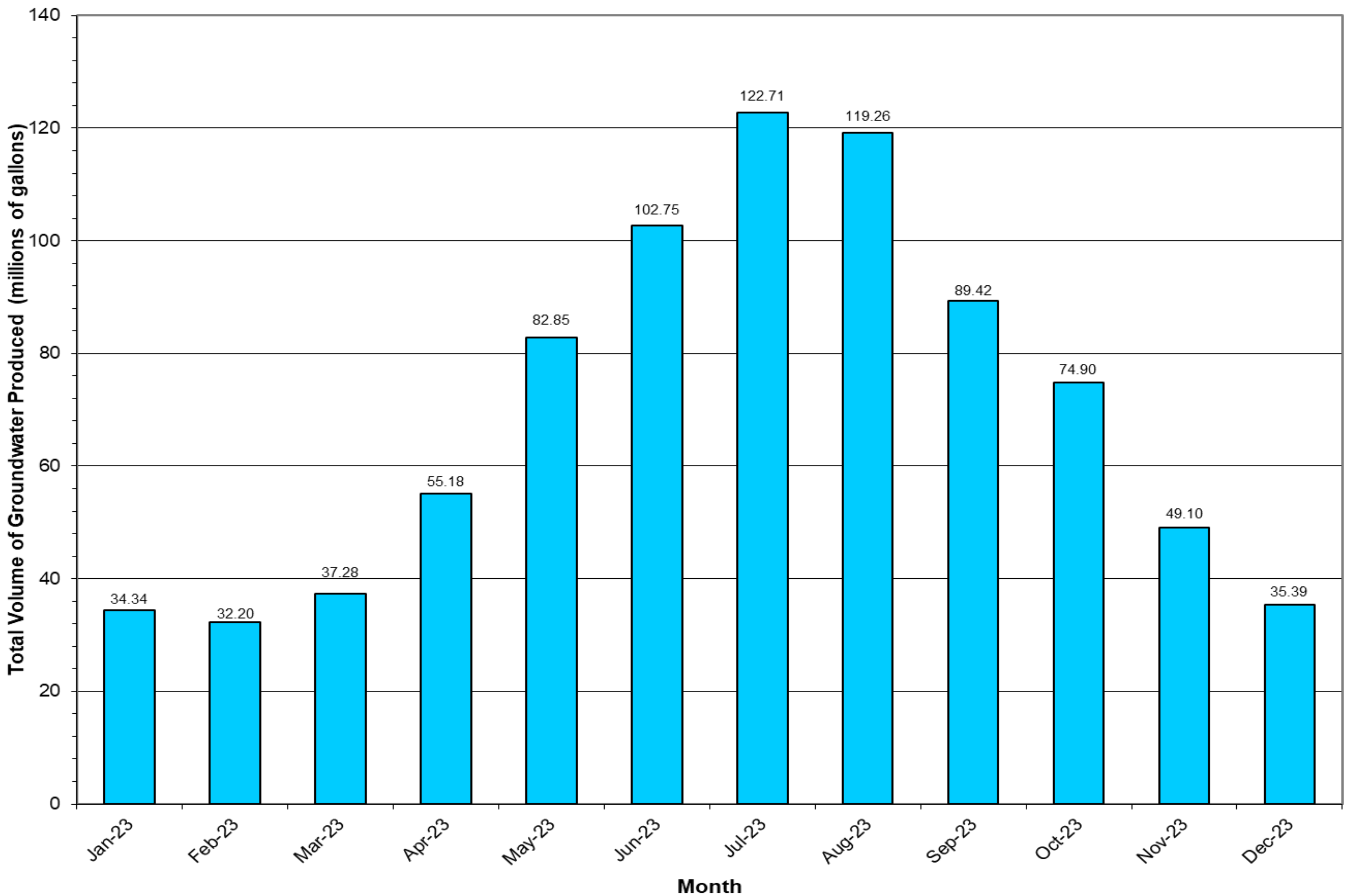

Figure 2B-13
Monthly Groundwater Pumped by Kirtland Air Force Base Production Wells, Calendar Year 2023

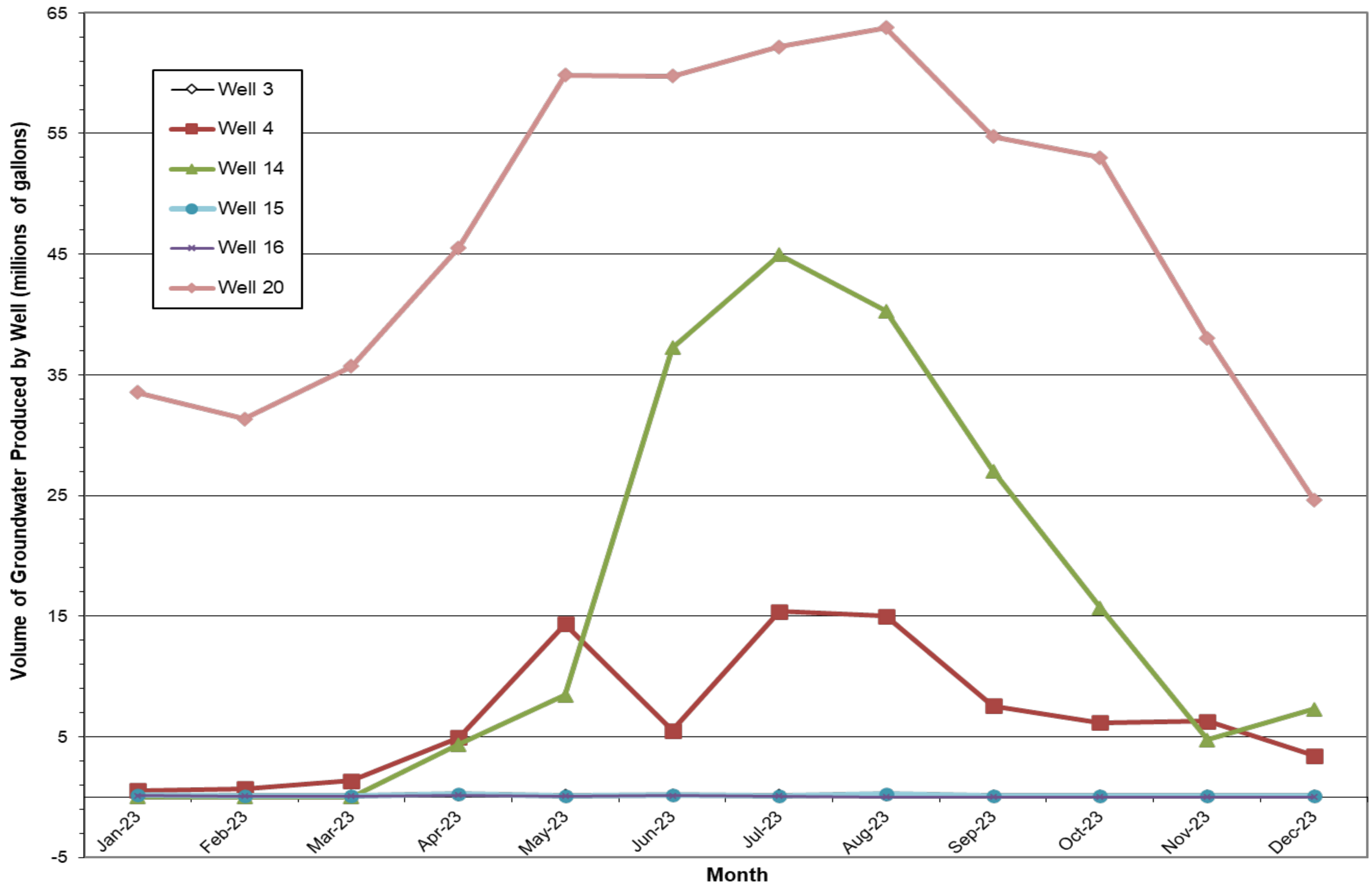

Figure 2B-14
Groundwater Pumped by Kirtland Air Force Base Production Wells, Calendar Year 2023

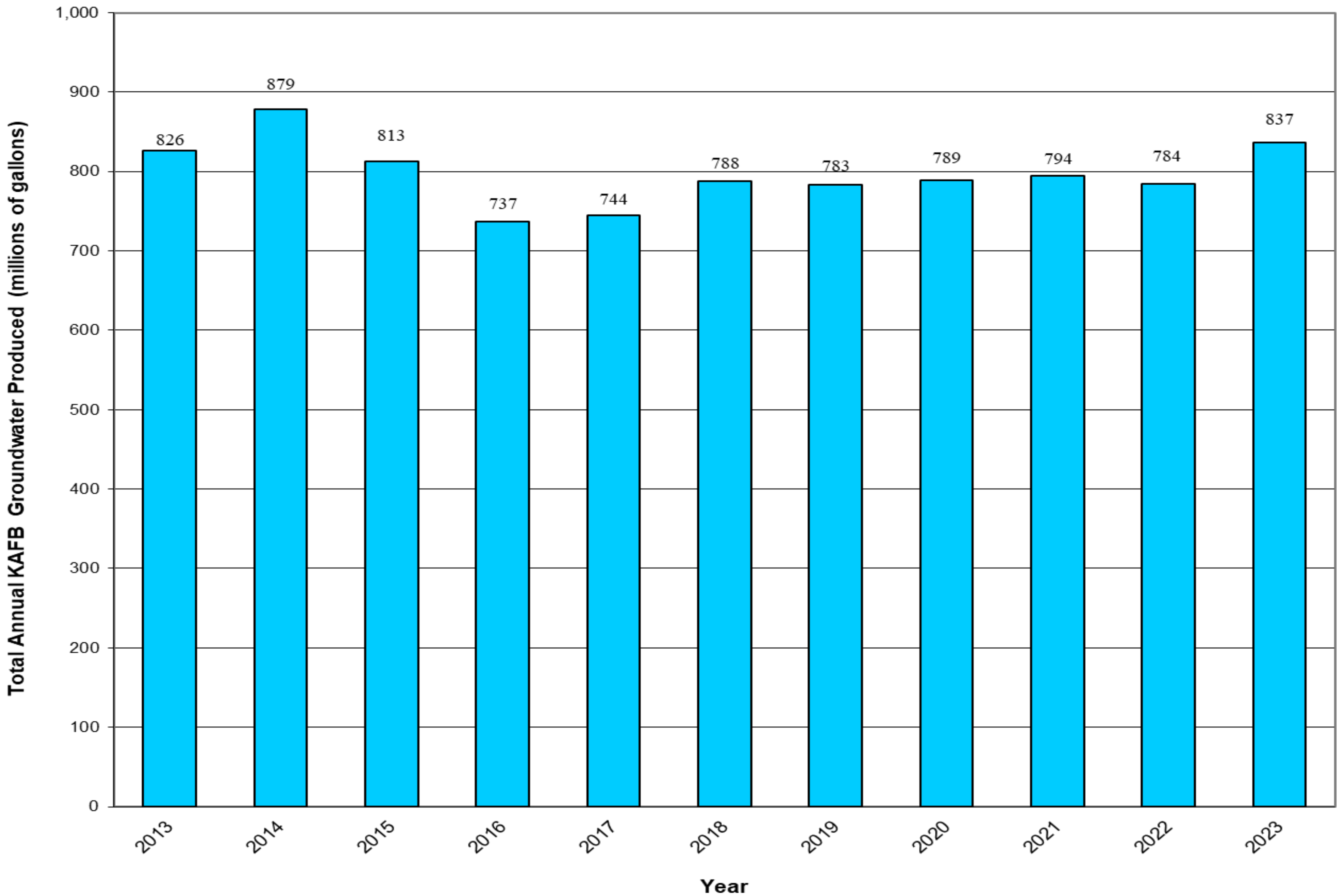

Figure 2B-15
Annual Groundwater Pumped by Kirtland Air Force Base Production Wells, 2013 to 2023

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Attachment 2C
Groundwater Monitoring Program Plots

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Attachment 2C Plots

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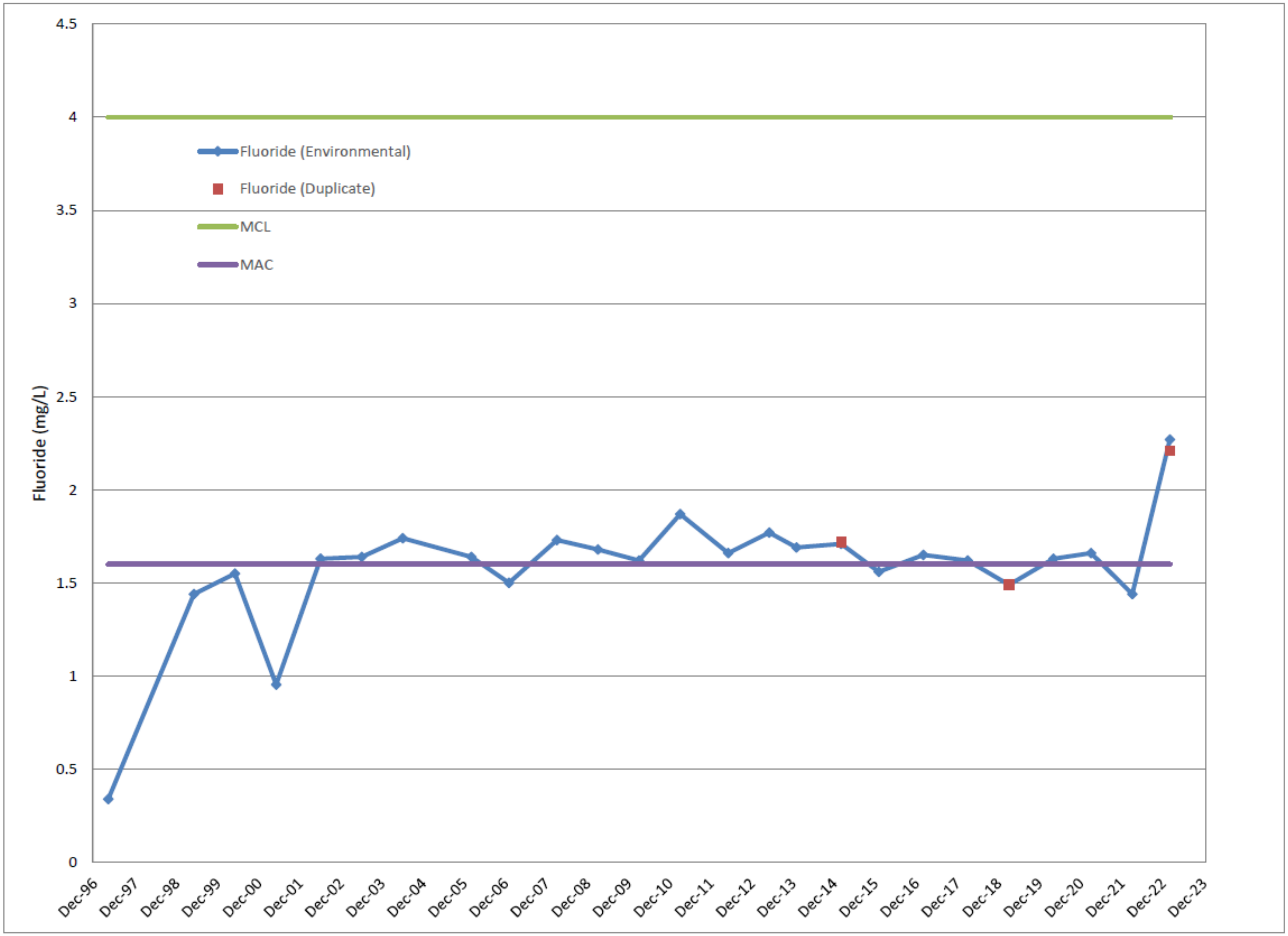

Figure 2C-1
Fluoride Concentrations, Coyote Springs

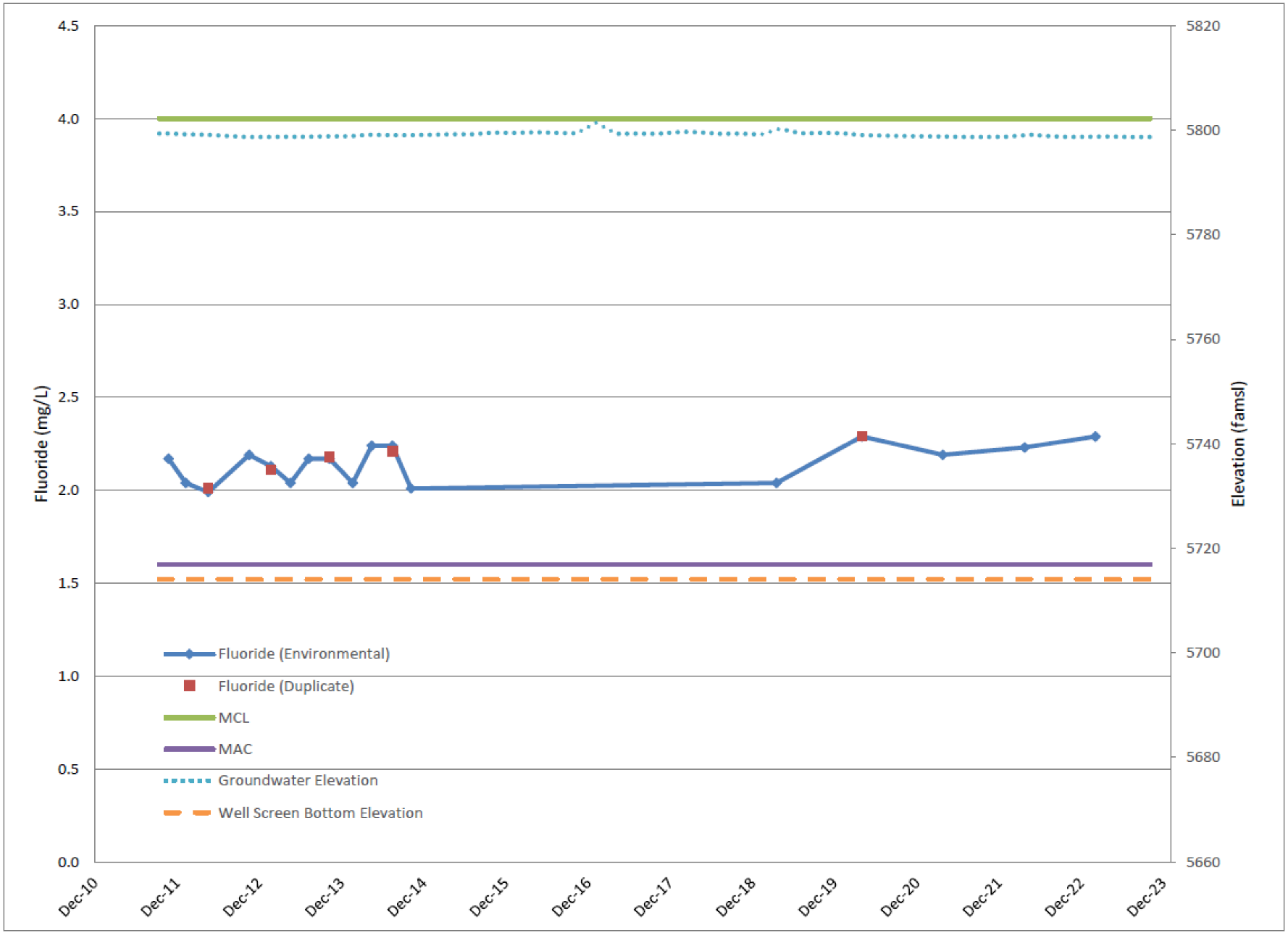

Figure 2C-2
Fluoride Concentrations, OBS-MW1

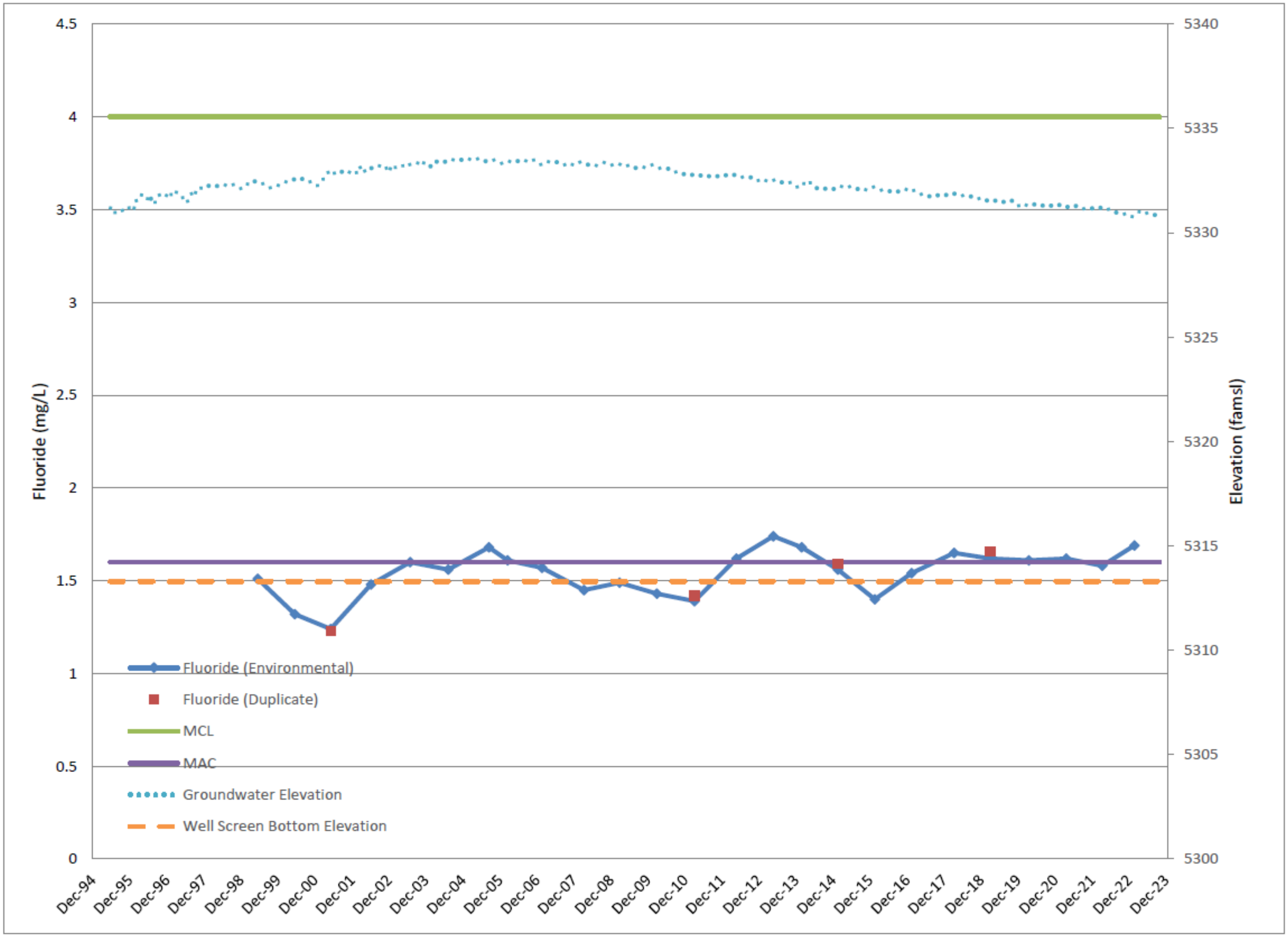

Figure 2C-3
Fluoride Concentrations, SFR-2S

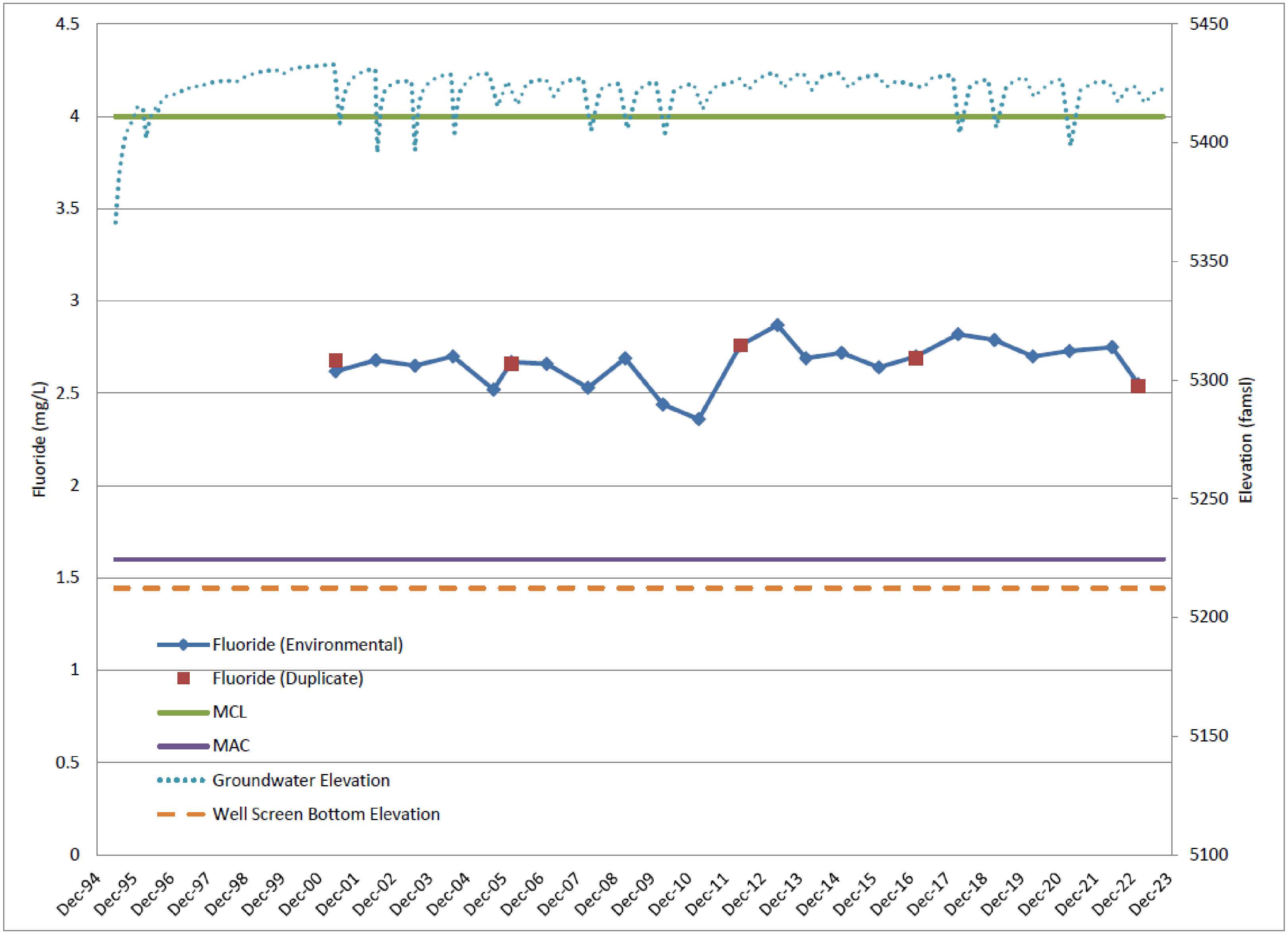

Figure 2C-4
Fluoride Concentrations, SFR-4T

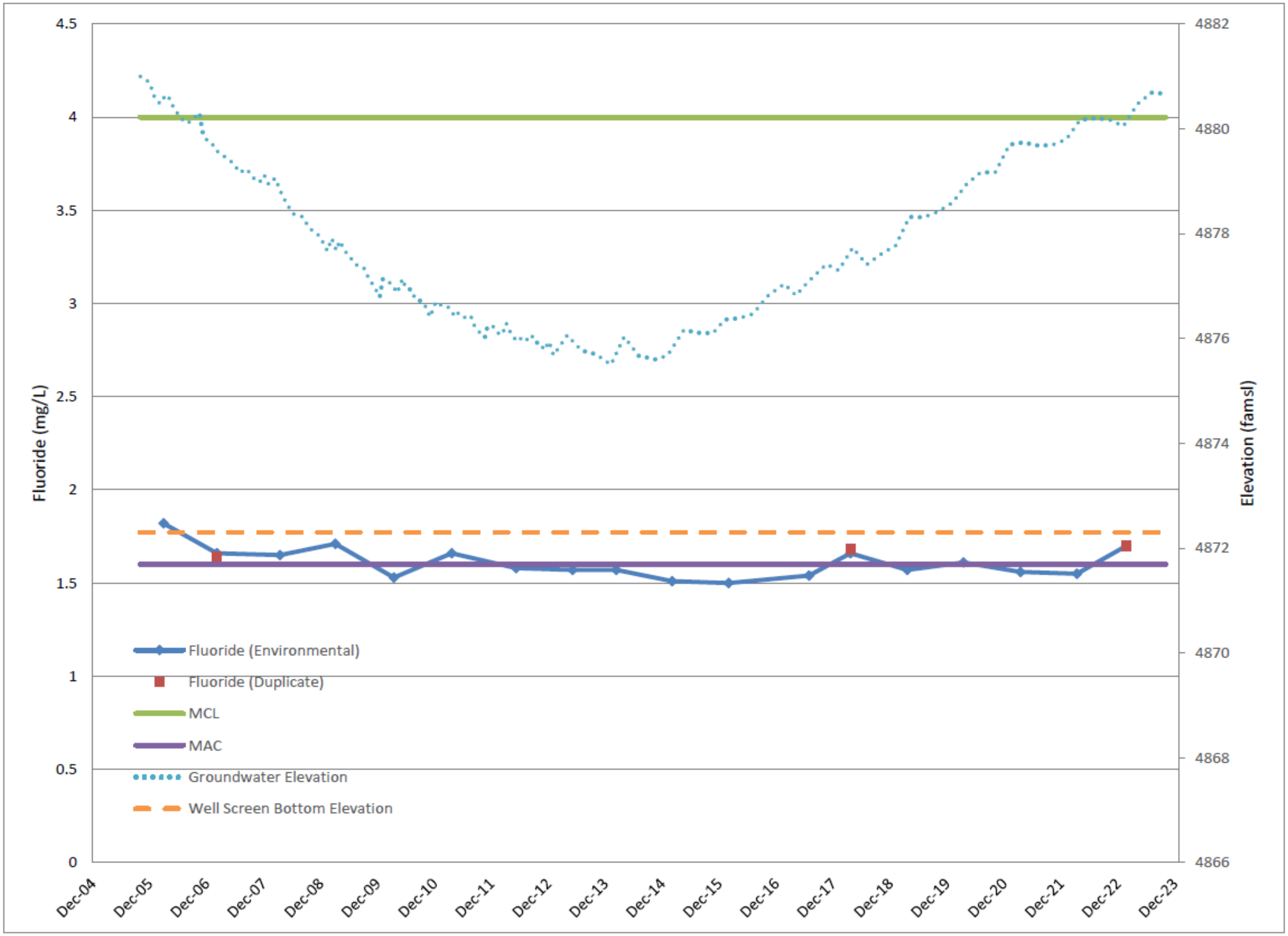

Figure 2C-5
Fluoride Concentrations, SWTA3-MW4

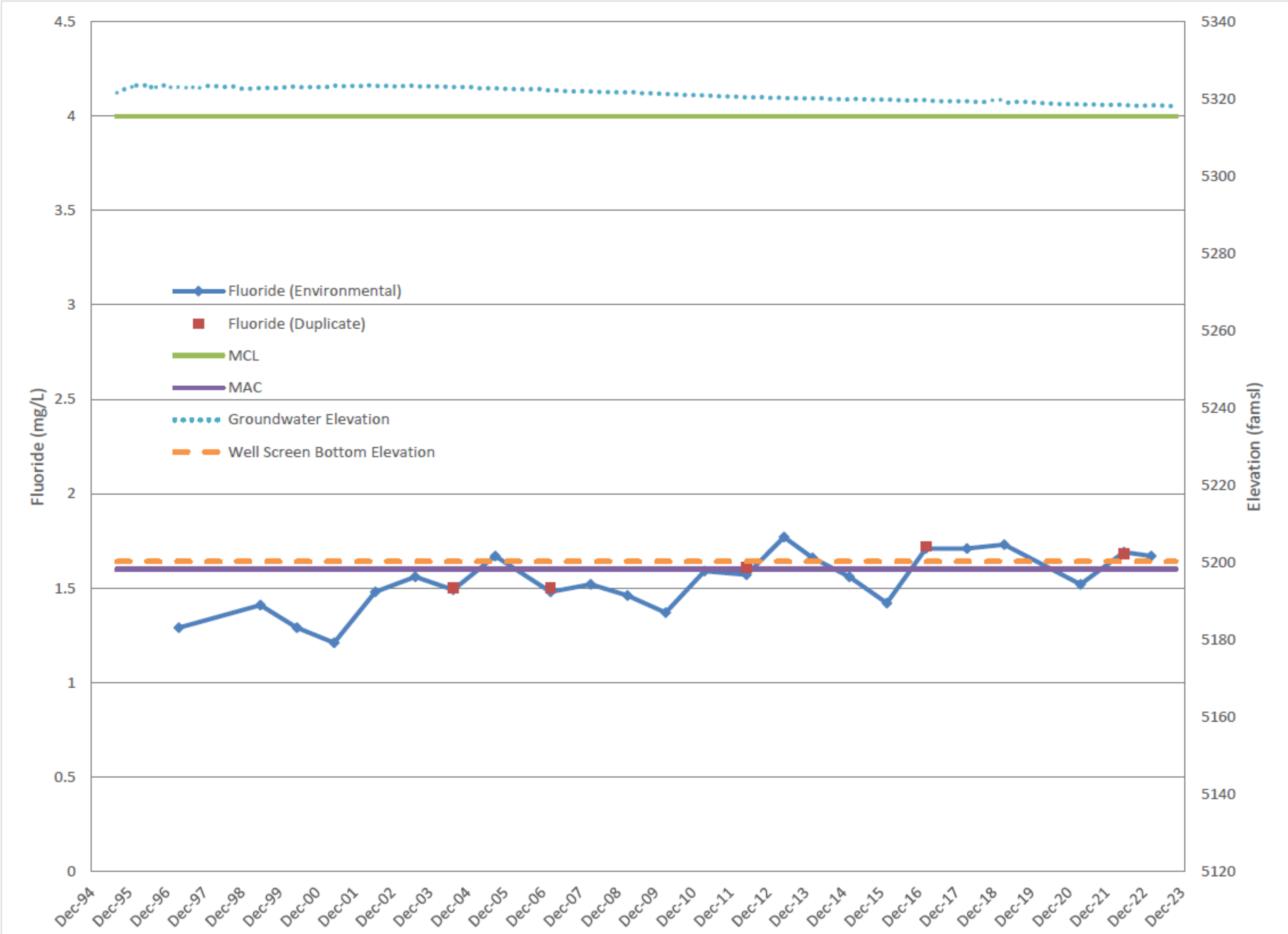

Figure 2C-6
Fluoride Concentrations, TRE-1

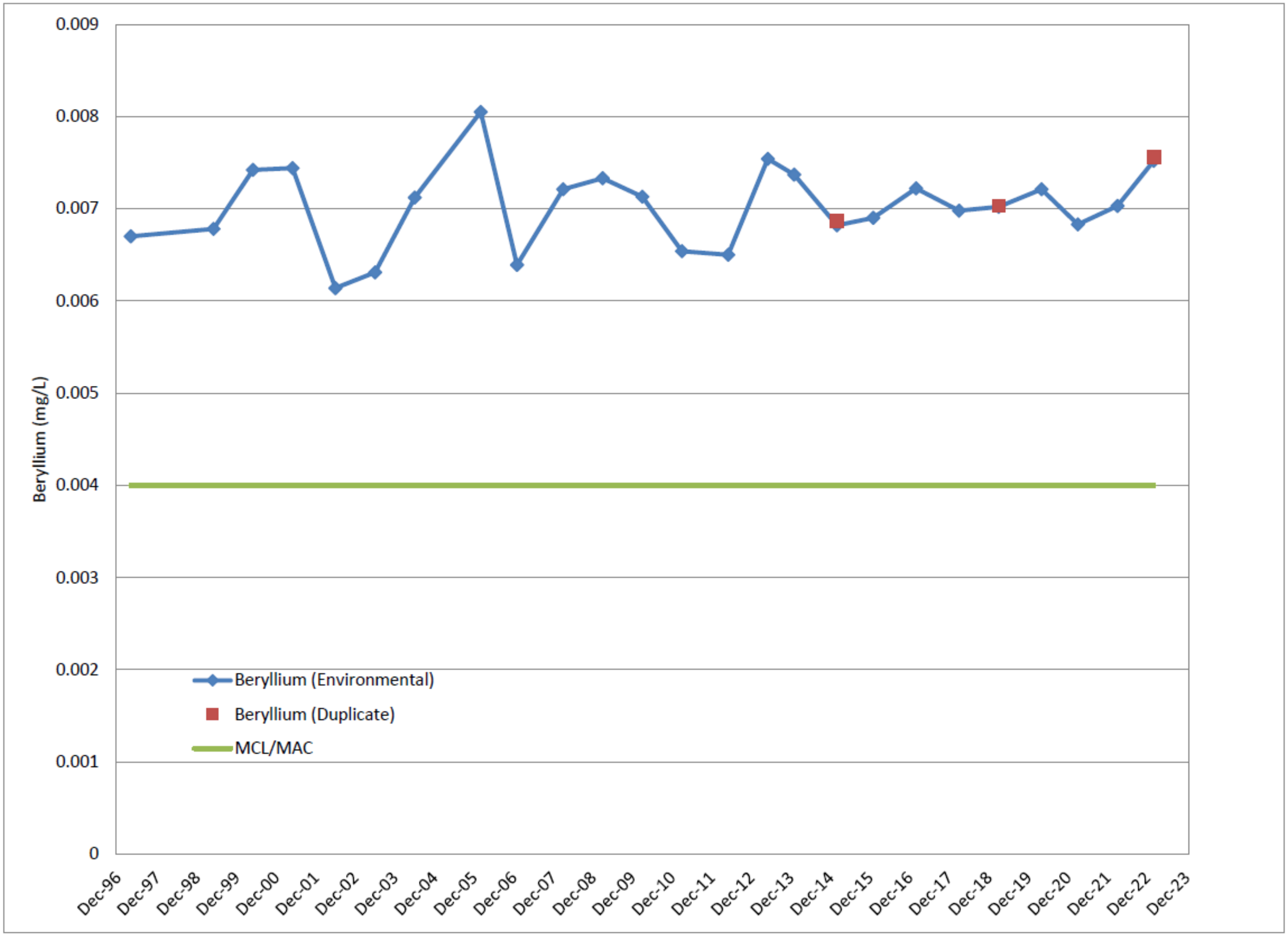

Figure 2C-7
Beryllium Concentrations, Coyote Springs

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Chapter 2.0
Groundwater Monitoring Program References

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3.0 Chemical Waste Landfill

3.1 Introduction

This chapter summarizes the calendar year (CY) 2023 groundwater monitoring activities and results for the Chemical Waste Landfill (CWL).

The CWL is a 1.9-acre former disposal site located in the southeastern corner of Technical Area (TA)-III at Sandia National Laboratories, New Mexico (SNL/NM) (Figure 3-1). From 1962 to 1981, the CWL was used to dispose of chemical, radioactive, and solid waste generated by SNL/NM research activities. From 1982 through 1985, only solid waste was disposed of at the CWL. Additionally, the CWL was used as an aboveground hazardous waste drum storage facility from 1981 to 1989.

In 1990, trichloroethene (TCE) was identified in groundwater at a concentration exceeding the U.S. Environmental Protection Agency (EPA) maximum contaminant level (MCL) of 5 micrograms per liter (µg/L). This finding led to the development and incorporation of a corrective action program into the *Chemical Waste Landfill Final Closure Plan and Postclosure Permit Application* (Final Closure Plan) (SNL/NM, December 1992). The SNL/NM Environmental Restoration Project implemented two voluntary corrective measures (VCMs): the Vapor Extraction VCM and the Landfill Excavation VCM. As part of the Vapor Extraction VCM conducted from 1996 through 1998, the volatile organic compound (VOC) soil-gas plume was reduced and controlled, further degradation of groundwater beneath the CWL was prevented, and TCE concentrations in groundwater were reduced to levels below the EPA MCL. As part of the Landfill Excavation VCM, the CWL was excavated from September 1998 through February 2002. The removal of all former disposal areas was confirmed by geophysical surveys, and the results of final verification soil samples demonstrated that the end-state conditions met the industrial risk-based standards approved by the New Mexico Environment Department (NMED). More than 52,000 cubic yards of contaminated soil and debris were removed (SNL/NM, April 2003).

In April 2004, after completion of backfilling activities, the U.S. Department of Energy/National Nuclear Security Administration and SNL/NM personnel requested approval to install an at-grade vegetative soil cover as an interim measure (DOE, April 2004) while NMED comments on the May 2003 *Chemical Waste Landfill Corrective Measures Study Report* (CWL CMS Report) (SNL/NM, December 2004) were being resolved. In September 2004, the NMED approved this request (NMED, September 2004) and construction of the at-grade evapotranspirative (ET) cover (i.e., vegetative soil cover) was completed in September 2005.

In May 2007, the NMED issued a Notice of Public Comment Period (NMED, May 2007a) for three documents: the CWL CMS Report; the *Resource Conservation and Recovery Act, Post-Closure Care Operating Permit, EPA ID No. NM5890110518, to the U.S. Department of Energy/Sandia Corporation, for the Sandia National Laboratories Chemical Waste Landfill* (NMED, May 2007b); and the *Chemical Waste Landfill Final Closure Plan – Chapter 12 Revision* (Final Closure Plan – Chapter 12 Revision) (SNL/NM, February 2006). In 2009, the NMED issued the *Final Permit Decision and Response to Comments, Post-Closure Care Permit for the Chemical Waste Landfill, Sandia National Laboratories, EPA ID No. NM5890110518, SNL-06-002* (CWL PCCP) (NMED, October 2009a, as modified), approved the CWL CMS Report, and approved the Final Closure Plan – Chapter 12 Revision (NMED, October 2009b).

In 2010, older monitoring wells CWL-MW4, CWL-MW5L, CWL-MW5U, CWL-MW6L, CWL-MW6U, and CWL-BW4A were decommissioned and new monitoring wells CWL-BW5, CWL-MW9, CWL-MW10, and CWL-MW11 were installed. The new monitoring wells became the compliance groundwater monitoring network for the CWL in accordance with the approved Final Closure Plan – Chapter 12 Revision. The *Chemical Waste Landfill Final Resource Conservation and Recovery Act Closure Report* (SNL/NM, September 2010) documenting closure in accordance with all Final Closure Plan requirements was submitted to the NMED after completion of monitoring well installation and decommissioning activities.

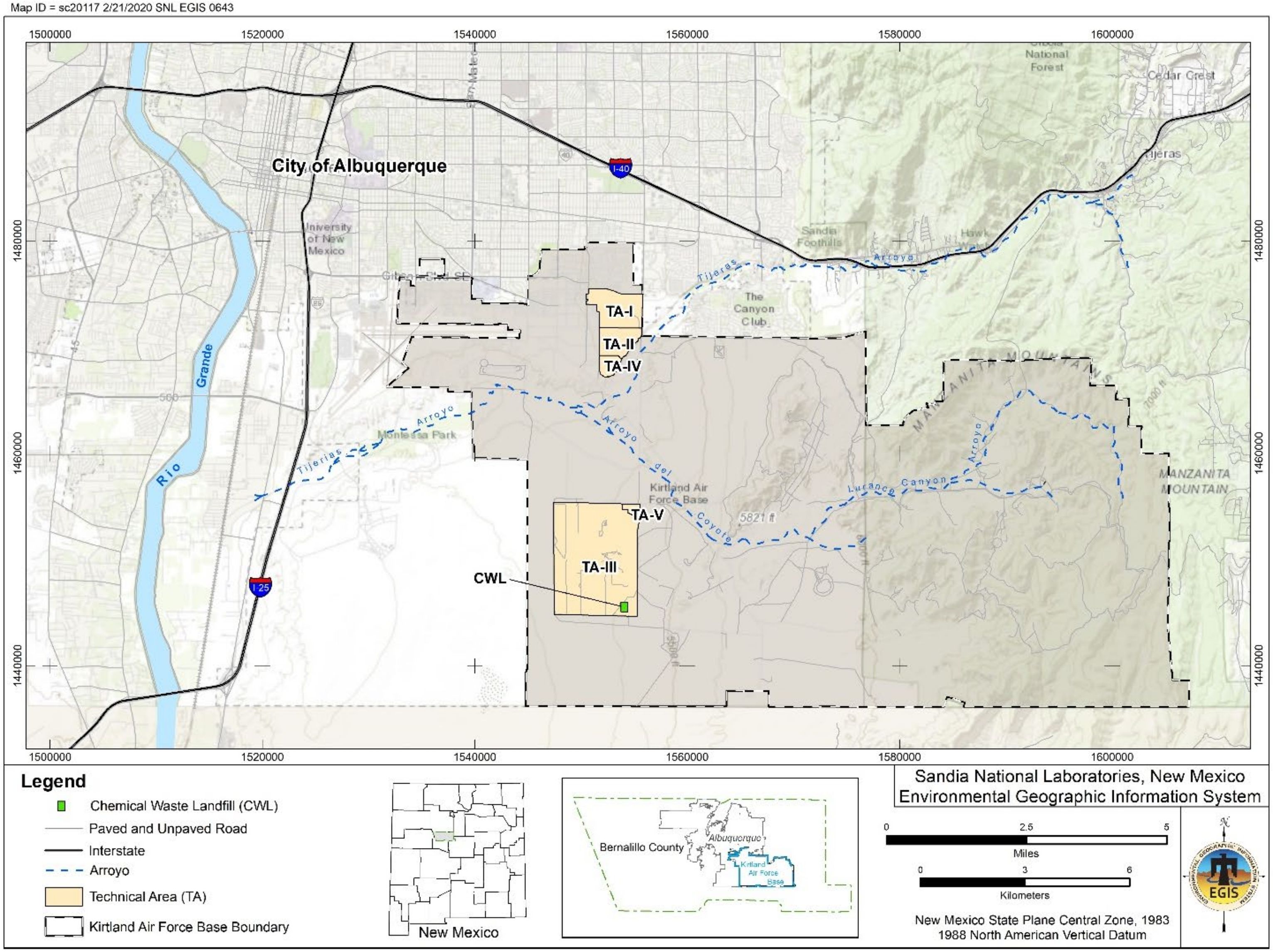

Figure 3-1
Location of the Chemical Waste Landfill with Respect to Kirtland Air Force Base and the City of Albuquerque

Upon NMED approval of CWL closure (NMED, June 2011), the CWL PCCP became the enforceable regulatory document. All CWL groundwater monitoring activities since June 2011 have been performed in accordance with the requirements specified in the CWL PCCP. Required monitoring (groundwater and soil-gas), inspections, and maintenance activities are comprehensively documented in annual post-closure care reports submitted to the NMED in March of each year. The *Chemical Waste Landfill Annual Post-Closure Care Report, Calendar Year 2022* (SNL/NM, March 2023) was submitted to the NMED in March 2023 and approved (NMED, May 2023). The *Chemical Waste Landfill Annual Post-Closure Care Report, Calendar Year 2023* will be submitted to the NMED in March 2024.

As stipulated in the CWL PCCP, the only regulatory standards that apply to CWL groundwater monitoring results are the CWL PCCP-defined hazardous constituent concentration limits. These NMED-defined regulatory standards apply only to a statistical evaluation of the constituent data set from a given monitoring well (i.e., the 95th percentile lower confidence limit of the mean for a particular constituent), not to individual results. The *Chemical Waste Landfill Annual Post-Closure Care Report, Calendar Year 2023* will present a comprehensive statistical evaluation of the CY 2023 CWL groundwater monitoring results.

3.1.1 Monitoring History

Monitoring of the groundwater at the CWL began in 1985 (IT, December 1985) as required by 20.4.1.600 NMAC, incorporating 40 CFR Part 265 (NMED, December 2018b). From February 22, 1993 through June 2, 2011, monitoring was conducted under the NMED-approved Final Closure Plan. Since then, monitoring has been conducted in accordance with the CWL PCCP.

3.1.2 Monitoring Network

The CWL monitoring well network consists of four monitoring wells: CWL-BW5, CWL-MW9, CWL-MW10, and CWL-MW11. These four wells are listed in Table 3-1 and shown on Figure 3-2.

Table 3-1
Chemical Waste Landfill Post-Closure Care Permit Monitoring Well Network and Calendar Year 2023 Compliance Activities

Well ID	WQ	WL	Comment
CWL-BW5	✓	✓	Upgradient well, sampled semiannually
CWL-MW9	✓	✓	Downgradient well, sampled semiannually
CWL-MW10	✓	✓	Downgradient well, sampled semiannually
CWL-MW11	✓	✓	Downgradient well, sampled semiannually
Total	4	4	Total for AGMR reporting

Notes:
Check marks indicate that WQ sampling and WL measurements were completed.
AGMR = annual groundwater monitoring report
BW = Background Well
CWL = Chemical Waste Landfill
ID = identifier
MW = Monitoring Well
WL = water level
WQ = water quality

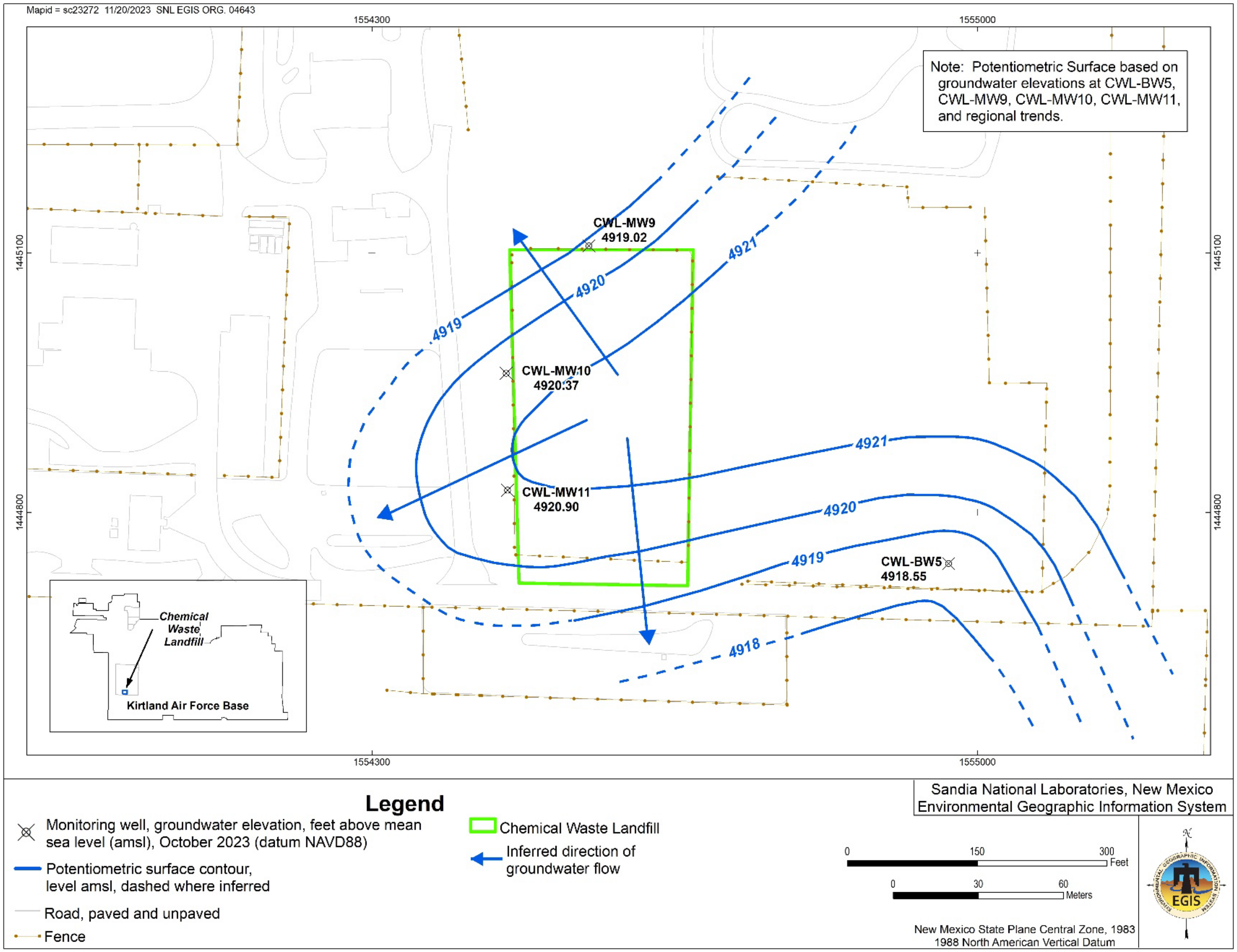

Figure 3-2
Localized Potentiometric Surface of the Regional Aquifer at the Chemical Waste Landfill, October 2023

3.1.3 Conceptual Site Model

The constituents of concern in the groundwater at the CWL are TCE, chromium, and nickel. A detailed Conceptual Site Model (CSM) is provided in Annex E of the CWL CMS Report. The current CSM is summarized as follows.

The upper surface of the Regional Aquifer (i.e., water table) beneath the CWL occurs within unconsolidated Santa Fe Group (SFG) deposits (i.e., fine-grained alluvial-fan deposits). The depth to water is approximately 500 feet (ft) below ground surface. The groundwater generally flows westward, away from the Manzanita Mountains and toward the Rio Grande. Several Kirtland Air Force Base (KAFB), Veterans Affairs, and Albuquerque Bernalillo County Water Utility Authority (ABCWUA) production wells have profoundly modified the natural groundwater flow regime to the west and north of the CWL by creating a trough in the water table in the western and northern parts of KAFB. As a result, water levels at the CWL have been steadily declining since 1985.

Attachment 3A, Figure 3A-1 (hydrograph) shows the rate of groundwater elevation decline from 2010 to 2023 at the CWL monitoring wells. Since 1985, the average rate of water table decline has been somewhat variable but typically in the range of 0.4 to 0.8 feet per year (ft/yr). The groundwater elevation decline between October 2022 and October 2023 at the wells ranged from 0.16 (CWL-MW9) to 0.36 ft (CWL-MW11). This decline was consistent with and slightly less than the decline between October 2021 to October 2022, which ranged from 0.20 (CWL-MW11) to 0.42 ft (CWL-BW5). Overall, the rate of decline has slowed, likely due to decreased pumping at ABCWUA production wells to the north. Recharge from the infiltration of direct precipitation at the CWL is negligible due to high evapotranspiration, low precipitation, the thick sequence of unsaturated SFG deposits above the water table, and the ET Cover that was installed in 2005. Groundwater recharge of the Regional Aquifer primarily occurs by the infiltration of precipitation in the Manzanita Mountains located approximately 5 miles to the east and has been affected by extended drought conditions that continued in 2023.

Table 3-2 presents the data used to construct the CY 2023 potentiometric surface map for the CWL monitoring well network (Figure 3-2).

Table 3-2
Groundwater Elevations Measured in October 2023 at Monitoring Wells Completed in the Regional Aquifer at the Chemical Waste Landfill

Well ID	Measurement Point (ft amsl) NAVD 88	Date Measured	Depth to Water (ft btoc)	Groundwater Elevation (ft amsl)
CWL-BW5	5,434.79	2-Oct-2023	516.24	4,918.55
CWL-MW9	5,426.12	2-Oct-2023	507.10	4,919.02
CWL-MW10	5,424.58	2-Oct-2023	504.21	4,920.37
CWL-MW11	5,423.24	2-Oct-2023	502.34	4,920.90

Notes:
amsl = above mean sea level
btoc = below top of casing
BW = Background Well
CWL = Chemical Waste Landfill
ft = feet
ID = identifier
MW = Monitoring Well
NAVD 88 = North American Vertical Datum of 1988

Figure 3-2 is consistent with the CSM and the base-wide potentiometric surface map (Plate 1). As Plate 1 shows, the potentiometric surface contours beneath TA-III generally trend north to south with the inferred groundwater flow direction being generally westward. The westward deflection of the potentiometric surface is a localized salient (i.e., a very gentle ridge or localized high) of the Regional Aquifer beneath the CWL (Figure 3-2) that reflects site-specific geologic controls. These controls are related to lateral and vertical changes in the hydraulic conductivity of the saturated, anisotropic, SFG alluvial-fan sediments that were predominantly deposited in an east-to-west direction. The nearest production well, KAFB-4, is located approximately 4.3 miles north-northwest of the CWL.

Measured orthogonally from the potentiometric surface contours on Figure 3-2 across the site, the horizontal gradient at the CWL has not changed significantly from previous years and is approximately 0.013 ft/ft. Groundwater velocities in the alluvial-fan sediments were calculated using the current potentiometric surface gradient, the hydraulic conductivity range (high and low values) from slug tests conducted in 2012 on all four CWL monitoring wells, and a porosity of 29 percent as determined from the laboratory analyses of CWL sediment samples (SNL/NM, October 1995). The CY 2023 calculated velocities ranged from approximately 1.8×10^{-4} to 2.8×10^{-3} ft/day. This is equivalent to approximately 0.07 to 1.02 ft/yr. These very low values are consistent with previous estimates for horizontal groundwater flow at the water table in the CWL vicinity. Estimated groundwater travel times from the CWL to the nearest production wells to the north are on the order of hundreds to thousands of years (SNL/NM, February 2001).

3.2 Regulatory Criteria

The CWL is a remediated, closed, regulated unit undergoing post-closure care in accordance with the CWL PCCP, which took effect on June 2, 2011 (NMED, June 2011). Groundwater monitoring requirements, procedures, and protocols are detailed in CWL PCCP Attachment 1, Section 1.8.1, and Attachment 2, Groundwater Sampling and Analysis Plan (SAP).

3.3 Scope of Activities

Semiannual groundwater sampling events were conducted at the CWL in January and July 2023 in accordance with CWL PCCP Attachment 2. The January 2023 groundwater samples (also referred to as environmental samples) were analyzed for TCE, chromium, nickel, and the enhanced list of VOCs (i.e., 1,1-dichloroethene; 1,1,2-trichloro-1,2,2-trifluoroethane; chloroform; tetrachloroethene; and trichlorofluoromethane). The July 2023 groundwater samples were analyzed for TCE, chromium, and nickel.

Table 3-3 lists the analytical parameters and monitoring wells sampled. Attachment 3B (Tables 3B-1 and 3B-2) presents the analytical results. The sampling activities were performed in accordance with the CWL PCCP, as detailed in the *Chemical Waste Landfill Groundwater Monitoring, Mini-Sampling and Analysis Plan for Fiscal Year 2023, 2nd Quarter Sampling* (SNL/NM, December 2022) and the *Chemical Waste Landfill Groundwater Monitoring, Mini-Sampling and Analysis Plan for Fiscal Year 2023, 4th Quarter Sampling* (SNL/NM, June 2023a).

The groundwater samples were submitted to GEL Laboratories, LLC in Charleston, South Carolina for analysis. The analytical results were compared to the EPA MCLs for drinking water (EPA, March 2018).

Table 3-3
Analytical Parameters for the Chemical Waste Landfill Monitoring Wells, Calendar Year 2023

Analytical Parameters	Semiannual Event	Monitoring Wells
VOCs: TCE 1,1,2-trichloro-1,2,2-trifluoroethane Tetrachloroethene 1,1-Dichloroethene Chloroform Trichlorofluoromethane	January	CWL-BW5 CWL-MW9 CWL-MW10 CWL-MW11 (Duplicate) CWL-MW11
Metals: Chromium Nickel		
VOCs: TCE	July	CWL-BW5 CWL-MW9 CWL-MW10 CWL-MW10 (Duplicate) CWL-MW11
Metals: Chromium Nickel		

Notes:
BW = Background Well
CWL = Chemical Waste Landfill
MW = Monitoring Well
TCE = trichloroethene
VOC = volatile organic compound

Field and laboratory quality control (QC) samples are discussed in Sections 1.3.4 and 1.3.5. The field QC samples included environmental duplicate, equipment blank (EB), field blank (FB), and trip blank (TB) samples. The laboratory QC samples included method blank samples, laboratory control samples, matrix spike and matrix spike duplicate samples, surrogate spike samples, and replicate samples.

3.4 Field Methods and Measurements

Field water quality parameters and groundwater elevations were measured in accordance with the CWL PCCP and procedures specified in the CWL groundwater monitoring mini-SAPs, which are consistent with the methods and procedures Section 1.3 describes. Attachment 3B, Table 3B-3 lists the field water quality parameters measured before sample collection and Attachment 3A, Figure 3A-1 (hydrograph) presents the groundwater elevation measurements for the monitoring wells.

As specified in CWL PCCP Attachment 2, Section 2.12, the purging requirements at the CWL include specifications for pumping at low flow rates such that low-yield wells do not purge dry. These specifications include equipping the portable Bennett groundwater sampling system with small-diameter tubing and a flow meter valve along the discharge line. In addition, during the purging process at wells prone to purge dry, the flow rate is continually adjusted to achieve as low a flow rate as possible without damaging the pump or causing it to fail due to overheating. This represents a “best faith effort” to purge the wells at the slowest rate possible given equipment limitations.

Two of the four monitoring wells (CWL-BW5 and CWL-MW9) met the minimum purge volume requirement. Monitoring wells CWL-MW10 and CWL-MW11 purged dry before removal of the minimum volume during both the January and July 2023 sampling events. Both wells were allowed to recover and then were sampled to collect the most representative groundwater sample possible given their low yields.

In January 2023, approximately 12.5 gallons (gal) were removed from CWL-MW10 and approximately 18.0 gal were removed from CWL-MW11 before the wells purged dry (purge volume requirement for both wells was approximately 21 gal). At CWL-MW10, the average estimated flow rate for the purging event was 0.129 gal per minute (gpm) and the estimated flow rate during the final three gal was 0.109 gpm (equivalent to 0.488 and 0.413 liters per minute, respectively). At CWL-MW11, the average estimated flow rate for the purging event was 0.145 gpm and the estimated flow rate during the final three gal was 0.111 gpm (equivalent to 0.549 and 0.420 liters per minute, respectively).

In July 2023, approximately 12 gal were removed from CWL-MW10 and approximately 17.25 gal were removed from CWL-MW11 before the wells purged dry (purge volume requirement for both wells was approximately 20 gal). At CWL-MW10, the average estimated flow rate for the purging event was 0.141 gpm and the estimated flow rate during the final three gal was 0.125 gpm (equivalent to 0.534 and 0.473 liters per minute, respectively). At CWL-MW11, the average estimated flow rate for the purging event was 0.144 gpm and the estimated flow rate during the final three gal was 0.136 gpm (equivalent to 0.545 and 0.515 liters per minute, respectively).

3.5 Analytical Methods

GEL Laboratories, LLC analyzed the groundwater samples using the applicable EPA-specified methods and protocols identified in Section 1.3.2 (Table 1-5).

3.6 Summary of Calendar Year 2023 Analytical Results

The following sections summarize the CY 2023 analytical results. Attachment 3B (Tables 3B-1 through 3B-3) presents the analytical results and field water quality parameter measurements. All analytical results (Tables 3B-1 and 3B-2) were reviewed and qualified during the data validation process (SNL/NM, June 2020, June 2023b) and include the laboratory and validation qualifiers.

No detected constituents exceeded established EPA MCLs or the CWL PCCP-defined hazardous concentration limits.

3.6.1 Volatile Organic Compounds

Table 3B-1 presents the analytical results for TCE and the enhanced list of VOCs (January) and TCE (July). TCE was the only VOC detected above the laboratory method detection limit (MDL) in the groundwater samples. TCE was detected in the January 2023 environmental sample from CWL-MW10 at a concentration of 0.880 µg/L and in the July 2023 environmental and duplicate samples from CWL-MW10 at concentrations of 1.01 and 0.980 µg/L, respectively. These TCE results are below the EPA MCL of 5.0 µg/L. No other VOCs were detected above the MDL in the January 2023 samples. Since implementation of the CWL PCCP in June 2011, TCE has been the only VOC detected in CWL groundwater samples and it has only been detected in groundwater samples from CWL-MW10. Since January 2015, concentrations in CWL-MW10 samples have mostly been less than 1 µg/L, indicating that the two VCMs completed from 1996 through 2002 were effective.

3.6.2 Metals

Table 3B-2 presents the analytical results for chromium and nickel. Chromium was not detected above the MDL in the groundwater samples. Nickel was detected at estimated concentrations ranging from 0.00109 to 0.00128 milligrams per liter in the CWL-MW10 samples. Nickel was not detected above the MDL in any other groundwater samples.

3.6.3 Water Quality Parameters

Table 3B-3 lists the field water quality parameter measurements obtained during purging of each monitoring well (Section 1.3.1.2). The field water quality parameters measured consisted of temperature, specific conductivity, oxidation-reduction potential, potential of hydrogen, and dissolved oxygen.

3.7 Quality Control Results

The following sections summarize the CY 2023 field and laboratory QC sample results. Table 1-7 (Section 1.3.3) lists each field and laboratory QC sample type and purpose.

3.7.1 Field Quality Control Samples

The field QC samples included environmental duplicate, EB, FB, and TB samples.

3.7.1.1 Environmental Duplicate Samples

One environmental duplicate sample was collected from CWL-MW11 in January 2023 and one environmental duplicate sample was collected from CWL-MW10 in July 2023. No constituents were detected in the January 2023 environmental-duplicate sample pair. For the environmental-duplicate sample pair collected from CWL-MW10 in July 2023, TCE and nickel were detected in both samples. The relative percent differences for TCE and nickel, 3 and 6 respectively, showed good agreement (i.e., relative percent difference values less than 20 for VOCs and less than 35 for metals) as defined in CWL PCCP Attachment 2.

3.7.1.2 Equipment Blank Samples

One EB sample was collected in January 2023 before sampling of CWL-MW11 began and was analyzed for TCE, chromium, nickel, and the enhanced list of VOCs. Chloroform was detected above the MDL in the EB sample; no corrective action was necessary because chloroform was not detected in the associated environmental samples. One EB sample was collected in July 2023 before sampling of CWL-MW10 began and was analyzed for TCE, chromium, and nickel. No constituents were detected in the July 2023 EB sample.

3.7.1.3 Field Blank Samples

Three FB samples were collected in January 2023 and analyzed for TCE and the enhanced list of VOCs. Chloroform was detected at very low concentrations above the MDL in the three FB samples; no corrective action was necessary because chloroform was not detected in the associated environmental samples. Three FB samples were collected in July 2023 and analyzed for TCE only. There were no TCE detections above the MDL in the July 2023 FB samples.

3.7.1.4 Trip Blank Samples

Six TB samples were submitted with the January 2023 samples and analyzed for TCE and the enhanced list of VOCs and six TB samples were submitted with the July 2023 samples and analyzed for TCE. No VOCs were detected in the January or July 2023 TB samples.

3.7.2 Laboratory Quality Control Samples

Internal laboratory QC samples were analyzed concurrently with the groundwater samples and included laboratory control samples, method blank samples, matrix spike and matrix spike duplicate samples, surrogate spike samples, and replicate samples. All laboratory QC sample results met analytical method and laboratory procedure requirements.

3.8 Variances and Nonconformances

All analytical and field methods were performed in accordance with the requirements specified in the CWL PCCP and associated CWL groundwater monitoring mini-SAPs. Variances and nonconformances for groundwater monitoring are defined in CWL PCCP Attachment 2, Section 2.22. There were no variances or nonconformances during the CY 2023 sampling activities.

All environmental sample, field QC sample, and laboratory QC sample results were reviewed and qualified per the guidelines provided in AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL/NM, June 2020, June 2023b). The results met data quality objectives and complied with analytical method and laboratory procedure requirements.

3.9 Summary and Conclusions

Groundwater samples were collected from the four CWL monitoring wells (CWL-BW5, CWL-MW9, CWL-MW10, and CWL-MW11) in January and July 2023 in accordance with the CWL PCCP. The January 2023 samples were analyzed for TCE, chromium, nickel, and the enhanced list of VOCs. The July 2023 samples were analyzed for TCE, nickel, and chromium. Based on the field and laboratory QC sample and data validation results, the CY 2023 groundwater monitoring data met data quality objectives and complied with analytical method and laboratory procedure requirements. No analytes were detected at concentrations exceeding established EPA MCLs or the CWL PCCP hazardous constituent concentration limits defined in CWL PCCP Attachment 1, Table 1-2.

3.10 Summary of Future Activities

As defined in the CWL PCCP, the post-closure care period for the CWL is 30 years and the compliance period for which the groundwater protection standard applies is 47 years; both periods began on June 2, 2011 when the NMED approved CWL closure (NMED, June 2011). An application for renewal of the CWL PCCP was submitted to the NMED in November 2020 (DOE, November 2020); no operational changes to the existing CWL PCCP were included in the application. The NMED may shorten or extend the post-closure care period under 20.4.1.500 NMAC, incorporating 40 CFR Part 264.117(a)(2) (NMED, December 2018a).

In accordance with the CWL PCCP, CWL groundwater monitoring will continue on a semiannual basis. Ongoing CWL groundwater monitoring results will be documented in both the comprehensive CWL annual post-closure care reports (submitted to the NMED in March of each year) and future annual groundwater monitoring reports.

Attachment 3A
Chemical Waste Landfill Hydrographs

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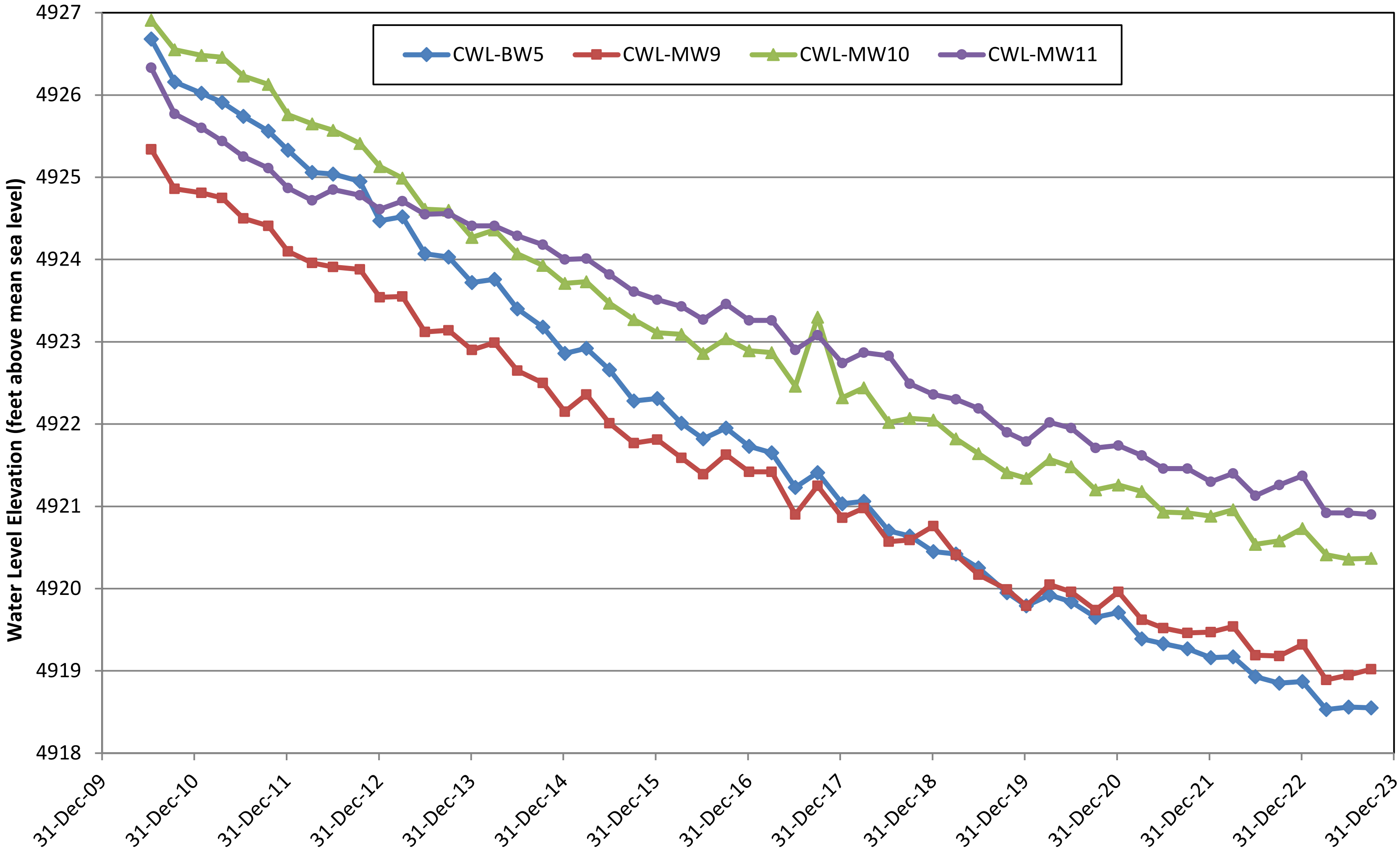

Figure 3A-1
Chemical Waste Landfill Groundwater Monitoring Wells

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Attachment 3B
Chemical Waste Landfill Analytical Results Tables

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Attachment 3B Tables

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Table 3B-1
Summary of Volatile Organic Compound Results, Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CWL-BW5	1,1-Dichloroethene	ND	0.333	1.00	7.00	U		119243-001	SW846-8260D
13-Jan-23	Chloroform	ND	0.333	1.00	80.0	U		119243-001	SW846-8260D
	Tetrachloroethene	ND	0.333	1.00	5.00	U		119243-001	SW846-8260D
	Trichloroethene	ND	0.333	1.00	5.00	U		119243-001	SW846-8260D
	Trichlorofluoromethane	ND	0.333	1.00	NE	U		119243-001	SW846-8260D
	1,1,2-Trichloro-1,2,2-trifluoroethane	ND	2.98	5.00	NE	U		119243-001	SW846-8260D
CWL-MW9	1,1-Dichloroethene	ND	0.333	1.00	7.00	U		119247-001	SW846-8260D
16-Jan-23	Chloroform	ND	0.333	1.00	80.0	U		119247-001	SW846-8260D
	Tetrachloroethene	ND	0.333	1.00	5.00	U		119247-001	SW846-8260D
	Trichloroethene	ND	0.333	1.00	5.00	U		119247-001	SW846-8260D
	Trichlorofluoromethane	ND	0.333	1.00	NE	U		119247-001	SW846-8260D
	1,1,2-Trichloro-1,2,2-trifluoroethane	ND	2.98	5.00	NE	U		119247-001	SW846-8260D
CWL-MW10	1,1-Dichloroethene	ND	0.333	1.00	7.00	U		119261-001	SW846-8260D
20-Jan-23	Chloroform	ND	0.333	1.00	80.0	U		119261-001	SW846-8260D
	Tetrachloroethene	ND	0.333	1.00	5.00	U		119261-001	SW846-8260D
	Trichloroethene	0.880	0.333	1.00	5.00	J		119261-001	SW846-8260D
	Trichlorofluoromethane	ND	0.333	1.00	NE	U		119261-001	SW846-8260D
	1,1,2-Trichloro-1,2,2-trifluoroethane	ND	2.98	5.00	NE	U		119261-001	SW846-8260D
CWL-MW11	1,1-Dichloroethene	ND	0.333	1.00	7.00	U		119253-001	SW846-8260D
18-Jan-23	Chloroform	ND	0.333	1.00	80.0	U		119253-001	SW846-8260D
	Tetrachloroethene	ND	0.333	1.00	5.00	U		119253-001	SW846-8260D
	Trichloroethene	ND	0.333	1.00	5.00	U		119253-001	SW846-8260D
	Trichlorofluoromethane	ND	0.333	1.00	NE	U		119253-001	SW846-8260D
	1,1,2-Trichloro-1,2,2-trifluoroethane	ND	2.98	5.00	NE	U		119253-001	SW846-8260D
CWL-MW11	1,1-Dichloroethene	ND	0.333	1.00	7.00	U		119254-001	SW846-8260D
18-Jan-23	Chloroform	ND	0.333	1.00	80.0	U		119254-001	SW846-8260D
(Duplicate)	Tetrachloroethene	ND	0.333	1.00	5.00	U		119254-001	SW846-8260D
	Trichloroethene	ND	0.333	1.00	5.00	U		119254-001	SW846-8260D
	Trichlorofluoromethane	ND	0.333	1.00	NE	U		119254-001	SW846-8260D
	1,1,2-Trichloro-1,2,2-trifluoroethane	ND	2.98	5.00	NE	U		119254-001	SW846-8260D

Refer to Notes on page 3B-9.

Table 3B-1 (concluded)
Summary of Volatile Organic Compound Results, Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CWL-BW5 17-Jul-23	Trichloroethene	ND	0.333	1.00	5.00	U		120782-001	SW846-8260D
CWL-MW9 18-Jul-23	Trichloroethene	ND	0.333	1.00	5.00	U		120786-001	SW846-8260D
CWL-MW10 24-Jul-23	Trichloroethene	1.01	0.333	1.00	5.00		J+	120799-001	SW846-8260D
CWL-MW10 (Duplicate) 24-Jul-23	Trichloroethene	0.980	0.333	1.00	5.00	J	J+	120800-001	SW846-8260D
CWL-MW11 20-Jul-23	Trichloroethene	ND	0.333	1.00	5.00	U		120793-001	SW846-8260D

Refer to Notes on page 3B-9.

Table 3B-2
Summary of Chromium and Nickel Results, Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CWL-BW5	Chromium	ND	0.00300	0.0100	0.100	U		119243-002	SW846-6020B
13-Jan-23	Nickel	ND	0.000600	0.00200	NE	U		119243-002	SW846-6020B
CWL-MW9	Chromium	ND	0.00300	0.0100	0.100	U		119247-002	SW846-6020B
16-Jan-23	Nickel	ND	0.000600	0.00200	NE	U		119247-002	SW846-6020B
CWL-MW10	Chromium	ND	0.00300	0.0100	0.100	U		119261-002	SW846-6020B
20-Jan-23	Nickel	0.00109	0.000600	0.00200	NE	J		119261-002	SW846-6020B
CWL-MW11	Chromium	ND	0.00300	0.0100	0.100	U		119253-002	SW846-6020B
18-Jan-23	Nickel	ND	0.000600	0.00200	NE	U		119253-002	SW846-6020B
CWL-MW11 (Duplicate)	Chromium	ND	0.00300	0.0100	0.100	U		119254-002	SW846-6020B
18-Jan-23	Nickel	ND	0.000600	0.00200	NE	U		119254-002	SW846-6020B
CWL-BW5	Chromium	ND	0.00300	0.0100	0.100	U		120782-002	SW846-6020B
17-Jul-23	Nickel	ND	0.000600	0.00200	NE	U		120782-002	SW846-6020B
CWL-MW9	Chromium	ND	0.00300	0.0100	0.100	U		120786-002	SW846-6020B
18-Jul-23	Nickel	ND	0.000600	0.00200	NE	U		120786-002	SW846-6020B
CWL-MW10	Chromium	ND	0.00300	0.0100	0.100	U		120799-002	SW846-6020B
24-Jul-23	Nickel	0.00128	0.000600	0.00200	NE	J		120799-002	SW846-6020B
CWL-MW10 (Duplicate)	Chromium	ND	0.00300	0.0100	0.100	U		120800-002	SW846-6020B
24-Jul-23	Nickel	0.00120	0.000600	0.00200	NE	J		120800-002	SW846-6020B
CWL-MW11	Chromium	ND	0.00300	0.0100	0.100	U		120793-002	SW846-6020B
20-Jul-23	Nickel	ND	0.000600	0.00200	NE	U		120793-002	SW846-6020B

Refer to Notes on page 3B-9.

Table 3B-3
Summary of Field Water Quality Measurements, Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Sample Date	Temperature[h] (^0C)	Specific Conductivity[h] (μmho/cm)	Oxidation Reduction Potential[h] (mV)	pH[h]	Turbidity[h] (NTU)	Dissolved Oxygen[h] (% Sat)	Dissolved Oxygen[h] (mg/L)
CWL-BW5	13-Jan-23	19.00	999.35	201.1	6.86	0.75	75.51	6.15
CWL-MW9	16-Jan-23	15.70	858.08	175.8	7.15	0.44	49.80	4.37
CWL-MW10	20-Jan-23	11.92	756.99	18.9	6.78	1.09	33.51	3.08
CWL-MW11	18-Jan-23	14.85	832.50	167.4	6.98	0.90	64.57	5.73
CWL-BW5	17-Jul-23	21.99	1112.9	142.8	6.94	0.61	86.41	6.17
CWL-MW9	18-Jul-23	22.61	1012.8	130.1	7.10	0.34	64.65	4.52
CWL-MW10	24-Jul-23	22.91	1022.4	-74.1	7.17	0.74	6.24	0.43
CWL-MW11	20-Jul-23	23.32	1085.1	180.0	7.07	0.61	76.52	5.28

Refer to Notes on page 3B-9.

Notes for Chemical Waste Landfill Groundwater Analytical Results Tables

% = percent
EPA = U.S. Environmental Protection Agency
ID = identifier
µg/L = micrograms per liter
mg/L = milligrams per liter
No. = number

[a]Result
ND = not detected (at MDL)

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

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

[d]MCL
MCL = Maximum contaminant level. Established by the EPA Office of Water, National Primary Drinking Water Standards (EPA March 2018). The total for trihalomethanes, including chloroform, is 80 mg/L.
NE = not established

[e]Laboratory Qualifier
If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.
J = Amount detected is below the PQL.
U = Analyte is absent or below the MDL.

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

J+ = The associated numerical value is an estimated quantity with a suspected positive bias.

[g]Analytical Method Reference
U.S. Environmental Protection Agency. (1986, as updated). *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd ed., Rev.1

[h]Field Water Quality Measurements
Field measurements obtained prior to sampling.
^{O}C = degrees Celsius
% Sat = percent saturation
µmho/cm = micromhos per centimeter
mg/L = milligrams per liter
mV = millivolts
NTU = nephelometric turbidity units
pH = potential of hydrogen (negative logarithm of the hydrogen ion concentration)

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Chapter 3.0
Chemical Waste Landfill References

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4.0 Mixed Waste Landfill

4.1 Introduction

This chapter summarizes the calendar year (CY) 2023 groundwater monitoring activities and results for the Mixed Waste Landfill (MWL).

The MWL is a 2.6-acre Solid Waste Management Unit (SWMU) located in the north-central portion of Technical Area-III at Sandia National Laboratories, New Mexico (SNL/NM) (Figure 4-1). The MWL consists of two distinct disposal areas: the classified area (occupying 0.6 acres) and the unclassified area (occupying 2.0 acres). Low-level radioactive, hazardous, and mixed waste was disposed of in the MWL from March 1959 through December 1988.

The Phase 1 Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) was completed in 1990 (SNL/NM, September 1990) and the Phase 2 RFI was completed in 1995 (Peace et al., 2002). The Phase 2 RFI confirmed tritium as the primary constituent of concern at the MWL. After resolution of all New Mexico Environment Department (NMED) comments on the *Report of the Mixed Waste Landfill Phase 2 RCRA Facility Investigation* (Peace et al., 2002), the *Mixed Waste Landfill Corrective Measures Study Final Report* (SNL/NM, May 2003) was prepared and submitted to the NMED. The NMED Secretary selected a vegetative cover with a biointrusion barrier (i.e., evapotranspirative [ET] cover) as the final remedy (NMED, May 2005), and construction of the MWL ET Cover was completed in 2009 in accordance with the NMED-approved *Mixed Waste Landfill Corrective Measures Implementation Plan* (SNL/NM, November 2005; NMED, December 2008). The *Mixed Waste Landfill Corrective Measures Implementation Report* documenting cover construction was submitted to the NMED (SNL/NM, January 2010) and approved (NMED, October 2011).

As required by the first MWL NMED Final Order (NMED, May 2005), the *Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan* (MWL LTMMP) (SNL/NM, March 2012, as modified) was submitted to the NMED and approved (NMED, January 2014). All MWL LTMMP monitoring, maintenance, repair, and reporting requirements, including the installation of the three multi-port soil-vapor monitoring wells (SNL/NM, January 2014) required to complete the LTMMP monitoring systems, were implemented upon NMED approval. After the NMED approved the *Installation of Three FLUTe™ Soil-Vapor Monitoring Wells (MWL-SV03, MWL-SV04, and MWL-SV05) at the Mixed Waste Landfill* report (SNL/NM, September 2014; NMED, September 2014),U.S. Department of Energy/National Nuclear Security Administration (DOE/NNSA) and SNL/NM personnel requested a Certification of Completion (DOE, September 2014), which the NMED granted (NMED, October 2014).

In October 2014, DOE/NNSA and SNL/NM personnel submitted to the NMED a *Request for Class 3 Permit Modification to Module IV of Hazardous Waste Permit* (DOE, October 2014) for Corrective Action Complete (CAC) with Controls status for the MWL. The associated regulatory process included two public comment periods, a public meeting held by DOE/NNSA and SNL/NM personnel in November 2014, and a four-day public hearing held by the NMED in July 2015. On March 13, 2016, the second MWL NMED Final Order (NMED, February 2016a) took effect (NMED, February 2016b), granting CAC with Controls status to the MWL and incorporating the MWL LTMMP into the *Resource Conservation and Recovery Act Facility Operating Permit for Sandia National Laboratories, EPA ID No. NM5890110518* (RCRA Permit) (NMED, January 2015, as modified). All controls required for the MWL, including groundwater monitoring, are defined in the MWL LTMMP and are comprehensively documented in MWL annual long-term monitoring and maintenance reports submitted to the NMED in June of each year. In CY 2023, DOE/NNSA and SNL/NM personnel submitted the *Mixed Waste Landfill Annual Long-Term Monitoring and Maintenance Report, April 2022 – March 2023* (SNL/NM, June 2023a) to the NMED, who approved the report (NMED, October 2023). DOE/NNSA and SNL/NM personnel also submitted the *Mixed Waste Landfill Second Five-Year Report, January 2024* in December 2023, ahead of the January 8, 2024 deadline (DOE, December 2023; SNL/NM, January 2024).

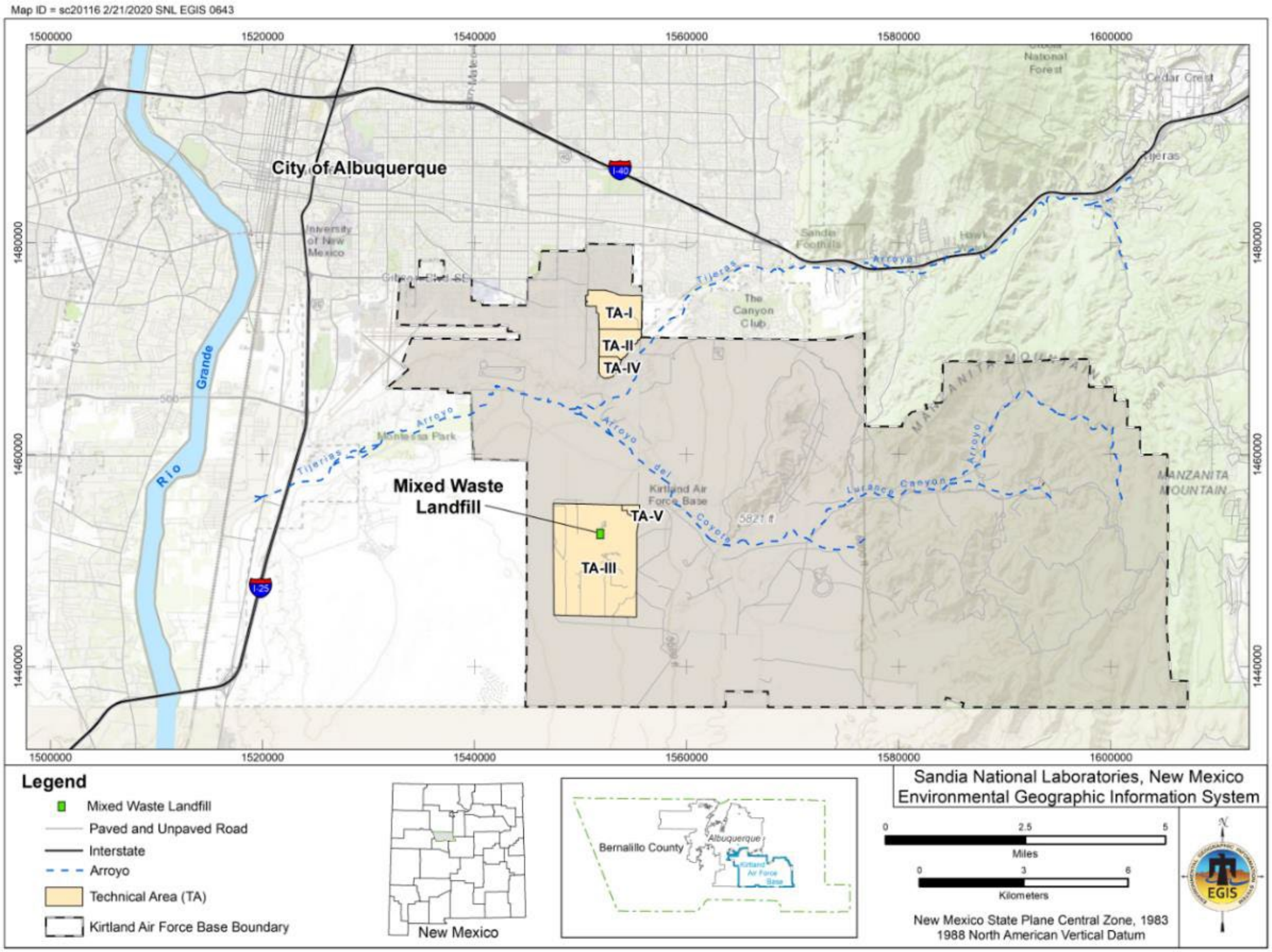

Figure 4-1
Location of the Mixed Waste Landfill with Respect to Kirtland Air Force Base and the City of Albuquerque

MWL groundwater monitoring results are directly compared to trigger levels and are subject to the trigger evaluation process defined in Table 5.2.4-1 and Figure 5.1-1 of the MWL LTMMP, respectively. A comprehensive evaluation of the CY 2023 MWL groundwater monitoring results will be presented in the *Mixed Waste Landfill Annual Long-Term Monitoring and Maintenance Report, April 2023 – March 2024*, which will be submitted to the NMED in June 2024.

4.1.1 Monitoring History

The groundwater at the MWL has been monitored since 1990. The original MWL groundwater monitoring network was modified in 2008 due to the declining water table (i.e., the water table dropped below the screen intervals) and corrosion of older stainless-steel well screens. Four original monitoring wells were plugged and abandoned (MWL-BW1, MWL-MW1, MWL-MW2, and MWL-MW3), and four new monitoring wells were installed (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9). These four wells were constructed with Schedule 80 polyvinyl chloride screens set across the water table of the Regional Aquifer and represent the NMED-approved compliance groundwater monitoring network under the MWL LTMMP.

Monitoring well MWL-MW4 was part of the original monitoring network, was completed at an angle of approximately six degrees from vertical, and has two discrete screen intervals isolated by an inflatable packer. DOE/NNSA and SNL/NM personnel submitted a RCRA Permit modification to the NMED (DOE, March 2023) requesting approval to decommission MWL-MW4, which was approved (NMED, July 2023). Decommissioning of MWL-MW4 is planned for CY 2024. MWL-MW5 and MWL-MW6 were also part of the original monitoring network; they are located west of the MWL and their screen intervals are below the top of the Regional Aquifer. These three wells are retained in the MWL LTMMP for informational purposes only (i.e., ongoing groundwater elevation measurements).

The groundwater at the MWL has been extensively characterized and monitored for major ion chemistry, volatile organic compounds (VOCs), semivolatile organic compounds, nitrate, metals, radionuclides, and perchlorate. Thirty-three years of analytical data indicate that the groundwater has not been impacted by the MWL. The current groundwater monitoring analytical parameters are discussed in Section 4.3.

4.1.2 Monitoring Network

The current MWL monitoring well network consists of seven monitoring wells (listed in Table 4-1 and shown on Figure 4-2). In accordance with the MWL LTMMP, four of these wells constitute the MWL compliance groundwater monitoring network for the uppermost part of the Regional Aquifer (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) and are sampled semiannually for various constituents. The remaining three wells (MWL-MW4, MWL-MW5, and MWL-MW6) are retained for monitoring groundwater elevations; sampling of these deeper wells is not required under the MWL LTMMP.

4.1.3 Conceptual Site Model

A detailed Conceptual Site Model is provided in the *Report of the Mixed Waste Landfill Phase 2 RFI* (Peace et al., 2002) and the *Mixed Waste Landfill Groundwater Report, 1990 through 2001* (Goering et al., 2002). An update integrating the findings from the monitoring wells installed in 2008 is presented in the *Mixed Waste Landfill Annual Groundwater Monitoring Report, Calendar Year 2009* (SNL/NM, June 2010).

Table 4-1
Mixed Waste Landfill Monitoring Well Network and Calendar Year 2023 Compliance Activities

Well ID	Installation Year	WQ[a]	WL[a]	Comment[b]
MWL-BW2	2008	✓	✓	Compliance well, sampled semiannually
MWL-MW4[c]	1993		✓	Groundwater elevation only
MWL-MW5	2000		✓	Groundwater elevation only
MWL-MW6	2000		✓	Groundwater elevation only
MWL-MW7	2008	✓	✓	Compliance well, sampled semiannually
MWL-MW8	2008	✓	✓	Compliance well, sampled semiannually
MWL-MW9	2008	✓	✓	Compliance well, sampled semiannually
Total	--	4	7	Total for AGMR reporting

Notes:
[a]Check marks indicate WQ sampling and WL measurements were completed.
[b]Requirements defined in the MWL LTMMP (SNL/NM, March 2012, as modified). Semiannual groundwater monitoring of compliance wells was conducted in May-June and November 2023.
[c]Upper screen of monitoring well MWL-MW4 has been historically monitored and is across the uppermost portion of Regional Aquifer. Since removal of the inflatable packer on April 14, 2023, groundwater elevations measured in MWL-MW4 reflect the lower screen.

AGMR = annual groundwater monitoring report
BW = Background Well
ID = identifier
LTMMP = Long-Term Monitoring and Maintenance Plan
MW = Monitoring Well
MWL = Mixed Waste Landfill
SNL = Sandia National Laboratories
WL = water level
WQ = water quality

The upper surface of the Regional Aquifer (i.e., water table) at the MWL is contained within the interfingering, unconsolidated, fine-grained alluvial-fan deposits of the Santa Fe Group. The depth to water is approximately 500 feet (ft) below ground surface. The more transmissive, coarser-grained ancestral Rio Grande sediments underlie the fine-grained alluvial-fan deposits beneath the MWL.

Attachment 4A, Figures 4A-1 and 4A-2 (hydrographs) show the rate of groundwater elevation change at the MWL monitoring wells. On average, the rate of decline has been relatively slow, and since 2017, the wells located west of the MWL have showed stable to slightly increasing or slightly decreasing groundwater elevations. MWL-BW2 on the east side of the MWL shows the highest rate of decline, which has been consistent since 2008 when this well was installed. From October 2022 to October 2023, the groundwater elevation at all MWL compliance wells located west of the MWL (MWL-MW7, MWL-MW8, and MWL-MW9) increased, ranging from 0.08 ft at MWL-MW7 to 0.22 ft at MWL-MW9. The groundwater elevation at MWL-BW2 on the east side of the MWL declined -0.18 ft, which was less than the decline of -0.26 ft observed between October 2021 and October 2022.

Changes from October 2022 to October 2023 at the other three monitoring wells with different, deeper well completions varied. MWL-MW4 showed a decline of -2.69 ft and MWL-MW5 and MWL-MW6 showed increases of 0.22 ft and 0.26 ft, respectively. The larger decline at MWL-MW4 was due to the removal of the inflatable packer on April 14, 2023 and the strong downward vertical hydraulic gradient in the Regional Aquifer beneath the MWL. The packer was removed after it failed to maintain the pressure needed to properly seal the area between the upper and lower screens of MWL-MW4. Numerous attempts to keep it properly inflated were unsuccessful. The subtle changes at the other wells are likely due to decreased pumping of Albuquerque Bernalillo County Water Utility Authority (ABCWUA) production wells to the north. Recharge from infiltration of direct precipitation at the MWL is negligible due to high evapotranspiration, low precipitation, the thick sequence of unsaturated Santa Fe Group deposits above the water table, and the presence of the MWL ET Cover. Groundwater recharge of the Regional Aquifer occurs primarily by the infiltration of precipitation in the Manzanita Mountains located approximately 5 miles to the east and has been affected by extended drought conditions that continued in 2023.

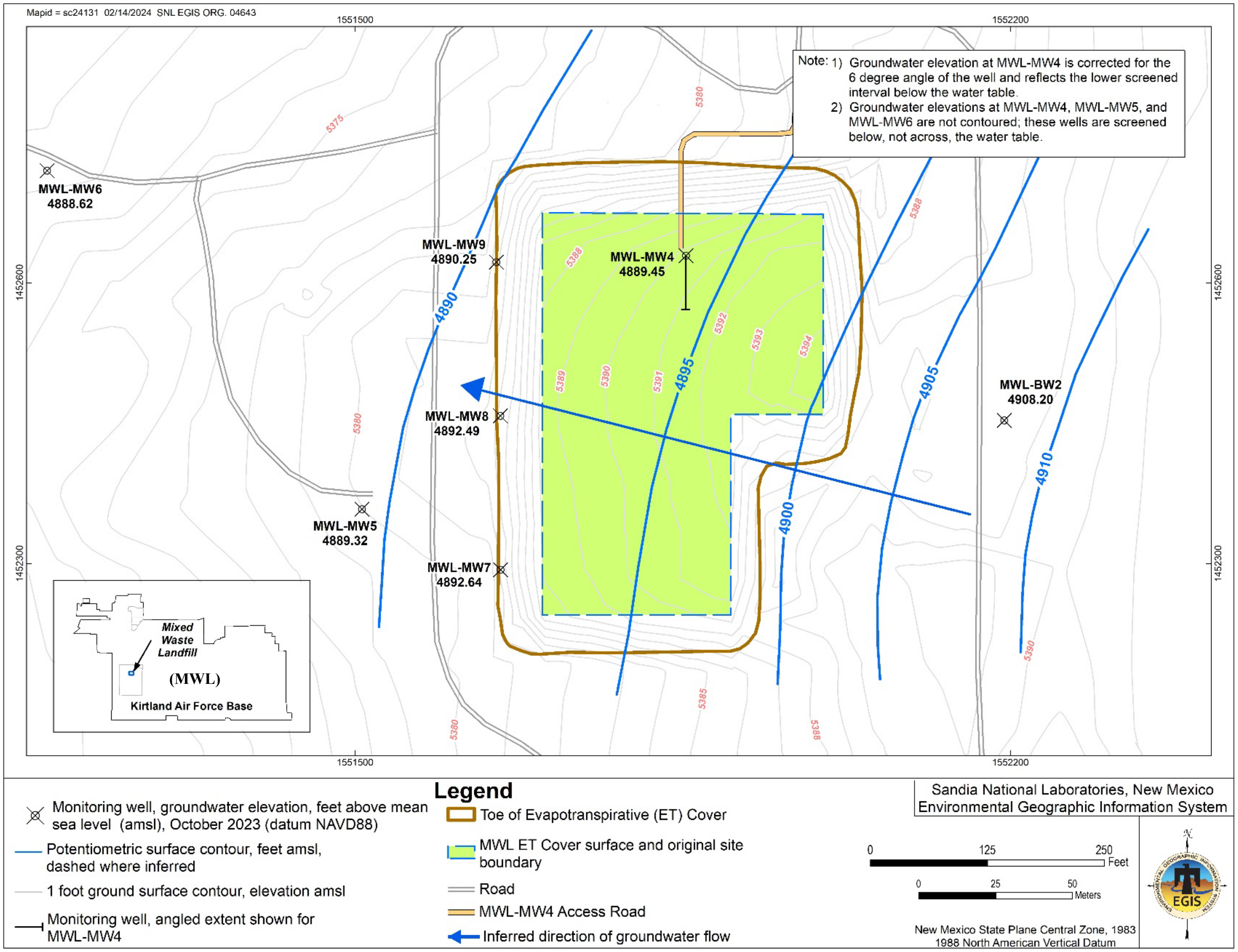

Figure 4-2
Localized Potentiometric Surface of the Regional Aquifer at the Mixed Waste Landfill, October 2023

Table 4-2 presents the data used to construct the October 2023 potentiometric surface map shown in Figure 4-2. The potentiometric surface of the Regional Aquifer beneath the MWL is consistent with past years.

Table 4-2
Groundwater Elevations Measured in October 2023 at Monitoring Wells Completed in the Regional Aquifer at the Mixed Waste Landfill

Well ID	Measurement Point (ft amsl) NAVD 88	Date Measured	Depth to Water (ft btoc)	Groundwater Elevation (ft amsl)
MWL-BW2	5391.02	2-Oct-2023	482.82	4908.20
MWL-MW4[a]	5391.70	2-Oct-2023	505.02	4889.45[b]
MWL-MW5[c]	5382.56	2-Oct-2023	493.24	4889.32
MWL-MW6[c]	5375.31	2-Oct-2023	486.69	4888.62
MWL-MW7	5383.30	2-Oct-2023	490.66	4892.64
MWL-MW8	5384.67	2-Oct-2023	492.18	4892.49
MWL-MW9	5381.91	2-Oct-2023	491.66	4890.25

Notes:
[a]Lower screen of monitoring well MWL-MW4 is monitored since removal of the inflatable packer on April 14, 2023; the October 2023 groundwater elevation measurement does not represent the uppermost portion of Regional Aquifer.
[b]The groundwater elevation is calculated using a correction for the 6-degree angle of the well casing.
[c]MWL-MW5 and MWL-MW6 are screened below the water table and are not used for contouring.

amsl = above mean sea level
btoc = below top of casing
BW = Background Well
ft = feet
ID = identifier
MW = Monitoring Well
MWL = Mixed Waste Landfill
NAVD 88 = North American Vertical Datum of 1988

The general direction of groundwater flow beneath the MWL is to the west and northwest, toward the Rio Grande and away from the Manzanita Mountains. Figure 4-2 is consistent with the base-wide potentiometric surface map (Plate 1), which shows that the potentiometric surface contours beneath Technical Area-III generally trend north to south, with the inferred groundwater flow direction being generally westward. Several Kirtland Air Force Base (KAFB), Veterans Affairs, and ABCWUA production wells have profoundly modified the natural groundwater flow regime near the MWL by creating a trough in the water table in the western and northern portions of KAFB (Plate 1). As a result, water levels at the MWL have historically declined, as shown in Attachment 4A, Figures 4A-1 and 4A-2 (from 2000 through 2014). However, since 2014, the rate of decline has slowed, and at all monitoring wells located west of the MWL, the groundwater elevation has stabilized, showing slight increases and decreases. The nearest production well, KAFB-4, is located approximately 3 miles north-northwest of the MWL.

Measured orthogonally from the potentiometric surface contours, the horizontal gradient for October 2023 ranges from approximately 0.03 to 0.08 ft/ft. Groundwater velocities in the alluvial-fan sediments were calculated using the current potentiometric surface gradient, the average hydraulic conductivity obtained from slug testing of the four compliance monitoring wells, and an effective porosity of 25 percent. The calculated CY 2023 groundwater velocity ranged from 0.02 to 0.06 ft/day; the average is 0.04 ft/day. These very low values are consistent with past years and previous estimates for horizontal groundwater flow at the water table in the MWL vicinity.

4.2 Regulatory Criteria

The MWL is regulated as SWMU 76 under the RCRA Permit, and corrective action at the MWL has been performed in accordance with the *Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act 74-4-10: Sandia National Laboratories Consent Order* (Consent Order) (NMED, April 2004), NMED Final Order on remedy selection (NMED, May 2005), and 20.4.1.500 NMAC, incorporating 40 CFR Part 264.101 (NMED, December 2018). On March 13, 2016, the MWL corrective action process under the Consent Order was completed (i.e., the February 2016 NMED Final Order granting Corrective

Action Complete with Controls status to the MWL took effect). All controls applicable to the MWL, including groundwater monitoring, are documented in the MWL LTMMP, which is incorporated through reference into Attachment M of the RCRA Permit. Groundwater monitoring requirements, procedures, and protocols are detailed in MWL LTMMP Appendix F, Groundwater Sampling and Analysis Plan (SAP).

This chapter and its attachments include groundwater monitoring data for both hazardous and radioactive constituents; however, the monitoring data for radionuclides is provided voluntarily by DOE/NNSA and SNL/NM personnel. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements imposed by the NMED, as Section III.A of the Consent Order specifies.

4.3 Scope of Activities

Semiannual groundwater sampling events were conducted at the MWL in May-June and November 2023. Groundwater samples (also referred to as environmental samples) were collected from four compliance monitoring wells (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) and analyzed for VOCs; metals, including cadmium, chromium, nickel, and total uranium; specific radionuclides by gamma spectroscopy; gross alpha/beta activity; radon-222; and tritium. In addition, groundwater samples were collected during the May-June 2023 sampling event for three perfluoroalkyl and polyfluoroalkyl substances (PFAS), including perfluorohexane sulfonic acid (PFHxS), perfluorooctane sulfonic acid (PFOS), and perfluorooctanoic acid (PFOA). These constituents were added to the May-June 2023 sampling event to address the NMED's request (NMED, July 2021) to evaluate emerging contaminants and toxic pollutants added to Subsection T of 20.6.2.7 NMAC since January 2014 (i.e., since NMED approval of the MWL LTMMP).

Table 4-3 lists the analytical parameters and monitoring wells sampled. The sampling activities were performed in accordance with the MWL LTMMP requirements and procedures outlined in the *Mixed Waste Landfill Groundwater Monitoring, Mini-Sampling and Analysis Plan for Fiscal Year 2023, 3rd Quarter Sampling* (SNL/NM, April 2023) and the *Mixed Waste Landfill Groundwater Monitoring, Min-Sampling and Analysis Plan for Fiscal Year 2024, 1st Quarter Sampling* (SNL/NM, September 2023).

The groundwater samples were submitted to GEL Laboratories, LLC in Charleston, South Carolina for analysis. The analytical results were compared to the EPA maximum contaminant levels (MCLs) for drinking water (EPA, March 2018).

Field and laboratory quality control (QC) samples are discussed in Sections 1.3.4 and 1.3.5. The field QC samples included environmental duplicate, equipment blank (EB), field blank (FB), and trip blank (TB) samples. The laboratory QC samples included method blank samples, laboratory control samples, matrix spike and matrix spike duplicate samples, surrogate spike samples, and replicate samples.

Table 4-3
Analytical Parameters for the Mixed Waste Landfill Monitoring Wells, Calendar Year 2023

Analytical Parameters	Semiannual Event	
	May-June	November
VOCs	MWL-BW2 MWL-MW7 MWL-MW8 MWL-MW8 (Duplicate) MWL-MW9	MWL-BW2 MWL-MW7 MWL-MW8 MWL-MW9 MWL-MW9 (Duplicate)
Metals: Cadmium, Chromium, Nickel, and Total Uranium		
Radionuclides: Gamma Spectroscopy (short list[a]) Gross Alpha/Beta Activity Radon-222, and Tritium		
Perfluoroalkyl & Polyfluoroalkyl Substances (PFAS): perfluorohexane sulfonic acid (PFHxS) perfluorooctane sulfonic acid (PFOS) perfluorooctanoic acid (PFOA)	MWL-BW2 MWL-MW7 MWL-MW8 MWL-MW8 (Duplicate) MWL-MW9	Not Analyzed

Notes:
[a]Gamma spectroscopy short list for the MWL includes americium-241, cesium-137, and cobalt-60. Potassium-40 is not an MWL constituent of concern but is reported for consistency.
BW = Background Well
MW = Monitoring Well
MWL = Mixed Waste Landfill
VOC = volatile organic compound

4.4 Field Methods and Measurements

Field water quality parameters and groundwater elevations were measured in accordance with the MWL LTMMP and procedures specified in the MWL groundwater monitoring mini-SAPs, which are consistent with the methods and procedures Section 1.3 describes. Attachment 4B, Table 4B-5 lists the field water quality parameters measured before sample collection and Attachment 4A, Figures 4A-1 and 4A-2 (hydrographs) present the groundwater elevation measurements for the monitoring wells.

As specified in MWL LTMMP Appendix F, Section 3.4, the purging requirements at the MWL include specifications for making a "best faith effort" to decrease flow rates such that low-yield wells do not purge dry. These specifications include equipping the portable Bennett groundwater sampling system with small-diameter tubing and a flow meter valve along the discharge line. In addition, during the purging process at wells with slow recharge rates, the flow rate is continually adjusted to achieve as low a flow rate as possible without damaging the pump or causing it to fail due to overheating. All monitoring wells met the minimum purge volume requirement during the CY 2023 sampling activities; no wells purged dry.

4.5 Analytical Methods

GEL Laboratories, LLC analyzed the groundwater samples using the applicable EPA and DOE-specified methods and protocols identified in Section 1.3.2 (Tables 1-5 and 1-6).

4.6 Summary of Calendar Year 2023 Analytical Results

The following sections summarize the CY 2023 analytical results. Attachment 4B presents the laboratory method detection limits (MDLs) for VOCs and PFAS (Table 4B-1), the May-June and November 2023 VOC results (Table 4B-2), the analytical results for metals and radiological constituents (Tables 4B-3 and 4B-4, respectively), and the field water quality parameter measurements (Table 4B-5). All analytical results (Tables 4B-2 through 4B-4) were reviewed and qualified during the data validation process (SNL/NM, June 2020, June 2023b) and include the laboratory and validation qualifiers.

No detected constituents exceeded established EPA MCLs. In addition, no results exceeded the respective MWL trigger levels defined in Table 5.2.4-1 of the MWL LTMMP.

4.6.1 Volatile Organic Compounds and Perfluoroalkyl and Polyfluoroalkyl Substances

Table 4B-1 presents the laboratory MDLs for VOCs for both CY 2023 groundwater sampling events and the three PFAS included in the May-June 2023 sampling event. Groundwater samples were not collected for PFAS in November 2023. There were no detections of PFHxS, PFOS, and PFOA in the May-June 2023 groundwater samples.

Table 4B-2 summarizes the VOCs detected above the MDL in the May-June and November 2023 groundwater samples. For the May-June 2023 results, acetone and toluene were reported at very low, estimated concentrations below the practical quantitation limit (PQL) (i.e., J-qualified) in the MWL-BW2 environmental sample. These results were qualified during data validation as not detected due to associated EB sample results. Toluene was reported at low concentrations near the PQL in the groundwater samples collected from MWL-MW7, MWL-MW8, and MWL-MW9 at concentrations ranging from 0.770 micrograms per liter (µg/L) (MWL-MW7) to 1.16 µg/L (MWL-MW8 environmental duplicate sample).

For the November 2023 results, methylene chloride and toluene were detected at low concentrations in all the environmental and environmental duplicate samples. All methylene chloride results were qualified during data validation as not detected due to laboratory method blank (i.e., laboratory QC sample) and/or TB sample results. Toluene was reported in all November 2023 groundwater samples at low concentrations below the PQL (i.e., J-qualified) ranging from 0.670 µg/L (MWL-MW8) to 0.990 µg/L (MWL-MW9 environmental sample). The toluene results were well below the EPA MCL and MWL LTMMP trigger level.

Toluene is a ubiquitous chemical and common laboratory contaminant that has been sporadically detected at very low concentrations in groundwater samples from the MWL and other SNL/NM sites. From 2008 through early 2010, SNL/NM personnel performed a comprehensive toluene investigation (SNL/NM, October 2010) that the NMED approved (NMED, January 2011). The extensive data and information presented in the report indicated that the MWL and other SNL/NM sites were not the source of the very low toluene concentrations detected in groundwater samples, which were like those reported in the May-June and November 2023 groundwater samples. The low-concentration detections of toluene in the MWL background well (MWL-BW2) support the conclusion that the MWL is not the source of toluene.

4.6.2 Metals

Table 4B-3 presents the CY 2023 analytical results for cadmium, chromium, nickel, and total uranium. Nickel and total uranium were the only metal analytes detected above the MDL. No metal concentrations were reported above established EPA MCLs and all results are consistent with historical ranges.

4.6.3 Radiological Parameters

Table 4B-4 presents the CY 2023 analytical results for gamma-emitting radionuclides, gross alpha/beta activity, radon-222, and tritium. No radiological activities were reported above established EPA MCLs and all results are consistent with historical ranges.

Gross alpha activity was measured in accordance with 40 CFR Part 141 and used as a radiological screening tool. Naturally occurring uranium was measured independently (i.e., total uranium concentration determined by metals analysis described above), and the gross alpha activity measurements were corrected by subtracting the total uranium activity from the uncorrected gross alpha activity results. An SNL/NM health physicist further reviewed the results to screen for radiological anomalies that could indicate potential contamination. Corrected gross alpha activity results were below the EPA MCL of 15 picocuries per liter. Gross beta results were used as a radiological screening tool and did not indicate the presence of a beta-emitting radionuclide that would exceed the established EPA MCL of 4 millirems per year. Tritium and gamma spectroscopy radionuclide activities were below the laboratory minimum detectable activity levels in all groundwater samples. All CY 2023 samples were nonradioactive.

4.6.4 Water Quality Parameters

Table 4B-5 lists the field water quality parameters measurements obtained during purging of each monitoring well (Section 1.3.1.2). The field water quality parameters measured consisted of temperature, specific conductivity, oxidation-reduction potential, potential of hydrogen, turbidity, and dissolved oxygen.

4.7 Quality Control Results

The following sections summarize the CY 2023 field and laboratory QC sample results. Table 1-7 (Section 1.3.3) lists each field and laboratory QC sample type and purpose.

4.7.1 Field Quality Control Samples

The field QC samples included environmental duplicate, EB, FB, and TB samples.

4.7.1.1 Environmental Duplicate Samples

Environmental duplicate samples were collected from MWL-MW8 (May-June 2023) and MWL-MW9 (November 2023) and analyzed for all constituents. The results for the environmental sample were compared to the results for the corresponding environmental duplicate sample. The relative percent difference was calculated for constituents that were detected above the MDL in both samples.

The CY 2023 sample pair (environmental sample and environmental duplicate sample) results showed good agreement, with calculated relative percent differences ranging from 3 to 11. Calculated relative percent differences were within the acceptable range of less than or equal to 20 for VOCs and less than or equal to 35 for metals as defined in MWL LTMMP Appendix F.

4.7.1.2 Equipment Blank Samples

EB samples (also referred to as rinsate blanks) were collected in May-June (four EB samples) before sampling of each monitoring well began and in November 2023 (one EB sample) before sampling of MWL-MW9 began. The EB samples were analyzed for all constituents, including the three PFAS during the May-June 2023 sampling event.

In the May-June 2023 EB samples, the compounds acetone, bromodichloromethane, 2-butanone, chloroform, dibromochloromethane, and toluene were detected above the associated MDLs. No corrective action was necessary for bromodichloromethane, 2-butanone, chloroform, or dibromochloromethane because these compounds were not detected in the associated environmental samples. Acetone and toluene were detected in the EB sample associated with MWL-BW2 at concentrations greater than the PQL. Both acetone and toluene were detected in the associated environmental sample at a concentration less than the PQL and were qualified as not detected at their respective PQLs during data validation. Toluene was detected at a concentration greater than the PQL in the EB sample associated with MWL-MW8. The associated environmental and environmental duplicate sample results were greater than the PQL and less than 10 times the EB value and were qualified during data validation as estimated values (i.e., J-qualified).

In the November 2023 EB sample, acetone, bromodichloromethane, chloroform, dibromochloromethane, and methylene chloride were detected above the associated MDLs. The methylene chloride EB sample result was qualified during data validation as not detected due to laboratory method blank and TB sample results; the EB sample methylene chloride result was therefore not applied to the associated environmental and environmental duplicate samples. No corrective action was necessary for acetone, bromodichloromethane, chloroform, or dibromochloromethane because these constituents were not detected in the associated environmental samples.

4.7.1.3 Field Blank Samples

Four FB samples were collected at each monitoring well location and analyzed for VOCs and four FB samples were collected at each monitoring well location and analyzed for PFHxS, PFOS, and PFOA during the May-June 2023 sampling event. These FB samples were prepared using deionized water as Section 1.3.4.3 describes. Another FB sample was collected from the deionized water used for equipment decontamination; this sample was analyzed for the same constituents as the environmental samples. Four additional FB samples, one at each monitoring well location, were collected using laboratory reagent-grade water (i.e., ultra-pure water supplied by the laboratory versus the deionized water supplied by a local vendor) and analyzed for the three PFAS only (PFHxS, PFOS, and PFOA). Bromodichloromethane, chloroform, and dibromochloromethane were detected in the FB samples. No corrective action was necessary because these compounds were not detected in the associated environmental samples. PFHxS, PFOS, and PFOA were not detected in any of the FB samples.

A total of five FB samples were collected and analyzed for VOCs during the November 2023 sampling event. The compounds detected above the MDLs in FB samples included acetone, bromodichloromethane, chloroform, dibromochloromethane, and methylene chloride. The methylene chloride FB sample results were qualified during data validation as not detected due to laboratory method blank and TB sample results. The FB sample results were therefore not applied to the associated environmental and environmental duplicate samples. No corrective action was necessary for acetone, bromodichloromethane, chloroform, or dibromochloromethane because these compounds were not detected in the associated environmental samples.

4.7.1.4 Trip Blank Samples

Fifteen TB samples (nine in May-June, six in November) were submitted with the CY 2023 environmental samples for analysis of VOCs. For the May-June TB results, acetone was detected above the MDL in a TB sample associated with the EB sample; no May-June 2023 environmental samples were affected. Methylene chloride was reported in the November 2023 TB samples at concentrations ranging from 0.600 µg/L to 6.33 µg/L. Due to these TB sample detections, the methylene chloride results for all environmental samples (including the MWL-MW9 environmental duplicate sample) were qualified as not detected during data validation. In addition, and as mentioned in Sections 4.7.1.2 and 4.7.1.3, the associated FB and EB methylene chloride sample results were also qualified during data validation as not detected due to TB and laboratory method blank results.

4.7.2 Laboratory Quality Control Samples

Internal laboratory QC samples were analyzed concurrently with the CY 2023 groundwater samples and included method blank samples, laboratory control samples, matrix spike and matrix spike duplicate samples, surrogate spike samples, and replicates samples. There were no laboratory QC sample issues for the May-June 2023 sampling event. For the November 2023 sampling event, all environmental sample results for methylene chloride were qualified as not detected during data validation due to method blank and TB sample results. All laboratory QC sample results met analytical method and laboratory procedure requirements.

4.8 Variances and Nonconformances

All analytical and field methods were performed in accordance with the requirements specified in the MWL LTMMP and associated MWL groundwater monitoring mini-SAPs. Variances and nonconformances for groundwater monitoring are defined in MWL LTMMP Appendix F, Section 6. There were no variances or nonconformances during the CY 2023 sampling activities.

All environmental sample, field QC sample, and laboratory QC sample results were reviewed and qualified per the guidelines provided in AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL/NM, June 2020, June 2023b). The results met data quality objectives and complied with analytical method and laboratory procedure requirements.

4.9 Summary and Conclusions

Groundwater samples were collected from the MWL compliance monitoring wells (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) in May-June and November 2023 in accordance with the MWL LTMMP. The groundwater samples were analyzed for VOCs; metals, including cadmium, chromium, nickel, and total uranium; specific radionuclides by gamma spectroscopy; gross alpha/beta activity; radon-222; and tritium. In addition, groundwater samples were collected during the May-June 2023 sampling event for three PFAS, including PFHxS, PFOS, and PFOA, to address the NMED's request (NMED, July 2021). Based on the field and laboratory QC sample and data validation results, the CY 2023 groundwater monitoring data met data quality objectives and complied with analytical method and laboratory procedure requirements. No validated results exceeded established EPA MCLs or MWL LTMMP trigger levels defined in the MWL LTMMP, Table 5.2.4-1. There were no detections of the three PFAS in the May-June 2023 groundwater samples.

4.10 Summary of Future Activities

All MWL monitoring, inspection, and maintenance activities will continue to be performed and documented in accordance with MWL LTMMP requirements. Two consecutive semiannual groundwater sampling events that included sampling and analysis for the three PFAS (October 2022 and May-June 2023) were completed in CY 2023, addressing the NMED's request to evaluate MWL groundwater for emerging contaminants (NMED, July 2021); there were no detections of PFAS. MWL groundwater monitoring will continue on a semiannual basis and the results will be documented in comprehensive MWL annual long-term monitoring and maintenance reports (submitted to NMED in June of each year) and future annual groundwater monitoring reports.

Attachment 4A
Mixed Waste Landfill Hydrographs

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Attachment 4A Hydrographs

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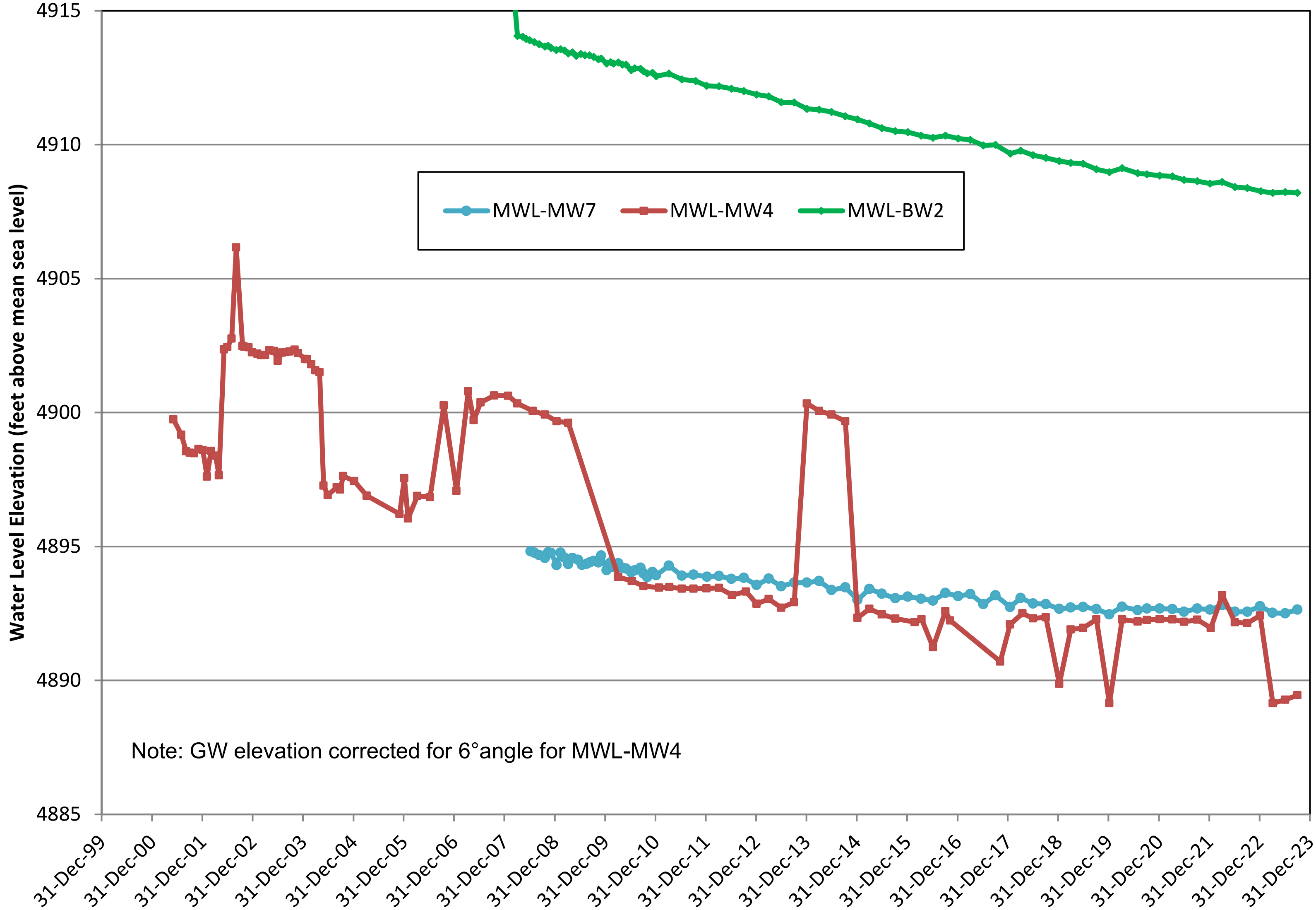

Figure 4A-1
Mixed Waste Landfill Groundwater Monitoring Wells (1 of 2)

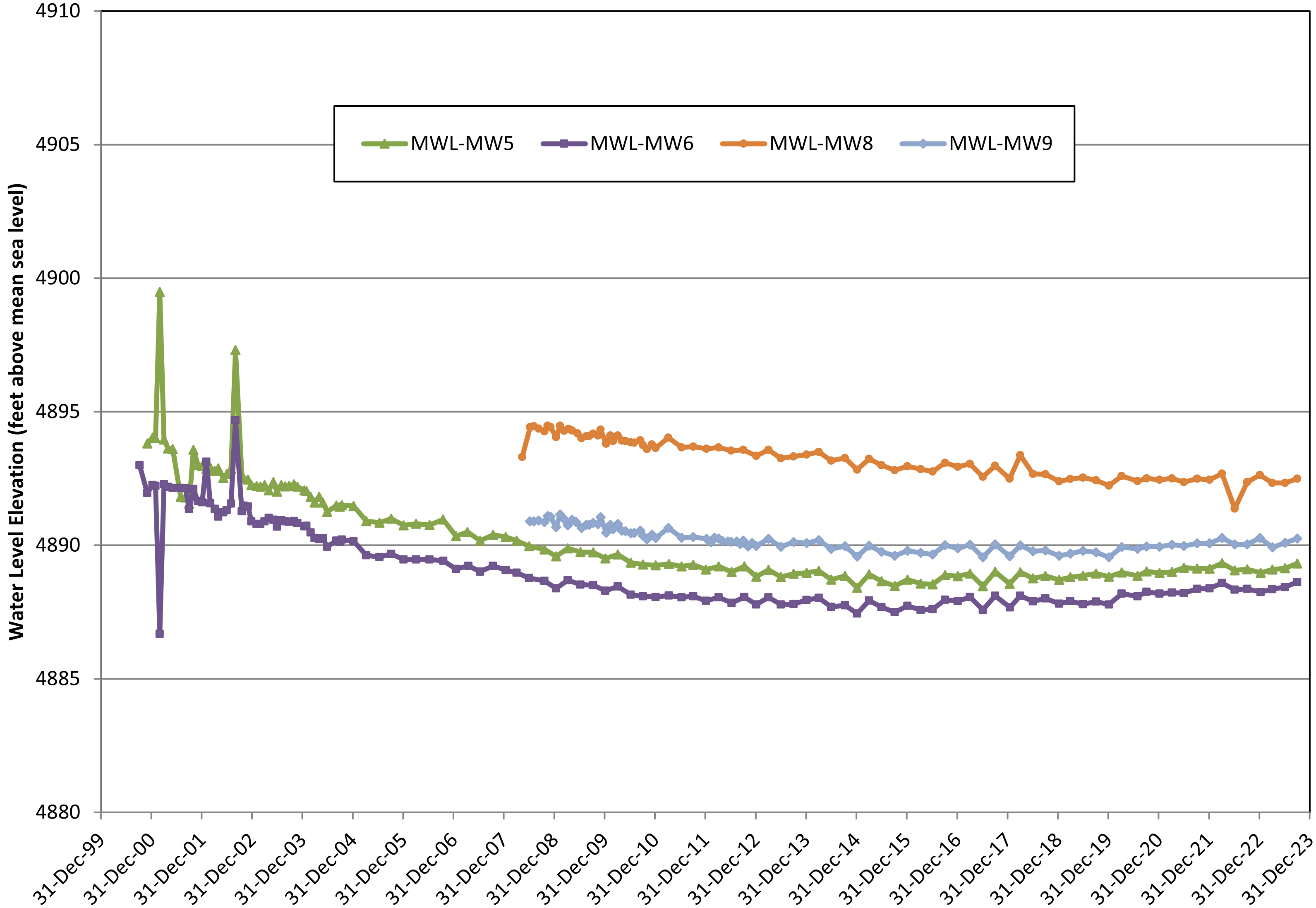

Figure 4A-2
Mixed Waste Landfill Groundwater Monitoring Wells (2 of 2)

Attachment 4B
Mixed Waste Landfill Analytical Results Tables

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Attachment 4B Tables

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Table 4B-1
Method Detection Limits for Volatile Organic Compounds and Perfluoroalkyl and Polyfluoroalkyl Substances, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Analyte	MDL[b]
Volatile Organic Compounds (Method SW846-8260D[g]) (µg/L)	
1,1,1-Trichloroethane	0.333
1,1,2,2-Tetrachloroethane	0.333
1,1,2-Trichloroethane	0.333
1,1-Dichloroethane	0.333
1,1-Dichloroethene	0.333
1,2-Dichloroethane	0.333
1,2-Dichloropropane	0.333
2-Butanone	1.67
2-Hexanone	1.67
4-methyl-, 2-Pentanone	1.67
Acetone	1.74
Benzene	0.333
Bromodichloromethane	0.333
Bromoform	0.333
Bromomethane	0.337
Carbon disulfide	1.67
Carbon tetrachloride	0.333
Chlorobenzene	0.333
Chloroethane	0.333
Chloroform	0.333
Chloromethane	0.333
Dibromochloromethane	0.333
Dichlorodifluoromethane	0.355
Ethylbenzene	0.333
Methylene chloride	0.500
Styrene	0.333
Tetrachloroethene	0.333
Toluene	0.333
Trichloroethene	0.333
Vinyl acetate	1.67
Vinyl chloride	0.333
Xylene	1.00
cis-1,2-Dichloroethene	0.333
cis-1,3-Dichloropropene	0.333
trans-1,2-Dichloroethene	0.333
trans-1,3-Dichloropropene	0.333
Perfluoroalkyl and Polyfluoroalkyl Substances (Method 537.1[g]) (ng/L)	
Perfluorohexane sulfonic acid (PFHxS)	0.566 - 0.636
Perfluorooctane sulfonic acid (PFOS)	0.686 - 0.771
Perfluorooctanoic acid (PFOA)	0.686 - 0.771

Refer to Notes on page 4B-13.

Table 4B-2
Summary of Detected Volatile Organic Compound Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-BW2	Acetone	1.79	1.74	5.00	NE	J	5.0U	120366-001	SW846-8260D
22-May-23	Toluene	0.540	0.333	1.00	1000	J	1.0U	120366-001	SW846-8260D
MWL-MW7 23-May-23	Toluene	0.770	0.333	1.00	1000	J		120372-001	SW846-8260D
MWL-MW8 28-Jun-23	Toluene	1.12	0.333	1.00	1000		J+	120386-001	SW846-8260D
MWL-MW8 (Duplicate) 28-Jun-23	Toluene	1.16	0.333	1.00	1000		J+	120387-001	SW846-8260D
MWL-MW9 26-Jun-23	Toluene	1.12	0.333	1.00	1000			120378-001	SW846-8260D
MWL-BW2	Methylene chloride	0.570	0.500	5.00	5.0	J	5.0UJ	121329-001	SW846-8260D
06-Nov-23	Toluene	0.690	0.333	1.00	1000	J		121329-001	SW846-8260D
MWL-MW7	Methylene chloride	6.30	0.500	5.00	5.0	B	6.3UJ	121332-001	SW846-8260D
07-Nov-23	Toluene	0.820	0.333	1.00	1000	J		121332-001	SW846-8260D
MWL-MW8	Methylene chloride	5.99	0.500	5.00	5.0	B	5.99UJ	121337-001	SW846-8260D
09-Nov-23	Toluene	0.670	0.333	1.00	1000	J		121337-001	SW846-8260D
MWL-MW9	Methylene chloride	6.41	0.500	5.00	5.0	B	6.41UJ	121342-001	SW846-8260D
08-Nov-23	Toluene	0.990	0.333	1.00	1000	J		121342-001	SW846-8260D
MWL-MW9 (Duplicate)	Methylene chloride	6.31	0.500	5.00	5.0	B	6.31UJ	121343-001	SW846-8260D
08-Nov-23	Toluene	0.890	0.333	1.00	1000	J		121343-001	SW846-8260D

Refer to Notes on page 4B-13.

Table 4B-3
Summary of Cadmium, Chromium, Nickel, and Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-BW2	Cadmium	ND	0.000300	0.00100	0.005	U		120366-003	SW846-6020B
22-May-23	Chromium	ND	0.00300	0.0100	0.10	U		120366-003	SW846-6020B
	Nickel	ND	0.000600	0.00200	NE	U		120366-003	SW846-6020B
	Uranium	0.00680	0.0000670	0.000200	0.030			120366-003	SW846-6020B
MWL-MW7	Cadmium	ND	0.000300	0.00100	0.005	U		120372-003	SW846-6020B
23-May-23	Chromium	ND	0.00300	0.0100	0.10	U		120372-003	SW846-6020B
	Nickel	ND	0.000600	0.00200	NE	U		120372-003	SW846-6020B
	Uranium	0.00773	0.0000670	0.000200	0.030			120372-003	SW846-6020B
MWL-MW8	Cadmium	ND	0.000300	0.00100	0.005	U		120386-003	SW846-6020B
28-Jun-23	Chromium	ND	0.00300	0.0100	0.10	U	UJ	120386-003	SW846-6020B
	Nickel	0.000806	0.000600	0.00200	NE	J	J-	120386-003	SW846-6020B
	Uranium	0.00762	0.0000670	0.000200	0.030			120386-003	SW846-6020B
MWL-MW8 (Duplicate)	Cadmium	ND	0.000300	0.00100	0.005	U		120387-003	SW846-6020B
28-Jun-23	Chromium	ND	0.00300	0.0100	0.10	U	UJ	120387-003	SW846-6020B
	Nickel	0.000726	0.000600	0.00200	NE	J	J-	120387-003	SW846-6020B
	Uranium	0.00736	0.0000670	0.000200	0.030			120387-003	SW846-6020B
MWL-MW9	Cadmium	ND	0.000300	0.00100	0.005	U		120378-003	SW846-6020B
26-Jun-23	Chromium	ND	0.00300	0.0100	0.10	U		120378-003	SW846-6020B
	Nickel	ND	0.000600	0.00200	NE	U		120378-003	SW846-6020B
	Uranium	0.00925	0.0000670	0.000200	0.030			120378-003	SW846-6020B
MWL-BW2	Cadmium	ND	0.000300	0.00100	0.005	U		121329-002	SW846-6020B
06-Nov-23	Chromium	ND	0.00300	0.0100	0.10	U		121329-002	SW846-6020B
	Nickel	0.000771	0.000600	0.00200	NE	J		121329-002	SW846-6020B
	Uranium	0.00675	0.0000670	0.000200	0.030			121329-002	SW846-6020B
MWL-MW7	Cadmium	ND	0.000300	0.00100	0.005	U		121332-002	SW846-6020B
07-Nov-23	Chromium	ND	0.00300	0.0100	0.10	U		121332-002	SW846-6020B
	Nickel	0.000840	0.000600	0.00200	NE	J		121332-002	SW846-6020B
	Uranium	0.00758	0.0000670	0.000200	0.030			121332-002	SW846-6020B
MWL-MW8	Cadmium	ND	0.000300	0.00100	0.005	U		121337-002	SW846-6020B
09-Nov-23	Chromium	ND	0.00300	0.0100	0.10	U		121337-002	SW846-6020B
	Nickel	ND	0.000600	0.00200	NE	U		121337-002	SW846-6020B
	Uranium	0.00757	0.0000670	0.000200	0.030			121337-002	SW846-6020B

Refer to Notes on page 4B-13.

Table 4B-3 (concluded)
Summary of Cadmium, Chromium, Nickel, and Uranium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW9 08-Nov-23	Cadmium	ND	0.000300	0.00100	0.005	U		121342-002	SW846-6020B
	Chromium	ND	0.00300	0.0100	0.10	U		121342-002	SW846-6020B
	Nickel	ND	0.000600	0.00200	NE	U		121342-002	SW846-6020B
	Uranium	0.00914	0.0000670	0.000200	0.030			121342-002	SW846-6020B
MWL-MW9 (Duplicate) 08-Nov-23	Cadmium	ND	0.000300	0.00100	0.005	U		121343-002	SW846-6020B
	Chromium	ND	0.00300	0.0100	0.10	U		121343-002	SW846-6020B
	Nickel	ND	0.000600	0.00200	NE	U		121343-002	SW846-6020B
	Uranium	0.00887	0.0000670	0.000200	0.030			121343-002	SW846-6020B

Refer to Notes on page 4B-13.

Table 4B-4
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Radon, and Tritium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-BW2	Americium-241	-0.905 ± 8.61	13.9	6.72	NE	U	BD	120366-004	EPA 901.1
22-May-23	Cesium-137	0.793 ± 1.74	3.10	1.46	NE	U	BD	120366-004	EPA 901.1
	Cobalt-60	0.778 ± 1.79	3.39	1.55	NE	U	BD	120366-004	EPA 901.1
	Potassium-40	22.9 ± 49.8	33.3	15.2	NE	U	BD	120366-004	EPA 901.1
	Gross Alpha	1.39	NA	NA	15 pCi/L	NA	None	120366-005	EPA 900.0
	Gross Beta	4.85 ± 0.890	1.19	0.571	4 mrem/yr		J	120366-005	EPA 900.0
	Tritium	-40.7 ± 86.2	174	77.2	4 mrem/yr	U	BD	120366-006	EPA 906.0M
	Radon-222	337 ± 98.6	86.1	40.8	1000 pCi/L			120366-007	SM7500 Rn B
MWL-MW7	Americium-241	-0.501 ± 6.83	12.1	5.86	NE	U	BD	120372-004	EPA 901.1
23-May-23	Cesium-137	-1.11 ± 3.81	4.41	2.12	NE	U	BD	120372-004	EPA 901.1
	Cobalt-60	1.25 ± 2.02	3.57	1.65	NE	U	BD	120372-004	EPA 901.1
	Potassium-40	-38.9 ± 44.6	47.8	22.5	NE	U	BD	120372-004	EPA 901.1
	Gross Alpha	-0.25	NA	NA	15 pCi/L	NA	None	120372-005	EPA 900.0
	Gross Beta	5.40 ± 0.885	1.21	0.583	4 mrem/yr		J	120372-005	EPA 900.0
	Tritium	11.4 ± 93.2	173	76.9	4 mrem/yr	U	BD	120372-006	EPA 906.0M
	Radon-222	147 ± 58.5	72.6	34.4	1000 pCi/L		J	120372-007	SM7500 Rn B
MWL-MW8	Americium-241	5.00 ± 9.43	16.8	8.09	NE	U	BD	120386-004	EPA 901.1
28-Jun-23	Cesium-137	1.80 ± 1.92	3.32	1.57	NE	U	BD	120386-004	EPA 901.1
	Cobalt-60	2.82 ± 1.84	3.82	1.76	NE	U	BD	120386-004	EPA 901.1
	Potassium-40	8.10 ± 43.5	29.2	13.1	NE	U	BD	120386-004	EPA 901.1
	Gross Alpha	4.71	NA	NA	15 pCi/L	NA	None	120386-005	EPA 900.0
	Gross Beta	5.04 ± 0.779	1.00	0.481	4 mrem/yr			120386-005	EPA 900.0
	Tritium	9.46 ± 92.1	161	76.9	4 mrem/yr	U	BD	120386-006	EPA 906.0M
	Radon-222	87.7 ± 46.1	65.6	31.0	1000 pCi/L		J	120386-007	SM7500 Rn B
MWL-MW8 (Duplicate)	Americium-241	9.90 ± 10.3	16.9	8.20	NE	U	BD	120387-004	EPA 901.1
28-Jun-23	Cesium-137	-0.149 ± 3.00	3.61	1.72	NE	U	BD	120387-004	EPA 901.1
	Cobalt-60	2.34 ± 2.76	3.56	1.64	NE	U	BD	120387-004	EPA 901.1
	Potassium-40	34.4 ± 54.7	35.6	16.5	NE	U	BD	120387-004	EPA 901.1
	Gross Alpha	4.16	NA	NA	15 pCi/L	NA	None	120387-005	EPA 900.0
	Gross Beta	5.51 ± 0.838	1.09	0.523	4 mrem/yr			120387-005	EPA 900.0
	Tritium	-49.0 ± 89.8	162	77.4	4 mrem/yr	U	BD	120387-006	EPA 906.0M
	Radon-222	103 ± 48.4	65.7	31.1	1000 pCi/L		J	120387-007	SM7500 Rn B

Refer to Notes on page 4B-13.

Table 4B-4 (continued)
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Radon, and Tritium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW9	Americium-241	3.59 ± 9.97	17.0	8.19	NE	U	BD	120378-004	EPA 901.1
26-Jun-23	Cesium-137	0.809 ± 2.16	3.79	1.79	NE	U	BD	120378-004	EPA 901.1
	Cobalt-60	-0.217 ± 2.43	4.29	1.98	NE	U	BD	120378-004	EPA 901.1
	Potassium-40	-37.1 ± 42.9	55.5	26.1	NE	U	BD	120378-004	EPA 901.1
	Gross Alpha	2.60	NA	NA	15 pCi/L	NA	None	120378-005	EPA 900.0
	Gross Beta	5.60 ± 0.872	1.17	0.567	4 mrem/yr			120378-005	EPA 900.0
	Tritium	16.0 ± 93.3	172	76.5	4 mrem/yr	U	BD	120378-006	EPA 906.0M
	Radon-222	388 ± 112	93.8	44.4	1000 pCi/L		J	120378-007	SM7500 Rn B
MWL-BW2	Americium-241	-4.95 ± 16.7	24.7	12.0	NE	U	BD	121329-003	EPA 901.1
06-Nov-23	Cesium-137	1.42 ± 2.30	3.66	1.74	NE	U	BD	121329-003	EPA 901.1
	Cobalt-60	-0.116 ± 2.05	3.76	1.73	NE	U	BD	121329-003	EPA 901.1
	Potassium-40	2.95 ± 46.7	41.3	19.1	NE	U	BD	121329-003	EPA 901.1
	Gross Alpha	7.08	NA	NA	15 pCi/L	NA	None	121329-004	EPA 900.0
	Gross Beta	-1.10 ± 28.1	48.4	23.6	4 mrem/yr	U	BD	121329-004	EPA 900.0
	Tritium	-1.97 ± 73.7	145	62.2	4 mrem/yr	U	BD	121329-005	EPA 906.0M
	Radon-222	349 ± 94.4	68.9	32.7	1000 pCi/L			121329-006	SM7500 Rn B
MWL-MW7	Americium-241	4.13 ± 16.2	27.5	13.2	NE	U	BD	121332-003	EPA 901.1
07-Nov-23	Cesium-137	-0.174 ± 2.40	3.78	1.78	NE	U	BD	121332-003	EPA 901.1
	Cobalt-60	0.845 ± 2.32	3.98	1.81	NE	U	BD	121332-003	EPA 901.1
	Potassium-40	-18.9 ± 44.7	65.1	30.8	NE	U	BD	121332-003	EPA 901.1
	Gross Alpha	1.38	NA	NA	15 pCi/L	NA	None	121332-004	EPA 900.0
	Gross Beta	7.86 ± 1.25	1.75	0.855	4 mrem/yr		J	121332-004	EPA 900.0
	Tritium	7.06 ± 76.5	147	63.1	4 mrem/yr	U	BD	121332-005	EPA 906.0M
	Radon-222	142 ± 61.8	80.4	38.0	1000 pCi/L		J	121332-006	SM7500 Rn B
MWL-MW8	Americium-241	7.22 ± 9.67	15.8	7.61	NE	U	BD	121337-003	EPA 901.1
09-Nov-23	Cesium-137	-1.03 ± 1.72	2.82	1.32	NE	U	BD	121337-003	EPA 901.1
	Cobalt-60	1.22 ± 1.89	3.60	1.65	NE	U	BD	121337-003	EPA 901.1
	Potassium-40	-18.0 ± 37.8	50.8	23.9	NE	U	BD	121337-003	EPA 901.1
	Gross Alpha	5.13	NA	NA	15 pCi/L	NA	None	121337-004	EPA 900.0
	Gross Beta	6.43 ± 0.974	1.24	0.595	4 mrem/yr		J	121337-004	EPA 900.0
	Tritium	57.6 ± 85.6	147	63.1	4 mrem/yr	U	BD	121337-005	EPA 906.0M
	Radon-222	144 ± 50.7	56.3	26.6	1000 pCi/L		J	121337-006	SM7500 Rn B

Refer to Notes on page 4B-13.

Table 4B-4 (concluded)
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Radon, and Tritium Results, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
MWL-MW9 08-Nov-23	Americium-241	4.75 ± 7.94	12.8	6.18	NE	U	BD	121342-003	EPA 901.1
	Cesium-137	0.576 ± 1.63	2.91	1.36	NE	U	BD	121342-003	EPA 901.1
	Cobalt-60	0.301 ± 1.55	2.95	1.33	NE	U	BD	121342-003	EPA 901.1
	Potassium-40	-27.1 ± 41.4	53.6	25.3	NE	U	BD	121342-003	EPA 901.1
	Gross Alpha	1.34	NA	NA	15 pCi/L	NA	None	121342-004	EPA 900.0
	Gross Beta	4.99 ± 1.02	1.47	0.711	4 mrem/yr		J	121342-004	EPA 900.0
	Tritium	-12.0 ± 72.7	147	62.8	4 mrem/yr	U	BD	121342-005	EPA 906.0M
	Radon-222	323 ± 89.0	66.8	31.6	1000 pCi/L			121342-006	SM7500 Rn B
MWL-MW9 (Duplicate) 08-Nov-23	Americium-241	-0.235 ± 7.27	11.9	5.73	NE	U	BD	121343-003	EPA 901.1
	Cesium-137	1.83 ± 4.29	2.79	1.31	NE	U	BD	121343-003	EPA 901.1
	Cobalt-60	1.14 ± 1.77	3.27	1.50	NE	U	BD	121343-003	EPA 901.1
	Potassium-40	20.1 ± 40.7	29.7	13.5	NE	U	BD	121343-003	EPA 901.1
	Gross Alpha	3.93	NA	NA	15 pCi/L	NA	None	121343-004	EPA 900.0
	Gross Beta	5.99 ± 0.842	0.955	0.454	4 mrem/yr		J	121343-004	EPA 900.0
	Tritium	-10.6 ± 71.8	144	61.8	4 mrem/yr	U	BD	121343-005	EPA 906.0M
	Radon-222	450 ± 115	67.0	31.6	1000 pCi/L			121343-006	SM7500 Rn B

Refer to Notes on page 4B-13.

Table 4B-5
Summary of Field Water Quality Measurements, Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Sample Date	Temperature[h] (^{0}C)	Specific Conductivity[h] (μmho/cm)	Oxidation Reduction Potential[h] (mV)	pH[h]	Turbidity[h] (NTU)	Dissolved Oxygen[h] (% Sat)	Dissolved Oxygen[h] (mg/L)
MWL-BW2	22-May-23	20.20	658.19	98.7	7.42	1.22	29.55	4.20
MWL-MW7	23-May-23	22.14	608.50	138.7	7.55	0.42	86.46	6.31
MWL-MW8	28-Jun-23	24.57	626.48	88.6	7.41	0.52	33.37	2.39
MWL-MW9	26-Jun-23	24.38	675.90	53.4	7.43	0.97	8.79	0.63
MWL-BW2	06-Nov-23	20.79	751.05	59.3	7.35	1.13	26.28	1.94
MWL-MW7	07-Nov-23	20.45	582.69	78.4	7.52	0.02	85.85	6.36
MWL-MW8	09-Nov-23	13.83	510.34	88.4	7.48	0.02	24.75	2.12
MWL-MW9	08-Nov-23	21.99	604.85	59.2	7.41	0.08	10.64	0.76

Refer to Notes on page 4B-13.

Notes for Mixed Waste Landfill Groundwater Analytical Results Tables

%	= percent
BW	= Background Well
CFR	= Code of Federal Regulations
EPA	= U.S. Environmental Protection Agency
ID	= identifier
µg/L	= micrograms per liter
mg/L	= milligrams per liter
mrem/yr	= millirem per year
MW	= Monitoring Well
MWL	= Mixed Waste Landfill
ng/L	= nanograms per liter, equivalent to parts per trillion
No.	= number
pCi/L	= picocuries per liter

[a]Result or Activity
Result applies to Tables 4B-2 and 4B-3; activity applies to Table 4B-4.
Gross alpha activity measurements were corrected by subtracting the total uranium activity (40 CFR 141). Activities of zero or less are considered not detected.

Bold	= Value exceeds the established EPA MCL. If the value reported by the laboratory exceeds the MCL but is qualified during data validation as not detected, the value is not bolded.
ND	= not detected (at MDL)

[b]MDL or MDA
The MDL applies to Table 4B-1 through 4B-3. MDA applies to Table 4B-4.

MDA	= The minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level.
MDL	= Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
NA	= Not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

[c]PQL or Critical Level
The PQL applies to Table 4B-2 and 4B-3. Critical level applies to Table 4B-4.

Critical Level	= The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
PQL	= Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.
NA	= Not applicable for gross alpha activities. The critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

[d]MCL

MCL = Maximum contaminant level. Established by the EPA Office of Water, National Primary Drinking Water Standards, (EPA March 2018).
The following are the MCLs for gross alpha particles and beta particles in community water systems:

- 15 pCi/L = gross alpha particle activity, excluding total uranium (40 CFR Part 141)
- 4 mrem/yr = any combination of beta and/or gamma emitting radionuclides (as dose rate)

NE = not established

Notes for Mixed Waste Landfill Groundwater Analytical Results Tables (concluded)

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

B	= The analyte was found in the blank above the effective MDL.
J	= Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
NA	= not applicable
U	= Analyte is absent or below the MDL.

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

BD	= Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J	= The associated value is an estimated quantity.
J+	= The associated numerical value is an estimated quantity with a suspected positive bias.
J-	= The associated numerical value is an estimated quantity with a suspected negative bias.
None	= No data validation for corrected gross alpha activity.
U	= The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.
UJ	= The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

[g]Analytical Method
Standard Methods for the Examination of Water and Wastewater, 23rd ed., 2017, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation. Washington, D.C.
EPA, 2020 (and updates), *Method 537.1, Determination of Selected Per- and Polyfluorinated Alkyl Substances in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS)*, EPA/600/R-20/006, Version 2.0, U.S. Environmental Protection Agency, Washington, D.C. (modified for groundwater).
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SM	= Standard Method
SW	= Solid Waste

[h]Field Water Quality Measurements
Field measurements obtained prior to sampling.

°C	= degrees Celsius
% Sat	= percent saturation
µmho/cm	= micromhos per centimeter
mg/L	= milligrams per liter
mV	= millivolts
NTU	= nephelometric turbidity units
pH	= potential of hydrogen (negative logarithm of the hydrogen ion concentration)

Chapter 4.0
Mixed Waste Landfill References

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5.0 Technical Area-V Groundwater Area of Concern

5.1 Introduction

This chapter summarizes the calendar year (CY) 2023 groundwater monitoring activities and results for the Technical Area-V Groundwater (TAVG) Area of Concern (AOC).

Trichloroethene (TCE) and nitrate have been identified as constituents of concern (COCs) in the groundwater at the TAVG AOC based on detections above the U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs). Low concentrations of TCE and nitrate have consistently been detected in the Regional Aquifer that is present approximately 500 feet (ft) below ground surface (bgs). The EPA MCLs and State of New Mexico drinking water standards for TCE and nitrate (as nitrogen) are 5 micrograms per liter (µg/L) and 10 milligrams per liter (mg/L), respectively. Since 1992, the maximum concentrations detected in the groundwater have been 22.4 µg/L for TCE and 15.3 mg/L for nitrate (as nitrogen).

5.1.1 Location

TA-V is located in the west-central part of Kirtland Air Force Base (KAFB), south of the City of Albuquerque (Figure 5-1 and Plate 1). TA-V occupies approximately 35 acres in the northeast corner of TA-III at SNL/NM.

5.1.2 Site History

TA-V was established in 1961 to test radiation effects on weapon components and has hosted multiple generations of research reactors, including the Sandia Engineering Reactor Facility, the Sandia Pulsed Reactor, the High Energy Radiation Megavolt Electron Source, and the PROTO I Facility. Active nuclear facilities include the Annular Core Research Reactor, the Sandia Pulsed Reactor, and the Auxiliary Hot Cell Facility, as well as radiological facilities such as the Gamma Irradiation Facility and the Low Dose Rate Irradiation Facility.

Since 1992, U.S. Department of Energy (DOE)/National Nuclear Security Administration (NNSA) and Sandia National Laboratories, New Mexico (SNL/NM) personnel have conducted numerous surface and subsurface investigations and remedial activities at TA-V. Table 5A-1 (Attachment 5A) provides the historical timeline of the investigations and the corresponding reference documents through December 2023. Past investigations were mainly site specific and conducted at various Solid Waste Management Unit (SWMUs) and AOCs. A total of 21 SWMUs and AOCs were previously identified at TA-V. The New Mexico Environment Department (NMED) Hazardous Waste Bureau (HWB) has granted Corrective Action Complete status to all 21 SWMUs and AOCs (SNL/NM, September 2015).

Historically, wastewater derived from TA-V facilities was disposed of at the Liquid Waste Disposal System (LWDS) Drain Field, the two unlined LWDS Surface Impoundments, and the TA-V Seepage Pits. The groundwater beneath TA-V is addressed separately as the TAVG AOC.

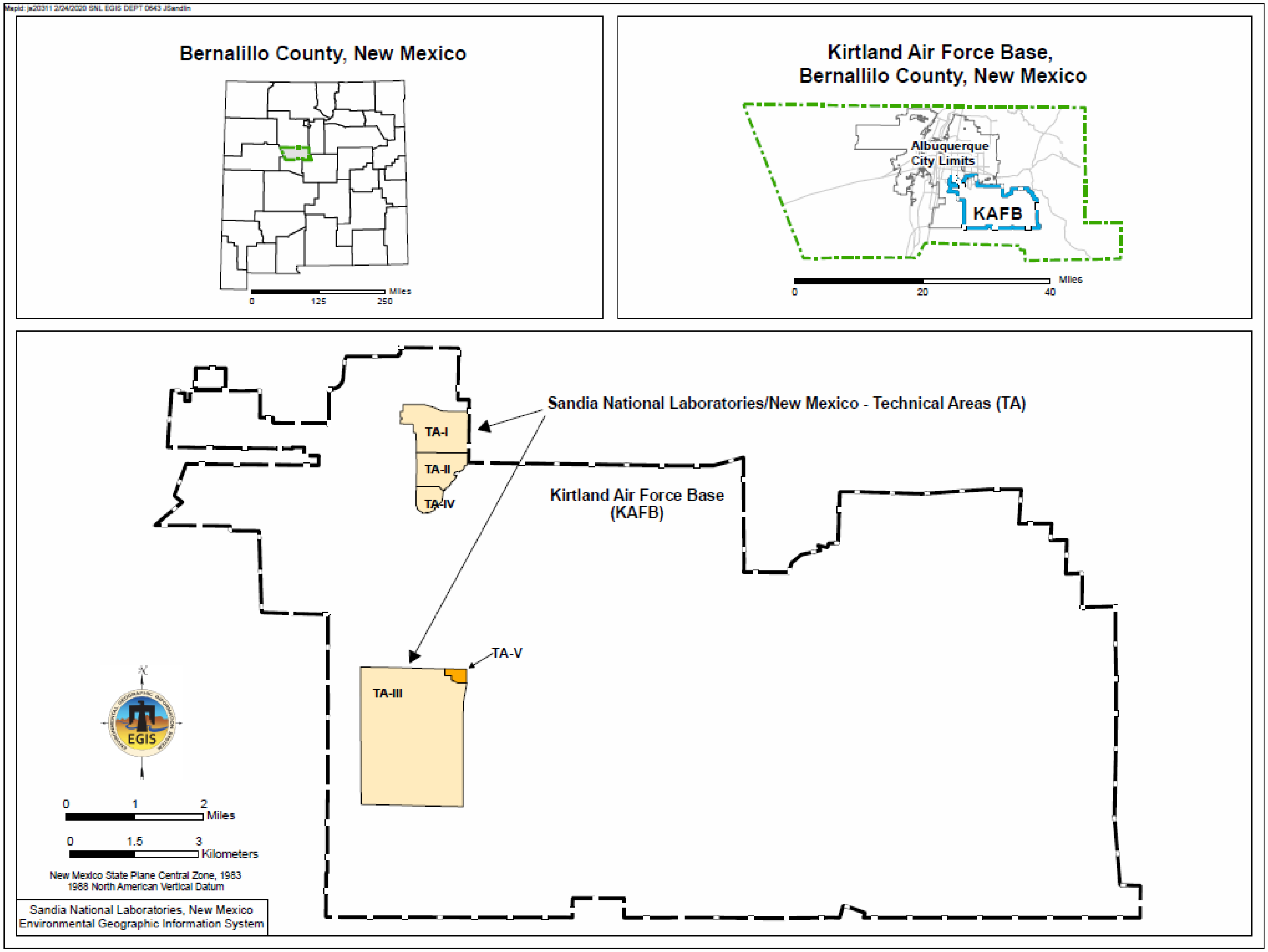

Figure 5-1
Location of Sandia National Laboratories, New Mexico and Technical Area-V

5.1.3 Monitoring History

Groundwater monitoring at TA-V began in October 1992. TCE was first detected in monitoring well LWDS-MW1 in November 1993 at a concentration of 6 µg/L, exceeding the EPA MCL of 5 µg/L. Nitrate above the EPA MCL of 10 mg/L was first detected in LWDS-MW1 in December 1995 at a concentration of 10.1 mg/L. Since 1992, 21 monitoring wells have been installed through the end of CY 2023 and 4 of the 21 wells have been plugged and abandoned (Table 5-1).

Historical groundwater analyses for TA-V have demonstrated that nitrite concentrations are below laboratory method detection limits (MDLs) and are considered noncontributory to the results of nitrate plus nitrite (NPN) analyses. Therefore, NPN (as nitrogen) results are used in this chapter and its attachments to represent nitrate concentrations.

Three soil-vapor wells were installed at the TAVG AOC in 2011. Soil-vapor samples were collected for eight consecutive quarters starting in April 2011 and concluding in March 2013. The samples were analyzed for volatile organic compounds (VOCs), including TCE. The analytical results were reported in Attachment 5D of the *Annual Groundwater Monitoring Report, Calendar Year 2013* (CY 2013 AGMR) (SNL/NM, June 2014) and are summarized in Section 5.1.6.5.

DOE/NNSA and SNL/NM personnel conducted a phased treatability study to evaluate the effectiveness of in-situ bioremediation (ISB) to treat groundwater contamination at the TAVG AOC. The technical approach was to gravity-inject substrate solution containing essential food, nutrients, and biodegradation bacteria into groundwater via injection well(s). DOE/NNSA and SNL/NM personnel began phase I of the treatability study in November 2017, completed phase I in May 2021, and documented the operational details and study results in the *Phase I Treatability Study Report for In-Situ Bioremediation at the Technical Area-V Groundwater Area of Concern* (2022 Phase I Treatability Study Report) (SNL/NM, March 2022) submitted to the NMED HWB in April 2022 (DOE, April 2022a). Based on the phase I treatability study results, DOE/NNSA and SNL/NM personnel recommended not proceeding to phase II of the treatability study. The NMED HWB subsequently approved the 2022 Phase I Treatability Study Report and concurred with the recommendation (NMED, June 2022).

After completing phase I of the ISB treatability study in May 2021, DOE/NNSA and SNL/NM personnel continued quarterly monitoring of the phase I treatment zone until April 2022. The phase I treatment zone included injection well TAV-INJ1 and monitoring well TAV-MW6. Thereafter, DOE/NNSA and SNL/NM personnel resumed sampling TAV-MW6 as part of the TAVG AOC monitoring well network in August 2022 (SNL/NM, June 2023). The NMED HWB has approved TAV-INJ1 for decommissioning (NMED, March 2023).

5.1.4 Current Monitoring Well Network

Table 5-1 lists the monitoring and injection wells installed to date; Figure 5-2 shows the well locations. In CY 2023, DOE/NNSA and SNL/NM personnel plugged and abandoned three monitoring wells (AVN-1, AVN-2, and LWDS-MW2) and installed new monitoring well TAV-MW17. Currently, there are 17 active monitoring wells (LWDS-MW1 and TAV-MW2 through TAV-MW17) at the TAVG AOC.

Table XI-1 of the *Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act 74-4-10: Sandia National Laboratories Consent Order* (Consent Order) (NMED, April 2004) specifies a quarterly sampling frequency for groundwater monitoring at the TAVG AOC. Following the ISB treatability study, DOE/NNSA and SNL/NM personnel requested approval to modify the sampling plan for the TAVG AOC monitoring well network (DOE, August 2022) and the NMED HWB subsequently approved the request (NMED, December 2022). DOE/NNSA and SNL/NM personnel started to implement the modified sampling plan in CY 2023. Section 5.3 describes the current sampling plan.

Table 5-1
Groundwater Monitoring and Injection Wells Screened in the Regional Aquifer at the Technical Area-V Groundwater Area of Concern

Well ID	Installation Year	WQ[a]	WL[a]	Comments
AVN-1	1995	NA	NA	Deeper completion (570–590 ft bgs), P&A in February 2023
AVN-2	1995	NA	NA	Water table completion (492–515 ft bgs), P&A in February 2023
LWDS-MW1	1993	✓	✓	Water table completion (495–515 ft bgs)
LWDS-MW2	1992	NA	NA	Deeper completion (506–526 ft bgs), P&A in February 2023
TAV-INJ1[b]	2017	NA	NA	Water table completion (509–539 ft bgs)
TAV-MW1	1995	NA	NA	Water table completion (489.5–509.5 ft bgs), P&A in February 2008
TAV-MW2	1995	✓	✓	Water table completion (497–513.5 ft bgs)
TAV-MW3	1997	✓	✓	Water table completion (532–552 ft bgs)
TAV-MW4	1997	✓	✓	Water table completion (495–515 ft bgs)
TAV-MW5	1997	✓	✓	Water table completion (487–507 ft bgs)
TAV-MW6	2001	✓	✓	Water table completion (507–527 ft bgs)
TAV-MW7	2001	✓	✓	Deeper completion (597–617 ft bgs)
TAV-MW8	2001	✓	✓	Water table completion (491–511 ft bgs)
TAV-MW9	2001	✓	✓	Deeper completion (582–602 ft bgs)
TAV-MW10	2008	✓	✓	Water table completion (508–528 ft bgs), replaced TAV-MW1
TAV-MW11	2010	✓	✓	Water table completion (512–532 ft bgs)
TAV-MW12	2010	✓	✓	Water table completion (507–527 ft bgs)
TAV-MW13	2010	✓	✓	Deeper completion (525–545 ft bgs)
TAV-MW14	2010	✓	✓	Water table completion (512–532 ft bgs)
TAV-MW15	2017	✓	✓	Water table completion (516–541ft bgs)
TAV-MW16	2017	✓	✓	Water table completion (527–552 ft bgs)
TAV-MW17	2023	✓	✓	Water table completion (523–543 ft bgs)
Total	----	17	17	Total for AGMR reporting

Notes:
[a] Check marks (✓) indicate WQ sampling and WL measurements were obtained in CY 2023.
[b] Approved for decommissioning as of September 2022 (NMED, September 2022).

AGMR = annual groundwater monitoring report
AVN = Area-V North
bgs = below ground surface
CY = calendar year
ft = foot (feet)
ID = identifier
INJ = Injection Well
LWDS = Liquid Waste Disposal System
MW = Monitoring Well
NA = not applicable
P&A = plugged and abandoned (decommissioned)
TAV = Technical Area-V (acronym used for well identification only)
WL = water level
WQ = water quality

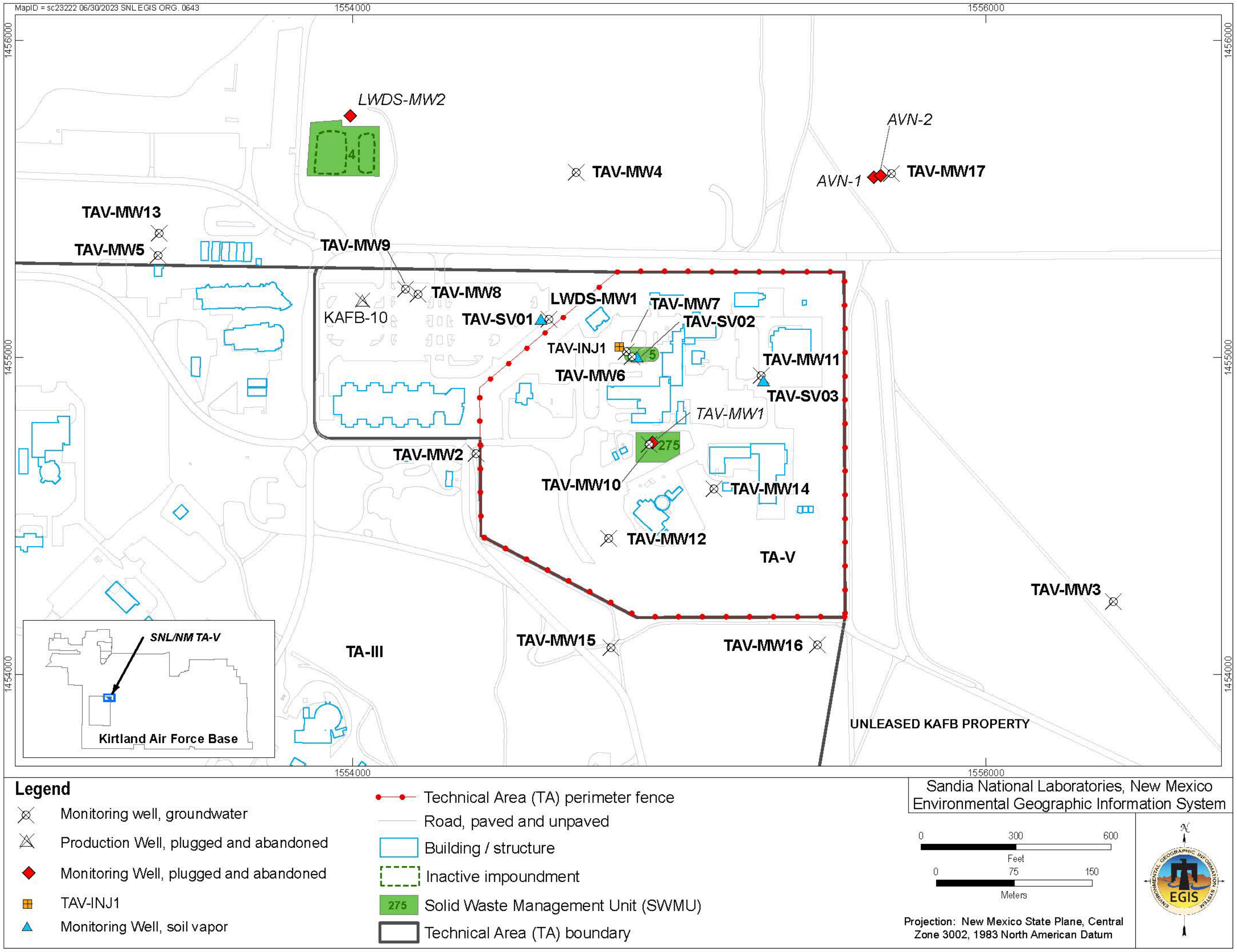

Figure 5-2
Technical Area-V Groundwater Area of Concern Monitoring Well Locations

5.1.5 Summary of Calendar Year 2023 Activities

TAVG AOC groundwater monitoring activities in CY 2023 included:

- Quarterly water level measurements at 17 monitoring wells.
- Quarterly preparation of mini-sampling and analysis plans (SAPs) and collection and analysis of groundwater samples from 17 monitoring wells. The sampling events were conducted in February/March, April, July/August/September, and October 2023.
- Preparation of analytical results tables (Attachment 5B), concentration versus time plots (Attachment 5C), and hydrographs (Attachment 5D).
- Submittal of the *Decommissioning Plan for Well TAV-INJ1 at the Technical Area-V Groundwater Area of Concern* (SNL/NM, January 2023a). The NMED HWB subsequently approved the plan (NMED, March 2023).
- Plugging and abandonment of three monitoring wells (AVN-1, AVN-2, and LWDS-MW2) and installation of new monitoring well TAV-MW17.
- Submittal of the *Monitoring Well TAV-MW17 Installation and Monitoring Well AVN-1, AVN-2, and LWDS-MW2 Decommissioning Report* (SNL/NM, July 2023). The NMED HWB subsequently approved the report with modification (NMED, October 2023a).
- Submittal of the *Comprehensive Site-Wide Groundwater Monitoring Plan (Revised), Calendar Year 2024* (SNL/NM, April 2023a). The NMED HWB subsequently approved the plan (NMED, October 2023b).

5.1.6 Conceptual Site Model

This section summarizes the Conceptual Site Model (CSM) for the TAVG AOC (Figure 5-3). The CSM was updated in the *Current Conceptual Model for Technical Area-V Groundwater Area of Concern at Sandia National Laboratories, New Mexico* (2015 CCM; SNL/NM, September 2015), which illustrates the geological and hydrogeological framework, contaminant sources, and distribution and migration paths of contaminants in the subsurface at TA-V.

5.1.6.1 Regional Hydrogeologic Conditions

TA-V is located within the Albuquerque Basin of the Rio Grande Rift in north-central New Mexico. The Rio Grande Rift is marked by a series of sediment-filled structural basins and adjoining uplifted mountain ranges. One of these basins, the Albuquerque Basin (also known as the Middle Rio Grande Basin), covers about 3,060 square miles in central New Mexico and extends north-south from Cochiti Reservoir to San Acacia, New Mexico. The Albuquerque Basin includes TA-V and the western part of KAFB.

The sedimentary deposits of the Santa Fe Group (SFG) and overlying alluvium that fill the Albuquerque Basin contain the Regional Aquifer. The Regional Aquifer is the primary source of municipal and industrial water in the Albuquerque area. The structure of the Regional Aquifer within the Middle Rio Grande Basin is complex (Bartolino and Cole, 2002). The major hydrostratigraphic units in the aquifer are tabular and wedge-shaped bodies that are truncated and displaced by numerous faults. Few of the major units are present continuously throughout the basin, and most "pinch out" against the subsurface basement blocks. These major units are hundreds to thousands of feet thick, extend over tens of square miles, and primarily consist of unconsolidated and partially cemented deposits that interfinger in complex arrangements.

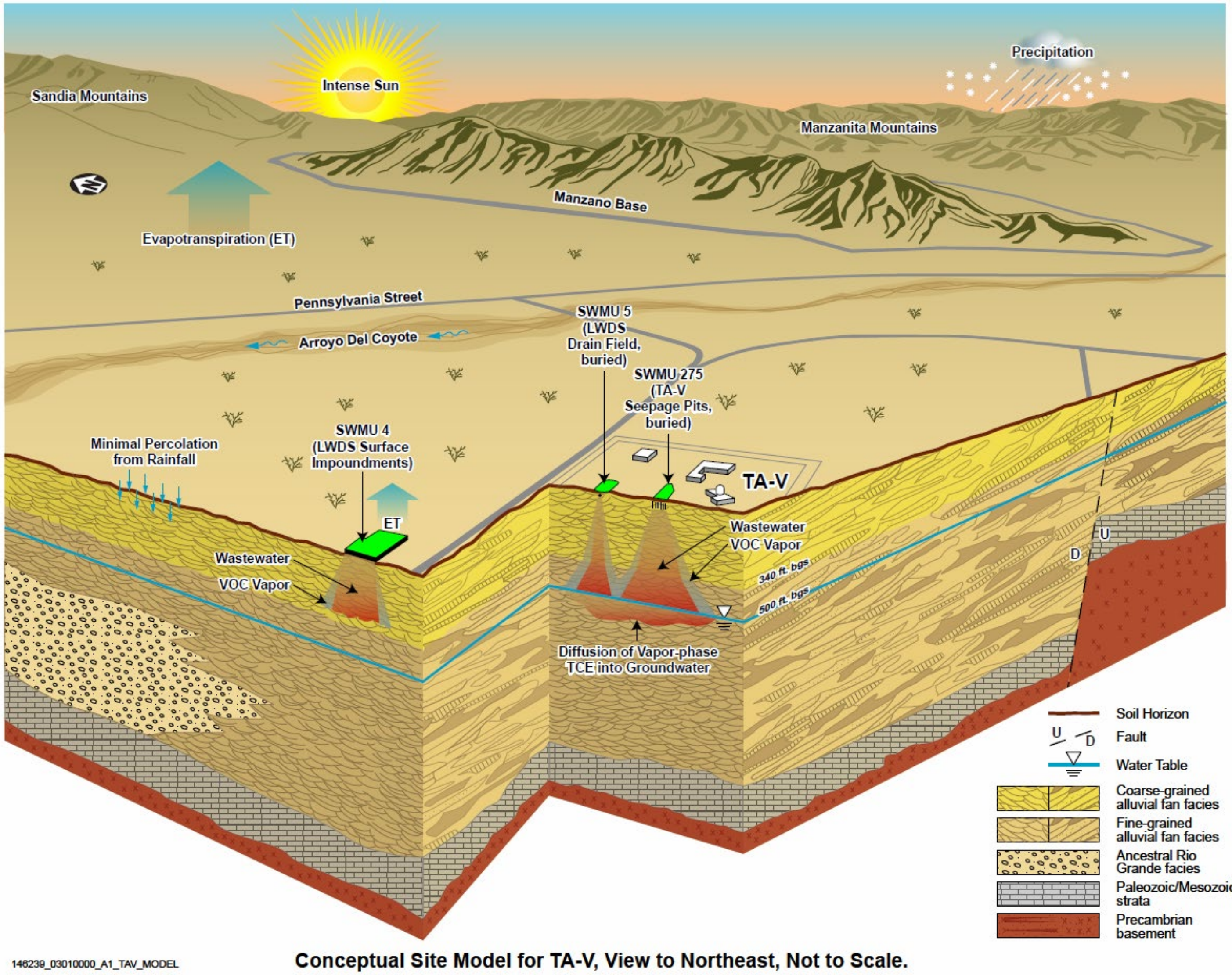

Figure 5-3
Conceptual Site Model for the Technical Area-V Groundwater Area of Concern (SNL/NM, September 2015)

The Regional Aquifer exhibits unconfined conditions. Prior to the development of groundwater resources in the Albuquerque area, groundwater flow in the Albuquerque Basin was generally north to south, with a westward component of groundwater flow from recharge areas along mountain-front boundaries to the east (Bartolino and Cole, 2002). As the Regional Aquifer was developed as a source of municipal and industrial water supplies, groundwater flow directions were altered toward the production wells near the northern boundary of KAFB. A minor amount of discharge occurs as groundwater moves out of the Albuquerque Basin into downgradient basins along the Rio Grande Rift as underflow or through discharge to the Rio Grande.

5.1.6.2 Hydrologic Conditions at Technical Area-V

TA-V is primarily underlain by a thick section of alluvial fan deposits. The alluvial fan lithofacies is subdivided into upper and lower sections. The upper section consists of relatively coarse-grained sediments deposited in a higher-energy environment. The lower section consists of a fine-grained, clay-rich unit. This unit has been identified as low-energy piedmont deposits derived from upland soil that developed during a preglacial humid climate. The total thickness of the alluvial fan deposits is typically thousands of feet. The water table of the Regional Aquifer is located in the fine-grained lower unit of alluvial fan deposits. The post-SFG alluvial fan deposits blanket the area around TA-V and compose the upper few tens of feet of the vadose zone. These deposits were derived primarily from alluvial fans that developed from Coyote Canyon to the east.

No evidence of groundwater perching above the Regional Aquifer has been observed at TA-V. Based on moisture content measurements of vadose zone sediment samples, minimal moisture remains in the vadose zone from historical wastewater disposal at TA-V (SNL/NM, September 2015).

The average annual precipitation at the Albuquerque International Sunport is approximately 8.84 inches (Section 2.6.2.1). Most precipitation falls in summer months, mainly in the form of brief heavy rains associated with thunderstorms. Estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL/NM. February 1998). Precipitation as a source of aquifer recharge is considered minimal and is unlikely to be a mechanism for transporting contaminants through the approximately 500-ft-thick vadose zone at TA-V.

Tijeras Arroyo and Arroyo del Coyote are located to the north and northeast of TA-V, respectively. The flow of surface water in the arroyos consists of brief ephemeral flows from mountainous drainages located to the east. Part of the recharge derived from infiltration of these flows is returned to the atmosphere through evapotranspiration. Some water that infiltrates the arroyo channels may move past the root zone and provide some local recharge. However, the distance between these ephemeral channels and TA-V precludes a significant effect on the local groundwater flow and contaminant transport. The active channels for Tijeras Arroyo and Arroyo del Coyote are located approximately 1.7 and 0.6 miles, respectively, from TA-V.

Horizontal hydraulic conductivities for the alluvial fan sediments were determined using aquifer pumping tests and slug tests. Aquifer pumping (and recovery) data were collected from two monitoring wells, AVN-1 and TAV-MW2, and the hydraulic conductivities were 38.3 and 0.09 ft per day (ft/day), respectively. Slug tests were conducted at all 21 monitoring wells, including three tests conducted in CY 2023 at TAV-MW15, TAV-MW16, and TAV-MW17. The horizontal hydraulic conductivities ranged from 0.04 to 30.82 ft/day. The wide range of hydraulic conductivities is attributed to the textural heterogeneities associated with the alluvial fan lithofacies. To reduce the bias of a few higher values, a geometric mean was calculated using the slug test results from the 21 monitoring wells. The geometric mean hydraulic conductivity was 1.44 ft/day.

Vertical hydraulic conductivity is typically estimated to be one-tenth to one-hundredth the horizontal hydraulic conductivity. In the 2015 CCM (SNL/NM, September 2015), vertical hydraulic gradients were calculated for the three monitoring well pairs (TAV-MW5 and TAV-MW13, TAV-MW6 and TAV-MW7, TAV-MW8 and TAV-MW9) and averaged downward at 0.07 ft per ft (ft/ft). Using October 2022 groundwater elevations, the average vertical hydraulic gradient for the three pairs was downward at 0.05 ft/ft.

The geochemical signatures (cations and anions) for groundwater samples collected from all the monitoring wells are similar, and the groundwater at TA-V is classified as a calcium-bicarbonate type (SNL/NM, September 2015).

5.1.6.3 Direction of Groundwater Flow

Groundwater flows predominantly from east to west in the vicinity of TA-V. To the west of TA-V, groundwater flow becomes more northernly in response to the pumping at KAFB, Albuquerque Bernalillo County Water Utility Authority (ABCWUA), and Veterans Affairs (VA) production wells located near the northern boundary of KAFB.

Table 5-2 lists the water levels measured in October 2023 at the 17 active monitoring wells in the TAVG AOC monitoring well network. Note that 14 of the 17 are screened across the water table and three (TAV-MW7, TAV-MW9, and TAV-MW13) are screened deeper in the Regional Aquifer.

Figure 5-4 shows the CY 2023 potentiometric surface of the TAVG AOC. The general orientation of the localized potentiometric surface contours is consistent with the base-wide potentiometric surface map (Plate 1). The potentiometric surface indicates that the localized groundwater flow is to the south and southwest. The horizontal hydraulic gradient ranges from 0.004 to 0.01 ft/ft. The horizontal groundwater flow velocity was calculated from the range of horizontal hydraulic conductivities (0.04 to 30.82 ft/day), the range of horizontal hydraulic gradients (0.004 to 0.01 ft/ft), and an effective porosity of 0.25. The estimates for linear groundwater flow velocity range greatly (approximately three orders of magnitude), from 0.23 to 450 ft per year (ft/yr).

Figure 5-4 shows a subtle groundwater mound in the potentiometric surface of the TAVG AOC. The groundwater mound was most likely an artifact of laterally variable water level declines within the heterogeneous and anisotropic aquifer that was undergoing regional drainage due to the combined effect of pumping at the KAFB, ABCWUA, and VA production wells. Mounding occurred where the sediments have lesser degrees of hydraulic conductivity than the surroundings and thus drained relatively slower.

Figures 5D-1 through 5D-4 (Attachment 5D) present the groundwater level fluctuations on a series of hydrographs for the 17 active monitoring wells in the TAVG AOC monitoring well network. The groundwater elevations at all the wells have steadily declined. The declines are due to pumping of the Regional Aquifer by the KAFB, ABCWUA, and VA production wells. The decline rates range from 0.40 to 0.80 ft/yr with an average decline rate of 0.64 ft/yr. In CY 2023, the groundwater elevation declined fastest in monitoring well TAV-MW3 and slowest in monitoring wells TAV-MW13 and TAV-MW16. The decline of the water table is expected to continue as long as pumping at production wells in the region continues. The groundwater elevations at new monitoring well TAV-MW17 were in line with the declining trend of nearby monitoring well AVN-1 before it was decommissioned in February 2023.

Since late 2008, groundwater levels at Regional Aquifer wells in the northern part of KAFB have shown an increasing trend. Presumably, this is in response to the ABCWUA transitioning to surface water for potable water supplies and decreased dependence on ABCWUA production wells immediately north of KAFB. However, this trend has not been seen as far south as TA-V.

Table 5-2
Groundwater Elevations Measured in October 2023 at Technical Area-V Groundwater Area of Concern

Well ID	Measuring Point (ft amsl) NAVD 88	Date Measured	Depth to Water (ft btoc)	Groundwater Elevation (ft amsl)
LWDS-MW1	5423.83	4-Oct-2023	507.29	4916.54
TAV-MW2	5427.33	2-Oct-2023	511.52	4915.81
TAV-MW3	5464.30	3-Oct-2023	549.71	4914.59
TAV-MW4	5427.89	3-Oct-2023	511.59	4916.30
TAV-MW5	5408.71	3-Oct-2023	496.10	4912.61
TAV-MW6	5431.17	4-Oct-2023	515.01	4916.16
TAV-MW7	5430.40	4-Oct-2023	516.99	4913.41
TAV-MW8	5417.00	4-Oct-2023	500.27	4916.73
TAV-MW9	5416.27	4-Oct-2023	503.00	4913.27
TAV-MW10	5437.03	4-Oct-2023	521.33	4915.70
TAV-MW11	5440.12	4-Oct-2023	523.99	4916.13
TAV-MW12	5435.72	4-Oct-2023	520.74	4914.98
TAV-MW13	5409.02	3-Oct-2023	499.13	4909.89
TAV-MW14	5441.52	4-Oct-2023	527.72	4913.80
TAV-MW15	5437.32	2-Oct-2023	522.44	4914.88
TAV-MW16	5448.34	3-Oct-2023	533.98	4914.36
TAV-MW17	5443.92	3-Oct-2023	529.17	4914.75

Notes:

amsl = above mean sea level
btoc = below top of casing (the measuring point)
ft = foot (feet)
ID = identifier
LWDS = Liquid Waste Disposal System
MW = Monitoring Well
NAVD 88 = North American Vertical Datum of 1988
TAV = Technical Area-V (acronym used for well identification only)

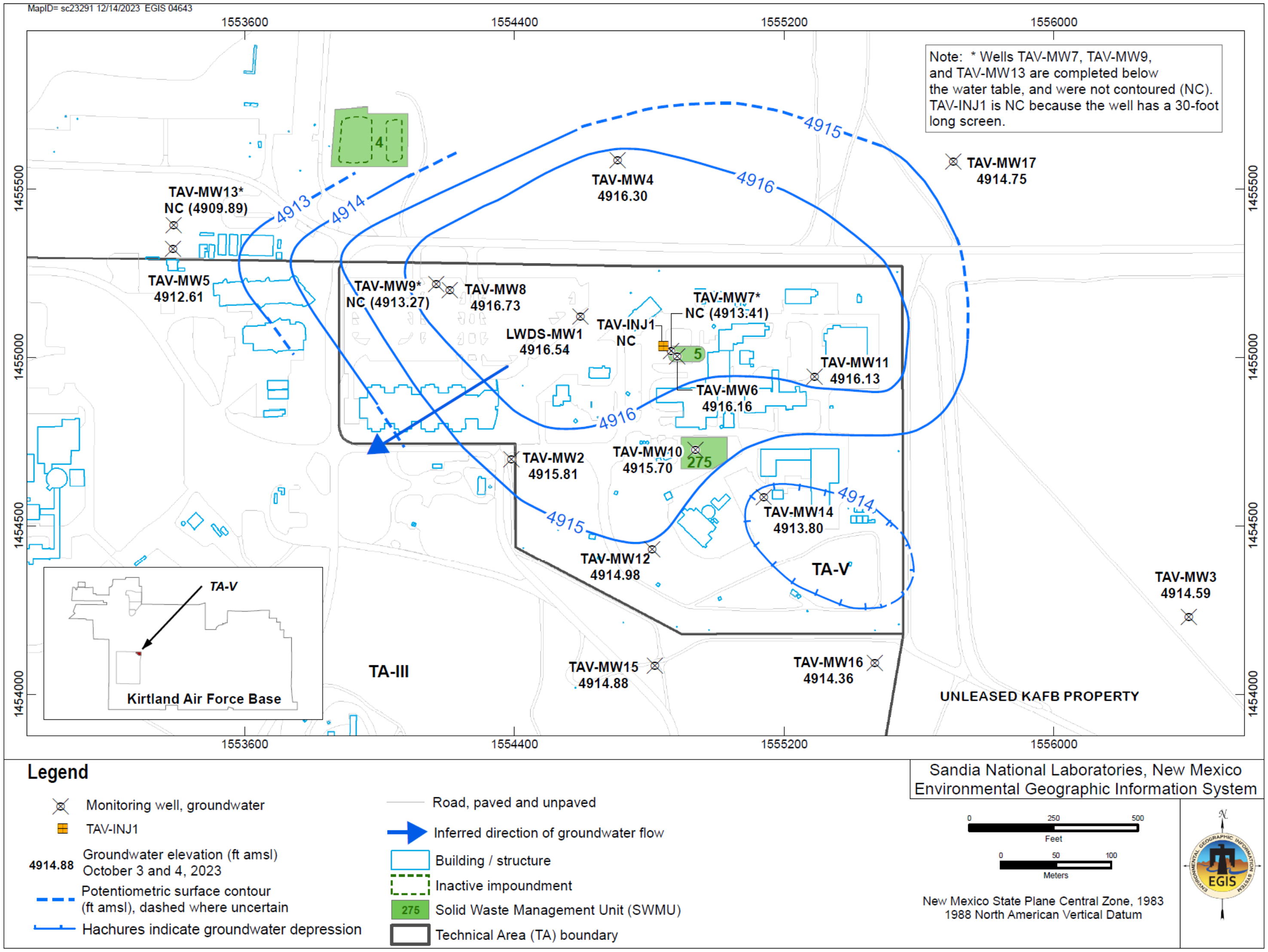

Figure 5-4
Potentiometric Surface of the Regional Aquifer at the Technical Area-V Groundwater Area of Concern (October 2023)

5.1.6.4 Contaminant Sources

The groundwater contamination at the TAVG AOC is not the result of surface contamination from a single SWMU. Prior to 1992, the majority of wastewater disposal at TA-V occurred at SWMUs 4, 5, and 275 (Figures 5-2 and 5-3). Table 5-3 presents the disposal periods, estimated disposal volumes, types of wastewater, and design characteristics for the three high-discharge SWMUs. Small volumes of TCE and other organic solvents were presumably present in wastewater that was disposed of at the LWDS Drain Field (SWMU 5) from 1962 to 1967, the LWDS Surface Impoundments (SWMU 4) from 1967 to 1972, and the TA-V Seepage Pits (SWMU 275) from the 1960s to the early 1980s, when disposal practices were modified to protect the environment. Disposal of wastewater at the TA-V Seepage Pits (SWMU 275) continued from the early 1980s until 1992, but the wastewater contained no organic solvents such as TCE. This continued discharge of wastewater likely flushed residual contaminants to the aquifer. After 1992, the sanitary waste and wastewater piping were connected to the base-wide KAFB sanitary sewer system that drains to the ABCWUA interceptor line. Upon cessation of wastewater disposal to the subsurface, vertical pathways to the aquifer were drained by gravity.

Table 5-3 shows that the estimated total discharge volume ranged from 48.5 to 68.5 million gallons (gal). SWMU 275 had the greatest discharge volume, accounting for up to 73 percent of the total discharge at TA-V. The average disposal rate for the three SWMUs ranged from approximately 1 to 2.4 million gal per year. The types of wastewater consisted of reactor cooling water, industrial water (from sinks and drains in radiochemistry laboratories and assembly shops), and septic (sanitary sewer) water.

Table 5-3
Wastewater and Septic Water Disposal History at Technical Area-V

Disposal Site	Date in Use	Estimated Volume (gal)	Percentage of Total Volume[a]	Average Disposal Rate (gal per Year)	Primary Types of Wastewater	Design Characteristics
SWMU 4 - LWDS Surface Impoundments	1967–1972[b]	12 million	18 – 25	2.4 million	Reactor cooling water and industrial water	Two unlined impoundments, total 0.4 acres
SWMU 5 - LWDS Drain Field	1962–1967	6.5 million	9 – 13	1.3 million	Reactor cooling water and industrial water	One buried, perforated horizontal pipe, 60-ft long, 36-ft deep, 3-ft diameter
SWMU 275 - TA-V Seepage Pits	1960s –1992	30 to 50 million	62 – 73	1 to 1.6[c] million	Septic water and industrial water	Six buried, open-bottomed cylinders, 20-ft deep, 6.5-ft diameter
Total Range for Three Sites	1962–1992	48.5 to 68.5 million				

Notes:
[a] Percentage calculated using the total range of discharge for three sites (48.5 to 68.5 million gal).
[b] Used intermittently for discharge of local surface water runoff and wastewater from sinks and floor drains until 1992. The unmonitored volume is assumed to be negligible.
[c] Assumes 30 years of discharge at the seepage pits.

ft = foot (feet)
gal = gallons
LWDS = Liquid Waste Disposal System
SWMU = Solid Waste Management Unit
TA-V = Technical Area-V

Elevated nitrate concentrations in the groundwater at TA-V are likely derived from sanitary waste disposals to the subsurface. Sanitary waste disposals continued until 1992, when the disposals were routed to the base-wide sanitary sewer system. Nitrate is considered a conservative constituent with regard to transport because it is highly soluble in water, not typically sorbed to sediments, and not bio-transformed under the aerobic groundwater conditions like those exhibited at TA-V. Therefore, any locally derived elevated concentrations of nitrate were most likely transported through the vadose zone along with the wastewater and sanitary waste discharges.

The large surface area of the impoundments (approximately 0.4 acres) could have facilitated significant evaporation of wastewater and VOCs. This likely minimized the depth of percolation. Historical analytical results from monitoring well LWDS-MW2, located immediately north of the LWDS Surface Impoundments (SWMU 4), indicated that the wastewater disposed of at the surface impoundments did not impact groundwater. TCE was never detected in groundwater samples from monitoring well LWDS-MW2, and except for one anomalous detection of 12.3 mg/L in May 2019 (SNL/NM, June 2020), nitrate concentrations never exceeded the EPA MCL of 10 mg/L. LWDS-MW2 was decommissioned in February 2023 (SNL/NM, August 2023).

The NMED-suggested background concentration for nitrate in groundwater is 4 mg/L (NMED, September 1997). Nitrate concentrations higher than 4 mg/L have been reported for monitoring wells AVN-1 and AVN-2, which are located upgradient of TA-V. AVN-1 and AVN-2 are co-located approximately 310 ft northeast of TA-V. These two monitoring wells have historically shown similar NPN concentrations, even though AVN-1 is screened 75 ft deeper than ANV-2. The maximum NPN concentration for AVN-1 was 11.8 mg/L in June 2009. The maximum NPN concentration for AVN-2 was 10.7 mg/L in December 2004. AVN-2 has been dry since April 2008. AVN-1 and AVN-2 were decommissioned in February 2023 (SNL/NM, August 2023). New monitoring well TAV-MW17 was installed in the vicinity of AVN-1 and AVN-2 in April 2023 and sampled for three quarters in CY 2023. The NPN concentrations at TAV-MW17 ranged from 7.57 to 8.70 mg/L, less than the historical maximum concentrations at AVN-1 and AVN-2.

Elevated nitrate concentrations at monitoring wells AVN-1 and AVN-2 may be related to the leaching of naturally occurring nitrate in the vadose zone by the infiltration of surface water through nitrate-bearing soils along Arroyo del Coyote and may not be associated with TA-V operations. Examples of such occurrences have been documented at several locations in the arid southwest United States (Walvoord et al., November 2003). Naturally occurring nitrate sources are also discussed in Chapter 6.0.

5.1.6.5 Contaminant Distribution and Transport in Vadose Zone

Contaminant migration in the subsurface is primarily controlled by infiltration of wastewater historically disposed of at TA-V and the low permeability of the sedimentary units in the vadose zone and Regional Aquifer. Limited amounts of natural recharge are a minor factor, with possible sources including precipitation and ephemeral flows in nearby arroyos.

The vadose zone, consisting of approximately 500 ft of unconsolidated alluvial fan sediments, forms the potential pathway for COC transport from surface and shallow subsurface contamination to the aquifer. The upper section of the alluvial fan sediments is relatively coarse-grained, becoming fine-grained and clay-rich at depths ranging from approximately 320 to 360 ft bgs across TA-V. The hydraulic properties of the vadose zone are highly variable and anisotropic because of the heterogeneous textures, lenticularity, layering, and variations in carbonate cementation. Disposal of large volumes of wastewater from the LWDS Drain Field (SWMU 5), the LWDS Surface Impoundments (SWMU 4), and the TA-V Seepage Pits (SWMU 275) may have occurred along preferential pathways through the thick vadose zone. Vertical flow through the discontinuous, layered, lenticular sediments in the vadose zone was most likely attenuated or diverted at horizons of varying hydraulic properties.

Vapor migration of VOCs in the vadose zone is a possible transport mechanism contributing to the distribution and transport of COCs in groundwater. Within the LWDS Drain Field (SWMU 5), trace quantities of TCE, tetrachloroethene, and benzene were detected in shallow soil-vapor samples collected in 1994 (SNL/NM, March 1999a). The possibility of vadose zone contamination was further investigated with the installation of monitoring wells TAV-MW6, TAV-MW7, TAV-MW8, and TAV-MW9 in March and April 2001. The results of soil-core and soil-vapor samples collected during well installation showed no significant residual VOCs in the vadose zone. Also, there was no evidence of excessive moisture in the vadose zone sediments; therefore, no significant residual wastewater was present in the vadose zone beneath the LWDS Drain Field (SNL/NM, October 2001). In the vicinity of the TA-V Seepage Pits (SWMU 275), trace quantities of TCE, tetrachloroethene, benzene, toluene, and total xylene were detected in soil-vapor samples collected during passive, surficial characterization studies conducted in 1994 and 1995 (SNL/NM, March 1999a).

To characterize the vertical extent of VOCs in the vadose zone at SWMUs 5 and 275, three soil-vapor wells (TAV-SV01, TAV-SV02, and TAV-SV03) were installed in 2011 (Figure 5-2). Each soil-vapor well was constructed with a series of ten 1-ft-long stainless-steel screens set at 50-ft intervals from 50 to 500 ft bgs. The three soil-vapor wells were sampled for eight consecutive quarters (April 2011 through March 2013). The samples were analyzed for VOCs, including TCE. The analytical results were previously reported in the CY 2013 AGMR (SNL/NM, June 2014). TCE was the most prevalent VOC in the vadose zone. Trend analysis indicated that soil-vapor concentrations have stabilized in the vadose zone (SNL/NM, September 2015). Without an active driving force (such as wastewater disposal), the TCE in the vadose zone is unlikely to act as an ongoing contaminant source to the groundwater. TCE is hydrophobic, with a water solubility of 1,100 mg/L at 20 degrees Celsius. Some TCE will be retained in the vadose zone due to sorption to fine-grained materials, as well as dissolution in pore water.

5.1.6.6 Contaminant Distribution and Transport in Groundwater

The concentrations of TCE and nitrate in the groundwater exceed the EPA MCLs at the locations where up to 86 percent of the TA-V wastewater and sanitary waste was disposed (SWMUs 5 and 275). Contaminant transport mechanisms in groundwater potentially include advection, dispersion, diffusion, biodegradation, and sorption (SNL/NM, September 2015). Groundwater monitoring results over the past three decades indicate that advection is not the main force driving contamination migration, most likely because of the low localized groundwater flow velocities. With limited advection, dispersion and diffusion become important transport mechanisms.

The potential for natural (intrinsic) biodegradation to occur in groundwater at TA-V was evaluated in two assessments. The anaerobic biodegradation assessment (SNL/NM, July 2004) involved collection of groundwater samples from the TAVG AOC monitoring well network at the time and analysis for dissolved gases and dechlorination products. The assessment quantitatively evaluated 18 parameters and concluded that anaerobic reductive dechlorination was not a significant process contributing to the natural attenuation of VOCs. Nitrate degradation was qualitatively assessed, and biologically mediated transformation of nitrate was not likely to occur.

The second assessment evaluated aerobic biodegradation (SNL/NM, April 2005). Groundwater samples were collected from the TAVG AOC monitoring well network at the time. The study coupled enzymatic probes with DNA analysis of the native groundwater. The study concluded that aerobic TCE cometabolism by the indigenous microbial population could be an existing mechanism for natural attenuation at the site. However, cometabolic reactions under aerobic conditions require the presence of methane or another similar substrate that is not present at the TAVG AOC (SNL/NM, September 2015). Denitrification was not evaluated in this study.

A study of denitrification parameters and isotopic signatures was conducted in 2013. Groundwater samples were collected from eight monitoring wells (LWDS-MW1, TAV-MW2, TAV-MW5, TAV-MW6, TAV-MW7, TAV-MW8, TAV-MW9, and TAV-MW10) and analyzed for stable dual-isotopes (nitrogen-14/nitrogen-15 and oxygen-16/oxygen-18), dissolved gases (nitrogen and argon), and total organic carbon. The study concluded that natural denitrification was not apparent at the TAVG AOC (Madrid et al., June 2013).

While nitrate does not sorb to sediments, TCE is a hydrophobic organic compound and sorbs to the organic matter in the aquifer matrix. Sorption is also a reversible process. As the dissolved contaminant concentration in groundwater decreases due to advection (although limited), the initially sorbed TCE portion tends to desorb and reenter groundwater through equilibration processes.

In summary, the relatively stable TCE and nitrate concentrations at the TAVG AOC can be attributed to the slow dispersion and diffusion processes and the reversible sorption process (for TCE). The CY 2023 analytical results for TCE and nitrate are discussed in Section 5.6.

5.1.6.7 Potential Receptors of Technical Area-V Groundwater Contamination

The potential for contaminated groundwater from the TAVG AOC to reach receptors was evaluated in the 2015 CCM (SNL/NM, September 2015). Production wells completed in the Regional Aquifer are the only potential exposure points at which the COCs in the groundwater could reach human receptors. However, no consumptive use of groundwater currently occurs within 2.8 miles of TA-V. Production well KAFB-4, the nearest production well, is located approximately 2.8 miles north-northwest of TA-V. Additional production wells are located farther north near the northern boundary of KAFB and are operated by KAFB, ABCWUA, and the VA. MODFLOW modeling results (SNL/NM, July 2005) demonstrated that contaminants in TA-V groundwater do not pose a threat to those production wells. The proposed Mesa del Sol production well field, located approximately 3 miles west of TA-V, is unlikely to be a receptor in the foreseeable future because it is improbable that KAFB and ABCWUA pumping will cease and that the groundwater flow path will revert to a westward direction toward Mesa del Sol.

There is no current or anticipated use of groundwater in the immediate vicinity of TA-V. Therefore, there is no foreseeable risk to human health or the environment from the groundwater contamination at the TAVG AOC or threat to the beneficial use of groundwater downgradient of TA-V.

5.2 Regulatory Criteria

The NMED HWB provides regulatory oversight of SNL/NM Environmental Restoration Operations and enforces regulations mandated by the Resource Conservation and Recovery Act (RCRA). All SWMUs and AOCs at SNL/NM are listed in the *Resource Conservation and Recovery Act Facility Operating Permit for Sandia National Laboratories, EPA ID No. NM5890110518* (RCRA Permit) (NMED January 2015a, as modified).

In April 2004, the Consent Order took effect (NMED, April 2004) and the regulatory authority for corrective action requirements was transferred from the RCRA Permit to the Consent Order. The Consent Order identifies the TA-V groundwater as an AOC. The TAVG AOC investigation must comply with the Consent Order requirements for site characterization and development of a Corrective Measures Evaluation (CME). As Section VI.K.1.a. of the Consent Order specifies, the EPA MCLs for drinking water contaminants, if available, should be used for groundwater cleanup standards. Therefore, the NMED HWB enforces the EPA MCLs for TCE and nitrate (as nitrogen) as groundwater cleanup standards for the TAVG AOC.

In response to the Consent Order, DOE/NNSA and SNL/NM personnel submitted the *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National*

Laboratories/New Mexico Technical Area-V (SNL/NM, April 2004a) and the *Corrective Measures Evaluation Work Plan, Technical Area-V Groundwater* (SNL/NM, April 2004b) to the NMED HWB in April 2004. The 2004 CME Work Plan was updated in December 2004 (2004 CME Work Plan, Revision 0; SNL/NM, December 2004).

After implementing the 2004 CME Work Plan, Revision 0, DOE/NNSA and SNL/NM personnel submitted the *Corrective Measures Evaluation Report for Technical Area-V Groundwater* (2005 CME Report) to the NMED HWB in July 2005 (SNL/NM, July 2005). The NMED HWB subsequently issued three Notices of Disapproval (NODs) for the 2005 CME Report in July 2008, August 2009, and December 2009, respectively (NMED, July 2008, August 2009, December 2009). DOE/NNSA and SNL/NM personnel responded to these NODs in April 2009, November 2009, and February 2010, respectively (DOE, April 2009, November 2009, February 2010). These NOD responses contained an appendix titled Technical Area-V Groundwater Investigation Work Plan, which proposed the installation of four monitoring wells and three soil-vapor wells to meet the NMED HWB characterization requirements. In May 2010, the NMED HWB issued a Notice of Conditional Approval for the Technical Area-V Groundwater Investigation Work Plan, Revision 2 (NMED, May 2010).

Since the 2005 CME Report, a substantial body of information from the additional monitoring wells and soil-vapor wells has become available. Accordingly, in 2013, DOE/NNSA and SNL/NM personnel requested that the 2005 CME Report be withdrawn from review and replaced with an updated CCM/CME Report by November 2014 (DOE, December 2013). The NMED HWB approved the request (NMED, December 2013).

Thereafter, to allow development of the technical approach and preparation of the associated work plan for an ISB treatability study to address the groundwater contamination at the TAVG AOC, DOE/NNSA and SNL/NM personnel requested a two-year extension for submitting the updated CCM/CME Report (DOE, November 2014a). The NMED HWB approved the request (NMED, January 2015b).

DOE/NNSA and SNL/NM personnel submitted the 2015 CCM (SNL/NM, September 2015) to the NMED HWB on October 20, 2015 (DOE, October 2015) to provide the background information, framework, and technical basis for the ISB treatability study. The NMED HWB approved the 2015 CCM on November 30, 2015 (NMED, November 2015).

In anticipation of conducting a phased ISB treatability study, DOE/NNSA and SNL/NM personnel requested, and the NMED HWB subsequently approved, a milestone extension for submitting the updated CCM/CME Report to May 20, 2022 (DOE, March 2016b; NMED, April 2016).

Following completion of the phase I treatability study in May 2021 and the additional one-year sampling of the phase I treatment zone in April 2022, DOE/NNSA and SNL/NM personnel requested another extension for submitting the updated CCM/CME Report (DOE, April 2022b). The NMED HWB approved the extension request on May 24, 2022 (NMED, May 2022). The updated CCM/CME Report is scheduled for submittal to the NMED HWB by May 20, 2024.

DOE/NNSA and SNL/NM personnel continue to present groundwater monitoring data for the TAVG AOC, along with data from other groundwater sites, in AGMRs. The outline of this chapter is based on the Consent Order-required elements of a Periodic Monitoring Report (NMED, April 2004, Section X.D.).

This chapter and its attachments include groundwater monitoring data for both hazardous and radioactive constituents; however, the monitoring data for radionuclides (gamma spectroscopy short list, gross alpha/beta activity, isotopic uranium, and tritium) are provided voluntarily by DOE/NNSA and SNL/NM personnel. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements of the Consent Order (NMED, April 2004), as Section III.A. of the Consent Order specifies.

5.3 Scope of Activities

Section 5.1.5 lists the TAVG AOC groundwater monitoring activities completed in CY 2023. The field activities included water level measurements and groundwater sampling. Table 5-4 summarizes the CY 2023 sampling events. Table 5-5 lists the analytes or parameters for each monitoring well for each sampling event. Tables 5-4 and 5-5 reflect the NMED-approved modified sampling plan for the TAVG AOC monitoring well network (NMED, December 2022), which DOE/NNSA and SNL/NM personnel started to implement in CY 2023.

Field and laboratory quality control (QC) samples (Sections 1.3.4 and 1.3.5) were collected at the same time as the groundwater samples (also referred to as environmental samples). The field QC samples included environmental duplicate, equipment blank (EB), field blank (FB), and trip blank (TB) samples. The TB samples remained in laboratory-supplied sample coolers. The laboratory QC samples included method blank samples.

5.4 Field Methods and Measurements

Section 1.3.1 describes how the CY 2023 groundwater data for the TAVG AOC were collected and analyzed. Table 5-4 lists the mini-SAPs implemented.

Table 5-4
Groundwater Monitoring Well Network and Sampling Dates for the Technical Area-V Groundwater Area of Concern, Calendar Year 2023

Date of Sampling Event	Wells Sampled	SAP
February/March 2023	LWDS-MW1, TAV-MW2, TAV-MW4, TAV-MW6, TAV-MW8, TAV-MW10, TAV-MW11, TAV-MW12, TAV-MW14, and TAV-MW16	*TA-V Groundwater Monitoring Mini-SAP for Second Quarter, Fiscal Year 2023* (SNL January 2023b)
April 2023	TAV-MW17	*TA-V Groundwater Monitoring Mini-SAP for Third Quarter, Fiscal Year 2023* (SNL April 2023b)
July/August/September 2023	LWDS-MW1, 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, TAV-MW15, TAV-MW16, and TAV-MW17	*TA-V Groundwater Monitoring Mini-SAP for Fourth Quarter, Fiscal Year 2023* (SNL July 2023a)
October 2023	TAV-MW17	*TA-V Groundwater Monitoring Mini-SAP for First Quarter, Fiscal Year 2024* (SNL October 2023)

Notes:
*TAV-MW10 was sampled on August 17, 2023, but the analytical results for VOCs were not comparable to historical values (Table 5B-1, Attachment B). The well was resampled for VOCs and NPN on September 27, 2023 with an environmental duplicate sample.

LWDS = Liquid Waste Disposal System
MW = Monitoring Well
NPN = nitrate plus nitrite
SAP = Sampling and Analysis Plan
SNL = Sandia National Laboratories
TA = Technical Area
TAV = Technical Area-V (acronym used for well identification only)
VOC = volatile organic compound

Table 5-5
Parameters Sampled at Technical Area-V Groundwater Area of Concern Monitoring Wells for Each Sampling Event, Calendar Year 2023

February/March 2023		April 2023	
Parameter	**Well ID**	**Parameter**	**Well ID**
NPN VOCs	LWDS-MW1 TAV-MW2 TAV-MW4 TAV-MW4 (Duplicate) TAV-MW6 TAV-MW6 (Duplicate) TAV-MW8 TAV-MW10 TAV-MW11 TAV-MW12 TAV-MW12 (Duplicate) TAV-MW14 TAV-MW16	Alkalinity[a] Anions (Bromide, Chloride, Fluoride, Sulfate)[a] Gamma Spectroscopy (short list[a,b]) Gross Alpha/Beta Activity[a] Isotopic Uranium[a] NPN Perchlorate TAL Metals plus Molybdenum and Uranium[a] Tritium[a] VOCs	TAV-MW17 TAV-MW17 (Duplicate)
July/August/September 2023		**October 2023**	
Parameter	**Well ID**	**Parameter**	**Well ID**
Alkalinity[a] Anions (Bromide, Chloride, Fluoride, Sulfate)[a] Gamma Spectroscopy (short list[a,b]) Gross Alpha/Beta Activity[a] Isotopic Uranium[a,c] NPN Perchlorate[c] TAL Metals plus Molybdenum and Uranium[a] Tritium[a] VOCs	LWDS-MW1 TAV-MW2 TAV-MW3 TAV-MW3 (Duplicate) TAV-MW4 TAV-MW5 TAV-MW6 TAV-MW7 TAV-MW7 (Duplicate) TAV-MW8 TAV-MW9 TAV-MW10 TAV-MW10 (Duplicate) TAV-MW11 TAV-MW12 TAV-MW13 TAV-MW14 TAV-MW15 TAV-MW15 (Duplicate) TAV-MW16 TAV-MW17	Alkalinity[a] Anions (Bromide, Chloride, Fluoride, Sulfate)[a] Gamma Spectroscopy (short list[a,b]) Gross Alpha/Beta Activity[a] Isotopic Uranium[a] NPN Perchlorate TAL Metals plus Molybdenum and Uranium[a] Tritium[a] VOCs	TAV-MW17 TAV-MW17 (Duplicate)

Notes:

[a]Analyses performed for waste characterization purposes (for environmental samples only).
[b]Gamma spectroscopy short list includes americium-241, cesium-137, cobalt-60, and potassium-40.
[c]For TAV-MW17 only.

ID = identifier
LWDS = Liquid Waste Disposal System
MW = Monitoring Well
NPN = nitrate plus nitrite (as nitrogen)
TAL = Target Analyte List
TAV = Technical Area-V (acronym used for well identification only)
VOC = volatile organic compound

5.5 Analytical Methods

The off-site laboratory analyzed the groundwater samples using the applicable EPA and DOE-specified methods and protocols identified in Section 1.3.2 (Tables 1-5 and 1-6).

5.6 Summary of Calendar Year 2023 Analytical Results

This section summarizes the CY 2023 groundwater monitoring results for the TAVG AOC, including exceedances of regulatory standards and trends in TCE and nitrate concentrations. Attachment 5B (Tables 5B-1 through 5B-8) presents the analytical results and field water quality parameter measurements for all CY 2023 sampling events. All analytical results (Tables 5B-1 through 5B-8) were reviewed and qualified during the data validation process and include the laboratory and validation qualifiers. Attachment 5C (Figures 5C-1 through 5C-8) presents concentration trend plots for the monitoring wells that exceeded the EPA MCLs for TCE and nitrate.

TCE and NPN (as nitrogen) are analyzed for every monitoring well sampled during each sampling event, and the waste characterization parameters are analyzed annually for all monitoring wells in the TAVG AOC monitoring well network. Table 5-5 shows that the third quarter was the most comprehensive sampling event in CY 2023, with all 17 active monitoring wells in the TAVG AOC monitoring well network sampled and annual waste characterization parameters analyzed.

New monitoring well TAV-MW17 was sampled for the first time in April 2023. Per the Consent Order, new monitoring wells must be sampled for perchlorate quarterly until they have four consecutive perchlorate results less than the screening level of 4 µg/L (NMED, April 2004). TAV-MW17 was sampled for perchlorate in the second, third, and fourth quarters of CY 2023 (Table 5-5). Waste characterization parameters were also analyzed for TAV-MW17 during each sampling event as a best management practice (Table 5-5).

Table 5B-1 (Attachment 5B) presents the analytical results for VOCs detected above the MDLs and Table 5B-2 (Attachment B) lists the MDLs for the VOCs. All but the following three VOCs were qualified during data validation as not detected in the groundwater samples:

- Chloroform
- cis-1,2-dichloroethene
- TCE

TCE was the only VOC that exceeded the EPA MCL of 5 µg/L. TCE was detected above the EPA MCL in samples from six monitoring wells (LWDS-MW1, TAV-MW4, TAV-MW6, TAV-MW8, TAV-MW10, and TAV-MW14). The maximum TCE concentration was 13.3 µg/L in the environmental sample collected from LWDS-MW1 in March 2023. Historically, the highest TCE concentrations at TA-V have been consistently detected at LWDS-MW1. Figures 5C-1 through 5C-6 (Attachment 5C) present the TCE concentration trend plots for the six monitoring wells. Figures 5C-1 through 5C-6 show the following:

- **LWDS-MW1 (Figure 5C-1, Attachment 5C)**—In CY 2023, the maximum TCE concentration was 13.3 µg/L (March 2023). The overall TCE trend is decreasing, with all concentrations above the EPA MCL of 5 µg/L.
- **TAV-MW4 (Figure 5C-2, Attachment 5C)**—In CY 2023, the maximum TCE concentration was 6.58 µg/L (August 2023). The TCE concentration exceeded the EPA MCL of 5 µg/L for the first time in May 2019. Since then, the overall TCE trend has been increasing, with concentrations mostly above the EPA MCL.

- **TAV-MW6 (Figure 5C-3, Attachment 5C)**—In CY 2023, the maximum TCE concentration was 10.3 µg/L (August 2023). The TCE concentration exceeded the EPA MCL of 5 µg/L for the first time in August 2006. Since then, the TCE concentrations increased, reaching the highest concentration of 18.8 µg/L in March 2014, and thereafter decreased while remaining consistently above the EPA MCL.
- **TAV-MW8 (Figure 5C-4, Attachment 5C)**—In CY 2023, the maximum TCE concentration was 5.37 µg/L (February and August 2023). The TCE concentration exceeded the EPA MCL of 5 µg/L in February 2019, the first time since November 2003. The TCE concentrations fluctuated above and below the EPA MCL of 5 µg/L in 2019 – 2021 and were above the EPA MCL in 2022 and 2023.
- **TAV-MW10 (Figure 5C-5, Attachment 5C)**—In CY 2023, the maximum TCE concentration was 10.6 µg/L (February 2023). The overall TCE trend is slightly decreasing, with all concentrations above the EPA MCL of 5 µg/L.
- **TAV-MW14 (Figure 5C-6, Attachment 5C)**—In CY 2023, the maximum TCE concentration was 5.15 µg/L (February 2023). The overall TCE trend is slightly decreasing; the TCE concentrations historically exceeded the EPA MCL of 5 µg/L and have fluctuated above and below the EPA MCL in recent years.

TCE has also been detected below the EPA MCL of 5 µg/L at five monitoring wells (TAV-MW2, TAV-MW11, TAV-MW12, TAV-MW16, and TAV-MW17).

TCE has never been detected above the MDL at monitoring wells TAV-MW3, TAV-MW5, TAV-MW7, TAV-MW9, or TAV-MW15. The only detection of 0.410 µg/L (J-qualified) in May 2021 at monitoring well TAV-MW13 is considered an anomaly (SNL/NM, June 2022). For these monitoring wells:

- TAV-MW3, TAV-MW5, and TAV-MW15 are located farther away from the discharge sources to the east, west, and south, respectively. TAV-MW13 is located near TAV-MW5 but is screened approximately 40 ft deeper than TAV-MW5. These boundary wells with no TCE detections define the lateral extent of the TCE contamination.
- TAV-MW7 and TAV-MW9 are located near monitoring wells TAV-MW6 and TAV-MW8, respectively, but are screened approximately 90 ft deeper. TCE has not been detected in the two deeper monitoring wells (TAV-MW7 and TAV-MW9). The lack of TCE detection in deeper groundwater near the contaminant sources (SWMUs 5 and 275) indicates that VOCs have not migrated deeper into the Regional Aquifer.

Also, TCE was never detected at monitoring wells AVN-1, AVN-2, and LWDS-MW2 before they were decommissioned in February 2023.

Figure 5-5 shows the TCE isoconcentration contours for the first quarter of CY 2023 (including the TCE result at monitoring well TAV-MW17, which was sampled for the first time in April (the second quarter of CY 2023). Note that monitoring wells with historical TCE detections are sampled semiannually starting in CY 2023. TCE concentrations from the first quarter, instead of the third quarter, were used to generate the TCE isoconcentration contours because they were, overall, higher than those of the third quarter and more representative of historical values. The general location and shape of the TCE isoconcentration contours have not changed significantly over the past several years.

Table 5B-3 (Attachment 5B) presents the analytical results for NPN (as nitrogen). NPN has historically been reported at low concentrations at each monitoring well at TA-V, ranging from less than 5 mg/L to slightly above the EPA MCL of 10 mg/L. NPN was detected above the EPA MCL in samples from monitoring wells LWDS-MW1 and TAV-MW10 in CY 2023. The maximum NPN concentration was 13.0 mg/L in the environmental sample collected from LWDS-MW1 in August 2023. The NPN concentrations at LWDS-MW1 and TAV-MW10 have typically exceeded the EPA MCL. Figures 5C-7 and 5C-8 (Attachment 5C) present the NPN concentration trend plots for LWDS-MW1 and TAV-MW10, respectively. Figures 5C-7 and 5C-8 show the following:

- **LWDS-MW1 (Figure 5C-7, Attachment 5C)**—In CY 2023, the maximum NPN concentration was 13.0 mg/L (August 2023). The overall NPN trend is slightly increasing, with most concentrations above the EPA MCL of 10 mg/L.
- **TAV-MW10 (Figure 5C-8, Attachment 5C)**—In CY 2023, the maximum NPN concentration was 12.8 mg/L (February 2023). The overall NPN trend is slightly increasing, with most concentrations above the EPA MCL of 10 mg/L.

Nitrate concentrations have previously exceeded the EPA MCL of 10 mg/L in samples from monitoring wells LWDS-MW2, TAV-MW6, TAV-MW10, and TAV-MW14, as well as AVN-1 and AVN-2 before they were decommissioned in February 2023 (Section 5.1.6.4). Monitoring well TAV-MW17 was installed in the vicinity of AVN-1 and AVN-2 after they were decommissioned. TAV-MW17 was sampled in the second, third, and fourth quarters of CY 2023, and all NPN concentrations were below the EPA MCL but above the NMED-suggested background concentration for nitrate in groundwater of 4 mg/L. Nitrate was also detected above the EPA MCL once at monitoring well TAV-MW5 in a split sample collected in November 1998 (soon after well installation) but has not been detected above the EPA MCL since then.

Figure 5-6 shows the NPN isoconcentration contour for the third quarter of CY 2023. NPN concentrations from this quarter were used to the generate the NPN isoconcentration contour because this was the only quarter that all 17 active monitoring wells were sampled (Table 5-5). The general location of the 10 mg/L NPN contour has not changed significantly over the past several years, and the contour typically encloses monitoring wells LWDS-MW1 and TAV-MW10.

The TCE and NPN plumes for CY 2023 (Figures 5-5 and 5-6, respectively) are roughly co-located with a generally northwest to southeast orientation. The contaminants are present at low concentrations in the Regional Aquifer in the vicinity of the LWDS Drain Field (SWMU 5) and the TA-V Seepage Pits (SWMU 275). The maximum concentrations of TCE and NPN at monitoring well LWDS-MW1 are slightly offset from SWMU 5, suggesting that localized stratigraphic controls influence contaminant migration in the 500-ft-thick vadose zone above the water table. The variability in hydraulic conductivities in saturated sediments has also likely influenced the distribution of contaminants in groundwater. The hydraulic conductivities measured by slug tests at monitoring wells TAV-MW6 and TAV-MW10 were 1.14 and 4.12 ft/day, respectively. The lowest hydraulic conductivity (0.04 ft/day) was measured at LWDS-MW1, where the highest contaminant concentrations in groundwater were detected. It is possible that a localized low-conductivity zone near the water table at LWDS-MW1 has acted as a barrier for contaminant migration.

Table 5B-4 (Attachment 5B) presents the analytical results for perchlorate at monitoring well TAV-MW17. All perchlorate concentrations were below the screening level of 4 μg/L in samples collected in the second, third, and fourth quarters of CY 2023. The fourth perchlorate sampling event is scheduled for the first quarter of CY 2024.

Table 5B-5 (Attachment 5B) presents the analytical results for anions (bromide, chloride, fluoride, and sulfate) and alkalinity (bicarbonate and carbonate). Anions and alkalinity were analyzed for all monitoring wells during the third quarter of CY 2023 sampling event, as well as for TAV-MW17 during all three CY 2023 sampling events. Fluoride is the only analyte with an established EPA MCL. None of the fluoride results exceeded the EPA MCL of 4.0 mg/L.

Table 5B-6 (Attachment 5B) presents the analytical results for the 23 Target Analyte List metals, molybdenum, and total uranium. These parameters were analyzed for all monitoring wells during the third quarter of CY 2023 sampling event, as well as for TAV-MW17 during all three CY 2023 sampling events. No metal parameters were detected above established EPA MCLs in any groundwater sample.

Table 5B-7 (Attachment 5B) presents the analytical results for gamma spectroscopy short list (americium-241, cesium-137, cobalt-60, and potassium-40), gross alpha/beta activity, and tritium. These radionuclides were analyzed for all monitoring wells during the third quarter of CY 2023 sampling event, as well as for TAV-MW17 during all three CY 2023 sampling events. Table 5B-7 also presents the isotopic uranium results for the three CY 2023 sampling events for TAV-MW17. All results were below established EPA MCLs. Gross alpha activity was measured as a radiological screening tool in accordance with the *National Primary Drinking Water Regulations* (40 CFR Part 141, December 1975, as updated). Naturally occurring uranium was measured independently (i.e., total uranium concentration determined by metals analysis described above), and the gross alpha activity measurements were corrected by subtracting the total uranium activity from the uncorrected gross alpha activity results. An SNL/NM health physicist further reviewed the results to assure that the samples were nonradioactive.

Table 5B-8 (Attachment 5B) presents the field water quality parameter measurements obtained during purging of each monitoring well (Section 1.3.1.2) during the CY 2023 sampling events. The field water quality parameters measured consisted of temperature, specific conductivity, oxidation-reduction potential, pH, turbidity, and dissolved oxygen. These parameters were measured to evaluate water chemistry stability and ensure the collection of representative groundwater samples. It is worth noting that the groundwater in the monitoring wells screened across the water table at TA-V is generally aerobic.

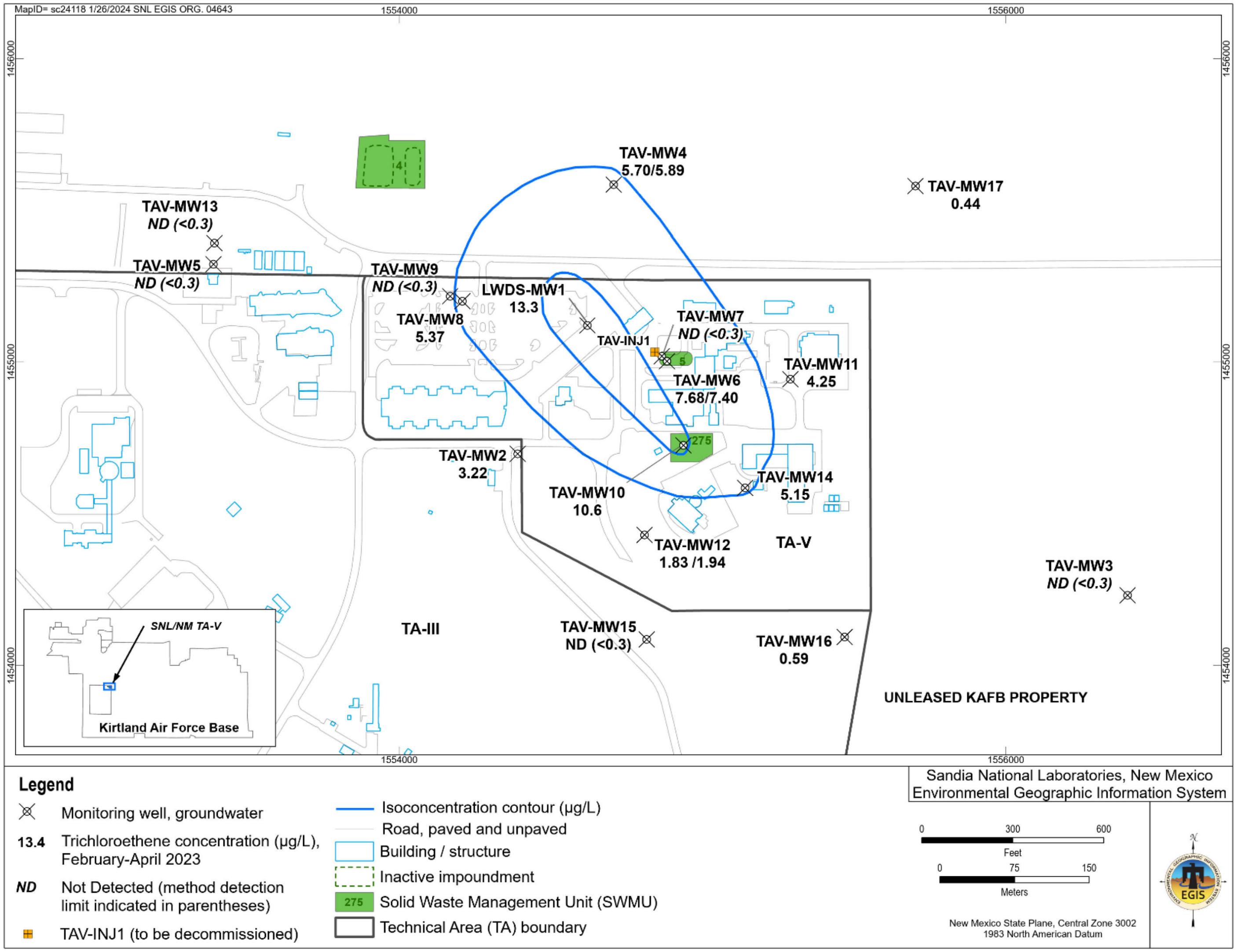

Figure 5-5
Distribution of Trichloroethene in Groundwater at Technical Area-V Groundwater Area of Concern, February – April 2023

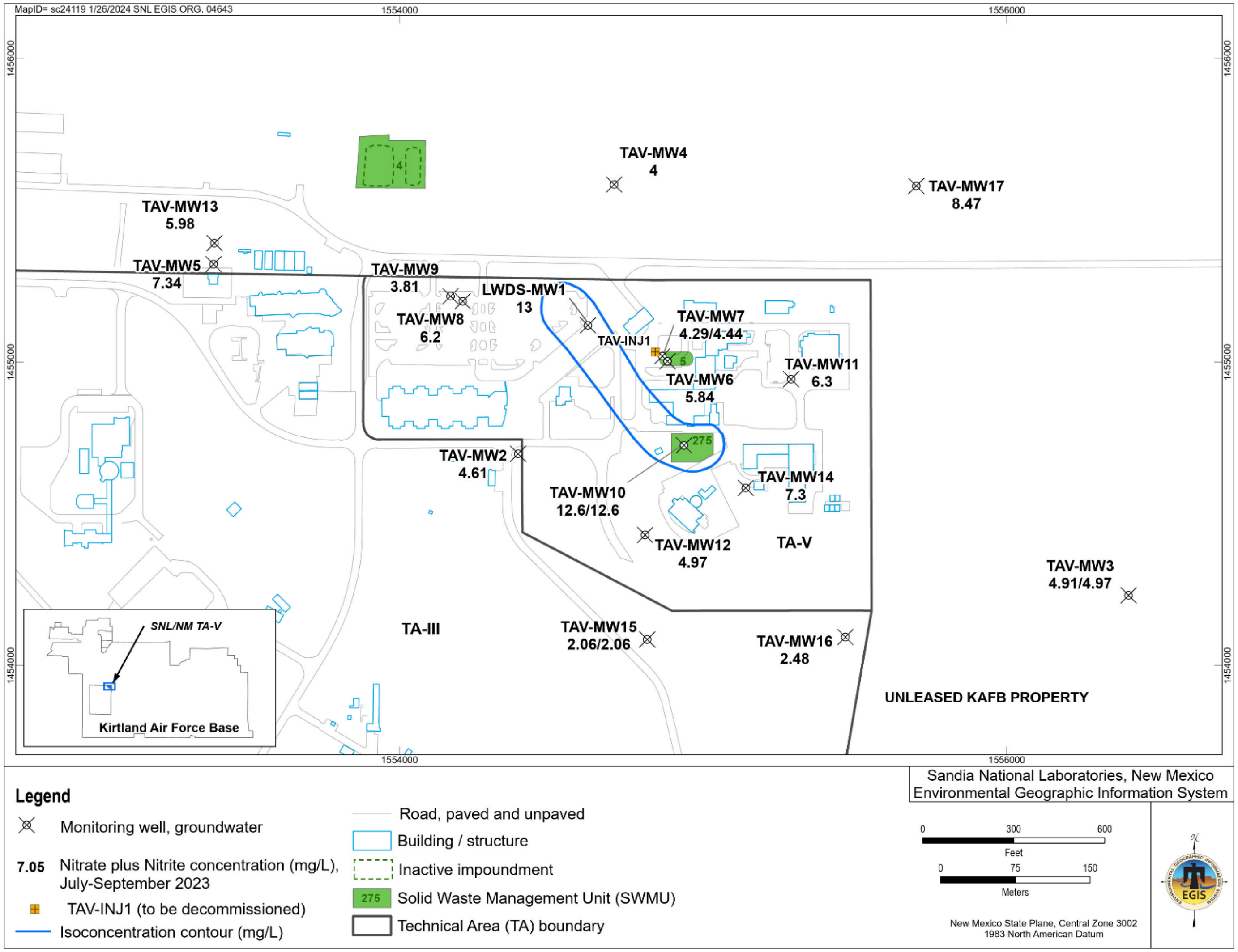

Figure 5-6
Distribution of Nitrate plus Nitrite in Groundwater at Technical Area-V Groundwater Area of Concern, July – September 2023

5.7 Quality Control Results

This section summarizes the CY 2023 field and laboratory QC sample results and their impact on data quality. Section 1.3 describes how the field and laboratory QC samples were collected and prepared. Table 1-7 (Section 1.3.4) lists each field and laboratory QC sample type and purpose.

Environmental duplicate samples were submitted for the same analyses as the environmental samples (minus waste characterization parameters) (Table 5-5). The environmental duplicate samples showed good agreement with the environmental samples based on the relative percent differences (RPDs). RPDs are unitless values calculated for analytes detected above the MDLs in the environmental and environmental duplicate samples. For the four CY 2023 sampling events, the RPDs for NPN ranged from <1 to 3; all were less than the RPD goal of 35. The RPDs for TCE ranged from <1 to 17; all were less than the RPD goal of 20. Environmental duplicate samples from monitoring well TAV-MW17 were submitted for perchlorate analysis during the second and fourth quarter of CY 2023 sampling events; the RPDs for perchlorate were <1 and 1, less than the RPD goal of 35.

EB samples were submitted for the same analyses as the environmental samples. The EB sample results per quarter were as follows:

- **First Quarter of CY 2023 Sampling Event** —Three EB samples were collected before sampling of monitoring wells TAV-MW4, TAV-MW6, and TAV-MW12 began. Bromodichloromethane, chloroform, dibromochloromethane, and NPN were detected in the EB samples. No corrective action for bromodichloromethane, dibromochloromethane, or NPN was required because these compounds were either not detected or detected in the associated environmental samples at concentrations greater than five times the EB result. Chloroform was detected above the practical quantitation limit (PQL) in the EB sample associated with TAV-MW4. However, the chloroform result for TAV-MW4 was not qualified as not detected during data validation because chloroform was historically detected in this well.
- **Second Quarter of CY 2023 Sampling Event** —One EB sample was collected before sampling of monitoring well TAV-MW17 began. Acetone, bromodichloromethane, chloride, chloroform, dibromochloromethane, sodium, and sulfate were detected in the EB sample. No corrective action was necessary because these compounds were either not detected or detected in the associated environmental samples at concentrations greater than five times the EB result.
- **Third Quarter of CY 2023 Sampling Event**—Five EB samples were collected before sampling of monitoring wells TAV-MW3, TAV-MW7, TAV-MW10, TAV-MW10 (resample), and TAV-MW15 began. Acetone, alkalinity, bromodichloromethane, chloride, chloroform, dibromochloromethane, fluoride, manganese, sodium, and sulfate were detected in the EB samples. No corrective action was necessary because these compounds were either not detected or detected in the associated environmental samples at concentrations greater than five times the EB result.
- **Fourth Quarter of CY 2023 Sampling Event**—One EB sample was collected before sampling of monitoring well TAV-MW17 began. Acetone, bromodichloromethane, 2-butanone, chloride, chloroform, sodium, and sulfate were detected in the EB sample. No corrective action was necessary because these compounds were either not detected or detected in the associated environmental samples at concentrations greater than five times the EB result.

The FB samples were analyzed for VOCs. The FB sample results per quarter were as follows:

- **First Quarter of CY 2023 Sampling Event**—Two FB samples were collected at the TAV-MW6 and TAV-MW8 well locations. Acetone, bromodichloromethane, chloroform, and dibromochloromethane were detected in the FB samples. No corrective action was necessary because, except for acetone (see corresponding TB bullet below), these compounds were not detected in the associated environmental samples. An FB sample was collected from the deionized source water used for equipment decontamination. The compounds detected in this FB sample included acetone, bromodichloromethane, chloroform, and dibromochloromethane.
- **Second Quarter of CY 2023 Sampling Event**—One FB sample was collected at the TAV-MW17 well location. Acetone, bromodichloromethane, chloroform, and dibromochloromethane were detected in the FB sample. No corrective action was necessary because these compounds were not detected in the associated environmental sample. An FB sample was collected from the deionized source water used for equipment decontamination. The compounds detected in this FB sample included acetone, bromodichloromethane, chloride, chloroform, dibromochloromethane, sodium, and sulfate.
- **Third Quarter of CY 2023 Sampling Event**—Three FB samples were collected at the TAV-MW8, TAV-MW15, and TAV-MW17 well locations. Acetone, bromodichloromethane, chloroform, and dibromochloromethane were detected in the FB samples. No corrective action was necessary because, except for acetone (see corresponding TB bullet below), these compounds were not detected in the associated environmental samples. An FB sample was collected from the deionized source water used for equipment decontamination. The compounds detected in this FB sample included acetone, bromodichloromethane, chloride, chloroform, copper, dibromochloromethane, sodium, and sulfate.
- **Fourth Quarter of CY 2023 Sampling Event**—One FB sample was collected at the TAV-MW17 well location. Acetone, bromodichloromethane, and chloroform were detected in the FB sample. No corrective action was necessary because these compounds were not detected in the associated environmental samples. A second FB sample was collected from the deionized source water used for equipment decontamination. The compounds detected in this FB sample included acetone, bromodichloromethane, chloroform, sodium, and sulfate.

The TB samples were analyzed for VOCs. The TB sample results per quarter were as follows:

- **First Quarter of CY 2023 Sampling Event**—Fourteen TB samples were submitted. Acetone and methylene chloride were detected at concentrations less than the PQLs in the TB samples and method blank sample. As a result, the environmental and environmental duplicate sample results for acetone for monitoring wells LWDS-MW1, TAV-MW6, TAV-MW8, TAV-MW10, TAV-MW12, and TAV-MW14 and methylene chloride for monitoring wells TAV-MW4, TAV-MW6, TAV-MW8, and TAV-MW14 were qualified as not detected during data validation.
- **Second Quarter of CY 2023 Sampling Event**—Two TB samples were submitted. Except for methylene chloride, no VOCs were detected in the TB samples. Methylene chloride was qualified as not detected during data validation because it was detected at a concentration less than the PQL in the method blank sample.
- **Third Quarter of CY 2023 Sampling Event—**Twenty-two TB samples were submitted. Acetone was detected at a concentration less than the PQL in one TB sample; therefore, the acetone result for monitoring well TAV-MW17 was qualified as not detected during data validation. Methylene chloride was detected at concentrations less than the PQL in the TB samples and method blank sample. As a result, the environmental and environmental duplicate sample results for methylene chloride for monitoring wells LWDS-MW1, TAV-MW9, and TAV-MW15 were qualified as not detected during data validation.

- **Fourth Quarter of CY 2023 Sampling Event**—Three TB samples were submitted. Methylene chloride was detected at concentrations less than the PQL in the TB samples. As a result, the environmental and environmental duplicate sample results for methylene chloride for monitoring well TAV-MW17 were qualified as not detected during data validation.

The laboratory QC sample results led to the following data qualifications in the environmental sample results:

- **First Quarter of CY 2023 Sampling Event**—See respective bullet under TB samples.
- **Second Quarter of CY 2023 Sampling Event**—Methylene chloride was detected at a concentration less than the PQL in the method blank sample. As a result, the environmental and environmental duplicate sample results for methylene chloride for monitoring well TAV-MW17 were qualified as not detected during data validation.
- **Third Quarter of CY 2023 Sampling Event**—See respective bullet under TB samples.
- **Fourth Quarter of CY 2023 Sampling Event**—None.

5.8 Variances and Nonconformances

No modifications to or deviations from the mini-SAPs (Table 5-4) were identified during the CY 2023 sampling activities. However, the following observations and activities associated with the CY 2023 sampling events were noted:

- **All Four Sampling Events in CY 2023 —**Monitoring wells LWDS-MW1 and TAV-MW12 purged dry before meeting the minimum purge volume requirement. The wells were allowed to recharge and were sampled the following workday.
- **Third Quarter of CY 2023 Sampling Event—**Due to elevated and unstable turbidity measurements during purging, monitoring well TAV-MW5 was purged an extra 3 gal to meet field water quality parameter stabilization criteria. Silt and sand were observed in the groundwater and on the sampling equipment after the sampling pump was removed from the well.
- **Third Quarter of CY 2023 Sampling Event—**Monitoring well TAV-MW10 was resampled for VOCs and NPN on September 27, 2023 because the original VOC values from samples collected on August 17, 2023 were not comparable to historical values and the RPDs were outside of QC criteria. The resample results were comparable to historical values and are reported in Tables 5B-1 and 5B-3 (Attachment 5B).

5.9 Summary and Conclusions

The CSM for the TAVG AOC indicates that contaminant releases involving TCE occurred from two primary sources (SWMUs 5 and 275). TCE was present in wastewater that was disposed of at the underground LWDS Drain Field (SWMU 5) during the period of 1962 to 1967 and at the buried TA-V Seepage Pits (SWMU 275) from the 1960s to the early 1980s.

Wastewater devoid of TCE continued to flush through the vadose zone beneath the TA-V Seepage Pits (SWMU 275) until 1992, most likely removing a significant portion of a potential secondary contaminant source. Upon cessation of wastewater disposal, drainage diminished through vertical pathways in the vadose zone. The low concentrations of TCE present in the Regional Aquifer today represent the wastewater releases that occurred before 1992. Sanitary waste containing nitrate was also released at SWMU 275 from the 1960s to 1992. Wastewater containing the contaminants migrated downward through the vadose zone and into the Regional Aquifer.

The combined effect of several wastewater release locations, various wastewater volumes, variable aquifer lithology, low groundwater flow velocities, dispersion, diffusion, and sorption is responsible for the current distribution of TCE and nitrate in the Regional Aquifer.

TCE concentrations in groundwater samples from six monitoring wells (LWDS-MW1, TAV-MW4, TAV-MW6, TAV-MW8, TAV-MW10, and TAV-MW14) exceeded the EPA MCL of 5 µg/L in CY 2023. The maximum TCE concentration was 13.3 µg/L in the environmental sample collected from monitoring well LWDS-MW1 in March 2023.

NPN concentrations in groundwater samples from monitoring wells LWDS-MW1 and TAV-MW10 exceeded the EPA MCL of 10 mg/L in CY 2023. The maximum NPN concentration was 13.0 mg/L in the environmental sample collected from monitoring well LWDS-MW1 in August 2023.

The CY 2023 analytical results are consistent with historical values. The following conclusions are based on a comprehensive review of historical and current groundwater contamination at the TAVG AOC:

- The COCs are TCE and nitrate.
- The primary sources of TCE and nitrate are two wastewater disposal systems: the LWDS Drain Field (SWMU 5) and the TA-V Seepage Pits (SWMU 275).
- Based on historical use and disposal of organic solvents at TA-V, the extent of TCE in the Regional Aquifer is attributed to wastewater releases containing TCE and the subsequent transport of TCE through the vadose zone to groundwater.
- The distribution of low TCE concentrations in the Regional Aquifer has remained relatively stable and is attributed to the combined effect of fine-grained aquifer lithology, low groundwater flow velocities, dispersion, diffusion, and sorption.
- The distribution of low nitrate concentrations is laterally widespread in the area, both inside and outside the TA-V boundary. The extent of the 10 mg/L NPN concentration contour has remained relatively stable within the TA-V boundary. An unrelated nitrate source and/or elevated background may contribute to the nitrate concentrations at upgradient monitoring well TAV-MW17, which is located northeast of TA-V.

5.10 Summary of Future Activities

TAVG AOC groundwater monitoring activities in CY 2024 will include:

- Quarterly groundwater elevation measurements at active monitoring wells.
- Collection and analysis of groundwater samples from active monitoring wells.
- Annual reporting of the CY 2024 groundwater monitoring activities and results in the CY 2024 AGMR.
- Completion of perchlorate sampling at monitoring well TAV-MW17.
- Plugging and abandonment of injection well TAV-INJ1.
- Submittal of the *Monitoring Well TAV-MW17 Installation and Monitoring Well AVN-1, AVN-2, and LWDS-MW2 Decommissioning Report (Revised)* to the NMED HWB in January 2024.
- Submittal of the *Comprehensive Site-Wide Groundwater Monitoring Plan, Calendar Year 2025* to the NMED HWB in April 2024.
- Submittal of the updated TAVG AOC CCM/CME Report to the NMED HWB in May 2024.

Attachment 5A
Historical Timeline of the Technical Area-V Groundwater Area of Concern

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Table 5A-1
Historical Timeline of the Technical Area-V Groundwater Area of Concern

Month	Year	Event	Reference
May	1959	Production well KAFB-10 was installed for fire suppression purposes. Water pumped occasionally for maintenance testing.	NMOSE, May 1959
	1961	Research buildings were constructed at TA-V.	DOE, September 1987
	1962	Discharge of wastewater to the vadose zone began.	DOE, September 1987
	1984	DOE created the CEARP to evaluate potential release sites at SNL/NM.	DOE, September 1987
	1988	The SNL/NM ER Project was created and began conducting investigations using the CEARP list of sites.	SNL/NM, March 1999a
	1992	Wastewater discharges to the vadose zone ceased after the ABCWUA sanitary sewer system was extended to TA-V.	SNL/NM, March 1999a
April	1992	The LWDS RFI Work Plan (SWMUs 4, 5, and 52) was submitted.	SNL/NM, March 1993
October	1992	Groundwater monitoring well LWDS-MW2 was installed at TA-V for the LWDS investigation.	SNL/NM, March 1993
May	1993	Groundwater monitoring well LWDS-MW1 was installed.	SNL/NM, September 1995
November	1993	LWDS-MW1 and LWDS-MW2 were sampled. The TCE concentration at LWDS-MW1 was 6 µg/L and exceeded the EPA MCL of 5 µg/L.	SNL/NM, March 1995a
June	1994	Submitted notification letter from DOE to EPA regarding TCE concentration exceeding MCL in well LWDS-MW1.	DOE, June 1994
March	1995	Groundwater sample analytical results for monitoring wells LWDS-MW1 and LWDS-MW2 reported in the CY 1994 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, March 1995a
February/March	1995	Wells TAV-MW1 and TAV-MW2 were installed.	SNL/NM, March 1996
May/June	1995	Wells AVN-1 and AVN-2 were installed.	SNL/NM, March 1995b
	1995	The LWDS RFI Report was completed.	SNL/NM, September 1995
March	1996	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 1995 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, March 1996
March	1996	Submitted letter to the NMED HWB with notification of elevated nitrate detection for well LWDS-MW1. The result was 10.1 mg/L, exceeding the EPA MCL of 10 mg/L.	DOE, March 1996
April	1996	KAFB-10 was plugged and abandoned due to the potential for the annulus of this production well to act as a conduit.	SNL/NM, April 1996
March	1997	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 1996 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, March 1997
April	1997	Wells TAV-MW3, TAV-MW4, and TAV-MW5 were installed.	SNL/NM, March 1999a
September	1997	NMED HWB issued an RSI stating that additional characterization was needed for each of the LWDS sites (SWMUs 4, 5, and 52).	NMED, September 1997
January	1998	RSI Response submitted to the NMED HWB.	SNL/NM, January 1998
March	1998	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 1997 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, March 1998
October	1998	Provided cross sections to the NMED HWB for the LWDS as required in the September 1997 RSI.	DOE, October 1998
March	1999	Submitted a summary report detailing groundwater conditions for the TA-III/V area that included sites from OU 1306 (TA-III) and OU 1307 (LWDS).	SNL/NM March 1999a
March	1999	Groundwater sampling analytical results for TAVG monitoring wells reported in the FY 1998 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM March 1999b

Refer to Notes at end of table.

Table 5A-1 (continued)
Historical Timeline of the Technical Area-V Groundwater Area of Concern

Month	Year	Event	Reference
March	2000	Groundwater sampling analytical results for TAVG monitoring wells reported in the FY 1999 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, March 2000
March/April	2001	Wells TAV-MW6, TAV-MW7, TAV-MW8, and TAV-MW9 were installed.	SNL/NM, October 2001
April	2001	Groundwater sampling analytical results for TAVG monitoring wells reported in the FY 2000 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, April 2001
November	2001	A summary of groundwater sampling results from TAVG monitoring wells for FYs 1999 and 2000 were compiled into one report. This was an update of the SNL March 1999a summary report.	SNL/NM, November 2001
March	2002	Groundwater sampling analytical results for TAVG monitoring wells reported in the FY 2001 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, March 2002
March	2003	Groundwater sampling analytical results for TAVG monitoring wells reported in the FY 2002 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, March 2003
June	2003	Subsurface geology at KAFB, including the TAVG monitoring area, was updated.	Van Hart, June 2003
March	2004	Groundwater sampling analytical results for TAVG monitoring wells reported in the FY 2003 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, March 2004
April	2004	The NMED issued the Consent Order to DOE/Sandia, which identified the TAVG as an AOC with groundwater contamination requiring a CME.	NMED, April 2004
April	2004	Submitted the TA-V CCM.	SNL/NM, April 2004a
April	2004	Submitted the TA-V CME Work Plan.	SNL/NM April 2004b
July	2004	The potential for natural (intrinsic) anaerobic biodegradation of TCE and nitrate in TA-V groundwater was evaluated.	SNL/NM, July 2004
October	2004	The NMED HWB approved the TA-V CCM without modification and approved the TA-V CME Work Plan with modification.	NMED, October 2004
December	2004	Submitted responses to the NMED HWB approval with modifications of the April 2004 TA-V CME Work Plan and a revised TA-V CME Work Plan.	SNL/NM, December 2004
April	2005	The potential for natural (intrinsic) aerobic biodegradation of TCE in TA-V groundwater was evaluated.	SNL/NM, April 2005
July	2005	Submitted the TA-V CME Report. The report details the selection of a preferred remedial alternative, cleanup goals, and a Corrective Measures Implementation Plan.	SNL/NM, July 2005
October	2005	Submitted request to the NMED HWB for change in sampling frequency for TAVG monitoring wells.	DOE, October 2005
October	2005	Groundwater sampling analytical results for TAVG monitoring wells reported in the FY 2004 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, October 2005
March	2006	Requested the removal of well AVN-2 from the TAVG monitoring network due to insufficient water for sampling caused by regional water level decline.	DOE, March 2006
November	2006	Groundwater sampling analytical results for TAVG monitoring wells reported in the FY 2005 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, November 2006

Refer to Notes at end of table.

Table 5A-1 (continued)
Historical Timeline of the Technical Area-V Groundwater Area of Concern

Month	Year	Event	Reference
March	2007	Groundwater sampling analytical results for TAVG monitoring wells reported in the FY 2006 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, March 2007
February	2008	Well TAV-MW1 plugged and abandoned. Well TAV-MW10 installed as replacement for TAV-MW1.	SNL/NM, June 2008
March	2008	Groundwater sampling analytical results for TAVG monitoring wells reported in the FY 2007 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, March 2008
July	2008	NMED HWB issued a NOD on the July 2005 CME Report for TAVG AOC.	NMED, July 2008
September	2008	The 13 TAVG monitoring wells were resurveyed to establish more accurate northing and easting coordinates and elevations for each well.	SNL/NM, October 2008
April	2009	NMED HWB required characterization of perchlorate in groundwater in one well (LWDS-MW1) at TA-V.	NMED, April 2009
April	2009	Submitted a response to the NOD on the July 2005 CME Report for TAVG AOC.	DOE, April 2009
June	2009	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 2008 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, June 2009
August	2009	NMED HWB issued a second NOD on the July 2005 CME Report for TAVG AOC.	NMED, August 2009
November	2009	Submitted a response to the second NOD on the July 2005 CME Report for TAVG AOC.	DOE, November 2009
December	2009	NMED HWB issued a third NOD on the July 2005 CME Report for TAVG AOC.	NMED, December 2009
February	2010	Submitted a response to the third NOD on the July 2005 CME Report for TAVG AOC.	DOE, February 2010
May	2010	NMED HWB issued a notice of conditional approval for the TA-V Groundwater Investigation Work Plan, Revision 2, which was part of the NOD responses.	NMED, May 2010
October	2010	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 2009 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, October 2010
November	2010	Completed installation of groundwater monitoring wells TAV-MW11, TAV-MW12, TAV-MW13, and TAV-MW14.	SNL/NM, June 2011
November	2010	Submitted a report to the NMED HWB for the geophysical logs and slug test results for the four newly installed TAVG monitoring wells.	SNL/NM, November 2010
December	2010	NMED HWB issued approval for the modification of soil-vapor monitoring well design.	NMED, December 2010
March	2011	Completed installation of soil-vapor monitoring wells TAV-SV01, TAV-SV02, and TAV-SV03.	SNL/NM, June 2011
June	2011	Submitted a summary report for TA-V Groundwater and Soil-Vapor Monitoring Well Installation.	SNL/NM, June 2011
July	2011	DOE/NNSA and SNL/NM personnel met with the NMED HWB to discuss the results from the first quarter of groundwater and soil-vapor monitoring.	SNL/NM, July 2011
September	2011	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 2010 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, September 2011
June	2012	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 2011 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, June 2012

Refer to Notes at end of table.

Table 5A-1 (continued)
Historical Timeline of the Technical Area-V Groundwater Area of Concern

Month	Year	Event	Reference
June	2013	A study of denitrification parameters and isotopic signatures was conducted.	Madrid et al., June 2013
June	2013	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 2012 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, June 2013
September	2013	NMED HWB approved the summary report for TA-V Groundwater and Soil-Vapor Monitoring Well Installation.	NMED, September 2013
December	2013	Requested that the 2005 CME Report be withdrawn and replaced with an updated CCM and CME Report.	DOE, December 2013
December	2013	NMED HWB approved the extension request for an updated CCM and CME Report to be submitted by November 21, 2014.	NMED, December 2013
June	2014	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 2013 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, June 2014
September	2014	DOE Office of Environmental Management issued a memorandum to DOE/NNSA Sandia Field Office providing the IRR team's comments and recommendations on the corrective measures for TAVG AOC based on a multi-agency meeting including the NMED HWB on July 17, 2014.	DOE, September 2014
November	2014	Submitted a two-year extension request for the CCM and CME Report.	DOE, November 2014a
November	2014	DOE Office of Environmental Management issued a second IRR memorandum that had been submitted to the Deputy Assistant Secretary of the Office of Environmental Compliance regarding the IRR team's recommendations for TAVG AOC.	DOE, November 2014b
January	2015	NMED HWB approved the extension request for an updated CCM and CME Report. Due date revised to November 30, 2016.	NMED, January 2015b
May	2015	DOE Office of Environmental Management issued a third IRR memorandum that had been submitted to the Deputy Assistant Secretary of the Office of Environmental Compliance as their final recommendations for TAVG AOC.	DOE, May 2015
June	2015	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 2014 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, June 2015
October	2015	Submitted an updated CCM and a Treatability Study Work Plan (TSWP) for In Situ Bioremediation (ISB) at TAVG AOC. Two phases were proposed in the TSWP. One injection well would be installed and operated in Phase I. Dependent of the findings of Phase I, two more injection wells could be installed and operated in phase two.	SNL/NM, September 2015 DOE, October 2015
November	2015	NMED HWB approved the 2015 CCM for TAVG AOC.	NMED, November 2015
December	2015	NMED HWB disapproved the TSWP and requested a revised TSWP and a response letter that addressed the disapproval comments by January 29, 2016.	NMED, December 2015
January	2016	Requested a two-month extension for the revised TSWP and the response to the NMED HWB disapproval letter.	DOE, January 2016
January	2016	NMED HWB approved the extension request for submittal of comments response and the revised TSWP. The new due date was March 31, 2016.	NMED, January 2016

Refer to Notes at end of table.

Table 5A-1 (continued)
Historical Timeline of the Technical Area-V Groundwater Area of Concern

Month	Year	Event	Reference
March	2016	Submitted the revised TSWP and the response to the NMED HWB disapproval letter.	SNL/NM, March 2016 DOE, March 2016a
March	2016	Submitted a summary of agreements and proposed schedule milestones pursuant to a multi-agency meeting including the NMED HWB on July 20, 2015. Requested an extension to update the CCM and CME Report.	DOE, March 2016b
April	2016	NMED HWB approved the extension of milestones and stated the new due date for the updated CCM and CME Report for TAVG AOC was May 20, 2022.	NMED, April 2016
May	2016	NMED HWB approved the Revised TSWP.	NMED, May 2016a
May	2016	Submitted the Notice of Intent to Discharge to the NMED GWQB for the ISB Treatability Study injection wells.	DOE, May 2016
May	2016	NMED HWB stated the report for geophysical Logs and slug test results (SNL November 2010) will be superseded by the updated CCM and CME Report.	NMED, May 2016b
June	2016	NMED GWQB stated that a Discharge Permit would be required for the ISB Treatability Study injection wells.	NMED, June 2016
June	2016	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 2015 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, June 2016
July	2016	Submitted the Discharge Permit Application for the ISB Treatability Study injection wells.	DOE, July 2016a
July	2016	Submitted the Permit to Drill applications to NMOSE for installing two groundwater monitoring wells, TAV-MW15 and TAV-MW16, and one injection well TAV-INJ1.	DOE, July 2016b
August	2016	NMOSE approved the Permit to Drill applications for wells TAV-MW15, TAV-MW16, and TAV-INJ1.	NMOSE, August 2016
September	2016	NMED GWQB determined the Discharge Permit Application was administratively complete.	NMED, September 2016
November	2016	Completed the public notice requirements for the Discharge Permit Application.	DOE, November 2016
January	2017	Completed installation and development of monitoring wells TAV-MW15 and TAV-MW16.	SNL/NM, May 2017
January	2017	Completed the redevelopment of monitoring wells AVN-1, LWDS-MW2, TAV-MW2, TAV-MW9, TAV-MW11, and TAV-MW12.	Lum, May 2017
February	2017	Started to implement the new sampling requirements per the NMED HWB-approved Revised TSWP.	DOE, March 2016a NMED, May 2016a
May	2017	NMED GWQB issued Discharge Permit, DP-1845.	NMED, May 2017
June	2017	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 2016 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, June 2017
May/July	2017	Well installation report for monitoring wells TAV-MW15 and TAV-MW16 was submitted to the NMED HWB.	SNL/NM, May 2017 DOE, July 2017
August	2017	NMED HWB approved the well installation report for monitoring wells TAV-MW15 and TAV-MW16.	NMED, August 2017
November	2017	Installed injection well TAV-INJ1 for Phase I of the ISB Treatability Study.	SNL/NM, June 2018a
November	2017	Notification to the NMED GWQB to commence discharge under DP-1845. Pilot Test for Phase I of the ISB Treatability Study was conducted. Approximately 9,000 gallons of treatment solution was discharged at injection well TAV-INJ1.	DOE, November 2017

Refer to Notes at end of table.

Table 5A-1 (continued)
Historical Timeline of the Technical Area-V Groundwater Area of Concern

Month	Year	Event	Reference
June	2018	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 2017 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, June 2018b
July	2018	Notification to the NMED HWB to proceed to full-scale operation at injection well TAV-INJ1 with modifications.	DOE, July 2018
August	2018	NMED HWB approved the modifications and concurred with the decision to proceed to full-scale operation at injection well TAV-INJ1.	NMED, August 2018
October	2018	Submitted the summary of the ISB Treatability Study Pilot Test operation and results.	SNL/NM, October 2018
October	2018	Full-scale operation for the Phase I ISB Treatability Study started at injection well TAV-INJ1.	SNL/NM, April 2019
April	2019	Completed six-month injections at well TAV-INJ1. Approximately 530,000 gallons of treatment solution was discharged via TAV-INJ1.	SNL/NM, October 2019
May	2019	Started two-year performance monitoring of the Phase I ISB Treatability Study.	SNL/NM, October 2019
June	2019	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 2018 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, June 2019
September	2019	NMED HWB requested a minimum of two sampling events to be conducted for 1,4-dioxane at TAVG AOC.	NMED, September 2019
June	2020	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 2019 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, June 2020
May/June	2021	Completed two sampling events for 1,4-dioxane at all groundwater wells at TAVG AOC.	SNL/NM, June 2022
June	2021	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 2020 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, June 2021
August	2021	Submitted request to the NMED HWB for transition of five groundwater wells under the NMED GWQB to the NMED HWB as condition to terminate DP-1845.	DOE, August 2021
August/ September	2021	Submitted the Work Plan to plug and abandon wells ANV-1, ANV-2, and LWDS-MW2, and install a new groundwater well (to be designated TAV-MW17).	SNL/NM, August 2021 DOE, September 2021
October	2021	NMED HWB approved the transition of five groundwater wells from the NMED GWQB to the NMED HWB.	NMED, October 2021a
October	2021	NMED HWB approved the Work Plan (with modification) to plug and abandon monitoring wells ANV-1, ANV-2, and LWDS-MW2, and install new monitoring well TAV-MW17.	NMED, October 2021b
November	2021	NMED GWQB agreed with the transition of five groundwater wells to the NMED HWB.	NMED, November 2021
November	2021	Submitted request to the NMED GWQB to terminate DP-1845.	DOE, November 2021
February	2022	NMED GWQB terminated DP-1845.	NMED, February 2022
March/April	2022	Submitted the Phase I Treatability Study Report to the NMED HWB.	SNL/NM, March 2022 DOE, April 2022a
April	2022	Requested an extension for submittal of the TAVG AOC CCM and CME Report, which was due to the NMED HWB by May 20, 2022.	DOE, April 2022b
May	2022	NMED HWB approved the extension request for the TAVG AOC CCM and CME Report.	NMED, May 2022

Refer to Notes at end of table.

Table 5A-1 (concluded)
Historical Timeline of the Technical Area-V Groundwater Area of Concern

June	2022	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 2021 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, June 2022
June	2022	NMED HWB approved the Phase I Treatability Study Report.	NMED, June 2022
July	2022	Submitted request to decommission well TAV-INJ1 and revert monitoring well TAV-MW6 to follow the requirements of the TAVG monitoring network.	DOE, July 2022
August	2022	Submitted request to modify the sampling plan of the TAVG monitoring network.	DOE, August 2022
September	2022	NMED HWB approved the request to decommission well TAV-INJ1 and revert monitoring well TAV-MW6 to follow the requirements of the TAVG monitoring network.	NMED, September 2022
December	2022	NMED HWB approved the request to modify the sampling plan of the TAVG monitoring network.	NMED, December 2022
January/ February	2023	Submitted the work plan to decommission injection well TAV-INJ1.	SNL/NM, January 2023a DOE, February 2023
February	2023	Plugged and abandoned three existing monitoring wells AVN-1, AVN-2, and LWDS-MW2 and installed new monitoring well TAV-MW17.	SNL/NM, July 2023b
March	2023	NMED HWB approved the work plan to decommission injection well TAV-INJ1.	NMED, March 2023
June	2023	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 2022 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, June 2023
July/August	2023	Submitted TAV-MW17 installation and AVN-1, AVN-2, and LWDS-MW2 decommissioning report.	SNL/NM, July 2023c DOE, August 2023
October	2023	NMED HWB issued approval with modification on the TAV-MW17 installation and AVN-1, AVN-2, and LWDS-MW2 decommissioning report.	NMED, October 2023a

Notes:

ABCWUA	= Albuquerque Bernalillo County Water Utility Authority
AOC	= Area of Concern
AVN	= Area-V (North)
CEARP	= Comprehensive Environmental Assessment and Response Program
CCM	= Current Conceptual Model
CME	= Corrective Measures Evaluation
Consent Order	= Compliance Order on Consent
CY	= calendar year
DP	= Discharge Permit
DOE	= U.S. Department of Energy
EPA	= U.S. Environmental Protection Agency
ER	= Environmental Restoration
FY	= fiscal year
GWQB	= Ground Water Quality Bureau
HWB	= Hazardous Waste Bureau
INJ	= Injection Well
IRR	= Internal Remedy Review
KAFB	= Kirtland Air Force Base
LWDS	= Liquid Waste Disposal System
MCL	= maximum contaminant level
µg/L	= microgram(s) per liter
mg/L	= milligram(s) per liter
MW	= Monitoring Well
NMED	= New Mexico Environment Department
NMOSE	= New Mexico Office of the State Engineer
NNSA	= National Nuclear Security Administration

Notes (concluded)

NOD	= Notice of Disapproval
OU	= Operable Unit
RCRA	= Resource Conservation and Recovery Act
RFI	= RCRA Facility Investigation
RSI	= Request for Supplemental Information
Sandia	= Sandia Corporation
SNL	= Sandia National Laboratories
SNL/NM	= Sandia National Laboratories, New Mexico
SWMU	= Solid Waste Management Unit
TA	= Technical Area
TAV	= Technical Area-V (well identification only)
TAVG	= Technical Area-V Groundwater
TCE	= trichloroethene

Attachment 5B
Technical Area-V Analytical Results Tables

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Attachment 5B Tables

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Table 5B-1
Summary of Detected Volatile Organic Compounds, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
LWDS-MW1 02-Mar-23	Acetone	2.19	1.74	5.00	NE	B, J	5.0U	119560-001	SW846-8260D
	Chloroform	0.430	0.333	1.00	80.0	J		119560-001	SW846-8260D
	Trichloroethene	**13.3**	0.333	1.00	5.00			119560-001	SW846-8260D
	cis-1,2-Dichloroethene	3.17	0.333	1.00	70.0			119560-001	SW846-8260D
TAV-MW2 16-Feb-23	Trichloroethene	3.22	0.333	1.00	5.00			119531-001	SW846-8260D
TAV-MW4 23-Feb-23	Chloroform	1.01	0.333	1.00	80.0		J	119546-001	SW846-8260D
	Methylene chloride	0.810	0.500	5.00	5.00	J	5.0UJ	119546-001	SW846-8260D
	Trichloroethene	**5.70**	0.333	1.00	5.00			119546-001	SW846-8260D
	cis-1,2-Dichloroethene	0.570	0.333	1.00	70.0	J		119546-001	SW846-8260D
TAV-MW4 (Duplicate) 23-Feb-23	Chloroform	1.06	0.333	1.00	80.0		J	119547-001	SW846-8260D
	Methylene chloride	0.850	0.500	5.00	5.00	J	5.0UJ	119547-001	SW846-8260D
	Trichloroethene	**5.89**	0.333	1.00	5.00			119547-001	SW846-8260D
	cis-1,2-Dichloroethene	0.600	0.333	1.00	70.0	J		119547-001	SW846-8260D
TAV-MW6 27-Feb-23	Acetone	2.19	1.74	5.00	NE	J	5.0U	119555-001	SW846-8260D
	Methylene chloride	2.98	0.500	5.00	5.00	B, J	5.0U	119555-001	SW846-8260D
	Trichloroethene	**7.68**	0.333	1.00	5.00			119555-001	SW846-8260D
	cis-1,2-Dichloroethene	0.870	0.333	1.00	70.0	J		119555-001	SW846-8260D
TAV-MW6 (Duplicate) 27-Feb-23	Acetone	2.07	1.74	5.00	NE	J	5.0U	119556-001	SW846-8260D
	Methylene chloride	2.95	0.500	5.00	5.00	B, J	5.0U	119556-001	SW846-8260D
	Trichloroethene	**7.40**	0.333	1.00	5.00			119556-001	SW846-8260D
	cis-1,2-Dichloroethene	0.920	0.333	1.00	70.0	J		119556-001	SW846-8260D
TAV-MW8 24-Feb-23	Acetone	2.06	1.74	5.00	NE	J	5.0U	119550-001	SW846-8260D
	Methylene chloride	2.98	0.500	5.00	5.00	B, J	5.0U	119550-001	SW846-8260D
	Trichloroethene	**5.37**	0.333	1.00	5.00			119550-001	SW846-8260D
	cis-1,2-Dichloroethene	0.520	0.333	1.00	70.0	J		119550-001	SW846-8260D
TAV-MW10 28-Feb-23	Acetone	2.37	1.74	5.00	NE	B, J	5.0U	119558-001	SW846-8260D
	Trichloroethene	**10.6**	0.333	1.00	5.00			119558-001	SW846-8260D
	cis-1,2-Dichloroethene	2.02	0.333	1.00	70.0			119558-001	SW846-8260D
TAV-MW11 21-Feb-23	Trichloroethene	4.25	0.333	1.00	5.00			119540-001	SW846-8260D
	cis-1,2-Dichloroethene	0.490	0.333	1.00	70.0	J		119540-001	SW846-8260D
TAV-MW12 20-Feb-23	Acetone	2.33	1.74	5.00	NE	B, J	5.0U	119535-001	SW846-8260D
	Trichloroethene	1.83	0.333	1.00	5.00			119535-001	SW846-8260D
TAV-MW12 (Duplicate) 20-Feb-23	Trichloroethene	1.94	0.333	1.00	5.00			119536-001	SW846-8260D

Refer to Notes on page 5B-42.

Table 5B-1 (continued)
Summary of Detected Volatile Organic Compounds, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW14 22-Feb-23	Acetone	1.91	1.74	5.00	NE	J	5.0U	119542-001	SW846-8260D
	Methylene chloride	0.810	0.500	5.00	5.00	J	5.0UJ	119542-001	SW846-8260D
	Trichloroethene	**5.15**	0.333	1.00	5.00			119542-001	SW846-8260D
	cis-1,2-Dichloroethene	0.450	0.333	1.00	70.0	J		119542-001	SW846-8260D
TAV-MW16 15-Feb-23	Trichloroethene	0.590	0.333	1.00	5.00	J		119529-001	SW846-8260D
TAV-MW17 21-Apr-23	Methylene chloride	1.36	0.500	5.00	5.00	B, J	5.0U	120126-001	SW846-8260D
	Trichloroethene	0.440	0.333	1.00	5.00	J		120126-001	SW846-8260D
TAV-MW17 (Duplicate) 21-Aprl-23	Methylene chloride	1.49	0.500	5.00	5.00	B, J	5.0U	120127-001	SW846-8260D
	Trichloroethene	0.520	0.333	1.00	5.00	J		120127-001	SW846-8260D
LWDS-MW1 21-Aug-23	Chloroform	0.480	0.333	1.00	80.0	J		120910-001	SW846-8260D
	Methylene chloride	4.40	0.500	5.00	5.00	B, J	5.0U	120910-001	SW846-8260D
	Trichloroethene	**7.71**	0.333	1.00	5.00			120910-001	SW846-8260D
	cis-1,2-Dichloroethene	2.39	0.333	1.00	70.0			120910-001	SW846-8260D
TAV-MW2 09-Aug-23	Trichloroethene	2.36	0.333	1.00	5.00		J	120890-001	SW846-8260D
TAV-MW4 15-Aug-23	Chloroform	1.10	0.333	1.00	80.0			120901-001	SW846-8260D
	Trichloroethene	**6.58**	0.333	1.00	5.00			120901-001	SW846-8260D
	cis-1,2-Dichloroethene	0.630	0.333	1.00	70.0	J		120901-001	SW846-8260D
TAV-MW6 16-Aug-23	Trichloroethene	**10.3**	0.333	1.00	5.00			120903-001	SW846-8260D
	cis-1,2-Dichloroethene	1.07	0.333	1.00	70.0			120903-001	SW846-8260D
TAV-MW8 14-Aug-23	Trichloroethene	**5.37**	0.333	1.00	5.00			120899-001	SW846-8260D
	cis-1,2-Dichloroethene	0.560	0.333	1.00	70.0	J		120899-001	SW846-8260D
TAV-MW9 27-Jul-23	Methylene chloride	1.16	0.500	5.00	5.00	J	5.0U	120867-001	SW846-8260D
TAV-MW10 17-Aug-23	Trichloroethene	**5.24**	0.333	1.00	5.00		R	120907-001	SW846-8260D
	cis-1,2-Dichloroethene	1.21	0.333	1.00	70.0		R	120907-001	SW846-8260D
TAV-MW10 (Duplicate) 17-Aug-23	Trichloroethene	**8.62**	0.333	1.00	5.00		R	120908-001	SW846-8260D
	cis-1,2-Dichloroethene	1.7	0.333	1.00	70.0		R	120908-001	SW846-8260D
TAV-MW10 (Resample) 27-Sep-23	Trichloroethene	**9.21**	0.333	1.00	5.00			121153-001	SW846-8260D
	cis-1,2-Dichloroethene	1.69	0.333	1.00	70.0			121153-001	SW846-8260D
TAV-MW10 (Duplicate) 27-Sep-23	Trichloroethene	**9.21**	0.333	1.00	5.00			121154-001	SW846-8260D
	cis-1,2-Dichloroethene	1.77	0.333	1.00	70.0			121154-001	SW846-8260D
TAV-MW11 10-Aug-23	Trichloroethene	4.82	0.333	1.00	5.00			120894-001	SW846-8260D
	cis-1,2-Dichloroethene	0.630	0.333	1.00	70.0	J		120894-001	SW846-8260D
TAV-MW12 08-Aug-23	Trichloroethene	2.93	0.333	1.00	5.00			120887-001	SW846-8260D

Refer to Notes on page 5B-42.

Table 5B-1 (concluded)
Summary of Detected Volatile Organic Compounds, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW14	Trichloroethene	4.57	0.333	1.00	5.00			120896-001	SW846-8260D
11-Aug-23	cis-1,2-Dichloroethene	0.440	0.333	1.00	70.0	J		120896-001	SW846-8260D
TAV-MW15 26-Jul-23	Methylene chloride	1.10	0.500	5.00	5.00	J	5.0U	120864-001	SW846-8260D
TAV-MW15 (Duplicate) 26-Jul-23	Methylene chloride	1.18	0.500	5.00	5.00	J	5.0U	120865-001	SW846-8260D
TAV-MW17	Acetone	2.29	1.74	5.00	NE	J	5.0U	120915-001	SW846-8260D
04-Aug-23	Trichloroethene	0.470	0.333	1.00	5.00	J		120915-001	SW846-8260D
TAV-MW17	Methylene chloride	0.620	0.500	5.00	5.00	J	5.0UJ	121354-001	SW846-8260D
24-Oct-23	Trichloroethene	0.470	0.333	1.00	5.00	J	J	121354-001	SW846-8260D
TAV-MW17 (Duplicate)	Methylene chloride	0.620	0.500	5.00	5.00	J	5.0UJ	121355-001	SW846-8260D
24-Oct-23	Trichloroethene	0.450	0.333	1.00	5.00	J	J	121355-001	SW846-8260D

Refer to Notes on page 5B-42.

Table 5B-2
Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260B and SW846-8260D), Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Analyte	MDL[b] (µg/L)	Analyte	MDL[b] (µg/L)
1,1,1-Trichloroethane	0.333	Chlorobenzene	0.333
1,1,2,2-Tetrachloroethane	0.333	Chloroethane	0.333
1,1,2-Trichloroethane	0.333	Chloroform	0.333
1,1-Dichloroethane	0.333	Chloromethane	0.333
1,1-Dichloroethene	0.333	Cyclohexane	0.333
1,2,3-Trichlorobenzene	0.333	Dibromochloromethane	0.333
1,2,4-Trichlorobenzene	0.333	Dichlorodifluoromethane	0.355
1,2-Dibromo-3-chloropropane	0.333	Ethylbenzene	0.333
1,2-Dibromoethane	0.333	Isopropylbenzene	0.333
1,2-Dichlorobenzene	0.333	Methyl acetate	1.67
1,2-Dichloroethane	0.333	Methylcyclohexane	0.333
1,2-Dichloropropane	0.333	Methylene chloride	0.500
1,3-Dichlorobenzene	0.333	Styrene	0.333
1,4-Dichlorobenzene	0.333	Tert-butyl methyl ether	0.333
2,2-trifluoroethane, 1,1,2-Trichloro-1	2.98	Tetrachloroethene	0.333
2-Butanone	1.67	Toluene	0.333
2-Hexanone	1.67	Trichloroethene	0.333
4-methyl-, 2-Pentanone	1.67	Trichlorofluoromethane	0.333
Acetone	1.74	Vinyl chloride	0.333
Benzene	0.333	Xylene	1.00
Bromochloromethane	0.333	cis-1,2-Dichloroethene	0.333
Bromodichloromethane	0.333	cis-1,3-Dichloropropene	0.333
Bromoform	0.333	m,p-Xylene	0.500
Bromomethane	0.337	o-Xylene	0.333
Carbon disulfide	1.67	trans-1,2-Dichloroethene	0.333
Carbon tetrachloride	0.333	trans-1,3-Dichloropropene	0.333

Refer to Notes on page 5B-42.

Table 5B-3
Summary of Nitrate plus Nitrite Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
LWDS-MW1 02-Mar-23	Nitrate plus nitrite	**12.1**	0.425	1.25	10.0			119560-002	EPA 353.2
TAV-MW2 16-Feb-23	Nitrate plus nitrite	5.30	0.170	0.500	10.0			119531-002	EPA 353.2
TAV-MW4 23-Feb-23	Nitrate plus nitrite	4.31	0.0850	0.250	10.0			119546-002	EPA 353.2
TAV-MW4 (Duplicate) 23-Feb-23	Nitrate plus nitrite	4.29	0.0850	0.250	10.0			119547-002	EPA 353.2
TAV-MW6 27-Feb-23	Nitrate plus nitrite	6.33	0.425	1.25	10.0			119555-002	EPA 353.2
TAV-MW6 (Duplicate) 27-Feb-23	Nitrate plus nitrite	6.30	0.425	1.25	10.0			119556-002	EPA 353.2
TAV-MW8 24-Feb-23	Nitrate plus nitrite	6.75	0.425	1.25	10.0			119550-002	EPA 353.2
TAV-MW10 28-Feb-23	Nitrate plus nitrite	**12.8**	0.425	1.25	10.0			119558-002	EPA 353.2
TAV-MW11 21-Feb-23	Nitrate plus nitrite	6.65	0.0850	0.250	10.0			119540-002	EPA 353.2
TAV-MW12 20-Feb-23	Nitrate plus nitrite	4.97	0.0850	0.250	10.0			119535-002	EPA 353.2
TAV-MW12 (Duplicate) 20-Feb-23	Nitrate plus nitrite	4.86	0.0850	0.250	10.0			119536-002	EPA 353.2
TAV-MW14 22-Feb-23	Nitrate plus nitrite	7.35	0.0850	0.250	10.0			119542-002	EPA 353.2
TAV-MW16 15-Feb-23	Nitrate plus nitrite	2.62	0.170	0.500	10.0			119529-002	EPA 353.2
TAV-MW17 21-Apr-23	Nitrate plus nitrite	7.63	0.170	0.500	10.0			120126-002	EPA 353.2
TAV-MW17 (Duplicate) 21-Apr-23	Nitrate plus nitrite	7.57	0.170	0.500	10.0			120127-002	EPA 353.2

Refer to Notes on page 5B-42.

Table 5B-3 (continued)
Summary of Nitrate plus Nitrite Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
LWDS-MW1 21-Aug-23	Nitrate plus nitrite	**13.0**	0.850	2.50	10.0			120910-002	EPA 353.2
TAV-MW2 09-Aug-23	Nitrate plus nitrite	4.61	0.850	2.50	10.0		J	120890-002	EPA 353.2
TAV-MW3 01-Aug-23	Nitrate plus nitrite	4.91	0.850	2.50	10.0			120878-002	EPA 353.2
TAV-MW3 (Duplicate) 01-Aug-23	Nitrate plus nitrite	4.97	0.850	2.50	10.0			120879-002	EPA 353.2
TAV-MW4 15-Aug-23	Nitrate plus nitrite	4.00	0.425	1.25	10.0			120901-002	EPA 353.2
TAV-MW5 02-Aug-23	Nitrate plus nitrite	7.34	0.170	0.500	10.0			120881-002	EPA 353.2
TAV-MW6 16-Aug-23	Nitrate plus nitrite	5.84	0.170	0.500	10.0			120903-002	EPA 353.2
TAV-MW7 28-Jul-23	Nitrate plus nitrite	4.29	0.170	0.500	10.0			120871-002	EPA 353.2
TAV-MW7 (Duplicate) 28-Jul-23	Nitrate plus nitrite	4.44	0.170	0.500	10.0			120872-002	EPA 353.2
TAV-MW8 14-Aug-23	Nitrate plus nitrite	6.20	0.850	2.50	10.0			120899-002	EPA 353.2
TAV-MW9 27-Jul-23	Nitrate plus nitrite	3.81	0.170	0.500	10.0			120867-002	EPA 353.2
TAV-MW10 17-Aug-23	Nitrate plus nitrite	**11.9**	1.70	5.00	10.0		R	120907-002	EPA 353.2
TAV-MW10 (Duplicate) 17-Aug-23	Nitrate plus nitrite	**12.0**	1.70	5.00	10.0		R	120908-002	EPA 353.2
TAV-MW10 (Resample) 27-Sep-23	Nitrate plus nitrite	**12.6**	1.70	5.00	10.0			121153-002	EPA 353.2
TAV-MW10 (Duplicate) 27-Sep-23	Nitrate plus nitrite	**12.6**	1.70	5.00	10.0			121154-002	EPA 353.2
TAV-MW11 10-Aug-23	Nitrate plus nitrite	6.30	0.850	2.50	10.0			120894-002	EPA 353.2
TAV-MW12 08-Aug-23	Nitrate plus nitrite	4.97	0.170	0.500	10.0			120887-002	EPA 353.2
TAV-MW13 31-Jul-23	Nitrate plus nitrite	5.98	0.170	0.500	10.0			120874-002	EPA 353.2
TAV-MW14 11-Aug-23	Nitrate plus nitrite	7.30	0.850	2.50	10.0			120896-002	EPA 353.2

Refer to Notes on page 5B-42.

Table 5B-3 (concluded)
Summary of Nitrate plus Nitrite Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW15 26-Jul-23	Nitrate plus nitrite	2.06	0.170	0.500	10.0			120864-002	EPA 353.2
TAV-MW15 (Duplicate) 26-Jul-23	Nitrate plus nitrite	2.06	0.170	0.500	10.0			120865-002	EPA 353.2
TAV-MW16 03-Aug-23	Nitrate plus nitrite	2.48	0.0850	0.250	10.0			120883-002	EPA 353.2
TAV-MW17 04-Aug-23	Nitrate plus nitrite	8.47	0.170	0.500	10.0			120915-002	EPA 353.2
TAV-MW17 24-Oct-23	Nitrate plus nitrite	8.70	0.170	0.500	10.0			121354-002	EPA 353.2
TAV-MW17 (Duplicate) 24-Oct-23	Nitrate plus nitrite	8.66	0.170	0.500	10.0			121355-002	EPA 353.2

Refer to Notes on page 5B-42.

Table 5B-4
Summary of Perchlorate Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW17 21-Apr-23	Perchlorate	0.000705	0.00005	0.004	NE	N	J-	120126-003	SW846-6850 M
TAV-MW17 (Duplicate) 21-Apr-23	Perchlorate	0.000703	0.00005	0.004	NE	N	J-	120127-003	SW846-6850 M
TAV-MW17 04-Aug-23	Perchlorate	0.000688	0.00005	0.0002	NE			120915-003	SW846-6850 M
TAV-MW17 24-Oct-23	Perchlorate	0.000758	0.00005	0.004	NE	H	J	121354-003	SW846-6850 M
TAV-MW17 (Duplicate) 24-Oct-23	Perchlorate	0.000764	0.00005	0.004	NE	H	J	121355-003	SW846-6850 M

Refer to Notes on page 5B-42.

Table 5B-5
Summary of Anions and Alkalinity Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW17	Bromide	0.215	0.067	0.200	NE			120126-004	SW846 9056A
21-Apr-23	Chloride	17.6	0.335	1.00	NE			120126-004	SW846 9056A
	Fluoride	1.17	0.033	0.100	4.0			120126-004	SW846 9056A
	Sulfate	39.0	0.665	2.00	NE			120126-004	SW846 9056A
	Bicarbonate Alkalinity	160	1.45	4.00	NE			120126-005	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		120126-005	SM 2320B
LWDS-MW1	Bromide	0.876	0.0670	0.200	NE			120910-003	SW846 9056A
21-Aug-23	Chloride	78.8	1.68	5.00	NE			120910-003	SW846 9056A
	Fluoride	0.719	0.0330	0.100	4.0			120910-003	SW846 9056A
	Sulfate	37.6	3.33	10.0	NE			120910-003	SW846 9056A
	Bicarbonate Alkalinity	198	0.725	2.00	NE			120910-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		120910-004	SM 2320B
TAV-MW2	Bromide	0.336	0.0670	0.200	NE		J	120890-003	SW846 9056A
09-Aug-23	Chloride	50.6	0.670	2.00	NE		J	120890-003	SW846 9056A
	Fluoride	1.06	0.0330	0.100	4.0		J	120890-003	SW846 9056A
	Sulfate	53.6	1.33	4.00	NE		J	120890-003	SW846 9056A
	Bicarbonate Alkalinity	249	0.725	2.00	NE		J	120890-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U	UJ	120890-004	SM 2320B
TAV-MW3	Bromide	0.243	0.0670	0.200	NE			120878-003	SW846 9056A
01-Aug-23	Chloride	27.7	0.670	2.00	NE			120878-003	SW846 9056A
	Fluoride	1.48	0.0330	0.100	4.0			120878-003	SW846 9056A
	Sulfate	65.7	1.33	4.00	NE			120878-003	SW846 9056A
	Bicarbonate Alkalinity	196	0.725	2.00	NE			120878-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		120878-004	SM 2320B
TAV-MW4	Bromide	0.483	0.0670	0.200	NE			120901-003	SW846 9056A
15-Aug-23	Chloride	39.9	0.335	1.00	NE			120901-003	SW846 9056A
	Fluoride	1.11	0.0330	0.100	4.0			120901-003	SW846 9056A
	Sulfate	36.7	0.665	2.00	NE			120901-003	SW846 9056A
	Bicarbonate Alkalinity	180	0.725	2.00	NE			120901-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		120901-004	SM 2320B
TAV-MW5	Bromide	0.184	0.0670	0.200	NE	J		120881-003	SW846 9056A
02-Aug-23	Chloride	18.2	0.335	1.00	NE			120881-003	SW846 9056A
	Fluoride	1.23	0.0330	0.100	4.0			120881-003	SW846 9056A
	Sulfate	42.3	0.665	2.00	NE			120881-003	SW846 9056A
	Bicarbonate Alkalinity	189	0.725	2.00	NE			120881-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		120881-004	SM 2320B

Refer to Notes on page 5B-42.

Table 5B-5 (continued)
Summary of Anions and Alkalinity Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW6	Bromide	0.880	0.0670	0.200	NE			120903-003	SW846 9056A
16-Aug-23	Chloride	88.8	1.34	4.00	NE			120903-003	SW846 9056A
	Fluoride	1.15	0.0330	0.100	4.0			120903-003	SW846 9056A
	Sulfate	38.8	2.66	8.00	NE			120903-003	SW846 9056A
	Bicarbonate Alkalinity	200	0.725	2.00	NE			120903-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		120903-004	SM 2320B
TAV-MW7	Bromide	0.246	0.0670	0.200	NE			120871-003	SW846 9056A
28-Jul-23	Chloride	29.2	0.335	1.00	NE			120871-003	SW846 9056A
	Fluoride	1.09	0.0330	0.100	4.0			120871-003	SW846 9056A
	Sulfate	66.1	0.665	2.00	NE			120871-003	SW846 9056A
	Bicarbonate Alkalinity	226	0.725	2.00	NE			120871-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		120871-004	SM 2320B
TAV-MW8	Bromide	0.328	0.0670	0.200	NE			120899-003	SW846 9056A
14-Aug-23	Chloride	42.9	0.670	2.00	NE			120899-003	SW846 9056A
	Fluoride	1.41	0.0330	0.100	4.0			120899-003	SW846 9056A
	Sulfate	48.6	1.33	4.00	NE			120899-003	SW846 9056A
	Bicarbonate Alkalinity	204	0.725	2.00	NE			120899-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		120899-004	SM 2320B
TAV-MW9	Bromide	0.275	0.0670	0.200	NE			120867-003	SW846 9056A
27-Jul-23	Chloride	34.6	0.335	1.00	NE			120867-003	SW846 9056A
	Fluoride	0.835	0.0330	0.100	4.0			120867-003	SW846 9056A
	Sulfate	61.4	0.665	2.00	NE			120867-003	SW846 9056A
	Bicarbonate Alkalinity	238	0.725	2.00	NE			120867-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		120867-004	SM 2320B
TAV-MW10	Bromide	0.374	0.0670	0.200	NE			120907-003	SW846 9056A
17-Aug-23	Chloride	47.1	0.670	2.00	NE			120907-003	SW846 9056A
	Fluoride	1.44	0.0330	0.100	4.0			120907-003	SW846 9056A
	Sulfate	46.4	1.33	4.00	NE			120907-003	SW846 9056A
	Bicarbonate Alkalinity	187	0.725	2.00	NE			120907-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		120907-004	SM 2320B
TAV-MW11	Bromide	0.530	0.0670	0.200	NE			120894-003	SW846 9056A
10-Aug-23	Chloride	54.7	0.670	2.00	NE			120894-003	SW846 9056A
	Fluoride	1.44	0.0330	0.100	4.0			120894-003	SW846 9056A
	Sulfate	42.4	1.33	4.00	NE			120894-003	SW846 9056A
	Bicarbonate Alkalinity	180	0.725	2.00	NE			120894-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		120894-004	SM 2320B

Refer to Notes on page 5B-42.

Table 5B-5 (continued)
Summary of Anions and Alkalinity Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW12	Bromide	0.390	0.0670	0.200	NE			120887-003	SW846 9056A
08-Aug-23	Chloride	50.6	0.670	2.00	NE			120887-003	SW846 9056A
	Fluoride	1.06	0.0330	0.100	4.0			120887-003	SW846 9056A
	Sulfate	60.4	1.33	4.00	NE	N	J+	120887-003	SW846 9056A
	Bicarbonate Alkalinity	246	0.725	2.00	NE			120887-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		120887-004	SM 2320B
TAV-MW13	Bromide	0.175	0.0670	0.200	NE	J		120874-003	SW846 9056A
31-Jul-23	Chloride	16.5	0.335	1.00	NE			120874-003	SW846 9056A
	Fluoride	1.16	0.0330	0.100	4.0			120874-003	SW846 9056A
	Sulfate	49.1	0.665	2.00	NE			120874-003	SW846 9056A
	Bicarbonate Alkalinity	198	0.725	2.00	NE			120874-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		120874-004	SM 2320B
TAV-MW14	Bromide	0.347	0.0670	0.200	NE			120896-003	SW846 9056A
11-Aug-23	Chloride	51.9	0.670	2.00	NE			120896-003	SW846 9056A
	Fluoride	1.25	0.0330	0.100	4.0			120896-003	SW846 9056A
	Sulfate	56.1	1.33	4.00	NE			120896-003	SW846 9056A
	Bicarbonate Alkalinity	219	0.725	2.00	NE			120896-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		120896-004	SM 2320B
TAV-MW15	Bromide	0.511	0.0670	0.200	NE			120864-003	SW846 9056A
26-Jul-23	Chloride	74.8	1.34	4.00	NE			120864-003	SW846 9056A
	Fluoride	0.860	0.0330	0.100	4.0			120864-003	SW846 9056A
	Sulfate	57.8	2.66	8.00	NE			120864-003	SW846 9056A
	Bicarbonate Alkalinity	265	0.725	2.00	NE			120864-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		120864-004	SM 2320B
TAV-MW16	Bromide	0.465	0.0670	0.200	NE			120883-003	SW846 9056A
03-Aug-23	Chloride	83.2	1.68	5.00	NE			120883-003	SW846 9056A
	Fluoride	0.959	0.0330	0.100	4.0			120883-003	SW846 9056A
	Sulfate	58.5	0.665	2.00	NE			120883-003	SW846 9056A
	Bicarbonate Alkalinity	286	0.725	2.00	NE			120883-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		120883-004	SM 2320B
TAV-MW17	Bromide	0.214	0.0670	0.200	NE			120915-004	SW846 9056A
04-Aug-23	Chloride	16.9	0.335	1.00	NE			120915-004	SW846 9056A
	Fluoride	1.21	0.0330	0.100	4.0			120915-004	SW846 9056A
	Sulfate	31.1	0.665	2.00	NE			120915-004	SW846 9056A
	Bicarbonate Alkalinity	161	0.725	2.00	NE			120915-005	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		120915-005	SM 2320B

Refer to Notes on page 5B-42.

Table 5B-5 (concluded)
Summary of Anions and Alkalinity Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW17	Bromide	0.214	0.0670	0.200	NE			121354-004	SW846 9056A
24-Oct-23	Chloride	16.8	0.335	1.00	NE	B		121354-004	SW846 9056A
	Fluoride	1.23	0.0330	0.100	4.0			121354-004	SW846 9056A
	Sulfate	30.0	0.665	2.00	NE			121354-004	SW846 9056A
	Bicarbonate Alkalinity	159	0.725	2.00	NE			121354-005	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		121354-005	SM 2320B

Refer to Notes on page 5B-42.

Table 5B-6
Summary of TAL Metals plus Molybdenum and Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW17	Aluminum	0.0506	0.0193	0.050	NE			120126-006	SW846 3005A/6020B
21-Apr-23	Antimony	ND	0.001	0.003	0.006	U		120126-006	SW846 3005A/6020B
	Arsenic	ND	0.002	0.005	0.010	U		120126-006	SW846 3005A/6020B
	Barium	0.100	0.00067	0.004	2.00			120126-006	SW846 3005A/6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		120126-006	SW846 3005A/6020B
	Cadmium	ND	0.0003	0.001	0.005	U		120126-006	SW846 3005A/6020B
	Calcium	42.9	0.080	0.200	NE			120126-006	SW846 3005A/6020B
	Chromium	0.00638	0.003	0.010	0.100	J		120126-006	SW846 3005A/6020B
	Cobalt	ND	0.0003	0.001	NE	U		120126-006	SW846 3005A/6020B
	Copper	0.00777	0.0003	0.002	NE	J		120126-006	SW846 3005A/6020B
	Iron	0.0723	0.033	0.100	NE	J		120126-006	SW846 3005A/6020B
	Lead	ND	0.0005	0.002	NE	U		120126-006	SW846 3005A/6020B
	Magnesium	12.4	0.010	0.030	NE			120126-006	SW846 3005A/6020B
	Manganese	0.0340	0.001	0.005	NE			120126-006	SW846 3005A/6020B
	Mercury	ND	0.000067	0.0002	0.002	U		120126-006	SW846 7470A
	Molybdenum	0.0170	0.0002	0.001	NE			120126-006	SW846 3005A/6020B
	Nickel	ND	0.0006	0.002	NE	U		120126-006	SW846 3005A/6020B
	Potassium	2.91	0.080	0.300	NE			120126-006	SW846 3005A/6020B
	Selenium	0.00267	0.015	0.005	0.050	J		120126-006	SW846 3005A/6020B
	Silver	ND	0.0003	0.001	NE	U		120126-006	SW846 3005A/6020B
	Sodium	47.4	0.080	0.250	NE			120126-006	SW846 3005A/6020B
	Thallium	ND	0.0006	0.002	0.002	U		120126-006	SW846 3005A/6020B
	Uranium	0.00303	0.000067	0.0002	0.030			120126-006	SW846 3005A/6020B
	Vanadium	0.00638	0.0033	0.020	NE	J		120126-006	SW846 3005A/6020B
	Zinc	0.0275	0.0033	0.020	NE			120126-006	SW846 3005A/6020B

Refer to Notes on page 5B-42.

Table 5B-6 (continued)
Summary of TAL Metals plus Molybdenum and Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
LWDS-MW1	Aluminum	ND	0.0193	0.0500	NE	U		120910-005	SW846 3005A/6020B
21-Aug-23	Antimony	ND	0.00100	0.00300	0.006	U		120910-005	SW846 3005A/6020B
	Arsenic	0.00300	0.00200	0.00500	0.010	J		120910-005	SW846 3005A/6020B
	Barium	0.0965	0.000670	0.00400	2.00			120910-005	SW846 3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120910-005	SW846 3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		120910-005	SW846 3005A/6020B
	Calcium	71.8	0.800	2.00	NE		J	120910-005	SW846 3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120910-005	SW846 3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120910-005	SW846 3005A/6020B
	Copper	ND	0.000300	0.00200	NE	U		120910-005	SW846 3005A/6020B
	Iron	ND	0.0330	0.100	NE	U		120910-005	SW846 3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120910-005	SW846 3005A/6020B
	Magnesium	20.7	0.0100	0.0300	NE			120910-005	SW846 3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	U		120910-005	SW846 3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		120910-005	SW846 7470A
	Molybdenum	0.00440	0.000200	0.00100	NE			120910-005	SW846 3005A/6020B
	Nickel	ND	0.000600	0.00200	NE	U		120910-005	SW846 3005A/6020B
	Potassium	2.87	0.0800	0.300	NE			120910-005	SW846 3005A/6020B
	Selenium	0.00549	0.00150	0.00500	0.050			120910-005	SW846 3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120910-005	SW846 3005A/6020B
	Sodium	65.7	0.800	2.50	NE			120910-005	SW846 3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120910-005	SW846 3005A/6020B
	Uranium	0.00269	0.0000670	0.000200	0.030			120910-005	SW846 3005A/6020B
	Vanadium	0.00734	0.00330	0.0200	NE	J		120910-005	SW846 3005A/6020B
	Zinc	0.00342	0.00330	0.0200	NE	J		120910-005	SW846 3005A/6020B

Refer to Notes on page 5B-42.

Table 5B-6 (continued)
Summary of TAL Metals plus Molybdenum and Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW2	Aluminum	ND	0.0193	0.0500	NE	U		120890-005	SW846 3005A/6020B
09-Aug-23	Antimony	ND	0.00100	0.00300	0.006	U		120890-005	SW846 3005A/6020B
	Arsenic	0.00228	0.00200	0.00500	0.010	J		120890-005	SW846 3005A/6020B
	Barium	0.0617	0.000670	0.00400	2.00			120890-005	SW846 3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120890-005	SW846 3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		120890-005	SW846 3005A/6020B
	Calcium	71.6	0.800	2.00	NE			120890-005	SW846 3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120890-005	SW846 3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120890-005	SW846 3005A/6020B
	Copper	0.000491	0.000300	0.00200	NE	J		120890-005	SW846 3005A/6020B
	Iron	ND	0.0330	0.100	NE	U		120890-005	SW846 3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120890-005	SW846 3005A/6020B
	Magnesium	22.8	0.0100	0.0300	NE			120890-005	SW846 3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	U		120890-005	SW846 3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		120890-005	SW846 7470A
	Molybdenum	0.00297	0.000200	0.00100	NE			120890-005	SW846 3005A/6020B
	Nickel	ND	0.000600	0.00200	NE	U		120890-005	SW846 3005A/6020B
	Potassium	3.88	0.0800	0.300	NE			120890-005	SW846 3005A/6020B
	Selenium	0.00296	0.00150	0.00500	0.050	J		120890-005	SW846 3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120890-005	SW846 3005A/6020B
	Sodium	65.5	0.800	2.50	NE			120890-005	SW846 3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120890-005	SW846 3005A/6020B
	Uranium	0.00569	0.0000670	0.000200	0.030			120890-005	SW846 3005A/6020B
	Vanadium	0.00666	0.00330	0.0200	NE	J		120890-005	SW846 3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	U		120890-005	SW846 3005A/6020B

Refer to Notes on page 5B-42.

Table 5B-6 (continued)
Summary of TAL Metals plus Molybdenum and Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW3	Aluminum	ND	0.0193	0.0500	NE	U		120878-005	SW846 3005A/6020B
01-Aug-23	Antimony	ND	0.00100	0.00300	0.006	U		120878-005	SW846 3005A/6020B
	Arsenic	ND	0.00200	0.00500	0.010	U		120878-005	SW846 3005A/6020B
	Barium	0.0510	0.000670	0.00400	2.00			120878-005	SW846 3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120878-005	SW846 3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		120878-005	SW846 3005A/6020B
	Calcium	59.5	0.800	2.00	NE			120878-005	SW846 3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120878-005	SW846 3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120878-005	SW846 3005A/6020B
	Copper	ND	0.000300	0.00200	NE	U		120878-005	SW846 3005A/6020B
	Iron	ND	0.0330	0.100	NE	U		120878-005	SW846 3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120878-005	SW846 3005A/6020B
	Magnesium	16.4	0.0100	0.0300	NE			120878-005	SW846 3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	U		120878-005	SW846 3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U	UJ	120878-005	SW846 7470A
	Molybdenum	0.00544	0.000200	0.00100	NE			120878-005	SW846 3005A/6020B
	Nickel	ND	0.000600	0.00200	NE	U		120878-005	SW846 3005A/6020B
	Potassium	4.78	0.0800	0.300	NE			120878-005	SW846 3005A/6020B
	Selenium	0.00222	0.00150	0.00500	0.050	J		120878-005	SW846 3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120878-005	SW846 3005A/6020B
	Sodium	59.6	0.800	2.50	NE			120878-005	SW846 3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120878-005	SW846 3005A/6020B
	Uranium	0.00355	0.0000670	0.000200	0.030			120878-005	SW846 3005A/6020B
	Vanadium	0.00720	0.00330	0.0200	NE	J		120878-005	SW846 3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	U		120878-005	SW846 3005A/6020B

Refer to Notes on page 5B-42.

Table 5B-6 (continued)
Summary of TAL Metals plus Molybdenum and Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW4	Aluminum	ND	0.0193	0.0500	NE	U		120901-005	SW846 3005A/6020B
15-Aug-23	Antimony	ND	0.00100	0.00300	0.006	U		120901-005	SW846 3005A/6020B
	Arsenic	0.00237	0.00200	0.00500	0.010	J		120901-005	SW846 3005A/6020B
	Barium	0.0841	0.000670	0.00400	2.00			120901-005	SW846 3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120901-005	SW846 3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		120901-005	SW846 3005A/6020B
	Calcium	51.1	0.400	1.00	NE			120901-005	SW846 3005A/6020B
	Chromium	0.0321	0.00300	0.0100	0.100			120901-005	SW846 3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120901-005	SW846 3005A/6020B
	Copper	0.000333	0.000300	0.00200	NE	J		120901-005	SW846 3005A/6020B
	Iron	ND	0.0330	0.100	NE	U		120901-005	SW846 3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120901-005	SW846 3005A/6020B
	Magnesium	15.0	0.0100	0.0300	NE			120901-005	SW846 3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	U		120901-005	SW846 3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		120901-005	SW846 7470A
	Molybdenum	0.00585	0.000200	0.00100	NE			120901-005	SW846 3005A/6020B
	Nickel	ND	0.000600	0.00200	NE	U		120901-005	SW846 3005A/6020B
	Potassium	3.06	0.0800	0.300	NE			120901-005	SW846 3005A/6020B
	Selenium	0.00270	0.00150	0.00500	0.050	J		120901-005	SW846 3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120901-005	SW846 3005A/6020B
	Sodium	47.0	0.0800	0.250	NE			120901-005	SW846 3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120901-005	SW846 3005A/6020B
	Uranium	0.00297	0.0000670	0.000200	0.030			120901-005	SW846 3005A/6020B
	Vanadium	0.00735	0.00330	0.0200	NE	J		120901-005	SW846 3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	U		120901-005	SW846 3005A/6020B

Refer to Notes on page 5B-42.

Table 5B-6 (continued)
Summary of TAL Metals plus Molybdenum and Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW5	Aluminum	0.237	0.0193	0.0500	NE			120881-005	SW846 3005A/6020B
02-Aug-23	Antimony	ND	0.00100	0.00300	0.006	U		120881-005	SW846 3005A/6020B
	Arsenic	ND	0.00200	0.00500	0.010	U		120881-005	SW846 3005A/6020B
	Barium	0.0671	0.000670	0.00400	2.00			120881-005	SW846 3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120881-005	SW846 3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		120881-005	SW846 3005A/6020B
	Calcium	49.0	0.0800	0.200	NE			120881-005	SW846 3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120881-005	SW846 3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120881-005	SW846 3005A/6020B
	Copper	0.000472	0.000300	0.00200	NE	J		120881-005	SW846 3005A/6020B
	Iron	0.217	0.0330	0.100	NE			120881-005	SW846 3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120881-005	SW846 3005A/6020B
	Magnesium	14.4	0.0100	0.0300	NE			120881-005	SW846 3005A/6020B
	Manganese	0.00375	0.00100	0.00500	NE	J		120881-005	SW846 3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		120881-005	SW846 7470A
	Molybdenum	0.00625	0.000200	0.00100	NE			120881-005	SW846 3005A/6020B
	Nickel	ND	0.000600	0.00200	NE	U		120881-005	SW846 3005A/6020B
	Potassium	2.97	0.0800	0.300	NE			120881-005	SW846 3005A/6020B
	Selenium	0.00237	0.00150	0.00500	0.050	J		120881-005	SW846 3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120881-005	SW846 3005A/6020B
	Sodium	47.3	0.0800	0.250	NE			120881-005	SW846 3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120881-005	SW846 3005A/6020B
	Uranium	0.00315	0.0000670	0.000200	0.030			120881-005	SW846 3005A/6020B
	Vanadium	0.00869	0.00330	0.0200	NE	J		120881-005	SW846 3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	U		120881-005	SW846 3005A/6020B

Refer to Notes on page 5B-42.

Table 5B-6 (continued)
Summary of TAL Metals plus Molybdenum and Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW6	Aluminum	0.224	0.0193	0.0500	NE			120903-005	SW846 3005A/6020B
16-Aug-23	Antimony	ND	0.00100	0.00300	0.006	U		120903-005	SW846 3005A/6020B
	Arsenic	0.00214	0.00200	0.00500	0.010	J		120903-005	SW846 3005A/6020B
	Barium	0.0727	0.000670	0.00400	2.00			120903-005	SW846 3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120903-005	SW846 3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		120903-005	SW846 3005A/6020B
	Calcium	73.2	0.400	1.00	NE			120903-005	SW846 3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120903-005	SW846 3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120903-005	SW846 3005A/6020B
	Copper	0.000709	0.000300	0.00200	NE	J		120903-005	SW846 3005A/6020B
	Iron	0.207	0.0330	0.100	NE			120903-005	SW846 3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120903-005	SW846 3005A/6020B
	Magnesium	21.8	0.0100	0.0300	NE			120903-005	SW846 3005A/6020B
	Manganese	0.0162	0.00100	0.00500	NE			120903-005	SW846 3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		120903-005	SW846 7470A
	Molybdenum	0.0110	0.000200	0.00100	NE			120903-005	SW846 3005A/6020B
	Nickel	ND	0.000600	0.00200	NE	U		120903-005	SW846 3005A/6020B
	Potassium	3.91	0.0800	0.300	NE			120903-005	SW846 3005A/6020B
	Selenium	0.00253	0.00150	0.00500	0.050	J		120903-005	SW846 3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120903-005	SW846 3005A/6020B
	Sodium	70.6	0.400	1.25	NE			120903-005	SW846 3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120903-005	SW846 3005A/6020B
	Uranium	0.00344	0.0000670	0.000200	0.030			120903-005	SW846 3005A/6020B
	Vanadium	0.00596	0.00330	0.0200	NE	J		120903-005	SW846 3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	U		120903-005	SW846 3005A/6020B

Refer to Notes on page 5B-42.

Table 5B-6 (continued)
Summary of TAL Metals plus Molybdenum and Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW7	Aluminum	ND	0.0193	0.0500	NE	U		120871-005	SW846 3005A/6020B
28-Jul-23	Antimony	ND	0.00100	0.00300	0.006	U		120871-005	SW846 3005A/6020B
	Arsenic	0.00311	0.00200	0.00500	0.010	J		120871-005	SW846 3005A/6020B
	Barium	0.0500	0.000670	0.00400	2.00			120871-005	SW846 3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120871-005	SW846 3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		120871-005	SW846 3005A/6020B
	Calcium	59.6	0.400	1.00	NE			120871-005	SW846 3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120871-005	SW846 3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120871-005	SW846 3005A/6020B
	Copper	ND	0.000300	0.00200	NE	U		120871-005	SW846 3005A/6020B
	Iron	0.0360	0.0330	0.100	NE	J		120871-005	SW846 3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120871-005	SW846 3005A/6020B
	Magnesium	17.6	0.0100	0.0300	NE			120871-005	SW846 3005A/6020B
	Manganese	0.00129	0.00100	0.00500	NE	J		120871-005	SW846 3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		120871-005	SW846 7470A
	Molybdenum	0.00401	0.000200	0.00100	NE			120871-005	SW846 3005A/6020B
	Nickel	ND	0.000600	0.00200	NE	U		120871-005	SW846 3005A/6020B
	Potassium	3.65	0.0800	0.300	NE			120871-005	SW846 3005A/6020B
	Selenium	0.00260	0.00150	0.00500	0.050	J		120871-005	SW846 3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120871-005	SW846 3005A/6020B
	Sodium	59.3	0.400	1.25	NE			120871-005	SW846 3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120871-005	SW846 3005A/6020B
	Uranium	0.00448	0.0000670	0.000200	0.030			120871-005	SW846 3005A/6020B
	Vanadium	0.00900	0.00330	0.0200	NE	J		120871-005	SW846 3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	U		120871-005	SW846 3005A/6020B

Refer to Notes on page 5B-42.

Table 5B-6 (continued)
Summary of TAL Metals plus Molybdenum and Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW8	Aluminum	0.0240	0.0193	0.0500	NE	J		120899-005	SW846 3005A/6020B
14-Aug-23	Antimony	ND	0.00100	0.00300	0.006	U		120899-005	SW846 3005A/6020B
	Arsenic	0.00251	0.00200	0.00500	0.010	J		120899-005	SW846 3005A/6020B
	Barium	0.0573	0.000670	0.00400	2.00			120899-005	SW846 3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120899-005	SW846 3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		120899-005	SW846 3005A/6020B
	Calcium	59.1	0.400	1.00	NE			120899-005	SW846 3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120899-005	SW846 3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120899-005	SW846 3005A/6020B
	Copper	ND	0.000300	0.00200	NE	U		120899-005	SW846 3005A/6020B
	Iron	ND	0.0330	0.100	NE	U		120899-005	SW846 3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120899-005	SW846 3005A/6020B
	Magnesium	17.7	0.0100	0.0300	NE			120899-005	SW846 3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	U		120899-005	SW846 3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		120899-005	SW846 7470A
	Molybdenum	0.00454	0.000200	0.00100	NE			120899-005	SW846 3005A/6020B
	Nickel	ND	0.000600	0.00200	NE	U		120899-005	SW846 3005A/6020B
	Potassium	3.79	0.0800	0.300	NE			120899-005	SW846 3005A/6020B
	Selenium	0.00236	0.00150	0.00500	0.050	J		120899-005	SW846 3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120899-005	SW846 3005A/6020B
	Sodium	60.0	0.400	1.25	NE			120899-005	SW846 3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120899-005	SW846 3005A/6020B
	Uranium	0.00341	0.0000670	0.000200	0.030			120899-005	SW846 3005A/6020B
	Vanadium	0.00714	0.00330	0.0200	NE	J		120899-005	SW846 3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	U		120899-005	SW846 3005A/6020B

Refer to Notes on page 5B-42.

Table 5B-6 (continued)
Summary of TAL Metals plus Molybdenum and Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW9	Aluminum	0.0439	0.0193	0.0500	NE	J		120867-005	SW846 3005A/6020B
27-Jul-23	Antimony	ND	0.00100	0.00300	0.006	U		120867-005	SW846 3005A/6020B
	Arsenic	0.00286	0.00200	0.00500	0.010	J		120867-005	SW846 3005A/6020B
	Barium	0.0562	0.000670	0.00400	2.00			120867-005	SW846 3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120867-005	SW846 3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		120867-005	SW846 3005A/6020B
	Calcium	57.8	0.400	1.00	NE			120867-005	SW846 3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120867-005	SW846 3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120867-005	SW846 3005A/6020B
	Copper	0.000878	0.000300	0.00200	NE	J		120867-005	SW846 3005A/6020B
	Iron	0.0591	0.0330	0.100	NE	J		120867-005	SW846 3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120867-005	SW846 3005A/6020B
	Magnesium	17.0	0.0100	0.0300	NE			120867-005	SW846 3005A/6020B
	Manganese	0.00217	0.00100	0.00500	NE	J		120867-005	SW846 3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		120867-005	SW846 7470A
	Molybdenum	0.00279	0.000200	0.00100	NE			120867-005	SW846 3005A/6020B
	Nickel	0.000605	0.000600	0.00200	NE	J		120867-005	SW846 3005A/6020B
	Potassium	3.60	0.0800	0.300	NE			120867-005	SW846 3005A/6020B
	Selenium	0.00249	0.00150	0.00500	0.050	J		120867-005	SW846 3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120867-005	SW846 3005A/6020B
	Sodium	49.5	0.0800	0.250	NE			120867-005	SW846 3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120867-005	SW846 3005A/6020B
	Uranium	0.00468	0.0000670	0.000200	0.030			120867-005	SW846 3005A/6020B
	Vanadium	0.00854	0.00330	0.0200	NE	J		120867-005	SW846 3005A/6020B
	Zinc	0.0102	0.00330	0.0200	NE	J		120867-005	SW846 3005A/6020B

Refer to Notes on page 5B-42.

Table 5B-6 (continued)
Summary of TAL Metals plus Molybdenum and Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW10	Aluminum	ND	0.0193	0.0500	NE	U		120907-005	SW846 3005A/6020B
17-Aug-23	Antimony	ND	0.00100	0.00300	0.006	U		120907-005	SW846 3005A/6020B
	Arsenic	ND	0.00200	0.00500	0.010	U		120907-005	SW846 3005A/6020B
	Barium	0.0661	0.000670	0.00400	2.00			120907-005	SW846 3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120907-005	SW846 3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		120907-005	SW846 3005A/6020B
	Calcium	60.0	0.400	1.00	NE			120907-005	SW846 3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120907-005	SW846 3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120907-005	SW846 3005A/6020B
	Copper	ND	0.000300	0.00200	NE	U		120907-005	SW846 3005A/6020B
	Iron	ND	0.0330	0.100	NE	U		120907-005	SW846 3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120907-005	SW846 3005A/6020B
	Magnesium	19.2	0.0100	0.0300	NE			120907-005	SW846 3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	U		120907-005	SW846 3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		120907-005	SW846 7470A
	Molybdenum	0.00565	0.000200	0.00100	NE			120907-005	SW846 3005A/6020B
	Nickel	ND	0.000600	0.00200	NE	U		120907-005	SW846 3005A/6020B
	Potassium	4.52	0.0800	0.300	NE			120907-005	SW846 3005A/6020B
	Selenium	0.00247	0.00150	0.00500	0.050	J		120907-005	SW846 3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120907-005	SW846 3005A/6020B
	Sodium	60.0	0.400	1.25	NE			120907-005	SW846 3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120907-005	SW846 3005A/6020B
	Uranium	0.00303	0.0000670	0.000200	0.030			120907-005	SW846 3005A/6020B
	Vanadium	0.00764	0.00330	0.0200	NE	J		120907-005	SW846 3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	U		120907-005	SW846 3005A/6020B

Refer to Notes on page 5B-42.

Table 5B-6 (continued)
Summary of TAL Metals plus Molybdenum and Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW11	Aluminum	ND	0.0193	0.0500	NE	U		120894-005	SW846 3005A/6020B
10-Aug-23	Antimony	ND	0.00100	0.00300	0.006	U		120894-005	SW846 3005A/6020B
	Arsenic	0.00231	0.00200	0.00500	0.010	J		120894-005	SW846 3005A/6020B
	Barium	0.0771	0.000670	0.00400	2.00			120894-005	SW846 3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120894-005	SW846 3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		120894-005	SW846 3005A/6020B
	Calcium	58.7	0.800	2.00	NE			120894-005	SW846 3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120894-005	SW846 3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120894-005	SW846 3005A/6020B
	Copper	ND	0.000300	0.00200	NE	U		120894-005	SW846 3005A/6020B
	Iron	ND	0.0330	0.100	NE	U		120894-005	SW846 3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120894-005	SW846 3005A/6020B
	Magnesium	16.2	0.0100	0.0300	NE			120894-005	SW846 3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	U		120894-005	SW846 3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		120894-005	SW846 7470A
	Molybdenum	0.00574	0.000200	0.00100	NE			120894-005	SW846 3005A/6020B
	Nickel	ND	0.000600	0.00200	NE	U		120894-005	SW846 3005A/6020B
	Potassium	3.77	0.0800	0.300	NE			120894-005	SW846 3005A/6020B
	Selenium	0.00442	0.00150	0.00500	0.050	J		120894-005	SW846 3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120894-005	SW846 3005A/6020B
	Sodium	54.2	0.800	2.50	NE			120894-005	SW846 3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120894-005	SW846 3005A/6020B
	Uranium	0.00288	0.0000670	0.000200	0.030			120894-005	SW846 3005A/6020B
	Vanadium	0.00644	0.00330	0.0200	NE	J		120894-005	SW846 3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	U		120894-005	SW846 3005A/6020B

Refer to Notes on page 5B-42.

Table 5B-6 (continued)
Summary of TAL Metals plus Molybdenum and Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW12	Aluminum	0.0475	0.0193	0.0500	NE	J		120887-005	SW846 3005A/6020B
08-Aug-23	Antimony	ND	0.00100	0.00300	0.006	U		120887-005	SW846 3005A/6020B
	Arsenic	ND	0.00200	0.00500	0.010	U		120887-005	SW846 3005A/6020B
	Barium	0.0700	0.000670	0.00400	2.00			120887-005	SW846 3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120887-005	SW846 3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		120887-005	SW846 3005A/6020B
	Calcium	68.7	0.800	2.00	NE			120887-005	SW846 3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120887-005	SW846 3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120887-005	SW846 3005A/6020B
	Copper	0.000380	0.000300	0.00200	NE	J		120887-005	SW846 3005A/6020B
	Iron	0.0961	0.0330	0.100	NE	J		120887-005	SW846 3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120887-005	SW846 3005A/6020B
	Magnesium	20.4	0.0100	0.0300	NE			120887-005	SW846 3005A/6020B
	Manganese	0.00126	0.00100	0.00500	NE	J		120887-005	SW846 3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		120887-005	SW846 7470A
	Molybdenum	0.00406	0.000200	0.00100	NE			120887-005	SW846 3005A/6020B
	Nickel	0.000676	0.000600	0.00200	NE	J		120887-005	SW846 3005A/6020B
	Potassium	3.89	0.0800	0.300	NE			120887-005	SW846 3005A/6020B
	Selenium	0.00210	0.00150	0.00500	0.050	J		120887-005	SW846 3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120887-005	SW846 3005A/6020B
	Sodium	66.2	0.800	2.50	NE			120887-005	SW846 3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120887-005	SW846 3005A/6020B
	Uranium	0.00581	0.0000670	0.000200	0.030			120887-005	SW846 3005A/6020B
	Vanadium	0.00638	0.00330	0.0200	NE	J		120887-005	SW846 3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	U		120887-005	SW846 3005A/6020B

Refer to Notes on page 5B-42.

Table 5B-6 (continued)
Summary of TAL Metals plus Molybdenum and Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW13	Aluminum	ND	0.0193	0.0500	NE	U		120874-005	SW846 3005A/6020B
31-Jul-23	Antimony	ND	0.00100	0.00300	0.006	U		120874-005	SW846 3005A/6020B
	Arsenic	ND	0.00200	0.00500	0.010	U		120874-005	SW846 3005A/6020B
	Barium	0.0590	0.000670	0.00400	2.00			120874-005	SW846 3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120874-005	SW846 3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		120874-005	SW846 3005A/6020B
	Calcium	57.1	0.800	2.00	NE			120874-005	SW846 3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120874-005	SW846 3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120874-005	SW846 3005A/6020B
	Copper	ND	0.000300	0.00200	NE	U		120874-005	SW846 3005A/6020B
	Iron	ND	0.0330	0.100	NE	U		120874-005	SW846 3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120874-005	SW846 3005A/6020B
	Magnesium	15.7	0.0100	0.0300	NE			120874-005	SW846 3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	U		120874-005	SW846 3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		120874-005	SW846 7470A
	Molybdenum	0.00546	0.000200	0.00100	NE			120874-005	SW846 3005A/6020B
	Nickel	ND	0.000600	0.00200	NE	U		120874-005	SW846 3005A/6020B
	Potassium	3.57	0.0800	0.300	NE			120874-005	SW846 3005A/6020B
	Selenium	0.00210	0.00150	0.00500	0.050	J		120874-005	SW846 3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120874-005	SW846 3005A/6020B
	Sodium	48.5	0.0800	0.250	NE			120874-005	SW846 3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120874-005	SW846 3005A/6020B
	Uranium	0.00338	0.0000670	0.000200	0.030			120874-005	SW846 3005A/6020B
	Vanadium	0.00805	0.00330	0.0200	NE	J		120874-005	SW846 3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	U		120874-005	SW846 3005A/6020B

Refer to Notes on page 5B-42.

Table 5B-6 (continued)
Summary of TAL Metals plus Molybdenum and Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW14	Aluminum	ND	0.0193	0.0500	NE	U		120896-005	SW846 3005A/6020B
11-Aug-23	Antimony	ND	0.00100	0.00300	0.006	U		120896-005	SW846 3005A/6020B
	Arsenic	0.00236	0.00200	0.00500	0.010	J		120896-005	SW846 3005A/6020B
	Barium	0.0618	0.000670	0.00400	2.00			120896-005	SW846 3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120896-005	SW846 3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		120896-005	SW846 3005A/6020B
	Calcium	64.5	0.400	1.00	NE			120896-005	SW846 3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120896-005	SW846 3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120896-005	SW846 3005A/6020B
	Copper	ND	0.000300	0.00200	NE	U		120896-005	SW846 3005A/6020B
	Iron	ND	0.0330	0.100	NE	U		120896-005	SW846 3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120896-005	SW846 3005A/6020B
	Magnesium	21.1	0.0100	0.0300	NE			120896-005	SW846 3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	U		120896-005	SW846 3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		120896-005	SW846 7470A
	Molybdenum	0.00432	0.000200	0.00100	NE			120896-005	SW846 3005A/6020B
	Nickel	ND	0.000600	0.00200	NE	U		120896-005	SW846 3005A/6020B
	Potassium	4.20	0.0800	0.300	NE			120896-005	SW846 3005A/6020B
	Selenium	0.00212	0.00150	0.00500	0.050	J		120896-005	SW846 3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120896-005	SW846 3005A/6020B
	Sodium	65.1	0.400	1.25	NE			120896-005	SW846 3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120896-005	SW846 3005A/6020B
	Uranium	0.00474	0.0000670	0.000200	0.030			120896-005	SW846 3005A/6020B
	Vanadium	0.00603	0.00330	0.0200	NE	J		120896-005	SW846 3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	U		120896-005	SW846 3005A/6020B

Refer to Notes on page 5B-42.

Table 5B-6 (continued)
Summary of TAL Metals plus Molybdenum and Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW15	Aluminum	ND	0.0193	0.0500	NE	U		120864-005	SW846 3005A/6020B
26-Jul-23	Antimony	ND	0.00100	0.00300	0.006	U		120864-005	SW846 3005A/6020B
	Arsenic	ND	0.00200	0.00500	0.010	U		120864-005	SW846 3005A/6020B
	Barium	0.0657	0.000670	0.00400	2.00			120864-005	SW846 3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120864-005	SW846 3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		120864-005	SW846 3005A/6020B
	Calcium	74.7	0.800	2.00	NE			120864-005	SW846 3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120864-005	SW846 3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120864-005	SW846 3005A/6020B
	Copper	ND	0.000300	0.00200	NE	U		120864-005	SW846 3005A/6020B
	Iron	0.0364	0.0330	0.100	NE	J		120864-005	SW846 3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120864-005	SW846 3005A/6020B
	Magnesium	25.3	0.0100	0.0300	NE			120864-005	SW846 3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	U		120864-005	SW846 3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U	0.0002UJ	120864-005	SW846 7470A
	Molybdenum	0.00313	0.000200	0.00100	NE			120864-005	SW846 3005A/6020B
	Nickel	ND	0.000600	0.00200	NE	U		120864-005	SW846 3005A/6020B
	Potassium	4.11	0.0800	0.300	NE			120864-005	SW846 3005A/6020B
	Selenium	0.00254	0.00150	0.00500	0.050	J		120864-005	SW846 3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120864-005	SW846 3005A/6020B
	Sodium	66.4	0.800	2.50	NE			120864-005	SW846 3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120864-005	SW846 3005A/6020B
	Uranium	0.00665	0.0000670	0.000200	0.030			120864-005	SW846 3005A/6020B
	Vanadium	0.00412	0.00330	0.0200	NE	J		120864-005	SW846 3005A/6020B
	Zinc	0.00465	0.00330	0.0200	NE	J		120864-005	SW846 3005A/6020B

Refer to Notes on page 5B-42.

Table 5B-6 (continued)
Summary of TAL Metals plus Molybdenum and Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW16	Aluminum	ND	0.0193	0.0500	NE	U		120883-005	SW846 3005A/6020B
03-Aug-23	Antimony	ND	0.00100	0.00300	0.006	U		120883-005	SW846 3005A/6020B
	Arsenic	ND	0.00200	0.00500	0.010	U		120883-005	SW846 3005A/6020B
	Barium	0.0701	0.000670	0.00400	2.00			120883-005	SW846 3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120883-005	SW846 3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		120883-005	SW846 3005A/6020B
	Calcium	82.5	0.800	2.00	NE			120883-005	SW846 3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120883-005	SW846 3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120883-005	SW846 3005A/6020B
	Copper	0.000734	0.000300	0.00200	NE	J		120883-005	SW846 3005A/6020B
	Iron	ND	0.0330	0.100	NE	U		120883-005	SW846 3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120883-005	SW846 3005A/6020B
	Magnesium	27.4	0.0100	0.0300	NE			120883-005	SW846 3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	U		120883-005	SW846 3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		120883-005	SW846 7470A
	Molybdenum	0.00254	0.000200	0.00100	NE			120883-005	SW846 3005A/6020B
	Nickel	ND	0.000600	0.00200	NE	U		120883-005	SW846 3005A/6020B
	Potassium	4.51	0.0800	0.300	NE			120883-005	SW846 3005A/6020B
	Selenium	0.00246	0.00150	0.00500	0.050	J		120883-005	SW846 3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120883-005	SW846 3005A/6020B
	Sodium	75.1	0.800	2.50	NE			120883-005	SW846 3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120883-005	SW846 3005A/6020B
	Uranium	0.00627	0.0000670	0.000200	0.030			120883-005	SW846 3005A/6020B
	Vanadium	0.00675	0.00330	0.0200	NE	J		120883-005	SW846 3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	U		120883-005	SW846 3005A/6020B

Refer to Notes on page 5B-42.

Table 5B-6 (continued)
Summary of TAL Metals plus Molybdenum and Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW17	Aluminum	ND	0.0193	0.0500	NE	U		120915-006	SW846 3005A/6020B
04-Aug-23	Antimony	ND	0.00100	0.00300	0.006	U		120915-006	SW846 3005A/6020B
	Arsenic	ND	0.00200	0.00500	0.010	U		120915-006	SW846 3005A/6020B
	Barium	0.0997	0.000670	0.00400	2.00			120915-006	SW846 3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120915-006	SW846 3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		120915-006	SW846 3005A/6020B
	Calcium	41.9	0.0800	0.200	NE			120915-006	SW846 3005A/6020B
	Chromium	0.00648	0.00300	0.0100	0.100	J		120915-006	SW846 3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120915-006	SW846 3005A/6020B
	Copper	0.000732	0.000300	0.00200	NE	J		120915-006	SW846 3005A/6020B
	Iron	ND	0.0330	0.100	NE	U		120915-006	SW846 3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120915-006	SW846 3005A/6020B
	Magnesium	11.8	0.0100	0.0300	NE			120915-006	SW846 3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	U		120915-006	SW846 3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		120915-006	SW846 7470A
	Molybdenum	0.0112	0.000200	0.00100	NE			120915-006	SW846 3005A/6020B
	Nickel	ND	0.000600	0.00200	NE	U		120915-006	SW846 3005A/6020B
	Potassium	2.77	0.0800	0.300	NE			120915-006	SW846 3005A/6020B
	Selenium	0.00226	0.00150	0.00500	0.050	J		120915-006	SW846 3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120915-006	SW846 3005A/6020B
	Sodium	41.0	0.0800	0.250	NE			120915-006	SW846 3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120915-006	SW846 3005A/6020B
	Uranium	0.00250	0.0000670	0.000200	0.030			120915-006	SW846 3005A/6020B
	Vanadium	0.00736	0.00330	0.0200	NE	J		120915-006	SW846 3005A/6020B
	Zinc	0.00418	0.00330	0.0200	NE	J		120915-006	SW846 3005A/6020B

Refer to Notes on page 5B-42.

Table 5B-6 (concluded)
Summary of TAL Metals plus Molybdenum and Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW17	Aluminum	ND	0.0193	0.0500	NE	U	UJ	121354-006	SW846 3005A/6020B
24-Oct-23	Antimony	ND	0.00100	0.00300	0.006	U	UJ	121354-006	SW846 3005A/6020B
	Arsenic	0.00368	0.00200	0.00500	0.010	B, J	0.005UJ	121354-006	SW846 3005A/6020B
	Barium	0.113	0.000670	0.00400	2.00		J	121354-006	SW846 3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U	UJ	121354-006	SW846 3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U	UJ	121354-006	SW846 3005A/6020B
	Calcium	44.3	0.0800	0.200	NE		J	121354-006	SW846 3005A/6020B
	Chromium	0.00718	0.00300	0.0100	0.100	J	J	121354-006	SW846 3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U	UJ	121354-006	SW846 3005A/6020B
	Copper	ND	0.000300	0.00200	NE	U	UJ	121354-006	SW846 3005A/6020B
	Iron	0.0434	0.0330	0.100	NE	J	J	121354-006	SW846 3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U	UJ	121354-006	SW846 3005A/6020B
	Magnesium	12.3	0.0100	0.0300	NE		J	121354-006	SW846 3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	U	UJ	121354-006	SW846 3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		121354-006	SW846 7470A
	Molybdenum	0.00926	0.000200	0.00100	NE		J	121354-006	SW846 3005A/6020B
	Nickel	ND	0.000600	0.00200	NE	U	UJ	121354-006	SW846 3005A/6020B
	Potassium	2.73	0.0800	0.300	NE		J	121354-006	SW846 3005A/6020B
	Selenium	0.00310	0.00150	0.00500	0.050	J	J	121354-006	SW846 3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U	UJ	121354-006	SW846 3005A/6020B
	Sodium	40.0	0.0800	0.250	NE		J	121354-006	SW846 3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U	UJ	121354-006	SW846 3005A/6020B
	Uranium	0.00265	0.0000670	0.000200	0.030		J	121354-006	SW846 3005A/6020B
	Vanadium	0.0107	0.00330	0.0200	NE	B, J	0.02UJ	121354-006	SW846 3005A/6020B
	Zinc	0.00463	0.00330	0.0200	NE	J	J	121354-006	SW846 3005A/6020B

Refer to Notes on page 5B-42.

Table 5B-7
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW17 21-Apr-23	Americium-241	0.227 ± 13.6	21.3	10.3	NE	U	BD	120126-007	EPA 901.1
	Cesium-137	1.27 ± 2.12	3.81	1.80	NE	U	BD	120126-007	EPA 901.1
	Cobalt-60	-0.615 ± 2.25	4.02	1.85	NE	U	BD	120126-007	EPA 901.1
	Potassium-40	-18.8 ± 47.3	52.8	24.8	NE	U	BD	120126-007	EPA 901.1
	Gross Alpha	0.78	NA	NA	15 pCi/L	NA	None	120126-008	EPA 900.0/SW846 9310
	Gross Beta	2.99 ± 0.829	1.25	0.605	4mrem/yr		J	120126-008	EPA 900.0/SW846 9310
	Uranium-233/234	3.21 ± 0.378	0.103	0.0455	NE			120126-009	DOE EML HASL-300
	Uranium-235/236	0.0894 ± 0.0480	0.0877	0.0367	NE		J	120126-009	DOE EML HASL-300
	Uranium-238	1.10 ± 0.170	0.0702	0.0293	NE			120126-009	DOE EML HASL-300
	Tritium	-28.5 ± 78.5	160	69.7	NE	U	BD	120126-010	EPA 906.0M
LWDS-MW1 21-Aug-23	Americium-241	-5.72 ± 15.7	26.4	12.8	NE	U	BD	120910-006	EPA 901.1
	Cesium-137	-0.533 ± 3.18	3.73	1.77	NE	U	BD	120910-006	EPA 901.1
	Cobalt-60	0.627 ± 2.21	4.01	1.86	NE	U	BD	120910-006	EPA 901.1
	Potassium-40	-7.36 ± 40.7	48.9	23.0	NE	U	BD	120910-006	EPA 901.1
	Gross Alpha	3.08	NA	NA	15 pCi/L	NA	None	120910-007	EPA 900.0/SW846 9310
	Gross Beta	4.34 ± 0.901	1.23	0.590	4mrem/yr			120910-007	EPA 900.0/SW846 9310
	Tritium	89.0 ± 88.4	142	60.9	NE	U	BD	120910-008	EPA 906.0M
TAV-MW2 09-Aug-23	Americium-241	0.172 ± 9.79	15.8	7.62	NE	U	BD	120890-006	EPA 901.1
	Cesium-137	1.45 ± 1.73	2.98	1.41	NE	U	BD	120890-006	EPA 901.1
	Cobalt-60	0.744 ± 1.64	3.09	1.42	NE	U	BD	120890-006	EPA 901.1
	Potassium-40	44.5 ± 41.3	27.2	12.4	NE		J	120890-006	EPA 901.1
	Gross Alpha	2.86	NA	NA	15 pCi/L	NA	None	120890-007	EPA 900.0/SW846 9310
	Gross Beta	5.16 ± 1.17	1.67	0.809	4mrem/yr			120890-007	EPA 900.0/SW846 9310
	Tritium	20.7 ± 90.9	158	75.4	NE	U	BD	120890-008	EPA 906.0M
TAV-MW3 01-Aug-23	Americium-241	10.4 ± 14.1	22.1	10.7	NE	U	BD	120878-006	EPA 901.1
	Cesium-137	2.11 ± 6.76	3.73	1.76	NE	U	BD	120878-006	EPA 901.1
	Cobalt-60	1.28 ± 2.34	4.38	2.03	NE	U	BD	120878-006	EPA 901.1
	Potassium-40	-14.5 ± 48.5	53.0	24.8	NE	U	BD	120878-006	EPA 901.1
	Gross Alpha	2.77	NA	NA	15 pCi/L	NA	None	120878-007	EPA 900.0/SW846 9310
	Gross Beta	5.25 ± 0.966	1.39	0.675	4mrem/yr			120878-007	EPA 900.0/SW846 9310
	Tritium	-26.8 ± 66.0	132	58.5	NE	U	BD	120878-008	EPA 906.0M

Refer to Notes on page 5B-42.

Table 5B-7 (continued)
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW4	Americium-241	-0.757 ± 15.2	25.8	12.4	NE	U	BD	120901-006	EPA 901.1
15-Aug-23	Cesium-137	2.46 ± 2.97	4.36	2.07	NE	U	BD	120901-006	EPA 901.1
	Cobalt-60	-0.766 ± 2.61	4.48	2.07	NE	U	BD	120901-006	EPA 901.1
	Potassium-40	4.39 ± 44.0	57.6	27.0	NE	U	BD	120901-006	EPA 901.1
	Gross Alpha	3.21	NA	NA	15 pCi/L	NA	None	120901-007	EPA 900.0/SW846 9310
	Gross Beta	4.02 ± 0.897	1.33	0.644	4mrem/yr			120901-007	EPA 900.0/SW846 9310
	Tritium	41.5 ± 78.5	137	61.0	NE	U	BD	120901-008	EPA 906.0M
TAV-MW5	Americium-241	3.62 ± 13.6	21.4	10.4	NE	U	BD	120881-006	EPA 901.1
02-Aug-23	Cesium-137	1.08 ± 5.28	3.88	1.84	NE	U	BD	120881-006	EPA 901.1
	Cobalt-60	1.27 ± 2.27	4.15	1.92	NE	U	BD	120881-006	EPA 901.1
	Potassium-40	-121 ± 76.3	62.1	29.5	NE	U	BD	120881-006	EPA 901.1
	Gross Alpha	0.81	NA	NA	15 pCi/L	NA	None	120881-007	EPA 900.0/SW846 9310
	Gross Beta	1.97 ± 0.949	1.55	0.756	4mrem/yr		J	120881-007	EPA 900.0/SW846 9310
	Tritium	6.47 ± 70.6	132	58.5	NE	U	BD	120881-008	EPA 906.0M
TAV-MW6	Americium-241	-9.06 ± 12.8	21.2	10.3	NE	U	BD	120903-006	EPA 901.1
16-Aug-23	Cesium-137	-3.67 ± 4.75	6.11	2.95	NE	U	BD	120903-006	EPA 901.1
	Cobalt-60	1.92 ± 2.56	4.71	2.19	NE	U	BD	120903-006	EPA 901.1
	Potassium-40	6.07 ± 49.5	57.8	27.2	NE	U	BD	120903-006	EPA 901.1
	Gross Alpha	2.86	NA	NA	15 pCi/L	NA	None	120903-007	EPA 900.0/SW846 9310
	Gross Beta	4.77 ± 0.730	0.921	0.440	4mrem/yr			120903-007	EPA 900.0/SW846 9310
	Tritium	3.32 ± 72.7	136	60.6	NE	U	BD	120903-008	EPA 906.0M
TAV-MW7	Americium-241	4.73 ± 9.88	17.4	8.43	NE	U	BD	120871-006	EPA 901.1
28-Jul-23	Cesium-137	-0.429 ± 2.04	3.40	1.62	NE	U	BD	120871-006	EPA 901.1
	Cobalt-60	-0.0165 ± 2.02	3.56	1.65	NE	U	BD	120871-006	EPA 901.1
	Potassium-40	-45.7 ± 54.0	58.8	28.0	NE	U	BD	120871-006	EPA 901.1
	Gross Alpha	3.05	NA	NA	15 pCi/L	NA	None	120871-007	EPA 900.0/SW846 9310
	Gross Beta	5.69 ± 1.08	1.55	0.754	4mrem/yr			120871-007	EPA 900.0/SW846 9310
	Tritium	-7.64 ± 68.8	132	58.6	NE	U	BD	120871-008	EPA 906.0M
TAV-MW8	Americium-241	-7.38 ± 18.1	30.5	14.7	NE	U	BD	120899-006	EPA 901.1
14-Aug-23	Cesium-137	0.486 ± 2.02	3.62	1.71	NE	U	BD	120899-006	EPA 901.1
	Cobalt-60	0.708 ± 2.19	4.14	1.90	NE	U	BD	120899-006	EPA 901.1
	Potassium-40	29.8 ± 63.0	35.9	16.2	NE	U	BD	120899-006	EPA 901.1
	Gross Alpha	2.34	NA	NA	15 pCi/L	NA	None	120899-007	EPA 900.0/SW846 9310
	Gross Beta	4.94 ± 0.896	1.22	0.592	4mrem/yr			120899-007	EPA 900.0/SW846 9310
	Tritium	35.9 ± 77.8	137	61.2	NE	U	BD	120899-008	EPA 906.0M

Refer to Notes on page 5B-42.

Table 5B-7 (continued)
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW9	Americium-241	6.89 ± 17.3	29.2	14.0	NE	U	BD	120867-006	EPA 901.1
27-Jul-23	Cesium-137	-0.0254 ± 2.23	3.96	1.87	NE	U	BD	120867-006	EPA 901.1
	Cobalt-60	-3.92 ± 3.76	3.06	1.35	NE	U	BD	120867-006	EPA 901.1
	Potassium-40	-23.2 ± 49.8	63.1	29.7	NE	U	BD	120867-006	EPA 901.1
	Gross Alpha	1.63	NA	NA	15 pCi/L	NA	None	120867-007	EPA 900.0/SW846 9310
	Gross Beta	6.19 ± 0.823	0.971	0.464	4mrem/yr			120867-007	EPA 900.0/SW846 9310
	Tritium	-3.45 ± 69.4	132	58.7	NE	U	BD	120867-008	EPA 906.0M
TAV-MW10	Americium-241	-8.83 ± 10.3	15.2	7.31	NE	U	BD	120907-006	EPA 901.1
17-Aug-23	Cesium-137	2.00 ± 2.18	3.71	1.75	NE	U	BD	120907-006	EPA 901.1
	Cobalt-60	1.85 ± 2.30	4.20	1.93	NE	U	BD	120907-006	EPA 901.1
	Potassium-40	48.8 ± 33.2	51.2	23.9	NE	U	BD	120907-006	EPA 901.1
	Gross Alpha	3.66	NA	NA	15 pCi/L	NA	None	120907-007	EPA 900.0/SW846 9310
	Gross Beta	3.37 ± 0.689	0.945	0.452	4mrem/yr			120907-007	EPA 900.0/SW846 9310
	Tritium	35.8 ± 78.8	141	60.8	NE	U	BD	120907-008	EPA 906.0M
TAV-MW11	Americium-241	-3.66 ± 14.1	22.8	11.0	NE	U	BD	120894-006	EPA 901.1
10-Aug-23	Cesium-137	2.06 ± 1.99	3.11	1.47	NE	U	BD	120894-006	EPA 901.1
	Cobalt-60	-0.515 ± 1.82	3.25	1.48	NE	U	BD	120894-006	EPA 901.1
	Potassium-40	-22.8 ± 37.8	49.5	23.3	NE	U	BD	120894-006	EPA 901.1
	Gross Alpha	1.78	NA	NA	15 pCi/L	NA	None	120894-007	EPA 900.0/SW846 9310
	Gross Beta	3.78 ± 0.815	1.16	0.563	4mrem/yr			120894-007	EPA 900.0/SW846 9310
	Tritium	4.81 ± 89.6	157	75.0	NE	U	BD	120894-008	EPA 906.0M
TAV-MW12	Americium-241	-2.89 ± 6.90	10.7	5.17	NE	U	BD	120887-006	EPA 901.1
08-Aug-23	Cesium-137	1.33 ± 1.62	2.78	1.32	NE	U	BD	120887-006	EPA 901.1
	Cobalt-60	1.39 ± 1.69	3.11	1.44	NE	U	BD	120887-006	EPA 901.1
	Potassium-40	49.0 ± 45.2	27.3	12.5	NE		J	120887-006	EPA 901.1
	Gross Alpha	2.85	NA	NA	15 pCi/L	NA	None	120887-007	EPA 900.0/SW846 9310
	Gross Beta	5.94 ± 0.860	1.04	0.498	4mrem/yr			120887-007	EPA 900.0/SW846 9310
	Tritium	-4.71 ± 71.3	135	60.4	NE	U	BD	120887-008	EPA 906.0M
TAV-MW13	Americium-241	10.8 ± 11.6	13.3	6.47	NE	U	BD	120874-006	EPA 901.1
31-Jul-23	Cesium-137	1.52 ± 4.37	3.26	1.55	NE	U	BD	120874-006	EPA 901.1
	Cobalt-60	-0.563 ± 2.17	3.78	1.76	NE	U	BD	120874-006	EPA 901.1
	Potassium-40	-52.6 ± 47.9	46.7	22.0	NE	U	BD	120874-006	EPA 901.1
	Gross Alpha	2.76	NA	NA	15 pCi/L	NA	None	120874-007	EPA 900.0/SW846 9310
	Gross Beta	4.13 ± 1.12	1.72	0.842	4mrem/yr		J	120874-007	EPA 900.0/SW846 9310
	Tritium	51.4 ± 77.7	133	59.0	NE	U	BD	120874-008	EPA 906.0M

Refer to Notes on page 5B-42.

Table 5B-7 (continued)
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW14	Americium-241	-0.520 ± 3.23	5.51	2.67	NE	U	BD	120896-006	EPA 901.1
11-Aug-23	Cesium-137	3.60 ± 3.15	5.35	2.53	NE	U	BD	120896-006	EPA 901.1
	Cobalt-60	1.55 ± 3.09	5.70	2.61	NE	U	BD	120896-006	EPA 901.1
	Potassium-40	-35.8 ± 57.1	69.7	32.4	NE	U	BD	120896-006	EPA 901.1
	Gross Alpha	5.00	NA	NA	15 pCi/L	NA	None	120896-007	EPA 900.0/SW846 9310
	Gross Beta	6.42 ± 0.872	1.05	0.507	4mrem/yr			120896-007	EPA 900.0/SW846 9310
	Tritium	10.7 ± 74.0	137	60.9	NE	U	BD	120896-008	EPA 906.0M
TAV-MW15	Americium-241	1.20 ± 16.7	27.2	13.2	NE	U	BD	120864-006	EPA 901.1
26-Jul-23	Cesium-137	0.206 ± 2.08	3.69	1.75	NE	U	BD	120864-006	EPA 901.1
	Cobalt-60	-0.761 ± 2.46	3.70	1.70	NE	U	BD	120864-006	EPA 901.1
	Potassium-40	-15.6 ± 45.1	50.8	23.8	NE	U	BD	120864-006	EPA 901.1
	Gross Alpha	2.92	NA	NA	15 pCi/L	NA	None	120864-007	EPA 900.0/SW846 9310
	Gross Beta	5.09 ± 1.01	1.46	0.710	4mrem/yr			120864-007	EPA 900.0/SW846 9310
	Tritium	-8.48 ± 70.5	135	60.1	NE	U	BD	120864-008	EPA 906.0M
TAV-MW16	Americium-241	-1.63 ± 7.33	11.9	5.77	NE	U	BD	120883-006	EPA 901.1
03-Aug-23	Cesium-137	-2.46 ± 3.75	4.69	2.26	NE	U	BD	120883-006	EPA 901.1
	Cobalt-60	0.154 ± 2.01	3.65	1.69	NE	U	BD	120883-006	EPA 901.1
	Potassium-40	3.87 ± 55.5	27.9	12.6	NE	U	BD	120883-006	EPA 901.1
	Gross Alpha	6.20	NA	NA	15 pCi/L	NA	None	120883-007	EPA 900.0/SW846 9310
	Gross Beta	6.41 ± 1.58	2.44	1.19	4mrem/yr		J	120883-007	EPA 900.0/SW846 9310
	Tritium	-6.60 ± 90.9	160	76.5	NE	U	BD	120883-008	EPA 906.0M
TAV-MW17	Americium-241	11.2 ± 18.6	28.4	13.8	NE	U	BD	120915-007	EPA 901.1
04-Aug-23	Cesium-137	-2.35 ± 3.23	4.08	1.95	NE	U	BD	120915-007	EPA 901.1
	Cobalt-60	-5.08 ± 4.78	3.73	1.72	NE	U	BD	120915-007	EPA 901.1
	Potassium-40	4.52 ± 47.3	32.6	14.9	NE	U	BD	120915-007	EPA 901.1
	Gross Alpha	0.01	NA	NA	15 pCi/L	NA	None	120915-008	EPA 900.0/SW846 9310
	Gross Beta	4.06 ± 0.781	1.13	0.550	4mrem/yr			120915-008	EPA 900.0/SW846 9310
	Uranium-233/234	2.57 ± 0.334	0.107	0.0468	NE			120915-009	DOE EML HASL-300
	Uranium-235/236	0.0679 ± 0.0503	0.0998	0.0415	NE	U	BD	120915-009	DOE EML HASL-300
	Uranium-238	0.863 ± 0.154	0.0971	0.0418	NE			120915-009	DOE EML HASL-300
	Tritium	-12.6 ± 90.1	159	76.1	NE	U	BD	120915-010	EPA 906.0M

Refer to Notes on page 5B-42.

Table 5B-7 (concluded)
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results,
Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TAV-MW17	Americium-241	1.53 ± 7.74	11.3	5.35	NE	U	BD	121354-007	EPA 901.1
24-Oct-23	Cesium-137	-0.273 ± 2.39	4.32	1.95	NE	U	BD	121354-007	EPA 901.1
	Cobalt-60	-0.0613 ± 2.79	5.35	2.36	NE	U	BD	121354-007	EPA 901.1
	Potassium-40	29.3 ± 57.9	51.1	22.4	NE	U	BD	121354-007	EPA 901.1
	Gross Alpha	0.18	NA	NA	15 pCi/L	NA	None	121354-008	EPA 900.0/SW846 9310
	Gross Beta	3.65 ± 0.927	1.39	0.676	4mrem/yr		J	121354-008	EPA 900.0/SW846 9310
	Uranium-233/234	2.94 ± 0.353	0.113	0.0508	NE		J	121354-009	DOE EML HASL-300
	Uranium-235/236	0.0835 ± 0.0464	0.0915	0.0387	NE	U	BD	121354-009	DOE EML HASL-300
	Uranium-238	1.08 ± 0.168	0.103	0.0457	NE		J	121354-009	DOE EML HASL-300
	Tritium	-44.2 ± 76.1	153	68.6	NE	U	BD	121354-010	EPA 906.0M

Refer to Notes on page 5B-42.

Table 5B-8
Summary of Field Water Quality Measurements[h], Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Sample Date	Temperature (^{0}C)	Specific Conductivity (μmho/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
LWDS-MW1	02-Mar-23	17.10	479.92	181.7	7.10	0.71	93.73	7.23
TAV-MW2	16-Feb-23	14.87	601.17	157.1	7.38	1.22	67.66	5.87
TAV-MW4	23-Feb-23	18.24	451.08	166.3	7.61	0.60	85.52	6.29
TAV-MW6	27-Feb-23	19.05	661.02	165.9	7.34	1.45	39.04	2.77
TAV-MW8	24-Feb-23	19.77	548.18	178.9	7.40	1.61	87.64	6.40
TAV-MW10	28-Feb-23	19.78	454.71	160.3	7.40	0.53	90.90	6.92
TAV-MW11	21-Feb-23	19.87	567.11	174.6	7.57	0.58	82.54	6.02
TAV-MW12	20-Feb-23	18.21	622.34	128.3	7.53	0.82	80.78	6.02
TAV-MW14	22-Feb-23	17.01	594.01	176.3	7.48	1.13	74.11	5.88
TAV-MW16	15-Feb-23	17.54	771.16	167.2	7.20	0.61	44.81	3.65
TAV-MW17	21-Apr-23	19.10	446.83	173.0	7.68	1.27	68.38	5.14
LWDS-MW1	21-Aug-23	27.62	835.20	174.3	7.54	0.94	109.53	6.96
TAV-MW2	09-Aug-23	23.6	778	153.4	7.31	0.74	71.7	6.07
TAV-MW3	01-Aug-23	22.00	586.22	212.1	7.59	0.74	76.40	5.43
TAV-MW4	15-Aug-23	22.07	531.63	191.6	7.67	0.81	92.17	6.57
TAV-MW5	02-Aug-23	23.62	516.94	198.9	7.78	5.60	93.19	6.41
TAV-MW6	16-Aug-23	21.4	750	172.6	7.32	5.76	29.9	2.65
TAV-MW7	28-Jul-23	22.09	628.26	112.3	7.36	0.79	2.26	0.24
TAV-MW8	14-Aug-23	20.62	596.95	203.6	7.59	1.17	88.87	6.49
TAV-MW9	27-Jul-23	22.75	654.60	55.5	7.34	1.84	9.58	0.67
TAV-MW10	17-Aug-23	22.5	679	148.9	7.41	0.56	85.4	7.38
TAV-MW10 (resample)	27-Sep-23	21.9	657	109.1	7.27	0.28	85.9	7.51
TAV-MW11	10-Aug-23	21.8	652	171.3	7.35	0.43	73.7	6.45
TAV-MW12	08-Aug-23	21.1	772	160.6	7.31	0.85	68.7	6.09
TAV-MW13	31-Jul-23	21.89	527.20	204.9	7.53	0.53	27.20	1.93
TAV-MW14	11-Aug-23	22.6	744	131.8	7.38	0.60	73.6	6.35
TAV-MW15	26-Jul-23	22.34	794.94	157.5	7.31	1.00	74.75	5.27
TAV-MW16	03-Aug-23	21.39	859.81	206.6	7.31	0.41	54.77	3.93
TAV-MW17	04-Aug-23	21.65	449.66	208.4	7.82	1.00	81.32	5.79
TAV-MW17	24-Oct-23	19.32	418.76	96.5	7.77	0.43	79.16	5.88

Refer to Notes on page 5B-42.

Notes for Technical Area-V Groundwater Monitoring Analytical Results Tables

%	= percent
CFR	= Code of Federal Regulations
EPA	= U.S. Environmental Protection Agency
ID	= identifier
µg/L	= micrograms per liter
mg/L	= milligrams per liter
mrem/yr	= millirem per year
No.	= number
pCi/L	= picocuries per liter

[a]Result or Activity

Result applies to Tables 5B-1 and 5B-3 through 5B-5. Activity applies to Table 5B-6.

Activity = Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Part 141). Activities of zero or less are considered to be not detected.

Bold = Value exceed the established MCL.

ND = not detected (at MDL)

[b]MDL or MDA

The MDL applies to Tables 5B-1 through 5B-5. MDA applies to Table 5B-6.

MDA = The minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level.

MDL = Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.

NA = Not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting the total uranium activity.

[c]PQL or Critical Level

The PQL applies to Tables 5B-1 and 5B-3 through 5B-5. Critical level applies to Table 5B-6.

Critical Level = The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.

NA = Not applicable for gross alpha activities. The critical level could not be calculated as the gross alpha activity was corrected by subtracting the total uranium activity.

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

[d]MCL

MCL = Maximum contaminant level. Established by the EPA Office of Water, National Primary Drinking Water Standards, (EPA, March 2018).

- The total for trihalomethanes (including bromodichloromethane and chloroform) is 80.0 µg/L.

The following are the MCLs for gross alpha particles and beta particles in community water systems:

- 15 pCi/L = gross alpha particle activity, excluding total uranium (40 CFR Part 141)
- 4 mrem/yr = any combination of beta and/or gamma emitting radionuclides (as dose rate)

NE = not established

[e]Laboratory Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

B	= The analyte was found in the blank above the effective MDL.
H	= Analytical holding time was exceeded.
J	= Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
N	= Results associated with a spike analysis that was outside control limits.
NA	= not applicable
U	= Analyte is absent or below the MDL.

Notes for Technical Area-V Groundwater Monitoring Analytical Results Tables (concluded)

[f]Validation Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

BD	= Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J	= The associated value is an estimated quantity.
J+	= The associated numerical value is an estimated quantity with a suspected positive bias.
J-	= The associated numerical value is an estimated quantity with a suspected negative bias.
None	= No data validation for corrected gross alpha activity.
U	= The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.
UJ	= The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

[g]Analytical Method

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EML	= Environmental Measurements Laboratory
HASL	= Health and Safety Laboratory
SM	= Standard Method
SW	= Solid Waste

[h]Field Water Quality Measurements

Field measurements collected prior to sampling.

˚C	= degrees Celsius
% Sat	= percent saturation
µmho/cm	= micromhos per centimeter
mg/L	= milligrams per liter
mV	= millivolts
NTU	= nephelometric turbidity units
pH	= potential of hydrogen (negative logarithm of the hydrogen ion concentration)

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Attachment 5C
Technical Area-V Plots

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Attachment 5C Plots

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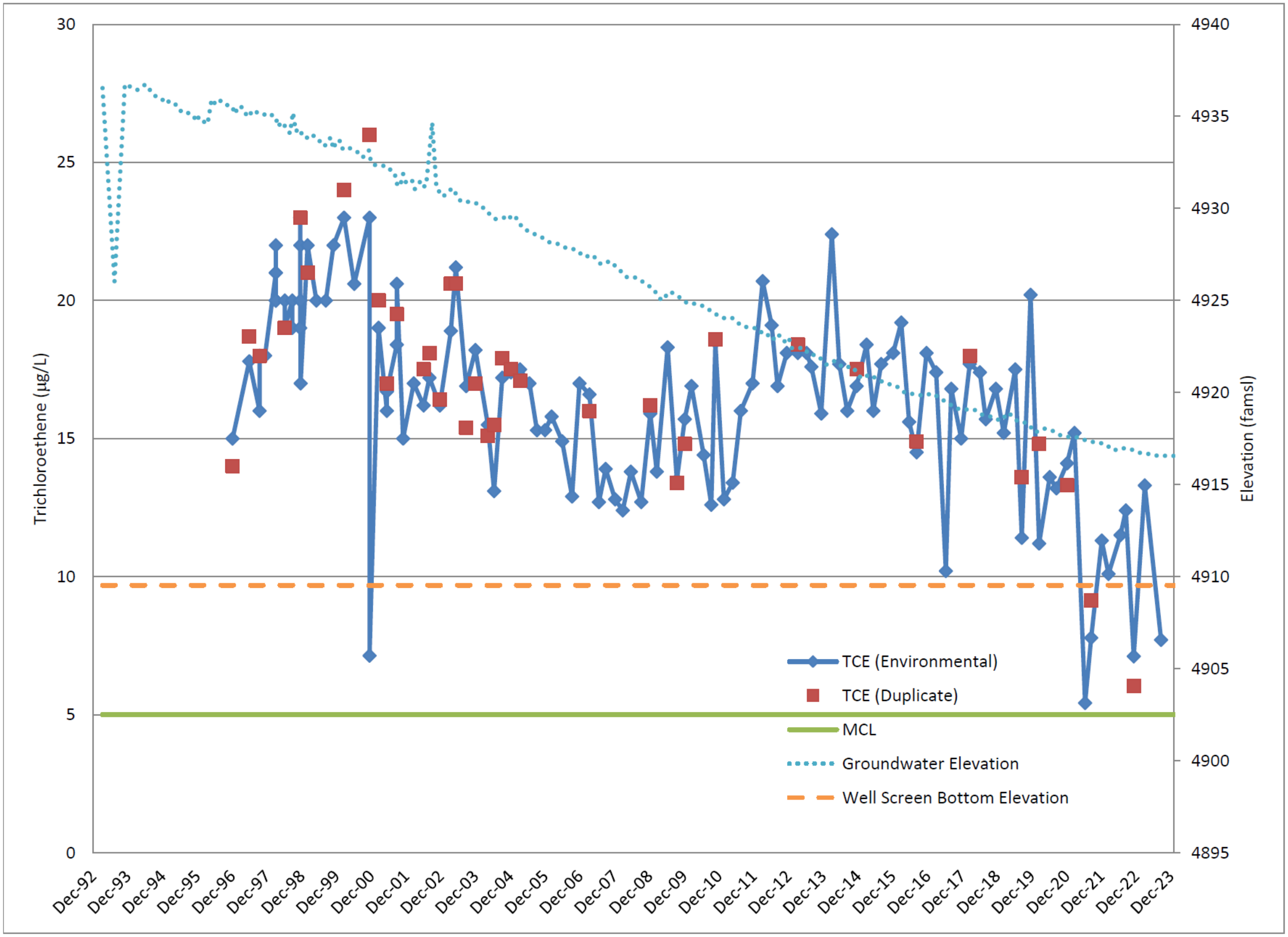

Figure 5C-1
Trichloroethene Concentrations, LWDS-MW1

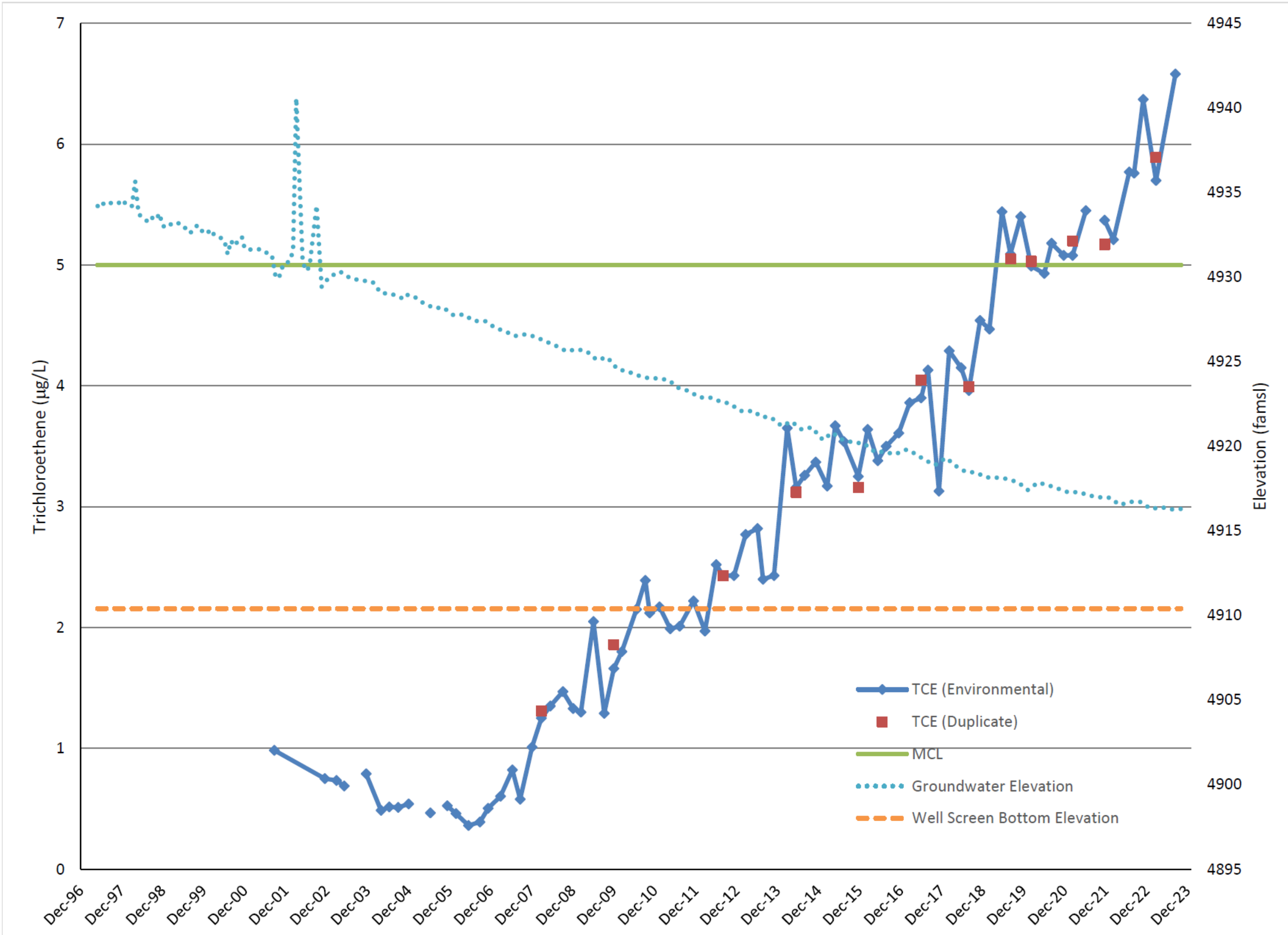

Figure 5C-2
Trichloroethene Concentrations, TAV-MW4

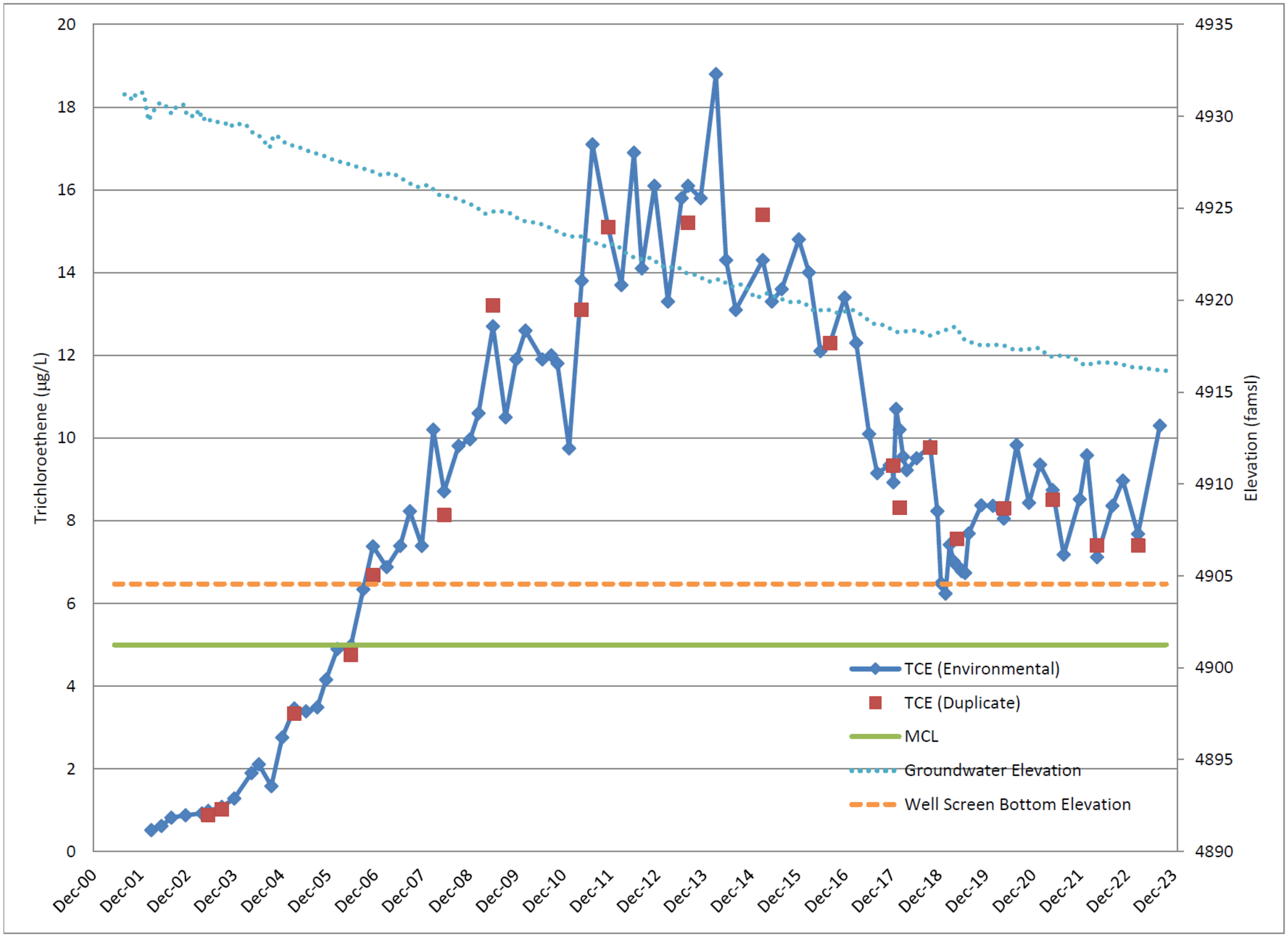

Figure 5C-3
Trichloroethene Concentrations, TAV-MW6

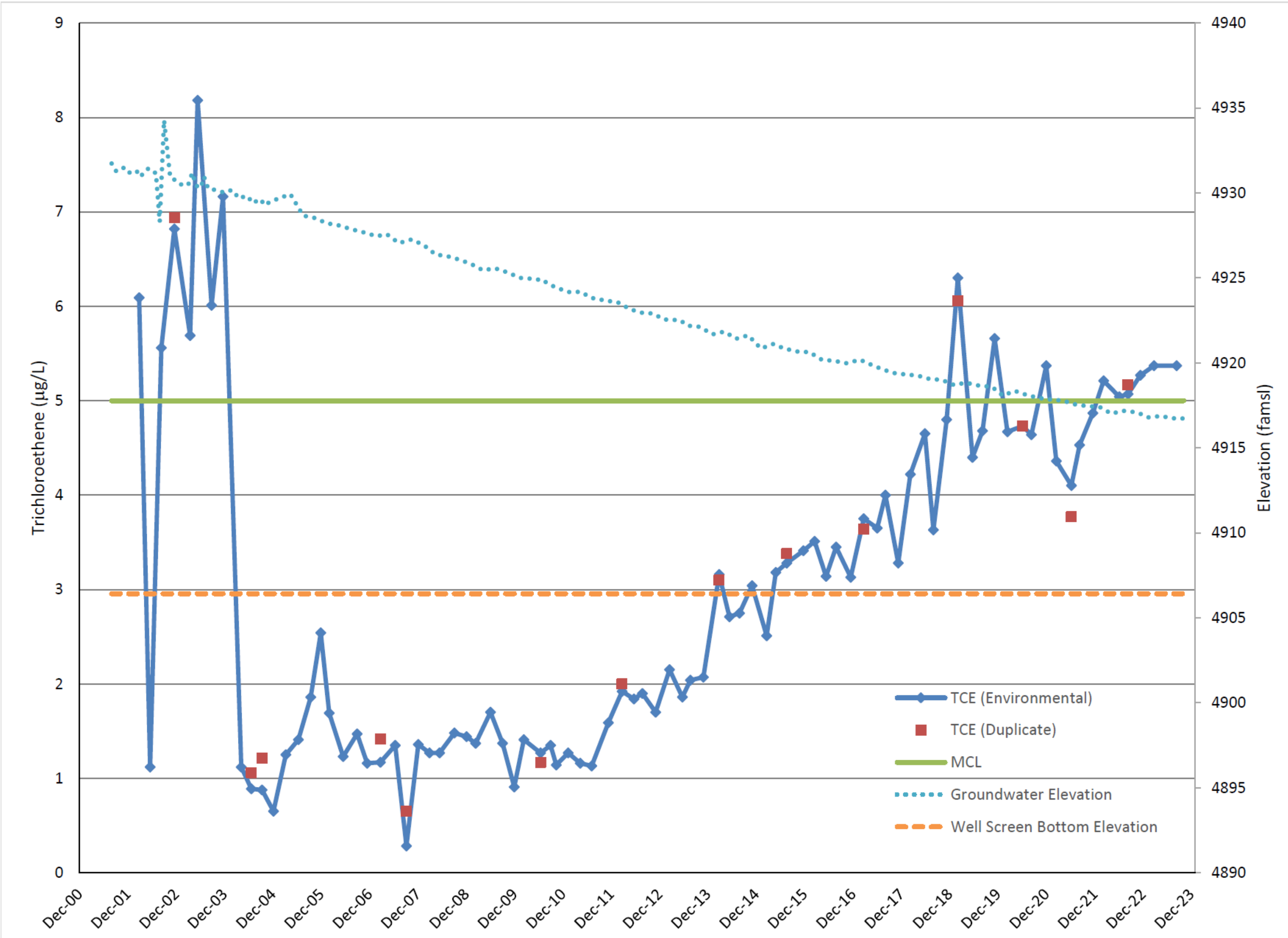

Figure 5C-4
Trichloroethene Concentrations, TAV-MW8

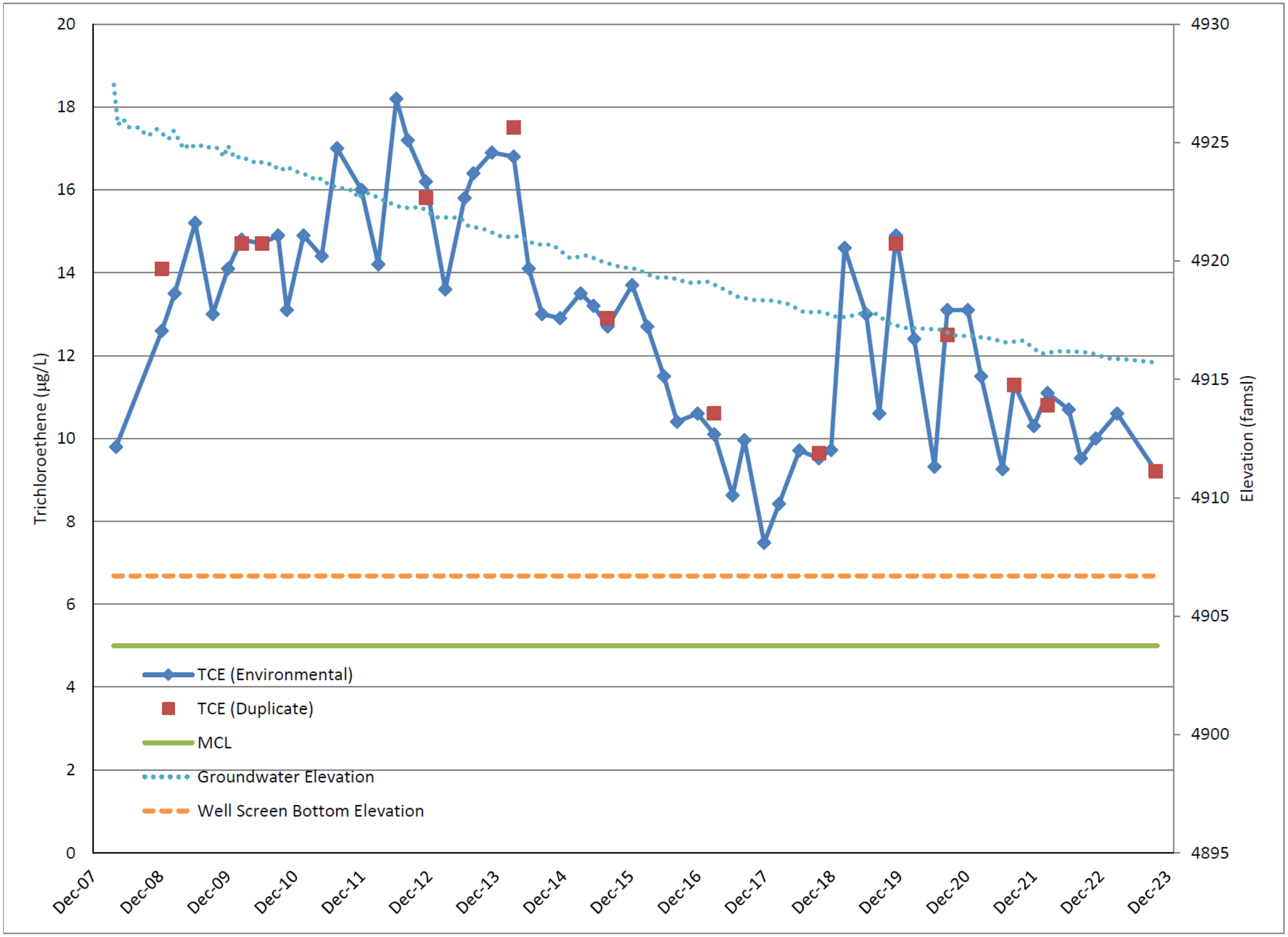

Figure 5C-5
Trichloroethene Concentrations, TAV-MW10

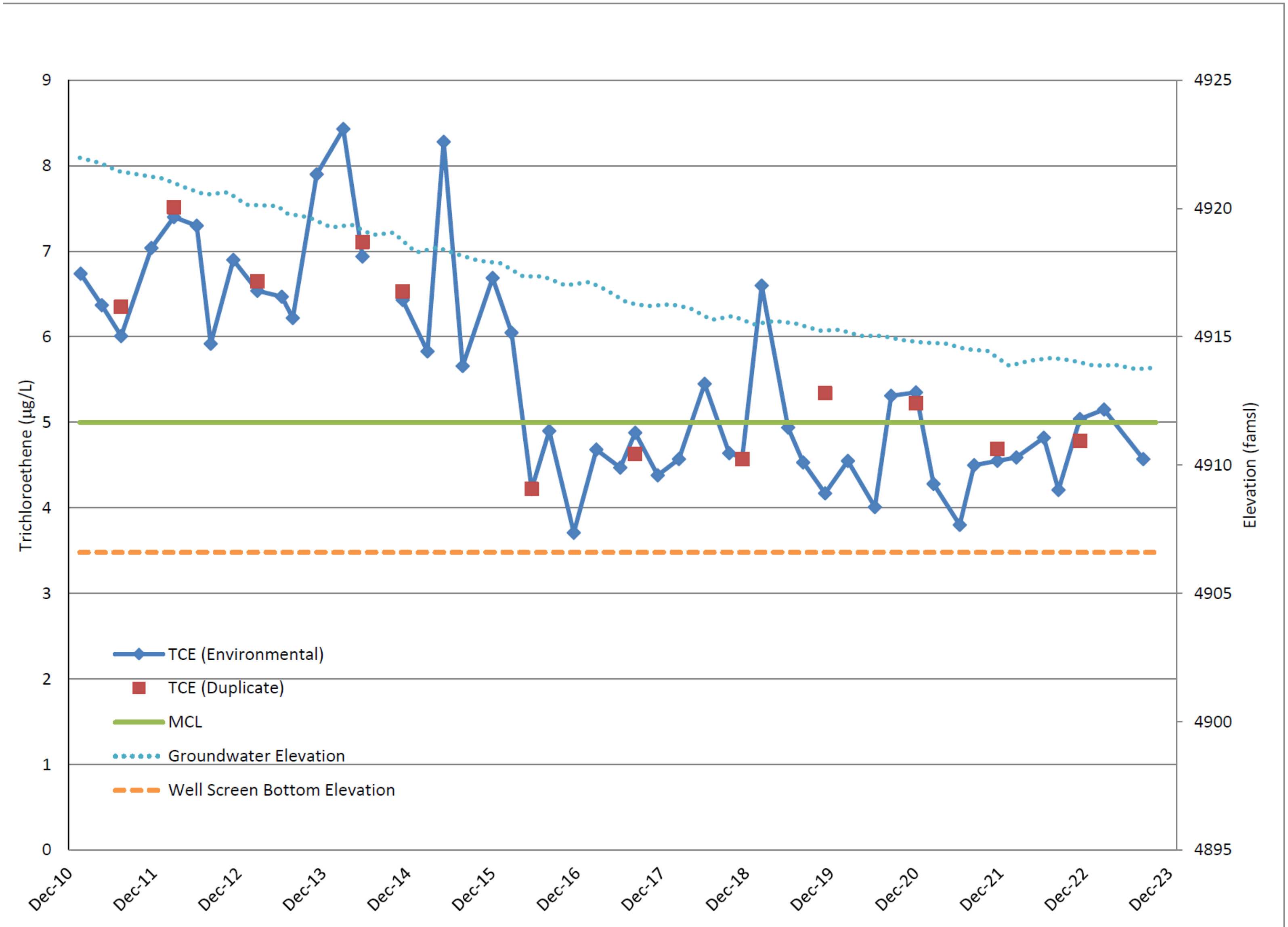

Figure 5C-6
Trichloroethene Concentrations, TAV-MW14

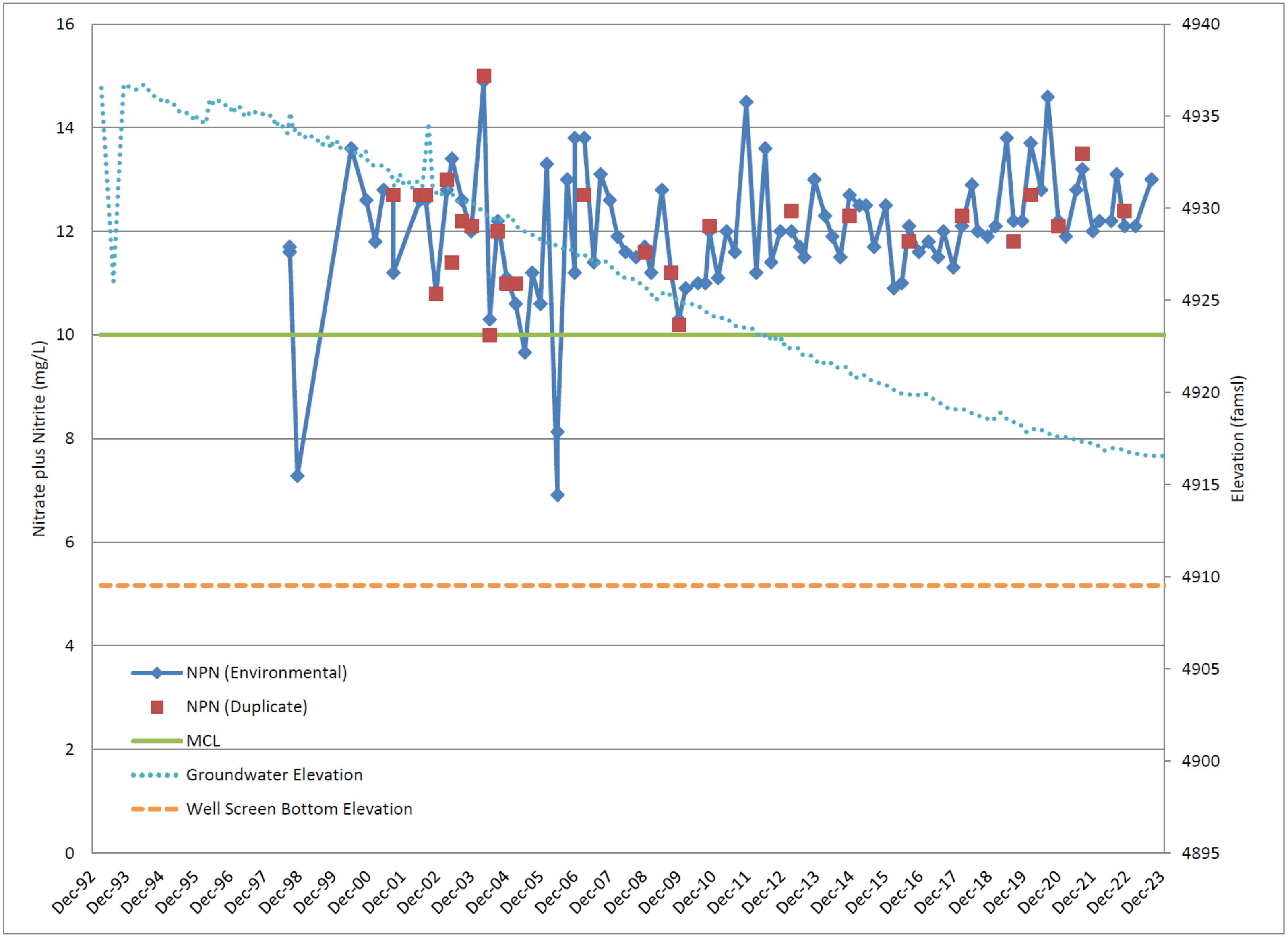

Figure 5C-7
Nitrate Plus Nitrite Concentrations, LWDS-MW1

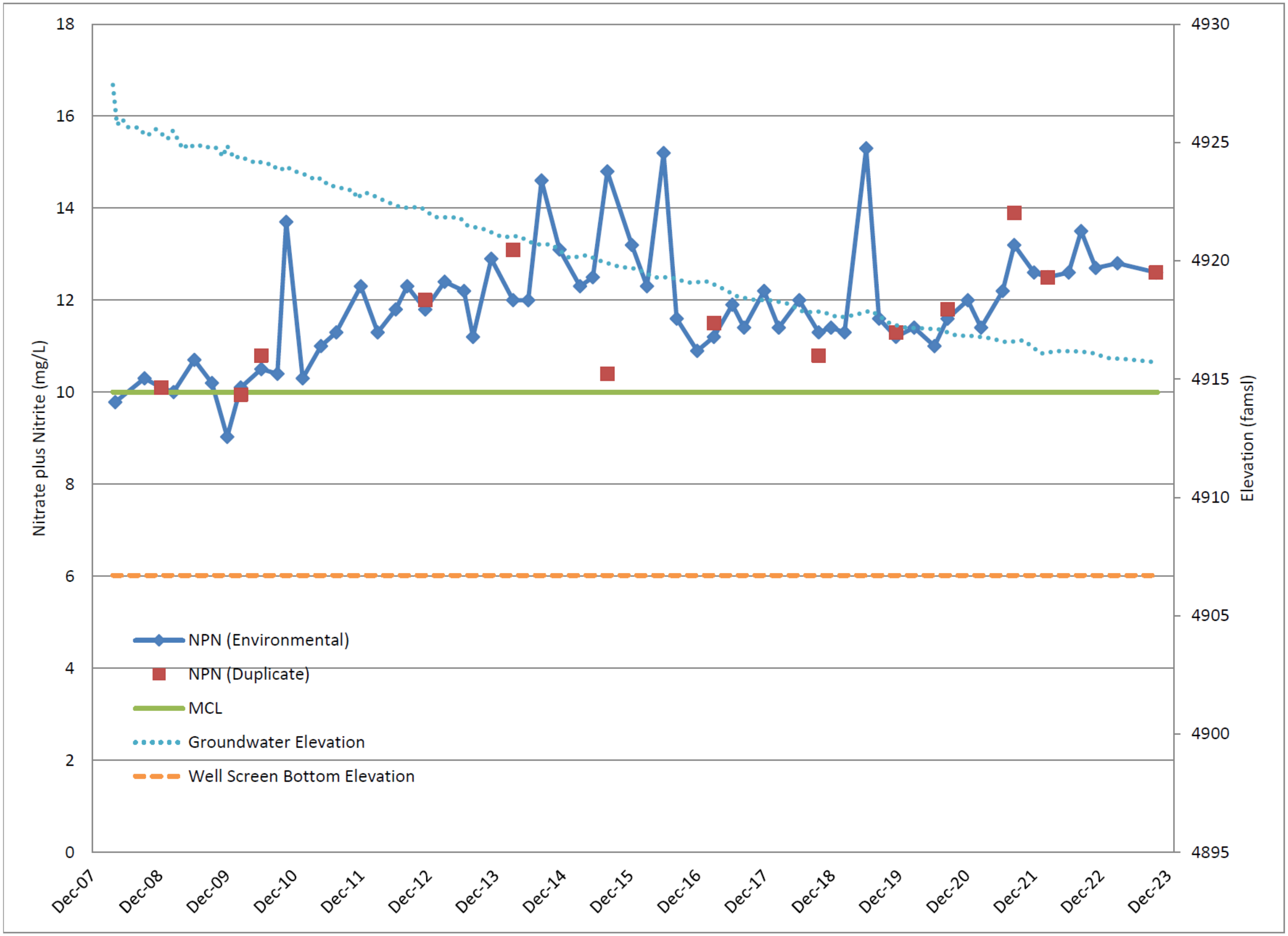

Figure 5C-8
Nitrate Plus Nitrite Concentrations, TAV-MW10

Attachment 5D
Technical Area-V Hydrographs

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Attachment 5D Hydrographs

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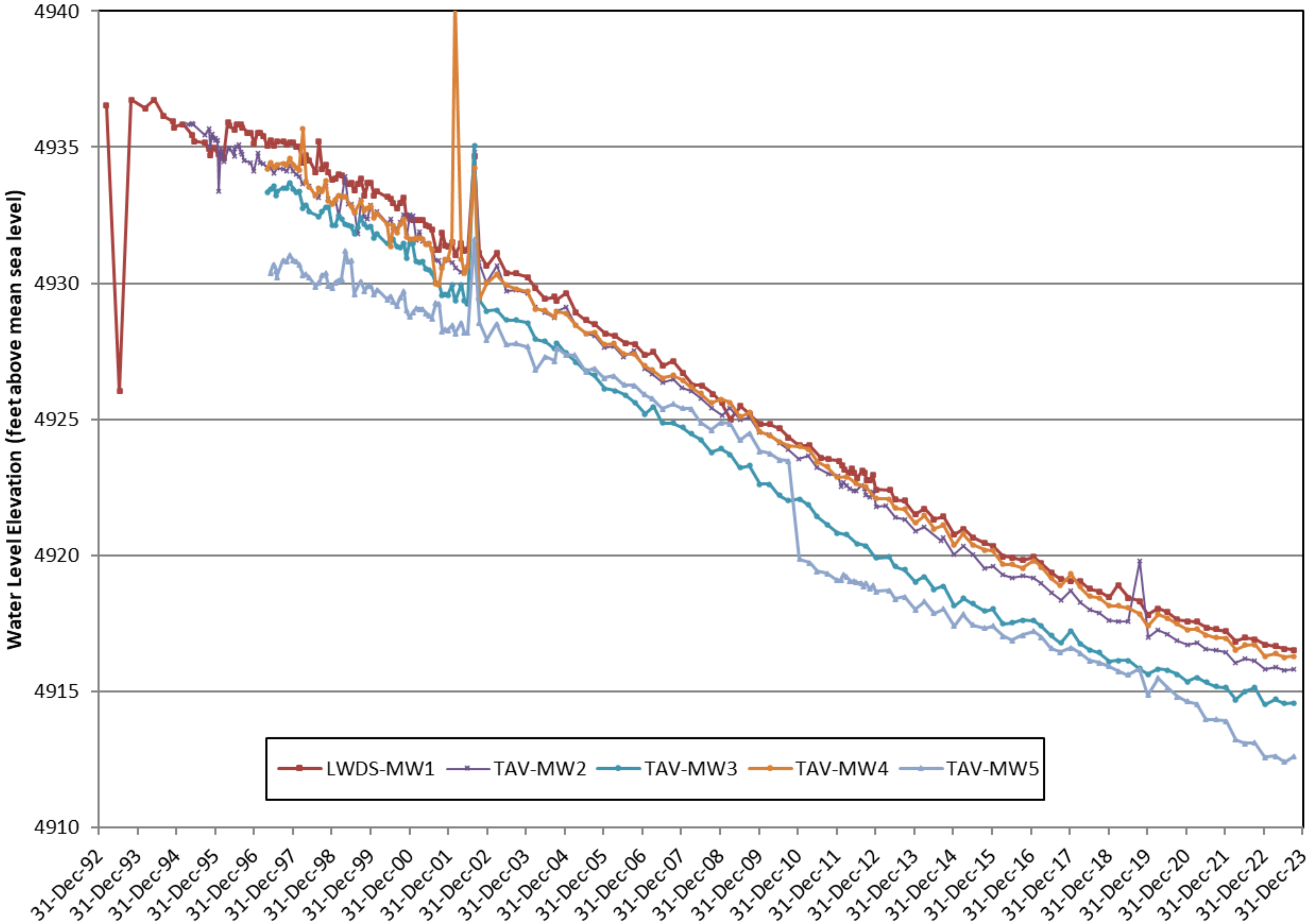

Figure 5D-1
Technical Area-V Groundwater Area of Concern Wells (1 of 4)

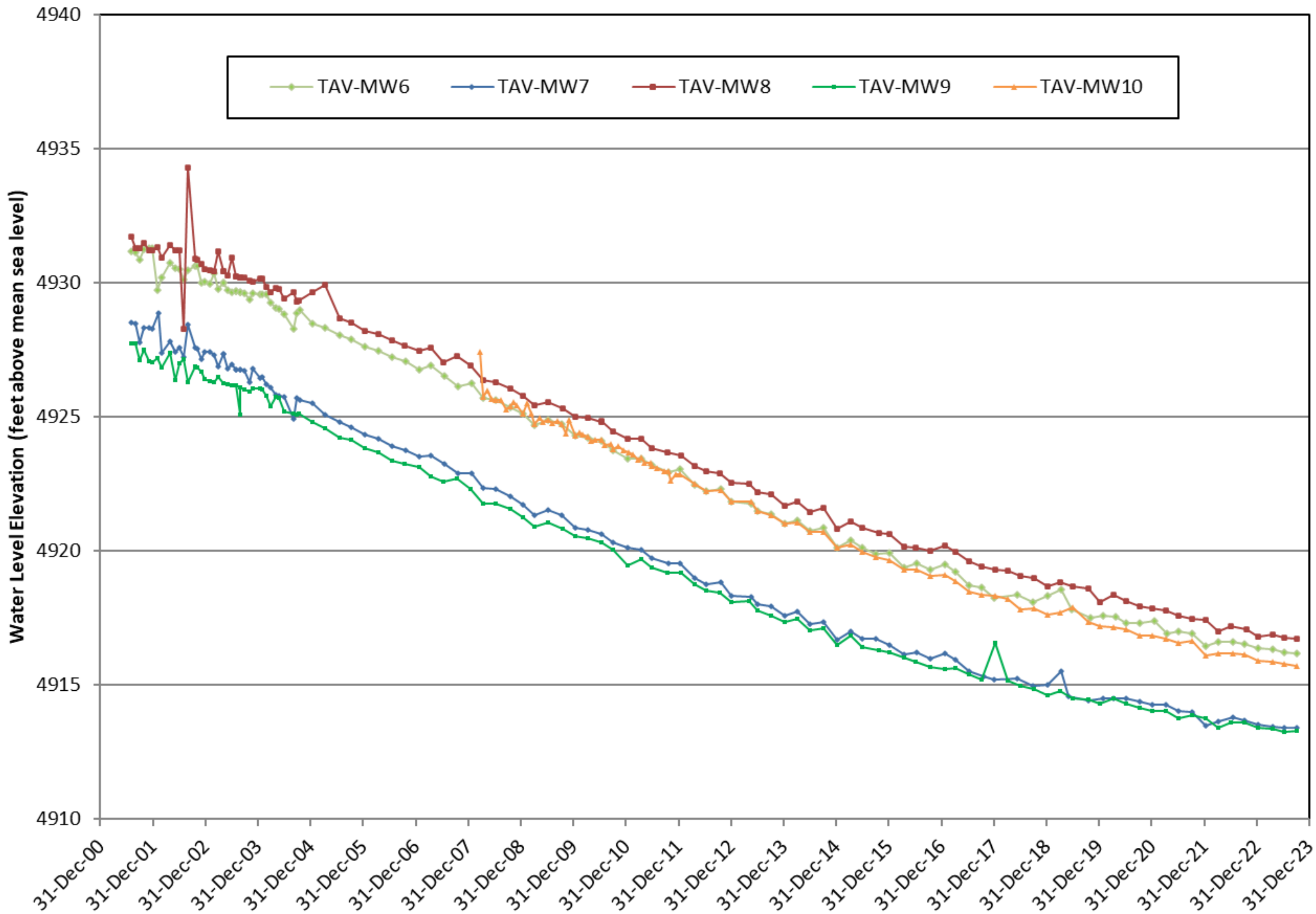

Figure 5D-2
Technical Area-V Groundwater Area of Concern Wells (2 of 4)

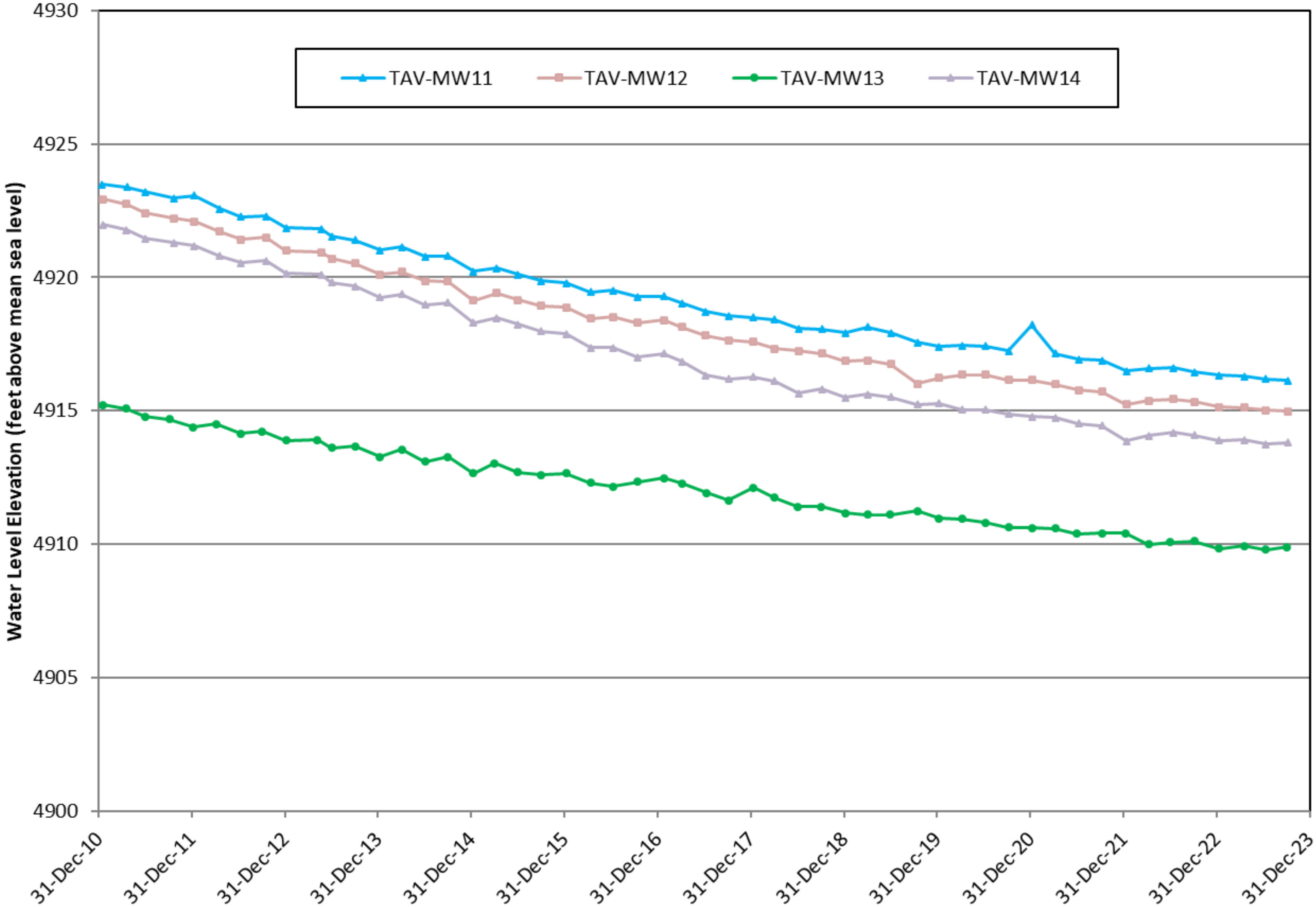

Figure 5D-3
Technical Area-V Groundwater Area of Concern Wells (3 of 4)

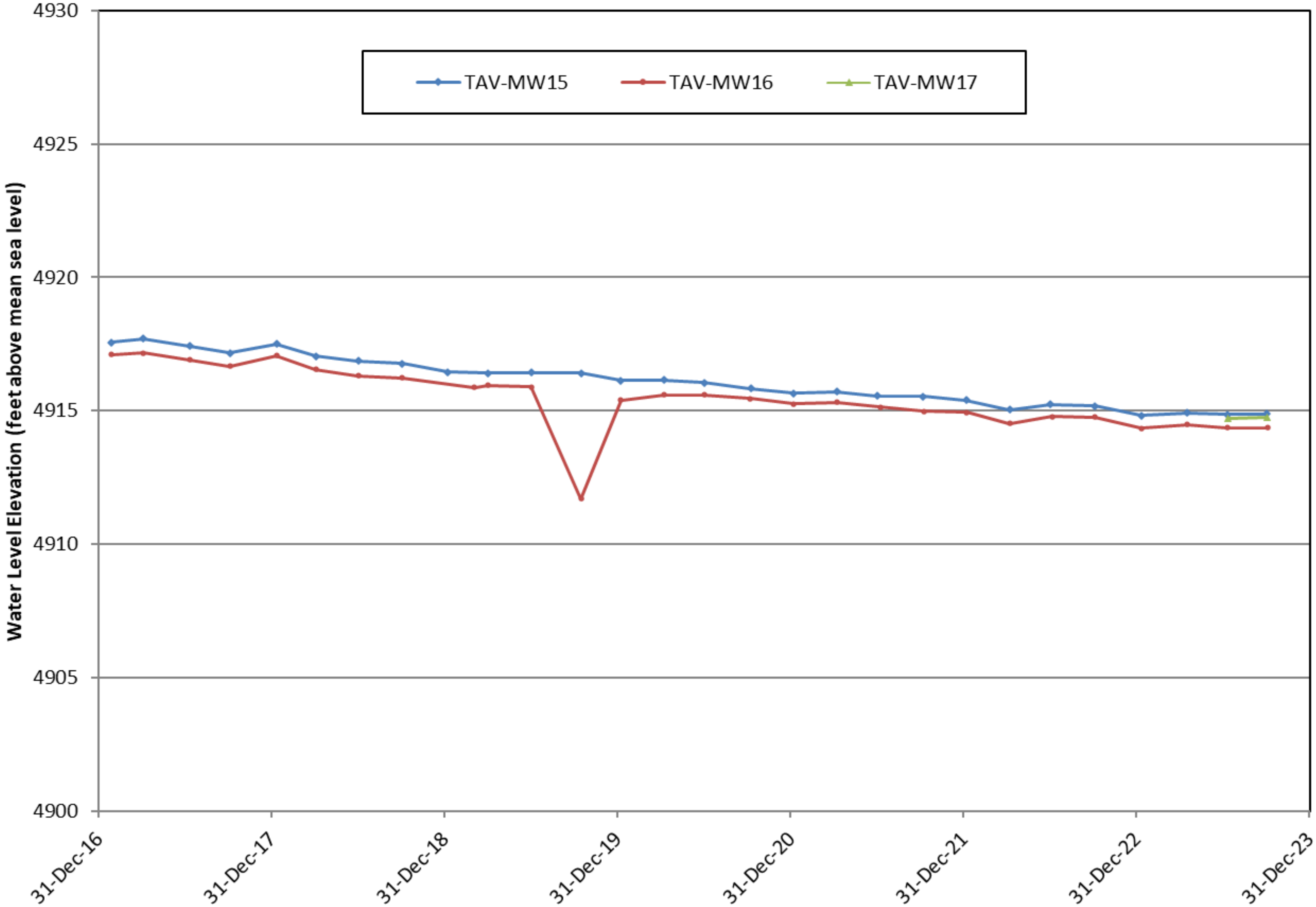

Figure 5D-4
Technical Area-V Groundwater Area of Concern Wells (4 of 4)

Chapter 5.0
Technical Area-V References

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6.0 Tijeras Arroyo Groundwater Area of Concern

6.1 Introduction

This chapter summarizes the calendar year (CY) 2023 groundwater monitoring activities and results for the Tijeras Arroyo Groundwater (TAG) Area of Concern (AOC).

The *Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act 74-4-10: Sandia National Laboratories Consent Order* (Consent Order) (NMED, April 2004) identifies the TAG AOC as an area of groundwater contamination requiring characterization and corrective action. As discussed in the *Tijeras Arroyo Groundwater Corrective Measures Implementation Plan* (TAG CMI Plan) (SNL/NM, June 2023a), which the New Mexico Environment Department (NMED) approved with modifications in 2023 (NMED, October 2023), nitrate is the constituent of concern for the TAG AOC. Nitrate concentrations in the groundwater at the TAG AOC exceed the U.S. Environmental Protection Agency (EPA) maximum contaminant level (MCL) of 10 milligrams per liter (mg/L).

Monitoring of the groundwater at the TAG AOC began in 1992. The TAG AOC overlies two primary water-bearing units of interest: (1) the Perched Groundwater System (PGWS) and (2) the Regional Aquifer. The original sources of nitrate from historical SNL/NM operations (wastewater outfall ditches and sanitary waste leach fields/seepage pits) that impacted the PGWS are no longer in operation. The greatest discharge at Solid Waste Management Unit (SWMU) 46 – the Old Acid Waste Line – ended in 1974 and discharges at nine smaller SWMUs at Technical Area (TA)-II ended in 1992 (SNL/NM, February 2018). All the surface-soil SWMUs in the TAG AOC have Corrective Action Complete status (SNL/NM, February 2018).

Department of Energy (DOE)/National Nuclear Security Administration (NNSA) and SNL/NM personnel submitted the *Tijeras Arroyo Groundwater Current Conceptual Model and Corrective Measures Evaluation Report* (TAG CCM/CME Report) (SNL/NM, December 2016) to the NMED in 2016, followed by the *Revised Tijeras Arroyo Groundwater Current Conceptual Model and Corrective Measures Evaluation Report* (Revised TAG CCM/CME Report) (SNL/NM, February 2018) in 2018. The Revised TAG CCM/CME Report proposed monitored natural attenuation (MNA) as the preferred remedy for the nitrate in the PGWS.

In 2022, the NMED endorsed MNA as the final remedy for the TAG AOC and issued a Fact Sheet/Statement of Basis (NMED, August 2022). After the public comment process was completed, the NMED approved the Revised TAG CCM/CME Report (SNL/NM, February 2018) in 2023 (NMED, January 2023). Following the Consent Order process, DOE/NNSA and SNL/NM personnel submitted the TAG CMI Plan to the NMED in 2023 (DOE, June 2023). The TAG CMI Plan addressed the Consent Order-required elements and established a revised list of monitoring wells to be sampled using an optimized sampling frequency.

In its October 26, 2023 approval-with-modification letter for the TAG CMI Plan (NMED, October 2023), the NMED requested that DOE/NNSA and SNL/NM add two existing PGWS monitoring wells (TA1-W-07 and TA2-NW1-325) to the semiannual sampling requirement because the two monitoring wells had not been sampled since 2002. DOE/NNSA, SNL/NM, and NMED personnel discussed the feasibility of sampling these two monitoring wells during a virtual meeting held on December 13, 2023. Before the meeting, SNL/NM personnel conducted well capacity tests in November 2023. The tests indicated that monitoring well TA1-W-07 could not produce water at a rate suitable for sampling purposes because the screened sediments had low hydraulic conductivities and well yield. Monitoring well TA2-NW1-325 was determined to be useful for future sampling activities. At the conclusion of the meeting, NMED personnel verbally agreed that only monitoring well TA2-NW1-325 needed to be added to the semiannual sampling requirement and that a revised TAG CMI Plan should document this addition.

The revised TAG CMI Plan will be submitted to the NMED in January 2024. In anticipation of the NMED issuing a final approval of the revised TAG CMI Plan in 2024, implementation of best management practices (BMPs) at the TAG AOC will begin in January 2024. The BMPs will include quarterly water level measurements at all monitoring wells, semiannual sampling of the PGWS monitoring wells, annual sampling of the Regional Aquifer monitoring wells, and analyses for nitrate. Implementation of the MNA final remedy is anticipated to begin in 2025.

6.1.1 Location

As Figure 6-1 shows, the TAG AOC covers approximately 1.82 square miles (sq mi) and contains three TAs (TA-I, TA-II, and TA-IV). Kirtland Air Force Base (KAFB) operations utilize numerous facilities and properties with a variety of land uses along the north, west, south, and southeast boundaries of TA-I, TA-II, and TA-IV. The area located along the northern and western boundaries of the three TAs contains KAFB facilities consisting of base housing, office buildings, a fire station, training schools, machine workshops, storage yards, a detention facility, an electromagnetic research facility, and the former KAFB Sewage Lagoons. Bordering the southern and southeastern edges of the TAG AOC are KAFB undeveloped open spaces, an active landfill, closed landfills, emergency response training areas, and the KAFB Tijeras Arroyo Golf Course. City of Albuquerque (COA) residential areas are located along the northern boundary of KAFB. The closed COA Eubank Landfill is located near the northeastern corner of the TAG AOC (Nelson, June 1997). A large-diameter sanitary sewer line operated by the Albuquerque Bernalillo County Water Utility Authority (ABCWUA) extends along the eastern and southern edges of the TAG AOC.

6.1.2 Site History

The facilities at TA-I, TA-II, and TA-IV were built on land that had been previously developed by commercial airline operators and to a greater extent by the military (Van Citters and Bisson, June 2003). Land use development began in 1928 when the public Albuquerque Airport was built on the East Mesa. Renamed Oxnard Field in 1929, the airport was used until late 1939 when the vicinity of Oxnard Field was purchased by the federal government for use as an Army Air Depot Training Station, later known as Sandia Base. After World War II, the old Oxnard Field runways and an extensive grid of taxiways were used to park aircraft (SNL/NM, February 2018). Starting in 1946, the War Assets Administration managed the sale and dismantlement of approximately 2,250 surplus military aircraft. Approximately 1,500 planes were dismantled and smelted down adjacent to the Oxnard taxiways. In addition to the smelter, numerous maintenance and machine shops were operated for several years.

In 1939, public airline service was moved approximately 4 miles to the west of Oxnard Field where the Albuquerque Municipal Airport was built. Using the municipal set of runways, the Albuquerque Army Air Base began operations in 1941. The Air Base was later dedicated as Kirtland Army Airfield and subsequently renamed KAFB. In 1971, the operations of KAFB, Sandia Base, and Manzano Base were combined under the Air Force Materiel Command (KAFB, March 2013). The municipal airfield is now known as the Albuquerque International Sunport.

In July 1945, the Z Division of the Manhattan Engineers District, an extension of the original Los Alamos Laboratory, was established at Sandia Base in the area that would become known as TA-I (Furman, April 1990). The primary mission of the Z Division was to provide engineering, production, stockpiling, and testing support for nuclear weapon systems. In 1949, the independent Sandia Laboratory was established at TA-I and TA-II. Construction of TA-IV began in 1977. Over the years, operations at the three TAs have evolved to include a wide variety of research and development activities, including weapons design, component production, high-performance computing, and energy research programs.

6.1.3 Monitoring History

Since 1992, SNL/NM Environmental Restoration Operations has conducted numerous environmental and groundwater investigations at the TAG AOC. The historical timeline (Attachment 6A, Table 6A-1) lists the field investigations concerning groundwater quality at the TAG AOC. Most of the investigations have been site-specific investigations conducted in support of SWMU assessments involving potential soil contamination. Where required, contaminated soil and weapons/construction debris have been excavated and removed. The NMED has granted Corrective Action Complete status to all 47 SWMUs in the TAG AOC. Only the groundwater issue remains.

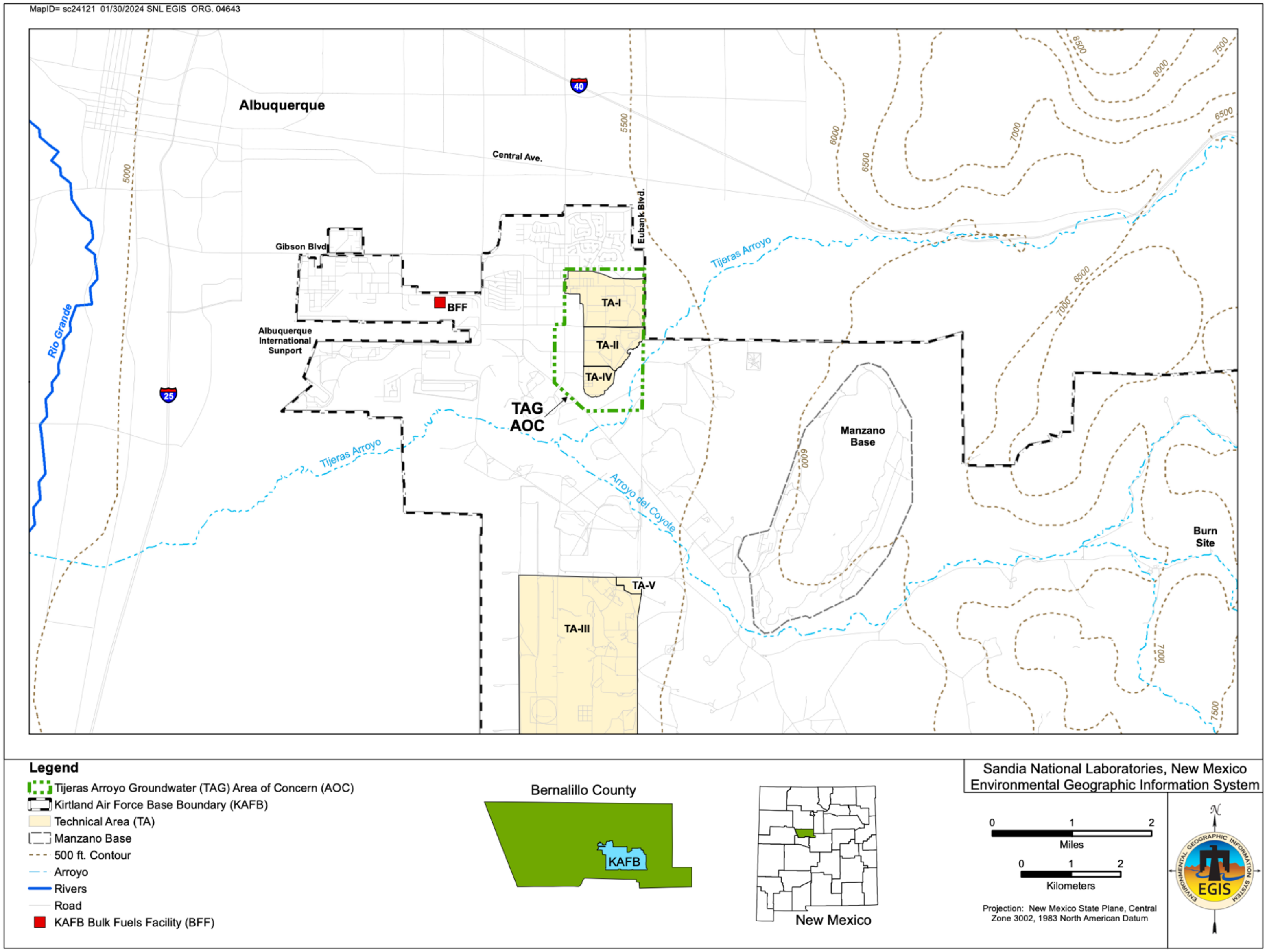

Figure 6-1
Location of the Tijeras Arroyo Groundwater Area of Concern

The KAFB Environmental Restoration Program (ERP) and the COA Environmental Health Department have also conducted groundwater investigations near the TAG AOC. Their initial findings were incorporated in the *Tijeras Arroyo Groundwater Investigation Report* (SNL/NM, November 2005). Since then, KAFB has issued nitrate abatement reports (KAFB, December 2015, January 2019, December 2023) describing nitrate release sites and groundwater monitoring data. As a separate endeavor, the KAFB ERP is remediating the vicinity of the Bulk Fuels Facility (BFF) located approximately 1.6 miles west of the TAG AOC (Figure 6-1). Petroleum hydrocarbon contamination (primarily from aviation gasoline and a relatively minor amount of jet fuel) associated with the BFF has impacted the Regional Aquifer (KAFB, November 2023). The extent of contamination and ongoing BFF remediation efforts do not affect groundwater quality at the TAG AOC.

Since 1992, groundwater quality at the TAG AOC has been evaluated as part of the TA-II SWMU investigations with the installation of monitoring wells in the central part of the TAG AOC. The PGWS was encountered at a depth of approximately 320 feet (ft) below ground surface (bgs). The Regional Aquifer was present at approximately 500 ft bgs. Subsequent drilling activities outside of TA-II identified that a localized Merging Zone of limited lateral extent was present between the PGWS and the Regional Aquifer near Powerline Road. The Conceptual Site Model (CSM) in Section 6.1.6 describes the hydrogeologic setting in greater detail.

Historical groundwater analyses for the TAG AOC have demonstrated that nitrite concentrations are below laboratory method detection limits (MDLs) and are considered noncontributory to the results of nitrate plus nitrite (NPN) analyses (SNL/NM, February 2018). Therefore, NPN (as nitrogen) results are used in this chapter and its attachments to represent nitrate concentrations. The EPA MCL and State of New Mexico drinking water standard (NMWQCC, December 2018) for nitrate (as nitrogen) is 10 mg/L.

To date (end of CY 2023), the maximum NPN concentration for the PGWS has been 30.0 mg/L and corresponded to the environmental sample collected in March 2011 from monitoring well TJA-7, which is located at SWMU 46. The maximum NPN concentration for the Merging Zone was 38.4 mg/L in the May 2007 environmental sample collected at monitoring well TJA-4; this well is located in the extreme southeast corner of the TAG AOC near the KAFB Tijeras Arroyo Golf Course. The maximum NPN concentration for the Regional Aquifer exclusive of the Merging Zone was 4.24 mg/L in the June 2019 environmental sample collected from monitoring well TJA-3, which is located at SWMU 46.

6.1.4 Current Monitoring Well Network

Figure 6-2 shows the TAG AOC monitoring well network. During CY 2023, SNL/NM personnel measured water levels at 27 monitoring wells and collected groundwater samples at 21 monitoring wells (Table 6-1). Prior to CY 2023, monitoring wells were sampled quarterly, semiannually, and annually. Under the revised TAG CMI Plan, 19 monitoring wells will be sampled semiannually and annually (Table 6-1). The quarterly sampling requirement has been eliminated. Eleven PGWS and eight Regional Aquifer monitoring wells are scheduled for semiannual and annual sampling, respectively, in accordance with the revised TAG CMI Plan.

Prior to NMED approval (NMED, October 2023) of the TAG CMI Plan (SNL/NM, June 2023a), variances in the sampling plan included monitoring wells PGS-2, TA1-W-03, and WYO-4 because these wells were not sampled. However, not sampling these wells is no longer considered a variance because the revised TAG CMI Plan does not require them to be sampled. Table 6-1 shows the former (pre-TAG CMI Plan) and current (revised TAG CMI Plan) sampling requirements.

Table 6-1
Groundwater Monitoring Conducted at the Tijeras Arroyo Groundwater Area of Concern in Calendar Year 2023

Well ID	Installation Year	Pre-CMI Plan Sampling Frequency	WQ	WL	CMI Plan (Revised) Sampling Frequency Starting 2024	CMI Plan (Revised) Water-Level Starting 2024	Comments
Eubank-1	1988			✓		Q	Regional Aquifer
PGS-2	1995	A		✓		Q	Regional Aquifer
TA1-W-01	1997	A	✓	✓		Q	Regional Aquifer
TA1-W-02	1998	A	✓	✓	A	Q	Regional Aquifer
TA1-W-03	1998	A		✓		dry	PGWS
TA1-W-04	1998	A	✓	✓		Q	Regional Aquifer
TA1-W-05	1998	A	✓	✓		Q	Regional Aquifer
TA1-W-06	1998	SA	✓	✓	SA	Q	PGWS
TA1-W-07	1998			✓		Q	PGWS
TA1-W-08	2001	A	✓	✓	SA	Q	PGWS
TA2-NW1-325	1993			✓	SA	Q	PGWS
TA2-NW1-595	1993	A	✓	✓	A	Q	Regional Aquifer
TA2-W-01	1994	SA	✓	✓	SA	Q	PGWS
TA2-W-19	1995	Q	✓	✓	SA	Q	PGWS
TA2-W-24	1998	spec.	✓	✓	A	Q	Regional Aquifer
TA2-W-25	1997	spec.	✓	✓	A	Q	Regional Aquifer
TA2-W-26	1998	Q	✓	✓	SA	Q	PGWS
TA2-W-27	1998	SA	✓	✓	SA	Q	PGWS
TA2-W-28	2014	Q	✓	✓	SA	Q	PGWS
TJA-2	1994	Q	✓	✓	SA	Q	PGWS
TJA-3	1998	Q	✓	✓	A	Q	Regional Aquifer
TJA-4	1998	Q	✓	✓	A	Q	Regional Aquifer – MZ
TJA-5	1998	spec.	✓	✓	SA	Q	PGWS
TJA-6	2001	SA	✓	✓	A	Q	Regional Aquifer
TJA-7	2001	Q	✓	✓	SA	Q	PGWS
WYO-3	2001	A	✓	✓	A	Q	Regional Aquifer
WYO-4	2001	Q		✓			PGWS
Total	----	24	21	27	19	25	----

Notes:
Green shading denotes monitoring wells that are screened in the Perched Groundwater System. Purple shading denotes the monitoring well is screened in the Merging Zone (below the Perching Horizon and above the Regional Aquifer). Monitoring wells screened in the Regional Aquifer are not shaded.
Check mark indicates WQ sampling or WL measurements were completed by SNL/NM personnel in CY 2023.
Water levels are measured quarterly.
Sampling frequency used by SNL/NM personnel: Q = quarterly, SA = semiannual, A = annual.
The special (spec.) monitoring wells were sampled voluntarily by SNL/NM personnel. The wells were not listed in SNL/NM work plans. Monitoring well Eubank-1 is owned by the City of Albuquerque and its personnel collect a groundwater sample on annual basis. Monitoring well TA2-W-28 replaced monitoring well TA2-SW1-320 because the water column was insufficient for sampling after 2014.
Monitoring well WYO-3 replaced monitoring well WYO-1.
Monitoring well WYO-4 replaced monitoring well WYO-2.
Responsibility for monitoring well WYO-4 was transferred to the Kirtland Air Force Base Environmental Restoration Program in 2017.

CMI = Corrective Measures Implementation
COA = City of Albuquerque
ID = identifier
MZ = Merging Zone
PGS = Parade Ground South
TA1-W = Technical Area I well
TA2-NW = Technical Area II northwest well
TA2-SW = Technical Area II southwest well
TA2-W = Technical Area II well
TJA = Tijeras Arroyo well
WL = water level
WQ = water quality
WYO = Wyoming Boulevard well

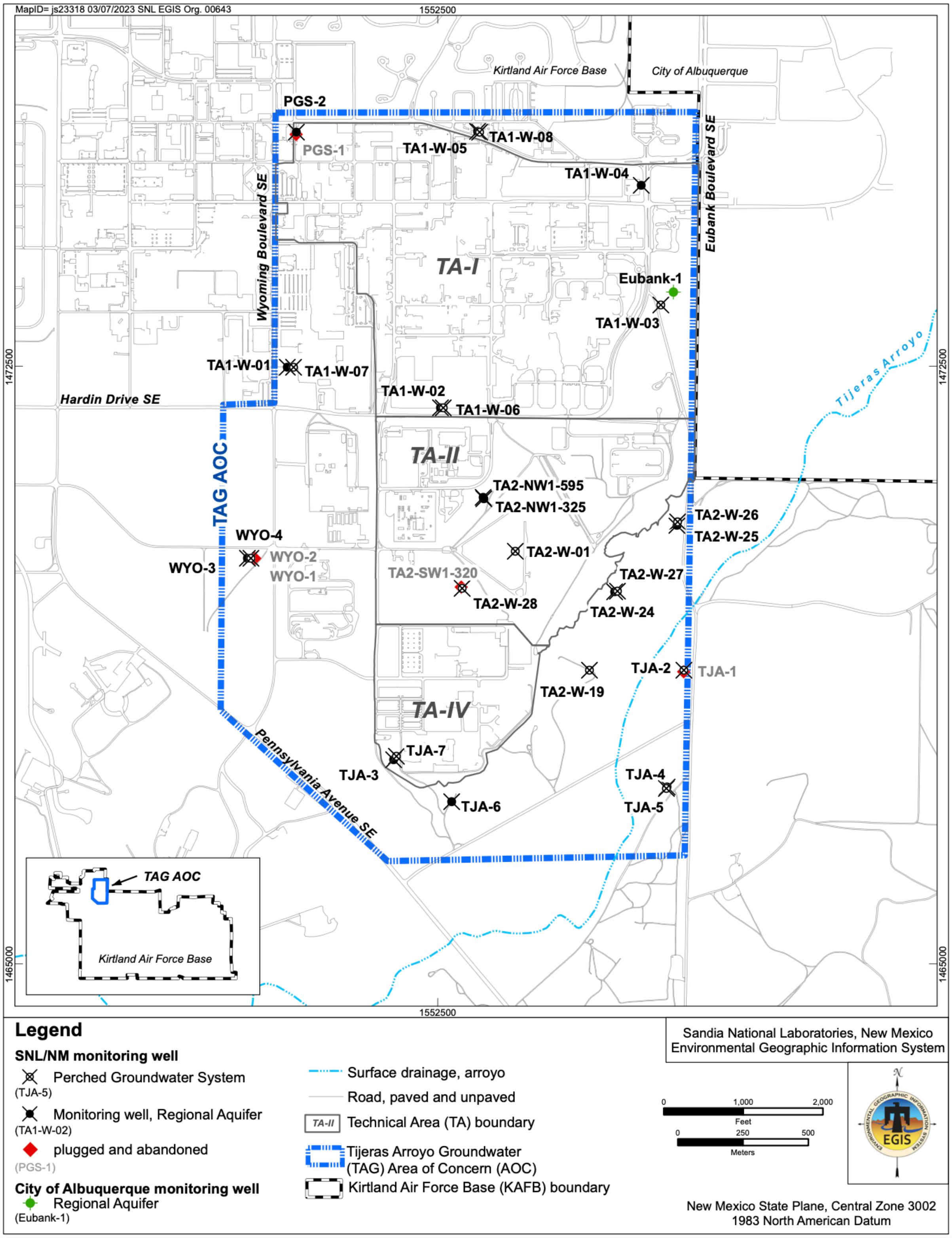

Figure 6-2
Groundwater Monitoring Wells in the Tijeras Arroyo Groundwater Area of Concern

6.1.5 Summary of Calendar Year 2023 Activities

TAG AOC groundwater monitoring activities in CY 2023 included:

- Quarterly water level measurements at 27 monitoring wells (Table 6-1). Attachment 6B presents hydrographs through CY 2023.
- Collection and analysis of groundwater samples from 21 monitoring wells (Table 6-1).
- Quarterly collection of groundwater samples from seven monitoring wells (TA2-W-19, TA2-W-26, TA2-W-28, TJA-2, TJA-3, TJA-4, and TJA-7) in March 2023, May/June 2023, August/September 2023, and November/December 2023.
- Semiannual collection of groundwater samples from four monitoring wells (TA1-W-06, TA2-W-01, TA2-W-27, and TJA-6) in March 2023 and August/September 2023.
- Annual collection of groundwater samples from seven monitoring wells (TA1-W-01, TA1-W-02, TA1-W-04, TA1-W-05, TA1-W-08, TA2-NW1-595, and WYO-3) in August/September 2023.
- Voluntary sampling of three monitoring wells (TA2-W-24, TA2-W-25, and TJA-5) in August/September 2023 in anticipation of the TAG CMI Plan being approved. Earlier work plans did not require these wells to be sampled.
- Reinstallation of a BaroBall on the top of the casing at monitoring well TJA-7 in July 2023. The well previously had a BaroBall from December 2006 to June 2018.
- Video logging of three monitoring wells (PGS-2, TA1-W-05, and TA1-W-08) in September 2023 as a BMP. Consistent with previous inspections, grout intrusion was observed in the PGS-2 well screens; the well has been unsuitable for sampling since August 2017 and cannot be rehabilitated. The casings and screens were in good condition at monitoring wells TA1-W-05 and TA1-W-08.
- Routine video logging of eight monitoring wells (TA1-W-06, TA2-W-01, TA2-W-24, TA2-W-25, TA2-W-26, TA2-W-28, TJA-5 and TJA-7) in October 2023 as a BMP. The casings and screens were all in good condition.
- Routine video logging of eight monitoring wells (TA1-W-02, TA1-W-07, TA2-NW1-325, TA2-NW1-595, TA2-W-19, TA2-W-27, TJA-2 and TJA-3) in November 2023 as a BMP. The casings and screens were all in good condition.
- Well capacity tests (using a Bennett pump) on monitoring wells TA1-W-07 and TA2-NW1-325 in November 2023. The wells had not been sampled since 2002. The findings indicated that TA1-W-07 did not yield water at a rate suitable for sampling because the screened sediments were of low hydraulic conductivity. TA2-NW1-325 was determined to be useful for future sampling activities.
- Monitoring well inspections during each monitoring event (water level measurement and groundwater sampling), Each monitoring well was inspected. The inspected items included signage, identification marker, pad lock, cap on the well casing, well-head integrity (pad, stovepipe or flush mount [vault]), and evidence of unauthorized access. The area around each well was also inspected for erosion, subsidence, and pavement damage. Where necessary, repairs were made or scheduled. No unauthorized access was evident at any of the monitoring wells.
- Submittal of the *Comprehensive Site-Wide Groundwater Monitoring Plan (Revised), Calendar Year 2024* (SNL/NM, April 2023a) to the NMED.
- Validation and summarization of the analytical results for the groundwater samples (Attachment 6C).
- Preparation of concentration trend plots for the groundwater samples (Attachment 6D).

6.1.6 Conceptual Site Model

The Revised TAG CCM/CME Report (SNL/NM, February 2018) presented a CSM for the vicinity of the TAG AOC. The CSM is a block diagram that illustrates surface features (topography and nitrate release sites) on the upper half of the image and subsurface features (stratigraphic and water-bearing units) on the lower half. The CSM (Figure 6-3) was updated in 2020 to better depict the Merging Zone near the KAFB Tijeras Arroyo Golf Course and the isolated lenses of saturation in which water elevation contours are not continuous with either the PGWS or the Regional Aquifer (SNL/NM, June 2021). Also, the Sewer Interceptor Line beneath the active Tijeras Arroyo channel was removed from the CSM figure because a COA video-camera survey showed that the ABCWUA Sewer Interceptor Line is intact (not leaking) along the southern and eastern boundaries of the TAG AOC.

The CSM (Figure 6-3) depicts a complex hydrogeologic setting and a variety of potential contaminant release sites. Significant features include the following:

- The TAG AOC covers approximately 1.82 sq mi.
- The PGWS has an extent of approximately 4.43 sq mi that encompasses and extends beyond the TAG AOC boundary.
- A Merging Zone linking the PGWS and the Regional Aquifer occurs along Powerline Road.
- The Tijeras Arroyo channel crosses KAFB and trends along the southern edge of the TAG AOC.
- The former KAFB Sewage Lagoons are located west of the TAG AOC.
- The SNL/NM SWMU 46 wastewater outfall is located on the southern edge of the TAG AOC.
- The SNL/NM TA-II discharge site consisting of nine SWMUs is located near the center of the TAG AOC.
- Possible ongoing KAFB and SNL/NM infrastructure leaks at sewer and water lines.
- The KAFB Tijeras Arroyo Golf Course is located approximately 0.4 miles southeast of the TAG AOC.

The sediments of the Santa Fe Group underlying the TAG AOC contain two water-bearing units: (1) the PGWS and (2) the Regional Aquifer. The PGWS is contained solely within the alluvial-fan lithofacies, which consists of silty sands, clayey layers, and poorly sorted gravels that are not laterally continuous. The Regional Aquifer occurs in the alluvial-fan lithofacies and the Ancestral Rio Grande (ARG) fluvial lithofacies. The eastern limit of the ARG sediments near the water table trends along the western boundary of the TAG AOC. The ARG sediments consist of more permeable sands and gravels that have a north-south depositional fabric. Table 6-2 summarizes the hydrogeologic characteristics of the two water-bearing units. Beneath the TAG AOC, the depths to water for the PGWS and the Regional Aquifer average approximately 300 and 510 ft bgs, respectively. The two water-bearing units are separated by a Perching Horizon and an approximately 200-ft-thick sequence of unsaturated sediments. Across the TAG AOC, the estimated thickness of the Perching Horizon beneath the PGWS ranges from 4 to 11 ft based on correlation of downhole geophysical logs and lithologic descriptions (SNL/NM, February 2018). The average thickness is approximately 7 ft. The Perching Horizon is composed of a layer of low permeability sediments (mostly clay) that dip to the southeast at approximately 1 degree (Van Hart, June 2003; SNL/NM, February 2018).

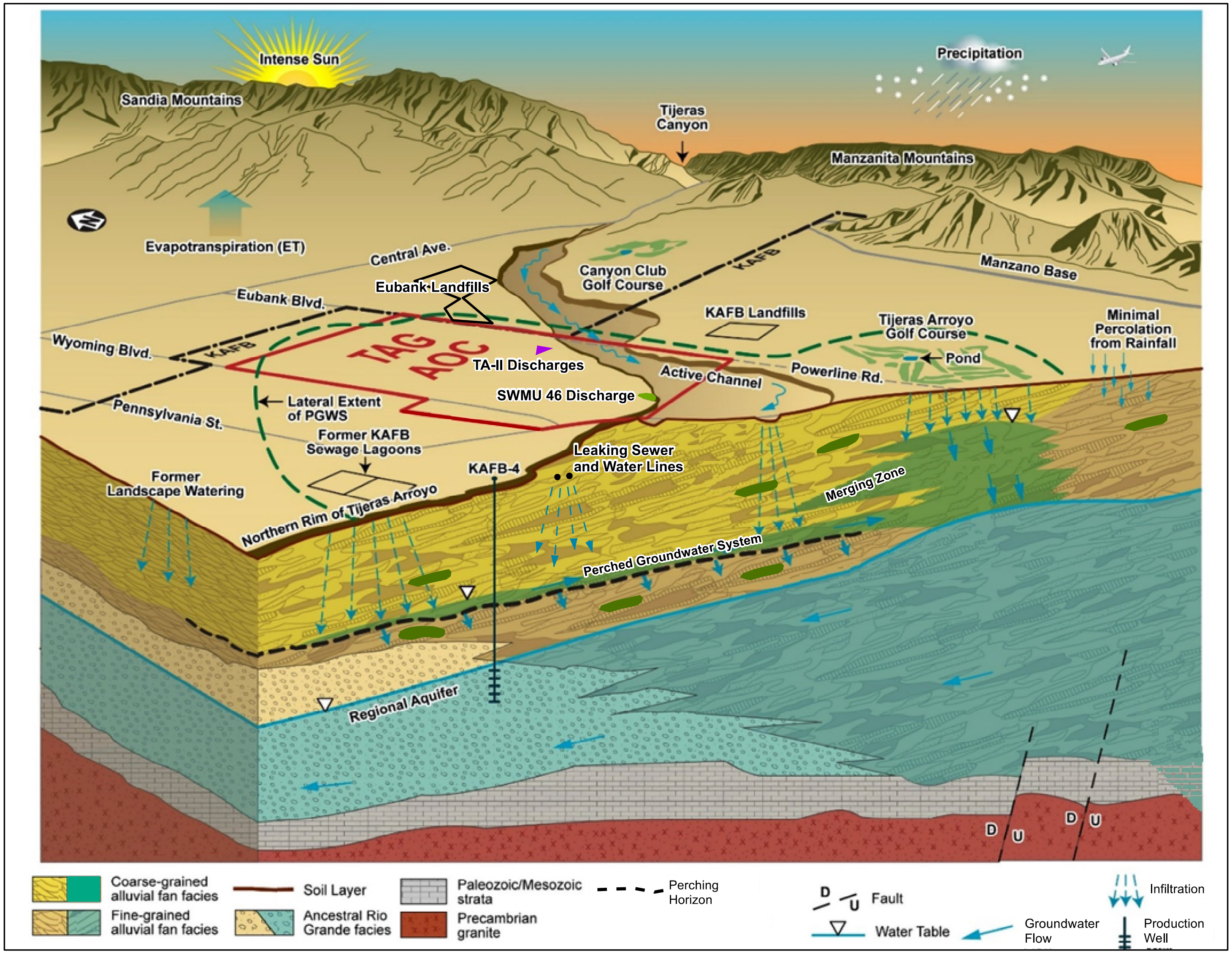

Figure 6-3
Tijeras Arroyo Groundwater Conceptual Site Model (SNL/NM, June 2021)

Table 6-2
Comparison of Hydrogeologic Characteristics for the Perched Groundwater System and the Regional Aquifer in the Vicinity of the Tijeras Arroyo Groundwater Area of Concern

Characteristic	Perched Groundwater System	Regional Aquifer
Potentiometric Surface	Slopes primarily to the southeast.	Slopes primarily to the west and northwest.
Pressure Head	Unconfined (water table) conditions.	Unconfined to semi-confined conditions.
Extent of Saturation	Restricted to the alluvial-fan lithofacies.	Contained within both the alluvial-fan lithofacies and the ARG fluvial lithofacies.
Flow Direction	Primarily to the east and southeast.	Primarily to the west and northwest.
Horizontal Gradient	Varies from approximately 0.004 to 0.0125 across the TAG AOC with an average of 0.01.	Varies from approximately 0.006 to 0.0125 across the TAG AOC with an average of 0.02.
Horizontal Hydraulic Conductivity (Kh)	A wide range from 0.0532 ft/day to 3.06 ft/day, with an average of 1.63 ft/day.	A narrow range of 1.66 to 7.75 ft/day, with an average of 3.77 ft/day.
Vertical Hydraulic Conductivity (Kv)	Estimated at 0.0163 ft/day.	Estimated at 0.0377 ft/day.
Effective Porosity	Assumed to be 0.25 (25 percent).	Assumed to be 0.25 (25 percent).
Groundwater Velocity, Horizontal	Range of 0.002 to 0.122 ft/day (equivalent to 0.778 to 44.68 ft/yr). Averages approximately 24 ft/yr.	0.066 to 0.310 ft/day (equivalent to 24.24 to 113.15 ft/yr). Averages approximately 55 ft/yr.
Potable Usage	None.	Utilized by KAFB, ABCWUA, and VA.
Non-potable Usage	PGWS water extraction and recirculation at the KAFB Tijeras Arroyo Golf Course.	None.
Lateral Extent	Approximately 4.43 sq mi.	Across the Albuquerque Basin.
Geochemical Uniqueness	High chloride, nitrate, and sulfate concentrations that are variable between monitoring wells. Indicative of differing types of waters such as septic waste and wastewater discharges at multiple Solid Waste Management Units.	Low calcium concentrations and high bicarbonate/alkalinity concentrations that are consistent between monitoring wells. Indicative of a single source such as mountain front recharge.
Water Levels	Steadily declining groundwater elevations averaging 0.48 ft/yr.	Increasing groundwater elevations averaging 0.85 ft/yr.
Recharge Sources	Primarily by former KAFB Sewage Lagoons (1962-1987) and SNL/NM TA-II former wastewater outfalls and septic systems (1948-1992). Minor ongoing input from landscape watering and presumed leaking water supply/sewer lines. Since 1966, irrigation at the KAFB Tijeras Arroyo Golf Course. Occasional surface-water flows in Tijeras Arroyo due to precipitation.	Primarily by mountain front recharge. Occasional surface-water flows in Tijeras Arroyo due to precipitation. Input from PGWS near Powerline Road.
Principal Hydrologic Controls	Stratigraphic dip of the Perching Horizon to the southeast coupled with lesser effect of the depositional fabric trending westward from the mountain front.	Combined drawdown of KAFB, ABCWUA, and VA production wells.

Notes:
Table is based on the Revised TAG CCM/CME Report (SNL/NM, February 2018). All characteristics, except for effective porosity (SNL/NM, September 2015), were obtained from studies conducted at the TAG AOC.
ABCWUA = Albuquerque Bernalillo County Water Utility Authority

Notes (concluded)

AOC	= Area of Concern
ARG	= Ancestral Rio Grande (lithofacies)
CCM	= Current Conceptual Model
CME	= Corrective Measures Evaluation
ft	= foot (feet)
ft/day	= feet per day
ft/ft	= feet per foot
ft/yr	= feet per year
KAFB	= Kirtland Air Force Base
PGWS	= Perched Groundwater System
SNL/NM	= Sandia National Laboratories, New Mexico
sq mi	= square mile(s)
TA	= Technical Area
TAG	= Tijeras Arroyo Groundwater
VA	= Veterans Affairs (previously known as Veterans Administration)

The *Annual Groundwater Monitoring Report, Calendar Year 2022* (SNL/NM, June 2023b) contains details concerning (1) the variety of recharge sources located in the vicinity of the TAG AOC, (2) a summary of groundwater modeling reports, and (3) geochemical Piper diagrams. The Revised TAG CCM/CME Report (SNL/NM, February 2018) discusses the volumes of water discharged and operational years of SNL/NM and KAFB SWMUs. The original sources of nitrate from historical SNL/NM operations (wastewater outfall ditches and sanitary waste leach fields/seepage pits) are no longer in operation. The highest volume discharge ended in 1974 and all discharges ended by 1992. Artificial driving forces for downward migration of nitrate through the vadose zone to groundwater no longer exist. There is no current or anticipated use of PGWS groundwater for potable or non-potable purposes in the TAG AOC.

Prior to land development in the 1940s, the alluvial-fan sediments likely did not contain sufficient natural water to fill a monitoring well casing. Subsequent water inputs from anthropogenic sources created a triggering effect that resulted in the artificial creation of the PGWS (Brady and Domski, 2001). The PGWS is currently a thin, dissipating, water-bearing unit that mostly formed as a result of historical anthropogenic discharges of wastewater and septic water. Groundwater in the PGWS migrates toward the southeast and in the Merging Zone coalesces with the underlying Regional Aquifer southeast of Tijeras Arroyo near Powerline Road. Based on MODFLOW mass-balance modeling, approximately 25 percent of the total groundwater loss from the PGWS is to the Merging Zone (Balleau Groundwater Inc. [BGW], September 2002). The remaining 75 percent flows vertically downward through the Perching Horizon and dissipates in the upper portion of the approximately 200 ft of unsaturated sediments present between the PGWS and the Regional Aquifer. There is no geochemical indication that groundwater flowing downward through the Perching Horizon has reached the Regional Aquifer, except in the Merging Zone southeast of the TAG AOC.

The PGWS continues to naturally dewater (dissipate), primarily because of the reduction of anthropogenic water discharges such as:

- The KAFB former Sewage Lagoons being taken out of service in 1987.
- SNL/NM SWMU 46 (Old Acid Waste Line Outfall) discharges ending in 1974.
- SNL/NM TA-II septic systems and wastewater outfall discharges ending in 1992.
- Less landscape watering in areas such as the former Ridgecrest Drive Base Housing, where approximately 625 homes were occupied from 1952 to 2005.

Monitoring well yields vary across the TAG AOC. This is due to the heterogeneity of the alluvial-fan sediments in which each well is screened. For example, monitoring well TA2-W-01, which typically has a 2-ft water column and is completed in medium- to coarse-grained sand and gravelly sand, produces a sufficient volume of water with low drawdown to allow sampling, whereas monitoring well TA2-W-26, which typically has a 7-ft water column set adjacent to silty sand, purges dry and must be allowed to recover overnight before groundwater samples can be collected.

6.1.6.1 Regional Hydrogeologic Conditions

Tijeras Arroyo is the most significant surface water drainage feature on KAFB. The arroyo trends westward across the northern part of KAFB and eventually drains into the Rio Grande approximately 8.3 miles west of the TAG AOC. Water flows in the arroyo several times per year as a result of thunderstorms. The 30-year average annual precipitation for the area, as measured at the Albuquerque International Sunport, is 8.84 inches (Chapter 2.6.2.1). During most rainfall events, rainfall quickly infiltrates into the soil. However, virtually all of the moisture subsequently undergoes evapotranspiration. Estimates of potential evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL/NM, February 1998).

Based on a nearby infiltration study conducted by the COA, the recharge rate beneath Tijeras Arroyo can be estimated. The recharge rate through the vadose zone underneath the Bear Canyon Arroyo was studied for the COA (DBS & Associates, Inc., April 2010). At the Bear Canyon Arroyo recharge project located 5 miles north of the KAFB Wyoming Gate, surface water reached the Regional Aquifer (at approximately 500 ft bgs) in approximately 50 days (Ewing, November 2019). Considering that the sediments beneath both arroyos (the Bear Canyon Arroyo and Tijeras Arroyo) are typically near saturation, it can be inferred that a portion of significant surface-water flows in Tijeras Arroyo could migrate downward and impact the PGWS in approximately 30 days. In stretches of Tijeras Arroyo on KAFB where the PGWS is not present, surface water could possibly reach the Regional Aquifer in approximately 40 to 50 days.

The TAG AOC overlies the eastern margin of the Albuquerque Basin where the major basin-bounding faults mostly trend parallel to the Sandia-Manzanita-Manzano mountain front. Alluvial-fan sediments obscure the Sandia Fault and West Sandia Fault east of the TAG AOC. For interpreting stratigraphic and structural features across KAFB, including the TAG AOC, Van Hart (June 2003) used a variety of data sources: (1) outcrop maps, (2) lithologic borehole logs, (3) downhole geophysical logs, and (4) surface geophysical surveys (seismic, magnetometer, and gravity). As Plate 1 shows, the Sandia Fault is located approximately 2 miles east of TA-II. The West Sandia Fault is located approximately 1.4 miles east of TA-II. Vertical offset of buried limestone strata was interpreted as being approximately 2,400 ft across the West Sandia Fault, but the fault does not extend upward to within 600 ft of the ground surface. Therefore, the West Sandia Fault was interpreted as not offsetting unconsolidated sediments at the Regional Aquifer water table. The basin-bounding faults depicted on Connell (2006) cross sections indicate that the Sandia Fault possibly dips 65 degrees westward beneath KAFB.

6.1.6.2 Hydrogeologic Conditions at the TAG AOC

The stratigraphic unit of greatest interest in the TAG AOC is the Upper Santa Fe Group, which is primarily composed of two unconsolidated interfingering lithofacies: (1) the alluvial-fan lithofacies and (2) the ARG fluvial lithofacies. Both lithofacies are less than 5 mega annum (millions of years) in age and are composed of unconsolidated to poorly cemented gravel, sand, silt, and clay (Stone et al., February 2000). The alluvial-fan lithofacies consists of poorly sorted piedmont-slope deposits derived from the Sandia, Manzanita, and Manzano Mountains. Fine-grained units within the alluvial-fan lithofacies produce low-permeability layers that are capable of perching groundwater. The ARG fluvial lithofacies are derived from northern sources and are typically composed of well-sorted, medium- to coarse-grained sands with higher hydraulic conductivities. Detailed subsurface mapping by Van Hart (June 2003) indicates that the thickness of Upper Santa Fe Group sediments beneath the central part of the TAG AOC is approximately 3,000 ft. These sediments are underlain by Mesozoic/Paleozoic limestone strata.

Beneath the TAG AOC, the depth to water in the PGWS ranged from approximately 276 to 333 ft bgs in October 2023. Depth to water for the Regional Aquifer exclusive of the Merging Zone ranged from approximately 438 to 564 ft bgs. A review of lithologic borehole descriptions and geophysical logs indicates that the sediments between the base of the Perching Horizon and the top of the Regional Aquifer are mostly dry to moist sediments that will not yield groundwater to a monitoring well. In 2023 outside of the Merging Zone, the thickness of unsaturated sediments between the base of the Perching Horizon and the Regional Aquifer water table averaged approximately 198 ft, decreasing from approximately 247 ft on the northwest side of the TAG AOC to 151 ft along the northern rim of Tijeras Arroyo. Groundwater in the PGWS mixes with the Regional Aquifer southeast of Tijeras Arroyo in a Merging Zone where the anastomosing set of alluvial-fan sediments are slightly more permeable and/or a minor fault might be present (Van Hart, June 2003). As noted earlier, Table 6-2 summarizes the hydrogeologic characteristics of the two water-bearing units.

6.1.6.3 Local Directions of Groundwater Flow

Figure 6-4 presents the CY 2023 potentiometric surface map of the PGWS. In addition to data measured by SNL/NM personnel, water level data for KAFB monitoring wells located outside the TAG AOC were used to interpret the potentiometric surface. Table 6-3 lists the groundwater elevations. During preparation of the Revised TAG CCM/CME Report (SNL/NM, February 2018), the lateral extent of the PGWS was estimated at approximately 4.43 sq mi. The PGWS lateral extent is queried at the northeast corner of the TAG AOC (Figure 6-4) because COA personnel have stated that the mud-rotary drilling technique used at monitoring wells Eubank-1 through Eubank-5 may have obscured the presence of the PGWS. The direction of groundwater flow in the PGWS is inferred from the potentiometric surface to be predominantly to the east and southeast. The horizontal gradient of the PGWS is variable across the TAG AOC. Beneath TA-I, TA-II, and TA-IV, the horizontal gradient varies from 0.004 to 0.0125, with an average of approximately 0.01. The vertical gradient is downward, as indicated by the merging of the two water-bearing units near the southeast corner of the TAG AOC.

Figure 6-5 presents the CY 2023 potentiometric surface map of the Regional Aquifer. In addition to data measured by SNL/NM personnel, water level data for KAFB and COA monitoring wells located outside the TAG AOC were used to interpret the potentiometric surface. Table 6-3 lists the groundwater elevations. The direction of groundwater flow in the Regional Aquifer is inferred from the potentiometric surface to be principally to the west and northwest toward the KAFB, ABCWUA, and Veterans Affairs (VA) production wells. The horizontal gradient of the Regional Aquifer beneath the TAG AOC varies from approximately 0.006 to 0.0125, with an average of approximately 0.02. The gradient west of the TAG AOC is essentially flat in the ARG sediments. Conversely, the horizontal gradient is steeper to the east of the TAG AOC at 0.03 to 0.045. Vertical flow gradients in the Regional Aquifer are inferred to be mostly downward in response to pumping at the distant production wells.

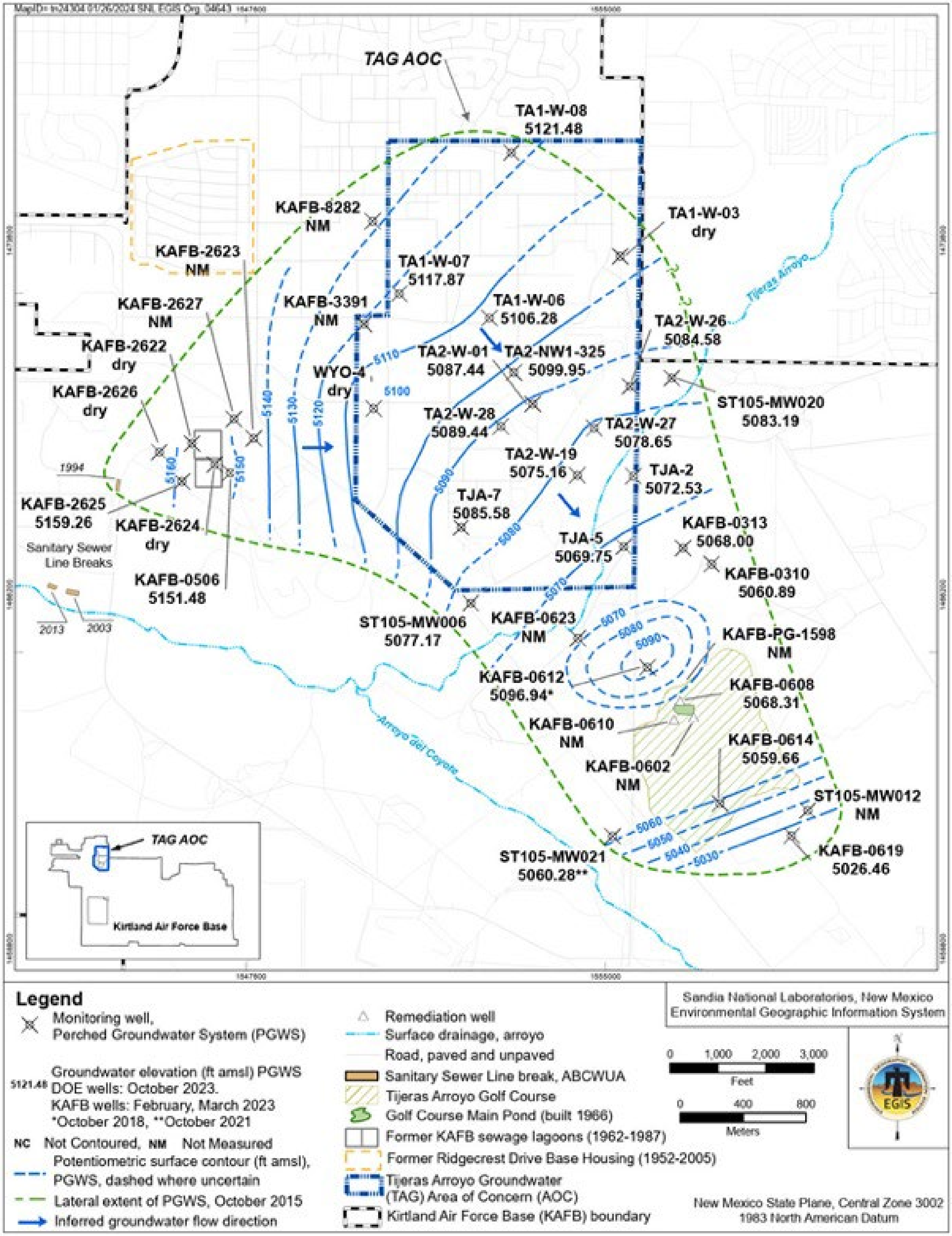

Figure 6-4
Potentiometric Surface Map for the Perched Groundwater System at the Tijeras Arroyo Groundwater Area of Concern, October 2023

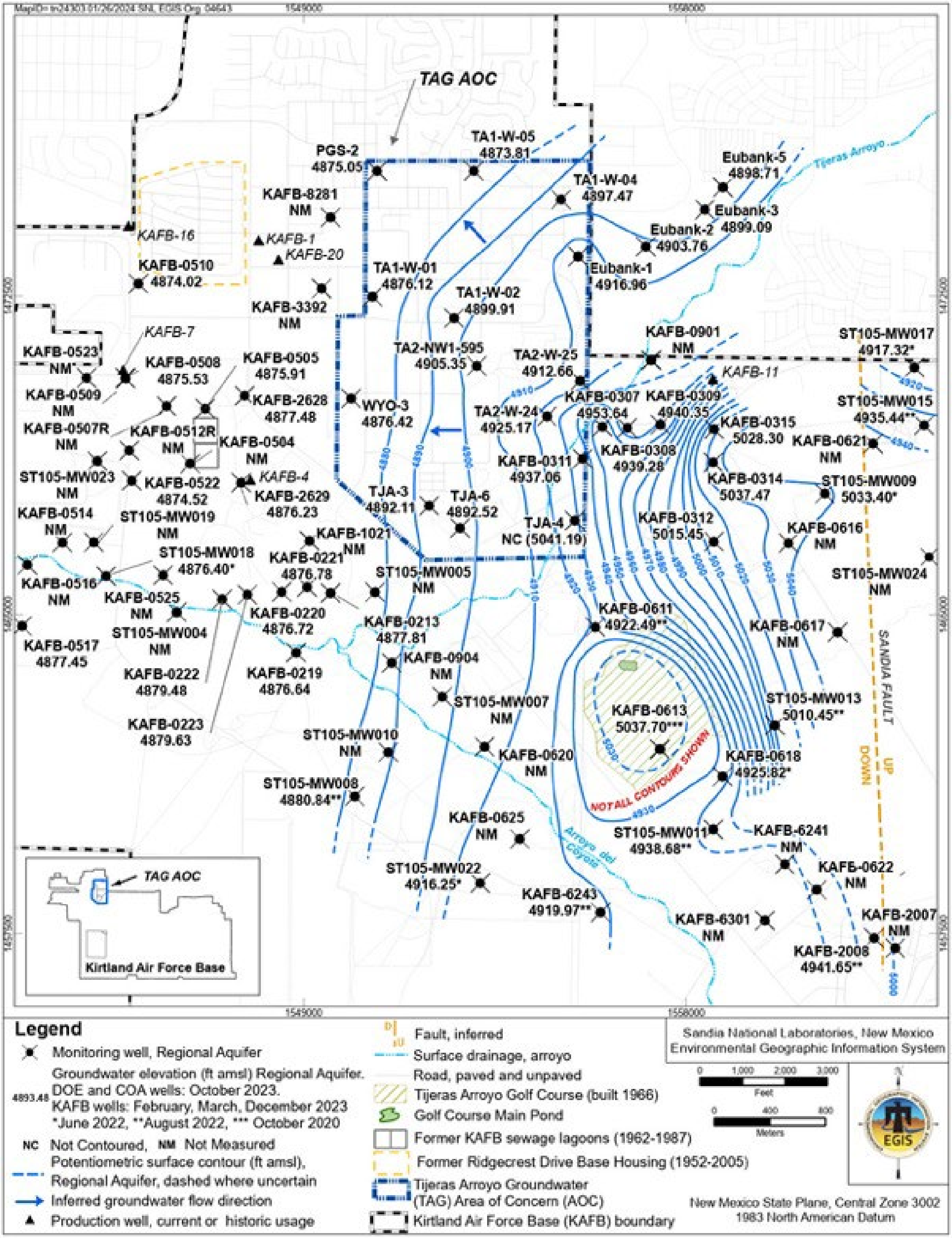

Figure 6-5
Potentiometric Surface Map of the Regional Aquifer at the Tijeras Arroyo Groundwater Area of Concern, October 2023

Table 6-3
Groundwater Elevations at Monitoring and Remediation Wells Located in the Vicinity of the Tijeras Arroyo Groundwater Area of Concern, October 2023

Monitoring Well ID	Measuring Point (ft amsl) NAVD 88	Date Measured	Depth to Water (ft btoc)	Groundwater Elevation (ft amsl)	Screened Unit in SFG sediments
Eubank-1	5460.02	4-Oct-2023	543.06	4916.96	Regional Aquifer
Eubank-2	5474.39	26-Oct-2023	570.63	4903.76	Regional Aquifer
Eubank-3	5498.73	26-Oct-2023	599.64	4899.09	Regional Aquifer
Eubank-5	5507.40	26-Oct-2023	608.69	4898.71	Regional Aquifer
PGS-2	5408.29	4-Oct-2023	533.24	4875.05	Regional Aquifer
TA1-W-01	5403.82	4-Oct-2023	527.70	4876.12	Regional Aquifer
TA1-W-02	5416.62	4-Oct-2023	516.71	4899.91	Regional Aquifer
TA1-W-03	5457.03	4-Oct-2023	dry	dry	PGWS
TA1-W-04	5460.98	4-Oct-2023	563.51	4897.47	Regional Aquifer
TA1-W-05	5433.84	6-Oct-2023	560.03	4873.81	Regional Aquifer
TA1-W-06	5417.10	4-Oct-2023	310.82	5106.28	PGWS
TA1-W-07	5404.92	4-Oct-2023	287.05	5117.87	PGWS
TA1-W-08	5434.19	6-Oct-2023	312.71	5121.48	PGWS
TA2-NW1-325	5421.94	4-Oct-2023	321.99	5099.95	PGWS
TA2-NW1-595	5421.26	4-Oct-2023	515.91	4905.35	Regional Aquifer
TA2-W-01	5419.99	4-Oct-2023	332.55	5087.44	PGWS
TA2-W-19	5351.21	4-Oct-2023	276.05	5075.16	PGWS
TA2-W-24	5363.66	4-Oct-2023	438.49	4925.17	Regional Aquifer
TA2-W-25	5374.86	4-Oct-2023	462.20	4912.66	Regional Aquifer
TA2-W-26	5375.77	4-Oct-2023	291.19	5084.58	PGWS
TA2-W-27	5362.85	4-Oct-2023	284.20	5078.65	PGWS
TA2-W-28	5412.41	4-Oct-2023	322.97	5089.44	PGWS
TJA-2	5353.20	4-Oct-2023	280.67	5072.53	PGWS
TJA-3	5390.56	4-Oct-2023	498.45	4892.11	Regional Aquifer
TJA-4	5341.16	4-Oct-2023	299.97	5041.19	Merging Zone
TJA-5	5341.33	4-Oct-2023	271.58	5069.75	PGWS
TJA-6	5343.16	4-Oct-2023	450.64	4892.52	Regional Aquifer
TJA-7	5391.27	4-Oct-2023	305.69	5085.58	PGWS
WYO-3	5392.09	4-Oct-2023	515.67	4876.42	Regional Aquifer
WYO-4	5392.57	4-Oct-2023	dry	dry	PGWS
KAFB-0213	5283.29	1-Mar-2023	405.48	4877.81	Regional Aquifer
KAFB-0219	5263.69	1-Mar-2023	387.05	4876.64	Regional Aquifer
KAFB-0220	5265.10	1-Mar-2023	388.38	4876.72	Regional Aquifer
KAFB-0221	5274.36	1-Mar-2023	397.58	4876.78	Regional Aquifer
KAFB-0222	5247.65	1-Mar-2023	368.17	4879.48	Regional Aquifer
KAFB-0223	5254.49	1-Mar-2023	374.86	4879.63	Regional Aquifer
KAFB-0307	5364.53	1-Mar-2023	410.89	4953.64	Regional Aquifer
KAFB-0308	5381.65	1-Mar-2023	442.37	4939.28	Regional Aquifer
KAFB-0309	5411.80	1-Mar-2023	471.45	4940.35	Regional Aquifer
KAFB-0310	5416.48	1-Mar-2023	355.59	5060.89	PGWS
KAFB-0311	5353.29	1-Mar-2023	416.23	4937.06	Regional Aquifer
KAFB-0312	5432.17	1-Mar-2023	416.72	5015.45	Regional Aquifer
KAFB-0313	5418.98	1-Mar-2023	350.98	5068.00	PGWS
KAFB-0314	5455.75	1-Mar-2023	418.28	5037.47	Regional Aquifer
KAFB-0315	5466.11	1-Mar-2023	437.81	5028.30	Regional Aquifer
KAFB-0504	5357.87	n.m.	n.m.	n.m.	Regional Aquifer

Refer to Notes at end of table.

Table 6-3 (continued)
Groundwater Elevations at Monitoring and Remediation Wells Located in the Vicinity of the Tijeras Arroyo Groundwater Area of Concern, October 2023

Well ID	Measuring Point (ft amsl) NAVD 88	Date Measured	Depth to Water (ft btoc)	Groundwater Elevation (ft amsl)	Screened Unit in SFG sediments
KAFB-0505	5362.81	29-Dec-2023	486.90	4875.91	Regional Aquifer
KAFB-0506	5363.47	7-Feb-2023	211.99	5151.48	PGWS
KAFB-0507R	5358.21	n.m.	n.m.	n.m.	Regional Aquifer
KAFB-0508	5351.88	7-Feb-2023	476.35	4875.53	Regional Aquifer
KAFB-0509	5441.56	n.m.	n.m.	n.m.	Above PGWS
KAFB-0510	5367.10	7-Feb-2023	493.08	4874.02	Regional Aquifer
KAFB-0512R	5302.73	n.m.	n.m.	n.m.	Regional Aquifer
KAFB-0514	5206.41	n.m.	n.m.	n.m.	Regional Aquifer
KAFB-0516	5205.64	n.m.	n.m.	n.m.	Regional Aquifer
KAFB-0517	5197.10	7-Feb-2023	319.65	4877.45	Regional Aquifer
KAFB-0522	5267.48	29-Dec-2023	392.96	4874.52	Regional Aquifer
KAFB-0523	5352.62	n.m.	n.m.	n.m.	Regional Aquifer
KAFB-0525	5229.75	n.m.	n.m.	n.m.	Regional Aquifer
KAFB-0602	5365.47	n.m.	n.m.	n.m.	PGWS
KAFB-0608	5361.17	6-Feb-2023	292.86	5068.31	PGWS
KAFB-0610	5359.47	n.m.	n.m.	n.m.	PGWS
KAFB-0611	5386.09	8-Aug-2022	463.60	4922.49	Regional Aquifer
KAFB-0612	5385.45	26-Oct-2018	288.51	5096.94	PGWS
KAFB-0613	5390.78	19-Oct-2020	353.08	5037.70	Regional Aquifer
KAFB-0614	5390.89	7-Feb-2023	331.23	5059.66	PGWS
KAFB-0616	5481.07	n.m.	n.m.	n.m.	Regional Aquifer
KAFB-0617	5505.78	n.m.	n.m.	n.m.	Regional Aquifer
KAFB-0618	5410.05	13-Jun-2022	484.23	4925.82	Regional Aquifer
KAFB-0619	5410.78	7-Feb-2023	384.32	5026.46	PGWS
KAFB-0620	5334.64	n.m.	n.m.	n.m.	Regional Aquifer
KAFB-0621	5569.89	n.m.	n.m.	n.m.	Regional Aquifer
KAFB-0622	5488.64	n.m.	n.m.	n.m.	Regional Aquifer
KAFB-0623	5328.94	n.m.	n.m.	n.m.	PGWS
KAFB-0625	5390.23	n.m.	n.m.	n.m.	Regional Aquifer
KAFB-0901	5390.07	n.m.	n.m.	n.m.	Regional Aquifer
KAFB-0904	5291.75	n.m.	n.m.	n.m.	Regional Aquifer
KAFB-1021	5348.02	n.m.	n.m.	n.m.	Regional Aquifer
KAFB-2007	5564.48	n.m.	n.m.	n.m.	Regional Aquifer
KAFB-2008	5541.74	8-Aug-2022	600.09	4941.65	Regional Aquifer
KAFB-2622	5358.14	6-Feb-2023	dry	dry	PGWS
KAFB-2623	5367.48	n.m.	n.m.	n.m.	PGWS
KAFB-2624	5362.27	6-Feb-2023	dry	dry	PGWS
KAFB-2625	5359.26	7-Feb-2023	200.00	5159.26	PGWS
KAFB-2626	5357.51	6-Feb-2023	dry	dry	PGWS
KAFB-2627	5367.47	n.m.	n.m.	n.m.	PGWS
KAFB-2628	5369.64	6-Feb-2023	492.16	4877.48	Regional Aquifer
KAFB-2629	5361.53	6-Feb-2023	485.30	4876.23	Regional Aquifer
KAFB-3391	5396.60	n.m.	n.m.	n.m.	PGWS
KAFB-3392	5394.51	n.m.	n.m.	n.m.	Regional Aquifer
KAFB-6241	5466.50	n.m.	n.m.	n.m.	Regional Aquifer

Refer to Notes at end of table.

Table 6-3 (concluded)
Groundwater Elevations at Monitoring and Remediation Wells Located in the Vicinity of the Tijeras Arroyo Groundwater Area of Concern, Calendar Year 2023

Monitoring Well ID	Measuring Point (ft amsl) NAVD 88	Date Measured	Depth to Water (ft btoc)	Groundwater Elevation (ft amsl)	Screened Unit in SFG sediments
KAFB-6243	5423.48	8-Aug-2022	503.51	4919.97	Regional Aquifer
KAFB-6301	5459.64	n.m.	n.m.	n.m.	Regional Aquifer
KAFB-8281	5401.03	n.m.	n.m.	n.m.	Regional Aquifer
KAFB-8282	5402.92	n.m.	n.m.	n.m.	PGWS
KAFB-PG-1598	5369.90	n.m.	n.m.	n.m.	PGWS
ST105-MW004	5234.61	n.m.	n.m.	n.m.	Regional Aquifer
ST105-MW005	5287.57	n.m.	n.m.	n.m.	Regional Aquifer
ST105-MW006	5313.26	6-Feb-2023	236.09	5077.17	PGWS
ST105-MW007	5311.18	n.m.	n.m.	n.m.	Regional Aquifer
ST105-MW008	5358.94	8-Aug-2022	478.10	4880.84	Regional Aquifer
ST105-MW009	5519.71	13-Jun-2022	486.31	5033.40	Regional Aquifer
ST105-MW010	5334.70	n.m.	n.m.	n.m.	Regional Aquifer
ST105-MW011	5422.66	8-Aug-2022	483.98	4938.68	Regional Aquifer
ST105-MW012	5419.90	n.m.	n.m.	n.m.	PGWS
ST105-MW013	5447.27	8-Aug-2022	436.82	5010.45	Regional Aquifer
ST105-MW015	5623.95	8-Aug-2022	688.51	4935.44	Regional Aquifer
ST105-MW017	5621.97	13-Jun-2022	704.65	4917.32	Regional Aquifer
ST105-MW018	5221.68	13-Jun-2022	345.28	4876.40	Regional Aquifer
ST105-MW019	5217.94	n.m.	n.m.	n.m.	Regional Aquifer
ST105-MW020	5383.72	7-Feb-2023	300.53	5083.19	PGWS
ST105-MW021	5390.90	6-Oct-2021	330.62	5060.28	PGWS
ST105-MW022	5386.66	13-Jun-2022	470.41	4916.25	Regional Aquifer
ST105-MW023	5275.86	n.m.	n.m.	n.m.	Regional Aquifer
ST105-MW024	5595.67	n.m.	n.m.	nm	Regional Aquifer

Notes:
Green shading denotes monitoring wells that are screened in the Perched Groundwater System.
Purple shading denotes the monitoring well is screened in the Merging Zone (below the Perching Horizon and above the Regional Aquifer).
Monitoring wells screened in the Regional Aquifer are not shaded.
The depth to water values from previous years are used for some KAFB monitoring wells that were not measured in 2023.
At monitoring well TA1-W-03, water was last measured in the screen in October 2018. No water was present in the screen in January 2019. The well likely went dry (the water level declined below the lowest slot) in December 2018.
Monitoring well WYO-4 went dry in June 2023.

amsl = above mean sea level
btoc = below top of casing (the measuring point)
ft = foot (feet)
ID = identifier
KAFB = Kirtland Air Force Base
NAVD 88 = North American Vertical Datum of 1988
n.m. = not measured
PGS = Parade Ground South
PGWS = Perched Groundwater System
SFG = Santa Fe Group
ST105-MW = KAFB project ST-105 monitoring well
TA1-W = Technical Area I well
TA2-NW = Technical Area III northwest well
TA2-W = Technical Area II well
TJA = Tijeras Arroyo well
WYO = Wyoming Boulevard well

6.1.6.4 Groundwater Elevations

A series of 22 hydrographs (Attachment 6B, Figures 6B-1 through 6B-10) depict the historical trends of groundwater elevations for PGWS and Regional Aquifer monitoring wells. No seasonality, such as a response to the summer monsoon rainfall, is apparent for the PGWS (Figures 6B-6, 6B-7, 6B-9, and 6B-10). Historically, water levels in the PGWS have trended downward in the TAG AOC. Near the former KAFB Sewage Lagoons, water levels have been declining since 1987, apparently in response to the lagoons being removed from service (KAFB, December 2023). Within the TAG AOC, artificial recharge to the PGWS has been nearly eliminated; SNL/NM wastewater outfall ditches and sanitary waste leach fields/seepage pits are no longer in operation (the greatest discharge ended in 1974 and all discharges ended by 1992). Currently, only minor amounts of landscape water and precipitation could potentially reach the PGWS.

The northernmost Regional Aquifer monitoring wells TA1-W-05 and PGS-2 (Figures 6B-1 and 6B-4, respectively), show a cycle related to pumping at KAFB, ABCWUA, and VA production wells because of increased demand in the summer months. Since late 2008, hydrographs for most of the Regional Aquifer monitoring wells in the TAG AOC have shown an increasing trend in groundwater elevations (Attachment 6B). Presumably, this is in response to the ABCWUA transitioning to surface water withdrawals for potable water supplies and a decreasing dependence on the production wells immediately north of KAFB (Section 2.6). Since 2010, the overall trend in groundwater elevations in the northern and central parts of the TAG AOC have increased at approximately 0.5 to 2.7 ft per year (ft/yr) in the Regional Aquifer. The hydrographs for TA1-W-04 and TA1-W-05 (Figures 6B-2 and 6B-1, respectively) have differing slopes, indicating that a partially impermeable hydraulic barrier possibly exists between the two monitoring wells. Water levels in the southwest corner of the TAG AOC at monitoring wells TJA-3 and TJA-6 (Figure 6B-5) have been stable since 2000.

For the period of October 2018 to October 2023, the water levels at 12 of the 13 Regional Aquifer monitoring wells increased, with a range of 0.06 to 0.89 ft/yr. Conversely, the water level in monitoring well TA2-NW1-595 decreased an average of 0.20 ft/yr during the 5-year period. Increases farther southeast of Tijeras Arroyo in some of the Regional Aquifer monitoring wells owned by KAFB probably resulted from irrigation at the KAFB Tijeras Arroyo Golf Course (BGW, February 2001; KAFB, December 2023).

6.1.6.5 Dewatering Prediction for the Perched Groundwater System

Table 6-4 lists the annual decline rate at each TAG AOC monitoring well from October 2018 through October 2023, as well as the predicted year when the water level will decline below the depth of each PGWS well screen. Excluding dry monitoring wells TA1-W-03 and WYO-4, the annual decline rate in PGWS groundwater elevations for the 5-year period ranged from 0.09 to 0.42 ft per year (ft/yr). The average 5-year PGWS decline rate for the 12 monitoring wells was approximately 0.29 ft/yr. Figure 6-6 shows that the greatest annual decline rate in groundwater elevations occurred in the central part of the TAG AOC. The combined set of hydrographs on Figure 6-7 illustrate the consistently declining water levels at PGWS monitoring wells in the TAG AOC. The water levels at the monitoring wells have followed a consistent downward trend since 2005 as the PGWS naturally dewaters (dissipates). Monitoring well TA1-W-03 went dry (the water level declined below the well screen) in October 2018 and monitoring well WYO-4 went dry in June 2023.

In October 2023, the water columns in the PGWS monitoring wells ranged from 2.04 to 18.25 ft (Table 6-4). Figure 6-8 shows that PGWS monitoring wells located across the central part of the TAG AOC have the shortest predicted lifespans for measuring water levels. By the end of 2023, two monitoring wells were dry. Three of the 14 PGWS monitoring wells in the TAG AOC are predicted to be dry in 2030. In 2040, four of the PGWS monitoring wells will be dry. By 2050, 5 of the 14 PGWS monitoring wells will be dry. Only in the northwest and southeast corners of the TAG AOC will water be present in the well screens after 2050. These predictions assume linear water level decline rates. However, this trend assumption may not hold true for all PGWS monitoring wells during remedy implementation. For example, the water level in monitoring well TA1-W-03 declined steadily at approximately 1.7 ft/yr from January 2014 through February 2017 and then declined more rapidly at approximately 3.5 ft/yr from February 2017 to October 2018. The rapid decline is attributed to alluvial-fan sediment heterogeneity.

As the PGWS continues to naturally dewater, the issue of installing replacement wells will be evaluated on a case-by-case basis in accordance with the TAG CMI Plan (SNL/NM, June 2023a). One issue to consider is the estimated thickness of saturated sediments beneath a particular well screen. Twelve of the 14 PGWS monitoring wells have well screens where the entire length of each screen was installed above the Perching Horizon. In accordance with work plans, the 20-ft-long well screens were installed so that the upper portion of each screen intercepted the water table at the time of drilling. Where the total thickness of saturated sediments exceeded 20 ft, the deeper saturated sediments were therefore not screened. Geophysical logs for PGWS and Regional Aquifer monitoring well pairs (SNL/NM, February 2018) were used to estimate the thickness of saturated sediments below each well screen. Table 6-4 shows that the estimated thickness of saturated sediments below each PGWS well screen ranges from 1 to 16 ft in 12 of the 14 PGWS monitoring wells. The average saturated thickness below the 12 well screens is 5 ft. Two monitoring wells (TA2-W-28 and TJA-2) have screens that extend into the Perching Horizon and thus do not have deeper sediments suitable for screening.

Table 6-4
Annual Decrease of Perched Groundwater System Groundwater Elevations for October 2018 through October 2023 and the Predicted Year When the Water Level Declines Below Each Monitoring Well Screen in the Tijeras Arroyo Groundwater Area of Concern

Well ID	Annual Decline Rate in Groundwater Elevation from October 2018 Through October 2023, ft	Water Column in Well Screen, October 2023, ft	Predicted Year When Water Level Declines Below Well Screen	Estimated Thickness of Saturated PGWS Sediments Below Bottom of Well Screen, ft
TA1-W-03	Dry – December 2018	dry	n.a.	5
TA1-W-06	0.31	8.88	2052	6
TA1-W-07	0.09	3.67	2063	1
TA1-W-08	0.17	8.78	2075	6
TA2-NW1-325	0.38	4.95	2037	3
TA2-W-01	0.39	2.04	2029	8
TA2-W-19	0.42	12.06	2052	10
TA2-W-26	0.30	6.78	2046	7
TA2-W-27	0.40	12.85	2056	1
TA2-W-28	0.36	9.94	2051	-3
TJA-2	0.32	16.23	2074	-1
TJA-5	0.14	18.25	2153	16
TJA-7	0.23	7.68	2057	2
WYO-4	Dry – June 2023	dry	n.a.	3
Average	0.29	9.34	n.a.	5

Notes:
Water column is length of water above the lowermost screen slot.
The values for average decline rate and water column in well does not include dry monitoring wells TA1-W-03 and WYO-4.
Negative thickness of saturated PGWS sediments indicates that the well screen extends into the Perching Horizon.
Thickness of saturated PGWS sediments below each well screen was estimated using geophysical logs (SNL/NM, February 2018).

n.a. = not applicable
ft = foot (feet)
ID = identifier
PGWS = Perched Groundwater System
TA1-W = Technical Area I well
TA2-NW = Technical Area II northwest well
TA2-W = Technical Area II well
TJA = Tijeras Arroyo well
WYO = Wyoming Boulevard well

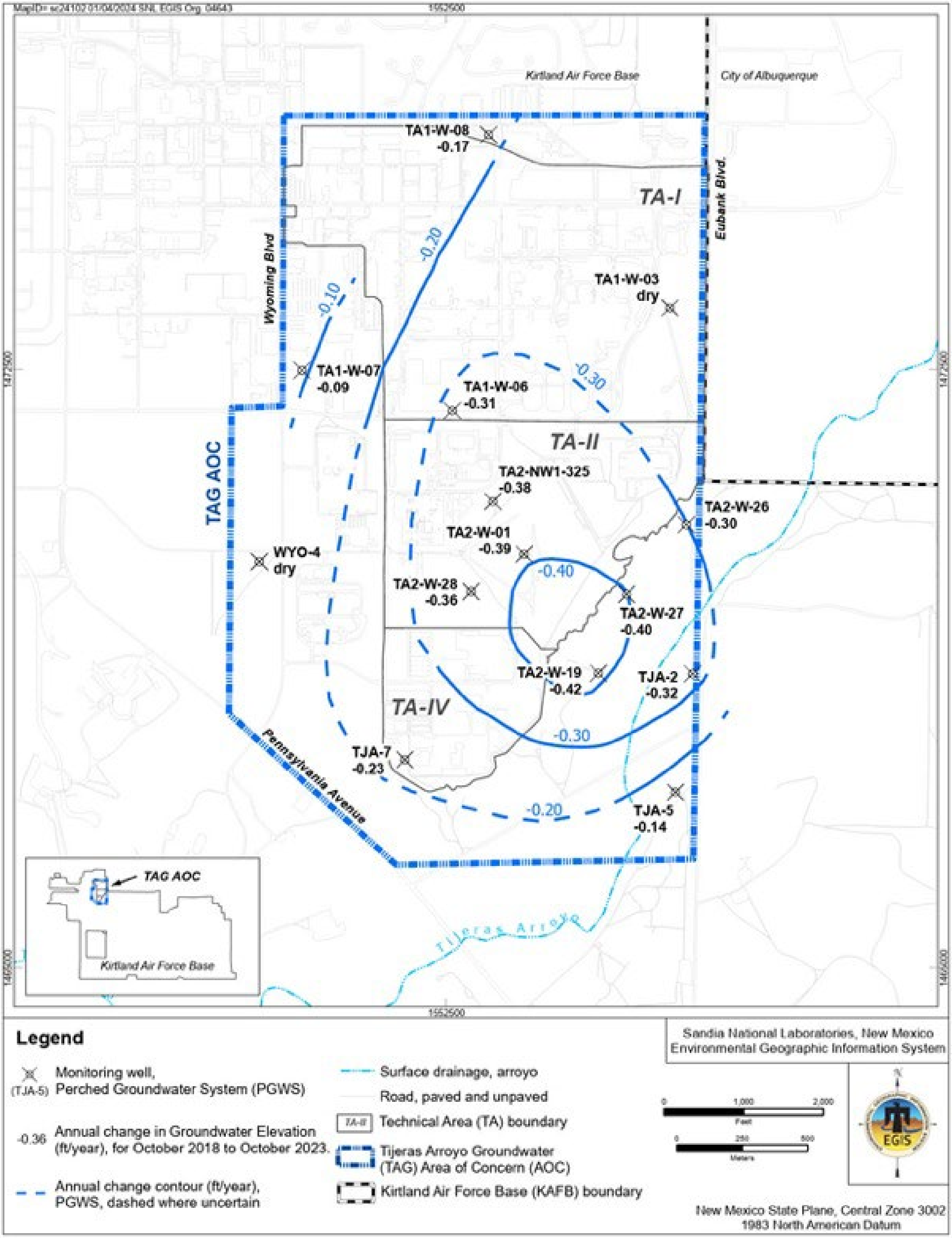

Figure 6-6
Annual Decline Rate of Groundwater Elevations at Perched Groundwater System Monitoring Wells in the Tijeras Arroyo Groundwater Area of Concern for October 2018 through October 2023

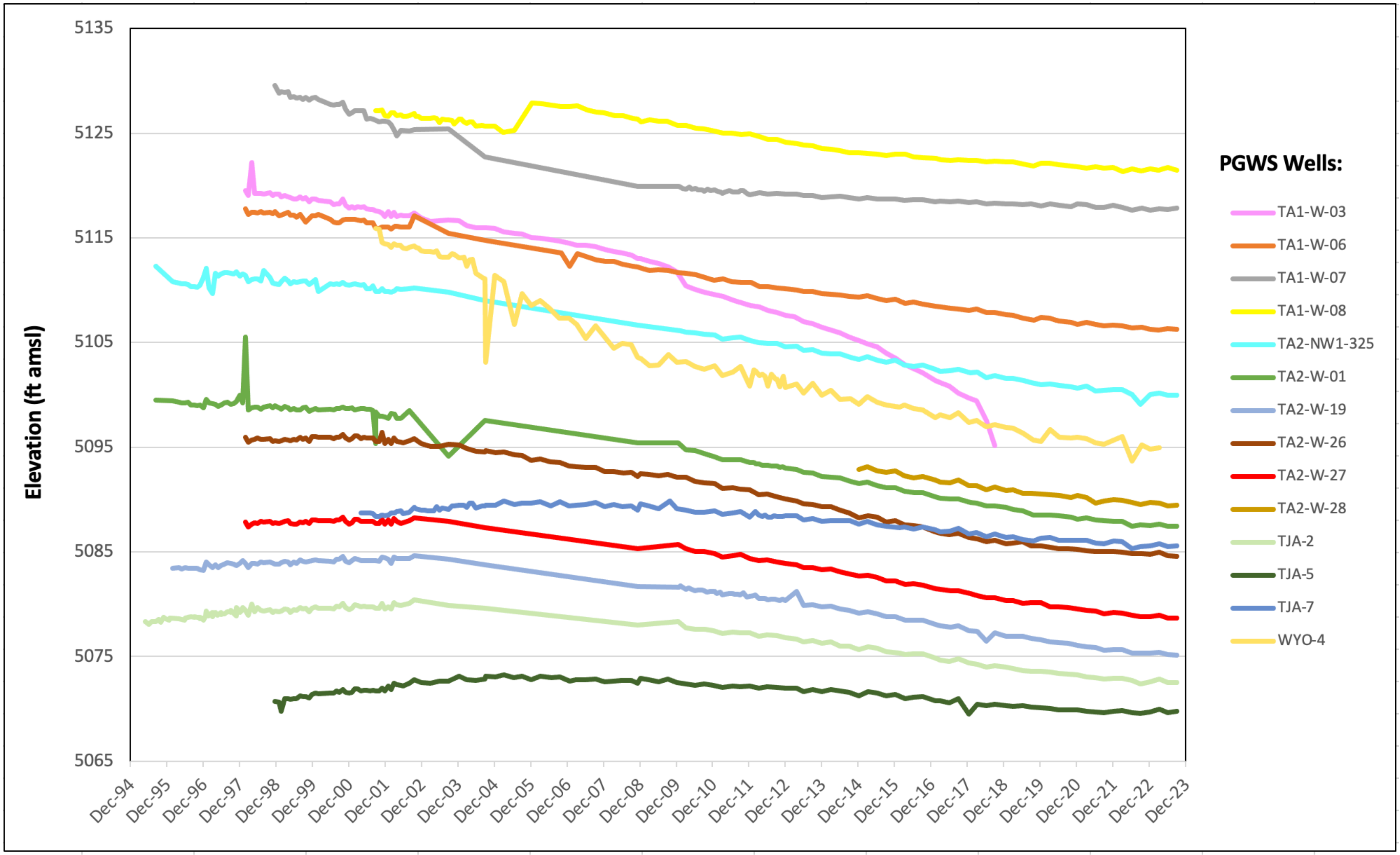

Figure 6-7
Hydrographs through October 2023 for Perched Groundwater System Monitoring Wells Located in the Tijeras Arroyo Groundwater Area of Concern

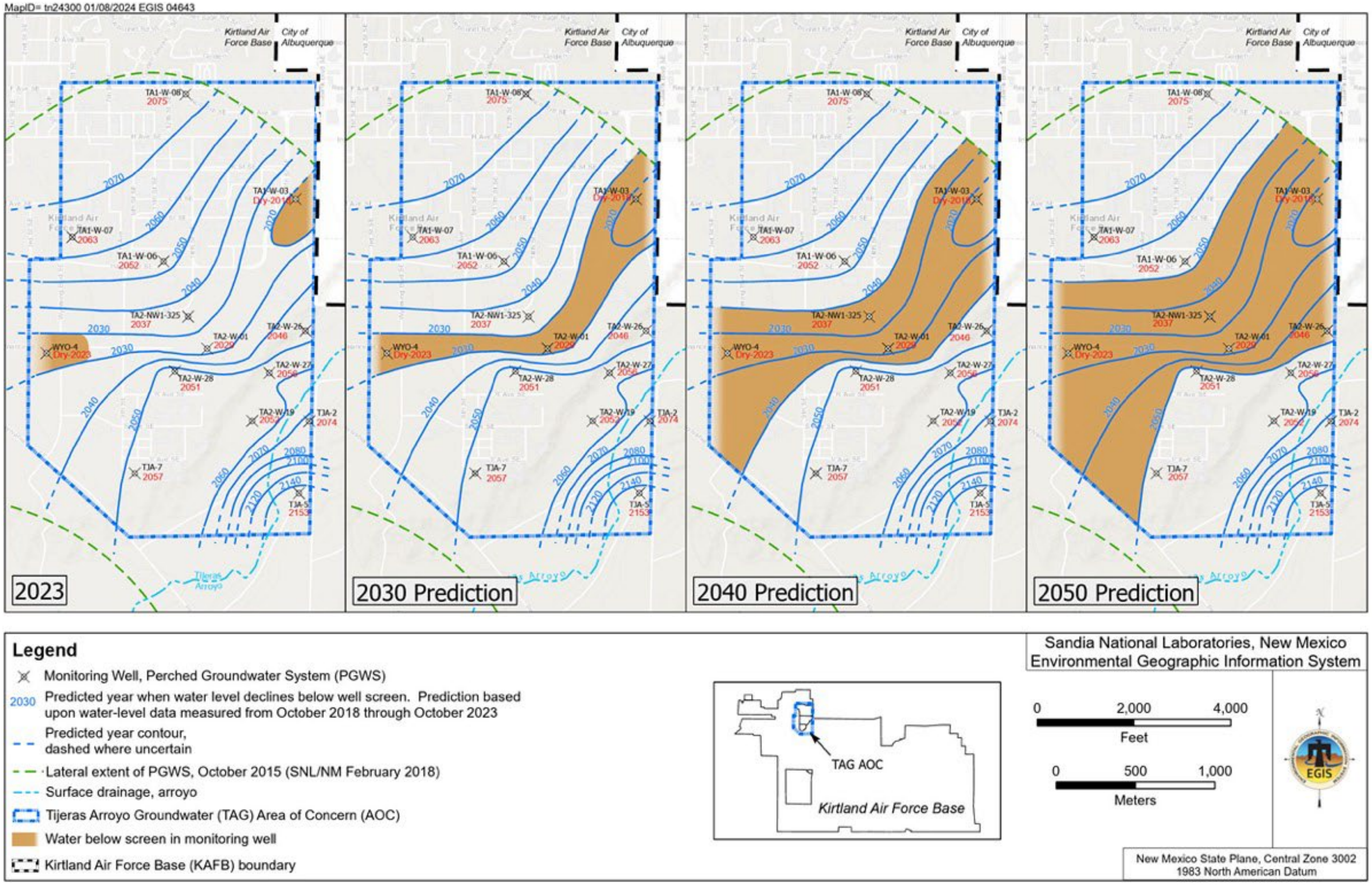

Figure 6-8
Lateral Extent of the Perched Groundwater System in October 2023 and the Predicted Years When Groundwater Elevations Will Decline Below Each Monitoring Well Screen in the Tijeras Arroyo Groundwater Area of Concern

6.1.6.6 Occurrence of Nitrate in the Environment

Nitrate is highly mobile in soil due to its high solubility in water and weak retention by soil particles. Nitrate occurs primarily in the dissolved phase and does not sorb onto sediments. The primary mechanism for nitrate transport in the environment is movement of water containing dissolved nitrate through soil and sediments. Nitrate does not volatilize and is likely to remain dissolved in water until consumed by plants or other organisms. Denitrification (the microbial degradation of nitrate) occurs more readily where anaerobic conditions are coupled with the presence of denitrifying bacteria and a suitable carbon source.

Nitrate in groundwater can be the result of both anthropogenic and natural sources (Interstate Technology and Regulatory Council [ITRC], June 2000). Potential anthropogenic nitrate sources include human sewage, nitrate fertilizers, certain high explosive materials, and industrial waste streams. Animal waste and decomposing plant debris are also potential nitrate sources. In the Chihuahuan Desert of the southwestern U.S., the accumulation of naturally occurring nitrate in desert-soil profiles was first identified by Walvoord et al. (November 2003). Based on chloride/nitrate ratios in soil profiles, Walvoord et al. (November 2003) proposed that subsoil nitrate reservoirs contain significant concentrations of nitrate that can be readily mobilized to groundwater when desert lands are modified by irrigation, watershed construction, or changes in climatic precipitation patterns. Accumulations of nitrate are typically concentrated below the biologically active zone. The maximum depth of most plant roots is approximately 5 meters (16.4 ft) in desert soils. Nitrogenous compounds produced by the decay of vegetation can accumulate along ephemeral channels. Nitrate becomes concentrated by evapotranspiration during long dry periods. Following significant rainfall events, nitrate is flushed downward to groundwater below the ephemeral channels.

To test the Walvoord et al. (November 2003) hypothesis at KAFB, the U.S. Geologic Survey (USGS) Water Science Center collected soil cores to a depth of 50 ft at 13 Geoprobe locations along the Tijeras Arroyo floodplain and the nearby mesa tops in 2017 (Linhoff, July 2022). Interpretation of chloride pulses and age-dating parameters in the vadose-zone samples indicated that a large mass of previously unrecognized nitrate has accumulated beneath the floodplain over the last several hundred years. Linhoff (July 2022) noted that the vadose zone samples collected from the nearby mesa tops did not contain significant nitrate concentrations. The study concluded that natural processes of nitrogen deposition resulted in accumulation of large inventories of nitrate in floodplain vadose zone soils that are intermittently flushed to groundwater during historical floodplain flooding events.

Also in 2017, the USGS collected water samples from 59 locations (wells, springs, and arroyos) in a 270-square-mile area located within and outside the KAFB boundary. The water samples were analyzed for a diverse set of parameters, including stable isotopes (carbon-14, nitrogen-15, and oxygen-18), tritium, dissolved noble gases, and major-ion geochemistry. The USGS collected groundwater samples from 33 monitoring wells located on KAFB that consisted of 26 KAFB monitoring wells outside the TAG AOC boundary and 7 DOE/NNSA monitoring wells inside the TAG AOC boundary. Linhoff (July 2022) interpreted a diverse set of analytes, including chloride/bromide ratios, nitrate/chloride ratios, stable isotopes, and the occurrence of artificial sweeteners, pharmaceuticals, personal care products, and various wastewater indicators.

The likely nitrate source for the 33 monitoring wells located on KAFB was interpreted as being:

- Anthropogenic source for 20 wells.
- Arroyo floodplain vadose zone nitrate mixed with anthropogenic nitrate for five wells.
- Unknown source for five wells.
- Background conditions for three wells.

According to Linhoff (July 2022), for the seven DOE/NNSA monitoring wells located within the TAG AOC, the likely nitrate source for the five wells screened in the PGWS (TA2-W-19, TA2-W-28, TJA-2, TJA-5, and TJA-7) was determined to be anthropogenic. Regional Aquifer monitoring well TJA-3 was interpreted as being representative of background conditions. Merging Zone monitoring well TJA-4 was interpreted as having a likely nitrate source of arroyo floodplain vadose zone nitrate mixed with anthropogenic nitrate.

A study of denitrification parameters and isotopic signatures conducted in 2013 for the TAG AOC indicated that denitrification was not occurring in the Regional Aquifer (Madrid et al., June 2013; Lum, March 2020). KAFB has also concluded that denitrification is unlikely to occur in the Regional Aquifer or PGWS (KAFB, July 2003; KAFB, December 2015). Linhoff (July 2022) did not identify denitrification as occurring at any of the 10 sampled PGWS monitoring wells. Denitrification is unlikely to occur in the PGWS because the groundwater is aerobic with low concentrations of dissolved oxygen.

6.1.6.7 Contaminant Sources

Historical SNL/NM discharges of wastewater and septic waters from SWMU 46 (Old Acid Waste Line Outfall) and the nine SWMUs at TA-II are the most likely sites to have impacted the groundwater at the TAG AOC. Discharges at SWMU 46 ended in 1974. Discharges at the TA-II SWMUs ended in 1992 (SNL/NM, February 2018).

The technical memorandum *Forensic Analyses and Nitrate Concentrations in Groundwater and the Suspected Nitrate Release Sites in the Vicinity of SNL/NM and Northern KAFB, Albuquerque, New Mexico* (SNL/NM, December 2019) is a comprehensive study of the potential nitrate release sites located in the northern part of KAFB, including the TAG AOC and nearby COA properties. The study includes a detailed large-scale figure (Plate A) with an extent of 23 sq mi. The study summarizes the operational years of potential nitrate release sites, historical maximum NPN concentrations for 150 wells, the Linhoff (July 2022) nitrate study, and the types of water associated with natural sources and 66 anthropogenic sites owned by DOE/NNSA, KAFB, ABCWUA, COA, and private entities. An updated version of the technical memorandum, *Nitrate Release Sites and Their Impact on Groundwater Quality in the Vicinity of SNL/NM and the Northern Portion of KAFB, Albuquerque, New Mexico* (Copland, in press), is scheduled for completion in 2024.

NPN concentrations at KAFB monitoring wells located on the Tijeras Arroyo floodplain south of the TAG AOC are much higher than at DOE/NNSA monitoring wells (KAFB, December 2023). Historical nitrate concentrations at PGWS monitoring well ST105-MW006 (maximum of 77 mg/L) and nearby monitoring well KAFB-0623 (maximum of 63.2 mg/L) are interpreted as having a contribution of naturally occurring (geogenic) arroyo floodplain vadose zone nitrate mixed with anthropogenic nitrate (Linhoff, July 2022). Monitoring well ST105-MW006 is located approximately 200 ft south of the TAG AOC. SNL/NM personnel postulate that recent construction activities (1999 and 2004) near the Pennsylvania Boulevard bridge might have flushed naturally occurring nitrate from the vadose zone to groundwater near the Pennsylvania Boulevard bridge after large precipitation events (Copland, in press).

6.1.6.8 Contaminant Transport in Groundwater

Potential receptors are the KAFB, ABCWUA, and VA production wells (SNL/NM, February 2018). These wells are located to the north and northwest of the TAG AOC. Three numerical modeling efforts have been conducted for the vicinity of the TAG AOC:

- Capture zone analysis for production wells (SNL/NM, February 2001)
- Contaminant transport modeling (SNL/NM, August 2005)
- Conceptual groundwater modeling incorporating recharge features and stratigraphic controls (BGW, September 2002)

Only the ABCWUA Ridgecrest Well Field was determined to be downgradient of TAG AOC nitrate contamination. The computer modeling predicted that nitrate in the PGWS could potentially reach the well field after a travel time of 130 years along a complex, approximately 3-mile-long flow path southeastward through the PGWS, downward into the Merging Zone, and northward through the Regional Aquifer. Prior to reaching the production wells, NPN concentrations would be attenuated to 0.24 mg/L, which is well below the EPA MCL of 10 mg/L for nitrate. Thus, there is no foreseeable risk to human health or threat to the beneficial use of groundwater from historical SNL/NM operations where nitrate contamination has impacted PGWS groundwater.

6.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of SNL/NM Environmental Restoration Operations, as well as implements and enforces regulations mandated by the Resource Conservation and Recovery Act (RCRA). All SWMUs and AOCs at SNL/NM are listed in the *Resource Conservation and Recovery Act Facility Operating Permit for Sandia National Laboratories, EPA ID No. NM5890110518* (NMED, January 2015, as modified).

All TAG AOC corrective action requirements are specified in the Consent Order (NMED, April 2004). The groundwater at the TAG AOC has been monitored since 1992.

This chapter and its attachments include groundwater monitoring data for both hazardous and radioactive constituents; however, the monitoring data for radionuclides (gamma spectroscopy short list, gross alpha/beta activity, and tritium) are provided voluntarily by DOE/NNSA and SNL/NM personnel. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements of the Consent Order (NMED, April 2004), as Section III.A of the Consent Order specifies.

6.3 Scope of Activities

Section 6.1.5 lists the TAG AOC groundwater monitoring activities completed in CY 2023. Table 6-5 lists the sampling events for each monitoring well and Table 6-6 lists the corresponding analytical parameters. As noted earlier, nitrate is the only constituent of concern for the TAG AOC and was measured by NPN analyses. Other analytes were used for waste characterization purposes.

A total of 21 monitoring wells were sampled in CY 2023. These wells (Table 6-1) consisted of 10 PGWS monitoring wells and 11 Regional Aquifer monitoring wells.

Field quality control (QC) samples were collected at the same time as the groundwater samples (also referred to as environmental samples). The field QC samples included environmental duplicate, equipment blank (EB), field blank (FB), and trip blank (TB) samples. The TB samples remained in laboratory-supplied coolers.

6.4 Field Methods and Measurements

The groundwater samples were collected with a portable Bennett nitrogen-gas powered downhole piston pump. Section 1.3 describes in detail the how the CY 2023 groundwater data for the TAG AOC were collected and analyzed. Table 6-5 lists the sampling and analysis plans (SAPs) implemented.

6.5 Analytical Methods

The off-site laboratory analyzed the groundwater samples using the applicable EPA and DOE-specified methods and protocols identified in Section 1.3.2. Data validation was performed as Section 1.3.1.5 describes. The qualifiers listed in the Validation Qualifier columns of Tables 6C-1, 6C-2, 6C-4, 6C-5, and 6C-6 are used in the following discussion and figures.

6.6 Summary of Calendar Year 2023 Analytical Results

The following sections summarize the CY 2023 groundwater monitoring results for the TAG AOC, including pertinent trends in NPN concentrations. Attachment 6C (Tables 6C-1 through 6C-7) presents the analytical results and field water quality parameter measurements for all CY 2023 sampling events. All analytical results (Tables 6C-1 through 6C-7) were reviewed and qualified during the data validation process and include the laboratory and validation qualifiers. Attachment 6D (Figures 6D-1 through 6D-6) presents NPN concentration trend plots for the six monitoring wells (TA2-W-19, TA2-W-28, TJA-2, TJA-4, TJA-5, and TJA-7) where groundwater samples have consistently exceeded the EPA MCL for nitrate.

Table 6-5
Groundwater Monitoring Well Network and Sampling Dates for the Tijeras Arroyo Groundwater Area of Concern in Calendar Year 2023

Date of Sampling Event	Monitoring Wells Sampled		SAP
March 2023	TA1-W-06 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	*Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY23, 2nd Quarter Sampling* (SNL/NM, February 2023)
May/June 2023	TA2-W-19 TA2-W-26 TA2-W-28 TJA-2	TJA-3 TJA-4 TJA-7	*Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY23, 3rd Quarter Sampling* (SNL/NM, April 2023b)
August/September 2023	TA1-W-01 TA1-W-02 TA1-W-04 TA1-W-05 TA1-W-06 TA1-W-08 TA2-NW1-595 TA2-W-01 TA2-W-19 TA2-W-24 TA2-W-25	TA2-W-26 TA2-W-27 TA2-W-28 TJA-2 TJA-3 TJA-4 TJA-5 TJA-6 TJA-7 WYO-3	*Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY23, 4th Quarter Sampling* (SNL/NM, July 2023)
November/December 2023	TA2-W-19 TA2-W-26 TA2-W-28 TJA-2	TJA-3 TJA-4 TJA-7	*Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY24, 1st Quarter Sampling* (SNL/NM, October 2023)

Notes:
Green shading denotes monitoring wells that are screened in the Perched Groundwater System.
Purple shading denotes monitoring well is screened in the Merging Zone (below the Perching Horizon and above the Regional Aquifer).
Monitoring wells screened in the Regional Aquifer are not shaded.

FY = fiscal year
SAP = Sampling and Analysis Plan
SNL = Sandia National Laboratories
TA1-W = Technical Area I well
WYO = Wyoming Boulevard well
TA2-NW = Technical Area II northwest well
TA2-W = Technical Area II well
TJA = Tijeras Arroyo well

Table 6-6
Analytes and Parameters for Monitoring Wells in the Tijeras Arroyo Groundwater Area of Concern per Sampling Event in Calendar Year 2023

Parameter	March 2023	
NPN VOCs[a]	TA1-W-06 TA1-W-06 (Duplicate) TA2-W-01 TA2-W-19 TA2-W-26 TA2-W-26 (Duplicate) TA2-W-27	TA2-W-27 (Duplicate) TA2-W-28 TJA-2 TJA-3 TJA-4 TJA-6 TJA-7
Parameter	**May/June 2023**	
NPN VOCs[a]	TA2-W-19 TA2-W-26 TA2-W-26 (Duplicate) TA2-W-28 TA2-W-28 (Duplicate)	TJA-2 TJA-3 TJA-4 TJA-7
Parameter	**August/September 2023**	
Alkalinity[a] Anions[a] Gamma Spectroscopy (short list)[a, b] Gross Alpha/Beta Activity[a] NPN TAL Metals plus Total Uranium[a] Tritium[a] VOCs[a]	TA1-W-01 TA1-W-02 TA1-W-02 (Duplicate) TA1-W-04 TA1-W-04 (Duplicate) TA1-W-05 TA1-W-06 TA1-W-08 TA2-NW1-595 TA2-W-01 TA2-W-19 TA2-W-24 TA2-W-25	TA2-W-25 (Duplicate) TA2-W-26 TA2-W-26 (Duplicate) TA2-W-27 TA2-W-28 TJA-2 TJA-3 TJA-4 TJA-5 TJA-5 (Duplicate) TJA-6 TJA-7 WYO-3
Parameter	**November/December 2023**	
NPN VOCs[a]	TA2-W-19 TA2-W-19 (Duplicate) TA2-W-26 TA2-W-26 (Duplicate) TA2-W-28	TJA-2 TJA-3 TJA-3 (Duplicate) TJA-4 TJA-7

Notes:
Green shading denotes monitoring wells that are screened in the Perched Groundwater System.
Purple shading denotes the well is screened in the Merging Zone (below the Perching Horizon and above the Regional Aquifer).
Monitoring wells screened in the Regional Aquifer are not shaded.
Environmental duplicate samples are not analyzed for alkalinity, anions, radionuclides, and metals.
[a]Analysis used for waste characterization purposes.
[b]Gamma spectroscopy short list consists of americium-241, cesium-137, cobalt-60, and potassium-40.

NPN = nitrate plus nitrite (as nitrogen)
TAL = Target Analyte List
TA1-W = Technical Area I well
TA2-NW = Technical Area II northwest well
TA2-W = Technical Area II well
TJA = Tijeras Arroyo well
VOC = volatile organic compound
WYO = Wyoming Boulevard well

6.6.1 *Analytical Results for Nitrate*

Table 6-7 lists the monitoring wells that exceeded the EPA MCL for nitrate in CY 2023. Figure 6-9 shows the monitoring well locations with the corresponding third quarter (August/September) NPN concentrations in environmental and environmental duplicate samples collected from PGWS and Regional Aquifer monitoring wells. The August/September CY 2023 event sampled more monitoring wells than the other events.

For the PGWS, groundwater samples from five monitoring wells (TA2-W-19, TA2-W-28, TJA-2, TJA-5, and TJA-7) exceeded the EPA MCL for nitrate during the August/September 2023 sampling event. Figure 6-9 depicts the lateral extent of NPN exceeding the EPA MCL for nitrate (10 mg/L) in the PGWS. NPN concentrations exceeding the EPA MCL are associated with SWMU 46 and the TA-II septic water and wastewater discharges sites. The lateral extent of NPN concentrations is dashed (queried) beyond the TAG AOC boundary. NPN concentrations are much greater in KAFB monitoring wells located immediately south of the TAG AOC, where NPN concentrations ranged up to 66 mg/L in CY 2023 (KAFB, December 2023).

The Merging Zone monitoring well TJA-4 also exceeded the EPA MCL for nitrate in all CY 2023 samples. None of the Regional Aquifer monitoring wells exceeded the EPA MCL for nitrate. Nitrate concentrations and trends are discussed below.

Table 6-7
Matrix Summarizing the Monitoring Wells Where Nitrate plus Nitrite Concentrations in Groundwater Exceeded the Nitrate Maximum Contaminant Level in the Tijeras Arroyo Groundwater Area of Concern during Calendar Year 2023

Aquifer	Number of Monitoring Wells Exceeding the nitrate EPA MCL of 10 mg/L in CY 2023	Maximum NPN Concentration in CY 2023 (mg/L)
Perched Groundwater System	Five monitoring wells (TA2-W-19, TA2-W-28, TJA-2, TJA-5, TJA-7)	21.9
Merging Zone	One monitoring well (TJA-4)	31.3
Regional Aquifer	None	4.05

Notes:
CY = calendar year
EPA = U.S. Environmental Protection Agency
MCL = maximum contaminant level
mg/L = milligrams per liter
ND = not detected
NPN = nitrate plus nitrite (as nitrogen)
TA2-W = Technical Area II well
TJA = Tijeras Arroyo well

Table 6-8 lists the maximum NPN concentrations for the five monitoring wells and the trend of NPN concentrations for CY 2018 through CY 2023. Figure 6-10 shows that the NPN concentrations have either been stable or decreasing for the last five years. The greater concentration of environmental or environmental duplicate samples is plotted per well on Figure 6-10.

The predicted years when four of the five monitoring wells (TA2-W-19, TA2-W-28, TJA-2, and TJA-7) will go dry (the water level will decline below the well screen) range from 2051 to 2074 (Table 6-8). Earlier predictions for these four monitoring wells were used to determine the duration of the remedy (SNL/NM, February 2018; SNL/NM, June 2023a). Monitoring well TJA-5 was not used to determine the duration of the remedy because the well has a unique geochemical signature (SNL/NM, February 2018) and is likely recharged from sources located upgradient of the TAG AOC.

Table 6-8
Maximum Nitrate Plus Nitrite Concentrations and Trends for Perched Groundwater System Monitoring Wells in the Tijeras Arroyo Groundwater Area of Concern Where the Nitrate Maximum Contaminant Level was Exceeded in Calendar Year 2023

Well ID	Maximum NPN in CY 2023, mg/L	NPN Trend for the Last 5 Years	Predicted Year Monitoring Well Goes Dry
TA2-W-19	12.7	Decreasing	2052
TA2-W-28	19.5 J	Stable	2051
TJA-2	12.5	Stable	2074
TJA-5	14.5	Decreasing	2153*
TJA-7	21.9	Stable	2057

Notes:
*Monitoring well TJA-5 is located in the farthest southeast part of the TAG AOC and is likely impacted by recharge sources located upgradient of the TAG AOC.
AOC = Area of Concern
CY = calendar year
EPA = U.S. Environmental Protection Agency
ID = identifier
J = estimated quantity
MCL = maximum contaminant level
mg/L = milligrams per liter
NPN = nitrate plus nitrite (as nitrogen)
TA2-W = Technical Area II well
TAG = Tijeras Arroyo Groundwater
TJA = Tijeras Arroyo well

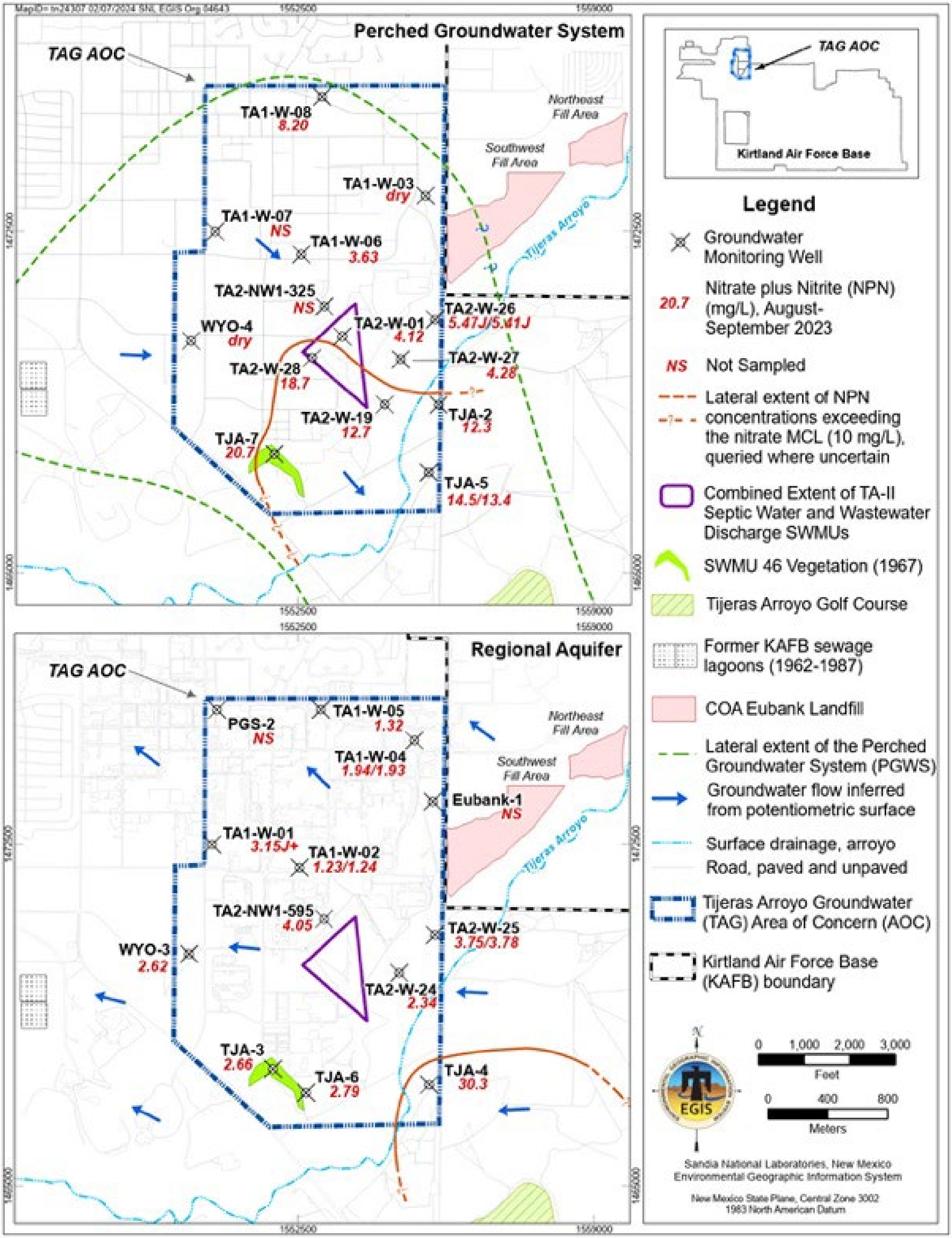

Figure 6-9
Distribution of Nitrate Plus Nitrate in the Perched Groundwater System and the Regional Aquifer at the Tijeras Arroyo Groundwater Area of Concern, August/September 2023

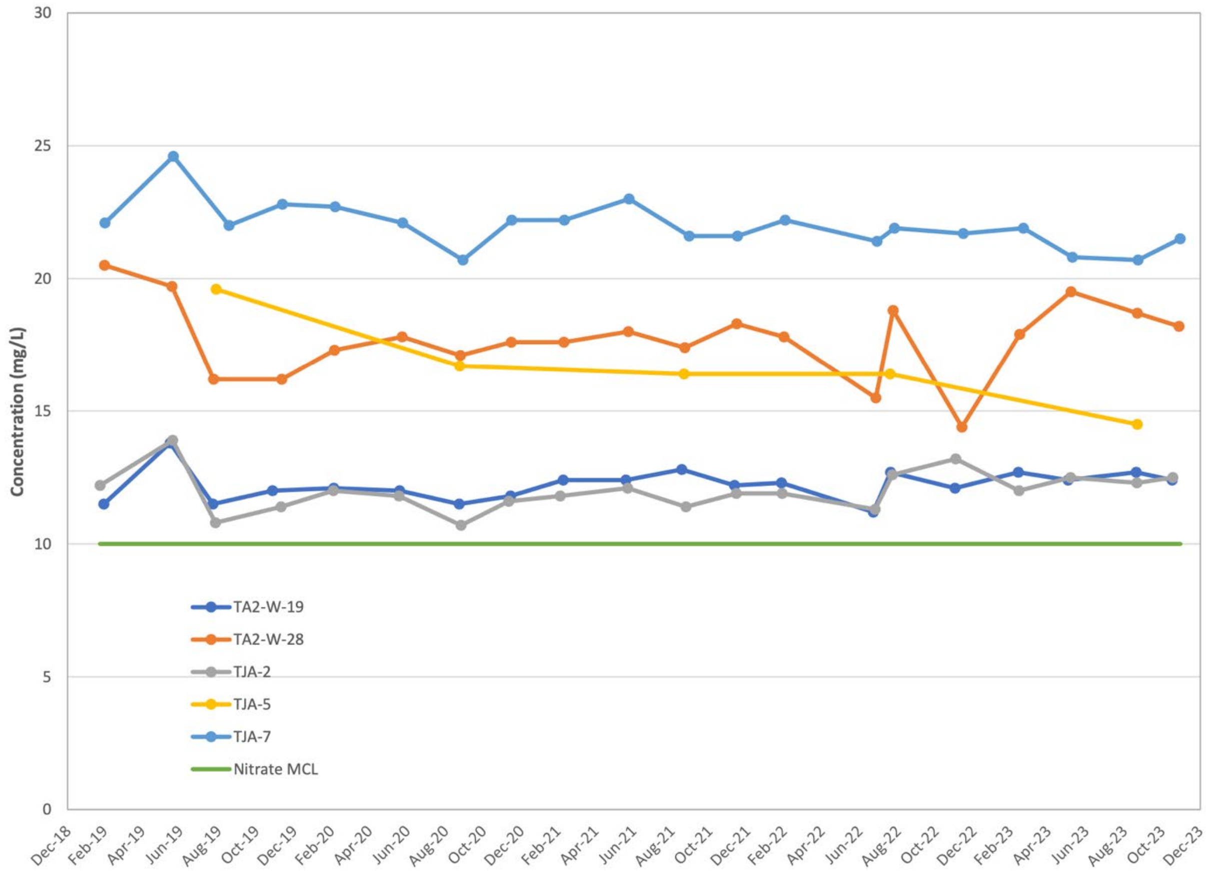

Figure 6-10
Nitrate Plus Nitrite Concentration Trend Plots for the Five Perched Groundwater System Monitoring Wells that Exceed the Nitrate Maximum Contaminant Level at the Tijeras Arroyo Groundwater Area of Concern

Five PGWS monitoring wells (TA2-W-19, TA2-W-28, TJA-2, TJA-5, and TJA-7) had NPN results exceeding the EPA MCL for nitrate of 10 mg/L in CY 2023 (Table 6C-1). The maximum NPN concentration was 21.9 mg/L in the March 2023 sample from monitoring well TJA-7. Since October 2018, the NPN trends for the environmental samples have been as follows:

- TA2-W-19 (Figure 6D-1): In CY 2023, the NPN concentrations in the quarterly samples ranged from 12.2 to 12.7 mg/L. The NPN trend for the last five years has decreased while the water level has consistently declined at a rate of approximately 0.42 ft/yr.
- TA2-W-28 (Figure 6D-2): In CY 2023, the NPN concentrations in the quarterly samples ranged from 17.9 to 19.5 (J-qualified) mg/L. The NPN trend for the last five years has been stable while the water level has consistently declined at approximately 0.36 ft/yr. TA2-W-28 (first sampled in December 2014) is the replacement monitoring well for TA2-SW1-320 (last sampled in August 2014). TA2-W-28 is the farthest upgradient well in the TAG AOC with NPN concentrations exceeding the EPA MCL for nitrate.
- TJA-2 (Figure 6D-3): In CY 2023, the NPN concentrations in the quarterly samples ranged from 12.0 to 12.5 mg/L. The NPN trend for the last five years has been stable while the water level has consistently declined at approximately 0.32 ft/yr.
- TJA-5 (Figure 6D-4): In CY 2023, the NPN concentration for the annual environmental sample was 14.5 mg/L, with the environmental duplicate sample having an NPN concentration of 13.4 mg/L. The NPN trend for the last five years has decreased while the water level has consistently declined at a rate of approximately 0.14 ft/yr.
- TJA-7 (Figure 6D-5): In CY 2023, the NPN concentrations in the quarterly samples ranged from 20.7 to 21.9 mg/L. The NPN trend for the last five years has been stable while the water level has consistently declined at a rate of approximately 0.23 ft/yr.

Merging Zone monitoring well TJA-4 had the highest NPN concentration (31.3 mg/L) of all the TAG AOC monitoring wells sampled in CY 2023 (Figure 6D-6). As Figure 6D-6 shows, the NPN trend for the last five years has been stable while the water level has increased at 0.08 ft/yr. This monitoring well is located at the southeast corner of the TAG AOC and is screened in the Merging Zone above the Regional Aquifer. For reporting purposes, monitoring well TJA-4 has historically been categorized as a Regional Aquifer monitoring well because its water level continues to increase in a manner similar to other monitoring wells that are screened in the Regional Aquifer. Monitoring well TJA-4 is screened in the localized Merging Zone that links the two water-bearing units, and its potentiometric surface cannot be reasonably contoured with the potentiometric surfaces for either the PGWS or the Regional Aquifer. Saturation of the Merging Zone is probably related to irrigation at the KAFB Tijeras Arroyo Golf Course located approximately 0.6 miles to the southeast. Elevated nitrate in this monitoring well likely reflects contributions from geogenic nitrate and/or anthropogenic sources located upgradient of the TAG AOC, such as fertilizer usage at the KAFB Tijeras Arroyo Golf Course.

6.6.2 Analytical Results for Volatile Organic Compounds, Anions, Metals, Radionuclides, and Field Parameters

This section summarizes the waste characterization analytes. Table 6C-2 presents the CY 2023 analytical results for the volatile organic compounds (VOCs) detected above the MDLs. Table 6C-3 lists the MDLs for the VOCs. Two PGWS monitoring wells (TA2-W-26 and TJA-7) had VOC concentrations that exceeded the EPA MCLs. The EPA MCLs for trichloroethene (TCE) and tetrachloroethene (PCE) are 5 micrograms per liter (µg/L). The December 2023 TCE and PCE concentrations for PGWS monitoring well TA2-W-26 were 16.8 and 7.78 µg/L, respectively. The November 2023 TCE concentration for PGWS monitoring well TJA-7 was 5.43 µg/L. None of the Regional Aquifer monitoring wells had VOC concentrations that exceeded established EPA MCLs.

Table 6C-4 presents the CY 2023 analytical results for major anions (bromide, chloride, fluoride, and sulfate) and alkalinity (bicarbonate and carbonate). Fluoride is the only analyte with an established EPA MCL. None of the fluoride results exceeded the EPA MCL of 4.0 mg/L.

Table 6C-5 presents the CY 2023 analytical results for the 23 Target Analyte List (TAL) metals and total uranium. No analytes exceeded established EPA MCLs.

Table 6C-6 presents the CY 2023 analytical results for gamma spectroscopy short list (americium-241, cesium-137, cobalt-60, and potassium-40), gross alpha/beta activity, and tritium. The gross alpha activity was measured as a radiological screening tool in accordance with the *National Primary Drinking Water Regulations* (40 CFR Part 141, December 1975, as updated). Naturally occurring uranium was measured independently. The total uranium concentration was measured in conjunction with the TAL metals analysis described above. The gross alpha activity measurements were corrected by subtracting the total uranium activity from the uncorrected gross alpha activity results. An SNL/NM health physicist further reviewed the results to assure that the samples were nonradioactive. All reported radionuclide activities were below established EPA MCLs. Gross beta results were used as a radiological screening tool; the results did not indicate the presence of a beta-emitting radionuclide that would exceed the EPA MCL of 4 millirems per year. Tritium activities were below the laboratory minimum detectable activity levels in all groundwater samples.

Table 6C-7 presents the field water quality parameter measurements obtained during purging of each monitoring well (Section 1.3.1.2). The field water quality parameters measured consisted of temperature, specific conductivity, oxidation-reduction potential, potential of hydrogen, and dissolved oxygen. These parameters were measured to evaluate water chemistry stability and ensure the collection of representative groundwater samples.

6.7 Quality Control Results

This section summarizes the CY 2023 field QC sample results and their impact on data quality. Section 1.3 describes how the field QC samples were collected and prepared. Table 1-7 (Section 1.3.4) lists each field QC sample type and purpose.

For CY 2023, the results for the environmental duplicate sample pairs for each sampling event showed good agreement based on the relative percent difference (RPD) for NPN (Table 6C-8). RPDs are unitless values calculated for those constituents detected above the MDL in the environmental and environmental duplicate samples. The calculated RPD for the CY 2023 NPN results ranged from 1 to 9, significantly less than the RPD goal of 35.

EB samples were submitted for the same analyses as the environmental samples. The EB sample results per quarter were as follows:

- **March 2023 Sampling Event**—The EB samples were collected before sampling of the three monitoring wells (TA1-W-06, TA2-W-26, and TA2-W-27) began. The VOCs acetone, bromodichloromethane, chloroform, and dibromochloromethane were detected in the EB samples. No corrective action was required for acetone, bromodichloromethane, or dibromochloromethane because these compounds were not detected in the associated environmental samples. Chloroform was reported above the practical quantitation limit (PQL) in the EB samples associated with TA1-W-06 and TA2-W-26. Chloroform has been historically detected in TA1-W-06 and TA2-W-26 environmental samples and was not qualified due to EB contamination based on professional judgement.

- **May/June 2023 Sampling Event**—The EB samples were collected before sampling of the two monitoring wells (TA2-W-26 and TA2-W-28) began. Acetone, bromodichloromethane, chloroform, and dibromochloromethane were detected in the EB samples. No corrective action was required for acetone, bromodichloromethane, or dibromochloromethane because these compounds were not detected in the associated environmental samples. Chloroform in the TA-W-26 result was qualified as an estimated value during data validation because chloroform has been historically reported in the TA2-W-26 environmental samples.
- **August/September 2023 Sampling Event**—The EB samples were collected before sampling of the five monitoring wells (TA1-W-02, TA1-W-04, TA2-W-25, TA2-W-26, and TJA-5) began. Acetone, bromodichloromethane, 2-butanone, chloride, chloroform, copper, dibromochloromethane, fluoride, NPN, sodium, and sulfate were detected above the MDLs in various EB samples. No corrective action was required for acetone, bromodichloromethane, 2-butanone, chloride, chloroform, dibromochloromethane, fluoride, NPN, sodium, or sulfate because either these parameters were not detected in the environmental samples or were reported in the environmental samples at greater than five times the EB concentration. Copper in TA2-W-26 and TJA-5 was qualified as not detected during data validation because it was reported at concentrations less than the PQL in the EB and environmental samples.
- **November/December 2023 Sampling Event**—The EB samples were collected before sampling of the three monitoring wells (TA2-W-19, TA2-W-26 and TJA-3) began. Acetone, bromodichloromethane, chloroform, and dibromochloromethane were detected in the EB samples. No corrective action was required for acetone, bromodichloromethane, or dibromochloromethane because these compounds were not detected in the associated environmental samples. Chloroform in the TA2-W-26 samples was qualified as estimated values during data validation because chloroform has been historically reported in TA2-W-26 environmental samples.

The FB sample results per quarter were as follows:

- **March 2023 Sampling Event**—Three FB samples were analyzed for VOCs to determine whether sample contamination from ambient field conditions occurred. Two FB samples were prepared by pouring deionized (DI) water into sample containers at the sample point (i.e., inside the sampling truck at the TA2-W-01 and TJA-7 monitoring well locations) to simulate the transfer of the environmental samples from the sampling system to the sample containers. An additional FB sample was collected from the DI water source used for equipment decontamination. Acetone, bromodichloromethane, chloroform, and dibromochloromethane were reported in the three FB samples. No corrective action was necessary because these compounds were not detected in the associated environmental samples.
- **May/June 2023 Sampling Event**—Three FB samples were analyzed for VOCs to determine whether sample contamination from ambient field conditions occurred. The FB samples were prepared by pouring DI water into sample containers at the sample point (i.e., inside the sampling truck at the TJA-3 and TJA-4 monitoring well locations) to simulate the transfer of environmental samples from the sampling system to the sample containers. An additional FB sample was collected from the DI water source used for equipment decontamination. Bromodichloromethane, chloroform, and dibromochloromethane were reported in the FB samples. No corrective action was necessary because these compounds were not detected in the associated environmental samples.

- **August/September 2023 Sampling Event**—Six FB samples were analyzed for VOCs to determine whether sample contamination from ambient field conditions occurred. The FB samples were prepared by pouring DI water into sample containers at the sample point (i.e., inside the sampling truck at the TA1-W-02, TA1-W-06, TA2-NW1-595, TJA-4, and WYO-3 monitoring well locations) to simulate the transfer of the environmental samples from the sampling system to the sample containers. The compounds detected in the FB samples included acetone, bromodichloromethane, chloroform, and dibromochloromethane. No corrective action was necessary for acetone, bromodichloromethane, or dibromochloromethane because these compounds were not detected in the associated environmental samples. Chloroform in the TA1-W-06 environmental sample was qualified as not detected during data validation because chloroform was reported at a concentration above the PQL in the associated FB sample and less than the PQL in the environmental sample. One additional FB sample was collected from the DI-water source used for equipment decontamination and analyzed for all parameters. Chloride, copper, sodium, sulfate, and zinc were reported above the MDL.
- **November/December 2023 Sampling Event**—Three FB samples were analyzed for VOCs to determine whether sample contamination from ambient field conditions occurred. Two FB samples were collected at the TA2-W-28 and TJA-2 monitoring well locations to simulate the transfer of the environmental samples from the sampling system to the sample containers. An additional FB sample was collected from the DI water source used for equipment decontamination. Acetone, bromodichloromethane, chloroform, and dibromochloromethane were reported in the FB samples. No corrective action was necessary because these compounds were not detected in the associated environmental samples.

The TB sample results per quarter were as follows:

- **March 2023 Sampling Event—**A total of 15 TB samples were submitted for VOC analysis. No VOCs were detected above MDLs in any TB sample, except for acetone, which was reported in three TB samples. Acetone was qualified as not detected in the TA2-W-26 environmental and environmental duplicate samples during data validation because it was reported below the PQL in the environmental and associated TB samples.
- **May/June 2023 Sampling Event**—A total of 10 TB samples were submitted for VOC analysis. No VOCs were detected above the MDLs in any of the TB samples, except for methylene chloride, which was reported in three TB samples. Methylene chloride in the environmental and environmental duplicate samples from TA2-W-26 and TJA-7 was qualified as not detected at the PQL during data validation because it was reported below the PQL in the environmental and associated TB samples.
- **August/September 2023 Sampling Event**—A total of 27 TB samples were submitted for VOC analysis. Acetone (4 TB samples) and methylene chloride (5 TB samples) were detected above the MDLs. Methylene chloride in the TA1-W-01, TA2-NW1-595, and TA2-W-25 (environmental duplicate only) samples was qualified as not detected during data validation because the reported concentrations were less than the PQL in the environmental and associated TB samples.
- **November/December 2023 Sampling Event—**A total of 11 TB samples were submitted for VOC analysis. Except for acetone and methylene chloride, no VOCs were detected above the MDLs in any TB sample. Acetone was reported in five TB samples, and no corrective action was required because it was not detected above the MDL in the associated environmental samples. Methylene chloride was reported in two TB samples. Methylene chloride in the environmental samples from TA2-W-19 and TJA-2 was qualified as not detected at the PQL during data validation because it was reported below the PQL in the environmental and associated TB samples.

6.8 Variances and Nonconformances

Variances from the water level measurement and/or groundwater sampling requirements specified in the TAG AOC mini-SAPs were as follows:

> **All Events in CY 2023**— During purging, fine-grained sand and silt material were observed on the sampling pump after retrieval at monitoring well TA2-W-26. Turbidity exceeded 100 nephelometric turbidity units (NTU) during the purge. The other five parameters were stable. The monitoring well purged dry before meeting the stability criterion for turbidity, which is a variance. The monitoring well was allowed to recover overnight before sample collection. During sampling, the turbidity for the four events ranged from 1.94 to 4.29 NTU (Table 6C-7).

6.9 Summary and Conclusions

General

- The TAG AOC encompasses an area of approximately 1.82 sq mi in the north-central part of KAFB.
- Groundwater investigations were initiated in 1992 and the current monitoring well network consists of 21 monitoring wells used for water quality analysis and 27 monitoring wells used for water level measurements.

Hydrogeology

- The PGWS is a thin, dissipating, artificially created water-bearing unit that was mostly created by historical anthropogenic sources (septic and wastewater discharges). These types of water discharges at SNL/NM ended in 1992.
- Groundwater in the PGWS flows predominantly to the east and southeast. Water levels at the PGWS monitoring wells continue to decline as the system naturally dewaters (dissipates).
- Groundwater from the PGWS is not pumped for potable use within or near the TAG AOC.
- For the period of October 2018 to October 2023, the decline rate for PGWS monitoring wells ranged from 0.09 to 0.42 ft/yr. The average 5-year PGWS decline rate for 12 of the 14 monitoring wells was approximately 0.29 ft/yr.
- By the end of CY 2023, two PGWS monitoring wells were dry. Three monitoring wells are predicted to be dry by 2030. In 2040, four monitoring wells will be dry. By 2050, five of the fourteen PGWS monitoring wells are predicted to be dry. Approximately half of the lateral extent of the PGWS in the TAG AOC will be dewatered by the year 2050. Only near the northwest and southeast corners of the TAG AOC will water be present in well screens after 2050.
- Groundwater in the Regional Aquifer flows to the west and northwest. Water levels continued to increase in 12 of the 13 Regional Aquifer monitoring wells. For the period of October 2018 to October 2023, the rate of increase in the 12 monitoring wells ranged from 0.06 to 0.89 ft/yr.

Groundwater Sampling and Analytical Parameters

- In CY 2023, monitoring wells were sampled during four events (March 2023, May/June 2023, August/September 2023, and November/December 2023). The groundwater samples for each event were analyzed for NPN.
- For waste characterization purposes, the August/September 2023 samples were also analyzed for VOCs, anions, alkalinity, TAL metals, total uranium, gamma spectroscopy short list, gross alpha/beta activity, and tritium.
- The analytical results for NPN, VOCs, anions, alkalinity, metals, and radionuclides were compared to established EPA MCLs (EPA, March 2018).

Analytical Results

- For the TAG AOC in CY 2023, the maximum NPN concentration was 21.9 mg/L in the March 2023 sample collected from monitoring well TJA-7.
- NPN concentrations exceeded the EPA MCL of 10 mg/L in samples from five PGWS monitoring wells (TA2-W-19, TA2-W-28, TJA-2, TJA-5, and TJA-7).
- Over the past five years, NPN concentrations at three PGWS monitoring wells (TA2-W-28, TJA-2, and TJA-7) were stable while NPN concentrations at the other two PGWS monitoring wells (TA2-W-19 and TJA-5) were decreasing.
- The lateral extent of NPN in the PGWS exceeding the EPA MCL for nitrate is consistent with previous years, is restricted to the southeast corner of the TAG AOC, and likely reflects anthropogenic sources from multiple release sites and impacts from naturally occurring (geogenic) nitrate.
- The maximum NPN concentration in the Regional Aquifer exclusive of the Merging Zone was 4.05 mg/L.
- In the Merging Zone above the Regional Aquifer, the maximum NPN concentration for CY 2023 was 31.3 mg/L and is likely attributable to geogenic nitrate and/or anthropogenic release sites that are located upgradient of the TAG AOC.
- The December 2023 TCE and PCE concentrations for PGWS monitoring well TA2-W-26 were 16.8 and 7.78 µg/L, respectively. The November 2023 TCE concentration for PGWS monitoring well TJA-7 was 5.43 µg/L.

Remedial Progress

- The TAG CMI Plan (SNL/NM, June 2023) defined the cleanup goals for the MNA final remedy as (1) NPN concentrations in the PGWS will decrease below the EPA MCL for nitrate and/or (2) the PGWS will naturally dewater. The natural processes inherent in MNA are evident at the TAG AOC.
- The analytical results show that the NPN concentrations in the PGWS are either decreasing or stable at the five monitoring wells that exceeded the EPA MCL for nitrate. Figure 6-10 shows the concentration trends for these five wells over the past five years.
- The water levels in PGWS monitoring wells across the TAG AOC are declining, indicating natural dewatering and reduction in the thickness of the saturated sediments. Figure 6-7 shows hydrographs for all the PGWS monitoring wells in the TAG AOC.

6.10 Summary of Future Activities

TAG AOC groundwater monitoring activities in CY 2024 will include:

- Submittal of the revised TAG CMI Plan to the NMED in January 2024.
- Quarterly water level measurements at 25 of 27 monitoring wells (Table 6-1). The exceptions are monitoring wells TA1-W-03 and WYO-4. TA1-W-03 will be tagged to verify that it is still dry. Responsibility for WYO-4 has been transferred to the KAFB ERP.
- Collection of groundwater samples from 19 monitoring wells (Table 6-1), with semiannual sampling of 11 PGWS monitoring wells and annual sampling of 8 Regional Aquifer monitoring wells, including Merging Zone well TJA-4.
- Annual reporting of the CY 2024 groundwater monitoring activities and results in the CY 2024 annual groundwater monitoring report (AGMR).
- Submittal of the *Comprehensive Site-Wide Groundwater Monitoring Plan, Calendar Year 2025* to the NMED in April 2024.
- Request for analytical and water level data from the KAFB ERP, COA Environmental Health Department, and USGS.
- Implementation of BMPs starting in January 2024. This is in anticipation of the NMED issuing a final approval of the revised TAG CMI Plan in 2024. The BMPs will include quarterly water level measurements at all monitoring wells, semiannual sampling of the PGWS monitoring wells, annual sampling of the Regional Aquifer monitoring wells, and analyses for nitrate.
- Implementation of the MNA final remedy. This is anticipated to begin in CY 2025. The findings will be presented in Annual Progress Report sections of each AGMR Chapter 6.0. The first Five Year Performance Monitoring Report is anticipated to be submitted to the NMED in 2030. The report will discuss CY 2025 through CY 2029 monitoring results and will evaluate the effectiveness of the MNA final remedy.

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Attachment 6A
Historical Timeline of the Tijeras Arroyo Groundwater Area of Concern

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Table 6A-1
Historical Timeline of the Tijeras Arroyo Groundwater Area of Concern

Year	Event	Reference
1928	Land-use development on the East Mesa began in 1928 when the public Albuquerque Airport was built. Renamed Oxnard Field in 1929, the airport was used until late 1939 when the vicinity of Oxnard Field was purchased by the federal government for use as an Army Air Depot Training Station, later to be known as Sandia Base.	Freeman, 2016; CE2 Corporation, September 2016
1939	In 1939, public airline service was moved approximately four miles to the west of Oxnard Field where the Albuquerque Municipal Airport was built. Using the municipal set of runways, the Albuquerque Army Air Base began operations in 1941.	www.econtent.unm.edu, 2016; Wikipedia, 2016
1945	"Z Division" of the Manhattan Engineers District, an extension of the original Los Alamos Laboratory, was established at Sandia Base in the area that would become known as TA-I.	Furman, April 1990
1946	After World War II, the old Oxnard Field runways and a new extensive grid of taxiways were used for parking military aircraft. Starting in 1946, the War Assets Administration managed the sale or the dismantlement and smelting of approximately 2,250 surplus military aircraft.	www.militarymediainc.com, 2016
1947	Wastewater and septic-water discharges begin began at TA-II. All discharges to the ground surface or buried leach fields ended in 1992.	SNL/NM, November 2005
1948	Wastewater and possibly septic-water discharges associated with TA-I began at SWMU 46. All discharges to ground surface at the outfall ditches ceased in 1974.	SNL/NM, November 2005
1949	The independent Sandia Laboratory was established. Existing buildings in TA-I were remodeled. New buildings in TA-I and TA-II were constructed.	Furman, April 1990
1977	Construction of TA-IV accelerator facilities began in 1977. All buildings use modern wastewater and septic disposal systems. No discharges to the ground were allowed.	SNL/NM, November 2005
1984	DOE created CEARP to evaluate potential release sites at SNL/NM.	DOE, September 1987
1988	The SNL/NM ER Project was created and began conducting investigations using the CEARP list of sites.	SNL/NM, March 1995a
1992	ER Project started to investigate groundwater at TA-II. The Perched Groundwater System was discovered with the installation of monitoring wells TA2-SW1-320, TA2-NW1-325, and TA2-NW1-595. The presence of the Regional Aquifer was previously known from base-wide studies.	SNL/NM, March 1995a
1994	Installed groundwater monitoring wells TA2-W-01 and TJA-2.	SNL/NM, March 1995a
1994	First detection of TCE in a groundwater sample from a SNL/NM well near Tijeras Arroyo. The October 1994 sample from monitoring well TA2-W-01 contained TCE at 1 µg/L.	SNL/NM, March 1995b
1995	Installed nested groundwater monitoring wells WYO-1 and WYO-2 in a single borehole. Installed groundwater monitoring wells PGS-2 and TA2-W-19.	SNL/NM, March 1996a
1995	First TCE exceedance of the U.S. Environmental Protection Agency MCL of 5 µg/L. The November 1995 groundwater sample from monitoring well TA2-W-19 contained TCE at 8.1 µg/L.	SNL/NM, March 1996b
1995	Comprehensive study of the geologic and hydrogeologic setting for SNL/NM and KAFB area completed.	GRAM and Lettis, December 1995
1996	Sandia North Groundwater Investigation Plan submitted to the NMED.	SNL/NM, March 1996a
1996	Shallow (Perched Groundwater System) Water-Bearing Zone Hydrologic Evaluation report prepared for aquifer parameters.	Wolford, September 1996
1996	Pressure transducer program conducted at four Perched Groundwater System monitoring wells (TA2-NW1-325, TA2-SW1-320, TA2-W-01, and TA2-W-19), two Regional Aquifer monitoring wells (PGS-2, TA2-NW1-595), and one production well (KAFB-5).	SNL/NM March 1998

Refer to Notes at end of table.

Table 6A-1 (continued)
Historical Timeline of the Tijeras Arroyo Groundwater Area of Concern

Year	Event	Reference
1996	Installed soil-vapor monitoring wells TA2-VW-20 and TA2-VW-21.	IT, January 1997
1997	Sandia North Geological Investigation Project Report was submitted to the NMED.	Fritts and Van Hart, March 1997
1997	Installed groundwater monitoring wells TA1-W-01 and TA2-W-25.	SNL/NM, March 1998
1997	Downhole geophysical surveying (electromagnetic induction, neutron, and natural gamma) was conducted on 21 SNL/NM and USAF monitoring wells near Tijeras Arroyo.	SNL/NM, March 1998
1998	Installed groundwater monitoring wells TA1-W-02, TA1-W-03, TA1-W-04, TA1-W-05, TA1-W-06, TA1-W-07, TA2-W-24, TA2-W-26, TA2-W-27, TJA-3, TJA-4, and TJA-5.	SNL/NM, June 2000
1998	Revision of the 1995 comprehensive study of the geologic and hydrogeologic setting for SNL/NM and KAFB area was completed.	SNL/NM, February 1998
1999	Colloidal borescope investigation was performed on 18 Perched Groundwater System monitoring wells.	AquaVISION, July 1999
1999	Structural interpretation was conducted using USGS aeromagnetic survey.	Van Hart et al., October 1999
2000	Project name at SNL/NM was changed from the “Sandia North Groundwater Investigation” to the “Tijeras Arroyo Groundwater” or TAG Investigation.	Collins, December 2000
2000	At NMED direction, the TAG High Performing Team (HPT) held its first meeting in October 2000.	SNL/NM, June 2003
2001	Installed groundwater monitoring wells TA1-W-08, TJA-6, and TJA-7.	SNL/NM, November 2002
2001	Installed soil-vapor monitoring wells 46-VW-01, 46-VW-02, and 227-VW-01.	SNL/NM, November 2002
2001	Geologic model of the Perched Groundwater System was updated.	Van Hart, June 2001
2001	Geochemical modeling of the Perched Groundwater System was conducted.	Brady and Domski, 2001
2001	Capture zone analysis conducted for production wells located outside the TAG Investigation area.	SNL/NM, February 2001
2001	Pressure transducer study was conducted using 19 monitoring wells (11 wells are screened in Perched Groundwater System and 8 wells are screened in Regional Aquifer).	SNL/NM, August 2001
2001	Installed replacement groundwater monitoring wells WYO-3 and WYO-4. Plugged and abandoned wells WYO-1 and WYO-2.	SNL/NM, June 2003
2002	Completed the calibration of the three-dimensional groundwater flow modeling of the TAG vicinity using the numerical code FEMWATER.	BGW, September 2002
2002	TAG Continuing Investigation Report was submitted to the NMED.	SNL/NM, November 2002
2003	Updated the interpretation of the subsurface geology at KAFB, including the TAG area.	Van Hart, June 2003
2003	TAG Investigation Work Plan submitted to the NMED. The plan discussed the tasks that SNL/NM personnel proposed to conduct.	SNL/NM, June 2003
2003	TAG Investigation Work Plan was approved by the NMED.	NMED, September 2003
2003	Installed soil-vapor monitoring wells 159-VW-01, 165-VW-01, 1004-VW-01, and 1052-VW-01.	SNL/NM, October 2003
2003	Final meeting of TAG HPT was held in October 2003. Twenty meetings were held during the three-year period (2000 to 2003). Personnel from SNL/NM, DOE/NNSA, KAFB Installation Restoration Program, NMED Groundwater Quality Bureau, NMED Hazardous Waste Bureau, NMED Oversight Bureau, U.S. Environmental Protection Agency Region 6, Bernalillo County, and the City of Albuquerque Environmental Health Department participated.	Copland and Skelly, October 2003
2004	Slug testing was conducted at five Perched Groundwater System monitoring wells and five Regional Aquifer monitoring wells.	Skelly et al., May 2004
2004	The Compliance Order on Consent identified the TAG Investigation as an AOC and required the preparation of a CME report for the TAG AOC.	NMED, April 2004

Refer to Notes at end of table.

Table 6A-1 (continued)
Historical Timeline of the Tijeras Arroyo Groundwater Area of Concern

Year	Event	Reference
2004	TAG CME Work Plan was submitted to the NMED.	SNL/NM, July 2004
2004	Installed soil-vapor monitoring wells TAG-SV-01, TAG-SV-02, TAG-SV-03, TAG-SV-04, and TAG-SV-05.	SNL/NM, November 2005
2004	Stable isotope ($\delta^{15}N$) analyses conducted for five Perched Groundwater System monitoring wells.	SNL/NM, November 2004
2004	TAG CME Work Plan was approved by the NMED.	NMED, October 2004
2005	TAG CME Report was submitted to the NMED. Report included contaminant transport modeling for groundwater.	SNL/NM, August 2005
2005	TAG Investigation Report (analogous to a CCM) was submitted to the NMED.	SNL/NM, November 2005
2006	Plugged and abandoned soil-vapor monitoring well TAG-SV-03.	Skelly, November 2006
2008	NMED issued a NOD on the TAG Investigation Report.	NMED, August 2008
2009	Response to the August 2008 NOD for the TAG Investigation Report submitted to the NMED.	SNL/NM, February 2009
2009	NMED issued a second NOD concerning the TAG Investigation Report.	NMED, August 2009
2010	Response to the second NOD concerning the TAG Investigation Report submitted to the NMED.	SNL/NM, January 2010
2010	NMED issued a Notice of Approval for the TAG Investigation Report.	NMED, February 2010
2012	Plugged and abandoned soil-vapor monitoring wells 159-VW-01, 165-VW-01, 227-VW-01, 1004-VW-01, and 1052-VW-01.	SNL/NM, March 2013
2012	Groundwater samples for dual isotopes analyses ($\delta^{15}N$ versus $\delta^{18}O$) were collected from five Regional Aquifer monitoring wells.	Madrid et al., June 2013
2014	Installed replacement groundwater monitoring well TA2-W-28. Plugged and abandoned nearby groundwater monitoring well TA2-SW1-320.	SNL/NM, April 2015
2015	Meeting was held between personnel from SNL/NM, DOE/NNSA, and NMED for discussing the schedule (milestones) for report submittals concerning the TAG AOC, the TA-V Groundwater AOC, and the Burn Site Groundwater AOC.	DOE, March 2016
2016	NMED milestones letter required that an “Updated CCM and CME Report” for the TAG AOC be submitted in December 2016.	NMED, April 2016
2016	A combined and updated TAG CCM/CME Report (dated December 2016) was submitted to the NMED. The transmittal letter was dated November 23, 2016.	SNL/NM, December 2016, DOE, November 2016
2017	NMED issued a disapproval letter for the TAG CCM/CME Report. NMED requested submittal of a revised report before November 30, 2017.	NMED, May 2017
2017	Meeting held between SNL/NM, DOE/NNSA, and NMED personnel to discuss the disapproval letter issues.	None
2017	Requested a time extension for submittal of the Revised TAG CCM/CME Report.	DOE, September 2017
2017	NMED approved the time extension request. Submittal date for the Revised TAG CCM/CME Report was set for February 15, 2018.	NMED, October 2017
2017	Responsibility for well WYO-4 was transferred to the KAFB ERP.	DOE, September 2017
2018	The Revised TAG CCM/CME Report was submitted to the NMED.	SNL/NM, February 2018
2018	Slug testing was conducted at replacement monitoring well TA2-W-28 to determine the hydraulic conductivity of the screened sediments.	Skelly et al., August 2018
2018	Status and locations of KAFB production wells were evaluated. More accurate coordinates were determined using field inspections and ortho-rectified aerial photography.	Copland, July 2018
2019	BaroBall (passive venting device) installed at well TJA-2 on April 26, 2019.	SNL/NM, June 2020
2019	Conducted extensive review of potential nitrate-release sites located in the north-central portion of KAFB and adjacent Albuquerque.	SNL/NM, December 2019
2020	Personnel from DOE/NNSA, SNL/NM, and NMED met virtually to discuss NMED’s ongoing review of the Revised TAG CCM/CME Report (SNL February 2018) on September 23, 2020.	SNL/NM, June 2021

Refer to Notes at end of table.

Table 6A-1 (concluded)
Historical Timeline of the Tijeras Arroyo Groundwater Area of Concern

Year	Event	Reference
2020	Video logging at well TA2-W-26 was conducted on December 18, 2020. BaroBall installed at well TA2-W-26 on December 21, 2020.	SNL/NM, June 2021
2021	Personnel from DOE/NNSA, SNL/NM, and NMED met virtually on May 11, 2021 to discuss NMED's ongoing review of the Revised TAG CCM/CME Report (SNL February 2018).	SNL/NM, June 2022
2021	Collected soil-vapor samples from monitoring wells TAG-SV-04 and TAG-SV-05 on May 14, 2021.	SNL/NM, June 2022
2022	Virtual meeting between SNL/NM, DOE/NNSA, and NMED on June 30, 2022.	SNL/NM, June 2023b
2022	NMED issued Public Notice No. 22-05 on August 5, 2022. The Public Notice was implicit approval of the Revised TAG CCM/CME Report (SNL February 2018).	This Report
2023	NMED issued the Final Remedy Decision for the TAG AOC on January 6, 2023.	NMED, January 2023
2023	TAG Corrective Measures Implementation (CMI) Plan submitted to the NMED on June 22, 2023.	SNL/NM, June 2023a
2023	NMED issued Approval with Modification on the TAG CMI Plan on October 26, 2023.	NMED, October 2023
2023	Video logging conducted on monitoring wells PGS-2, TA1-W-05, and TA1-W-08 in September 2023.	This Report
2023	Video logging conducted on monitoring wells TA1-W-06, TA2-W-01, TA2-W-24, TA2-W-25, TA2-W-26, TA2-W-28, TJA-5 and TJA-7 in October 2023.	This Report
2023	Video logging conducted on monitoring wells TA1-W-02, TA1-W-07, TA2-NW1-325, TA2-NW1-595, TA2-W-19, TA2-W-27, TJA-2 and TJA-3 in November 2023.	This Report
2023	Well-capacity tests conducted on monitoring wells TA1-W-07 and TA2-NW1-325 in November 2023.	This Report
2023	Virtual meeting held between DOE/NNSA, SNL/NM, and NMED personnel on December 13, 2023 to discuss the feasibility of sampling monitoring wells TA1-W-07 and TA2-NW1-325.	This Report
2023	Continued to conduct groundwater monitoring across the TAG AOC.	This Report

Notes:

$\delta^{15}N$ = delta 15 nitrogen
$\delta^{18}O$ = delta 18 oxygen
µg/L = microgram(s) per liter
AOC = Area of Concern
BGW = Balleau Groundwater Inc.
CCM = Current Conceptual Model
CEARP = Comprehensive Environmental Assessment and Response Program
CME = Corrective Measures Evaluation
DOE = U.S. Department of Energy
ER = Environmental Restoration
ERP = Environmental Restoration Program
FEMWATER = Finite Element Model of Water
GRAM = GRAM, Inc.
HPT = High Performing Team
HWB = Hazardous Waste Bureau
IT = IT Corporation
KAFB = Kirtland Air Force Base
Lettis = William Lettis & Associates, Inc.
MCL = maximum contaminant level
NMED = New Mexico Environment Department
NNSA = National Nuclear Security Administration
NOD = Notice of Disapproval
PGS = Parade Ground South
SNL = Sandia National Laboratories
SNL/NM = Sandia National Laboratories, New Mexico
SV = Soil Vapor
SWMU = Solid Waste Management Unit
TA = Technical Area
TA1-W = Technical Area-I well
TA2-NW = Technical Area-II northwest well
TA2-SW = Technical Area-II southwest well
TA2-W = Technical Area-II well
TAG = Tijeras Arroyo Groundwaterl
TCE = trichloroethene
TJA = Tijeras Arroyo Well
USAF = U.S. Air Force Response Program
USGS = U.S. Geological Survey
VW = Vapor Well
WYO = Wyoming Boulevard Well

Attachment 6B
Tijeras Arroyo Groundwater Hydrographs

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Attachment 6B Hydrographs

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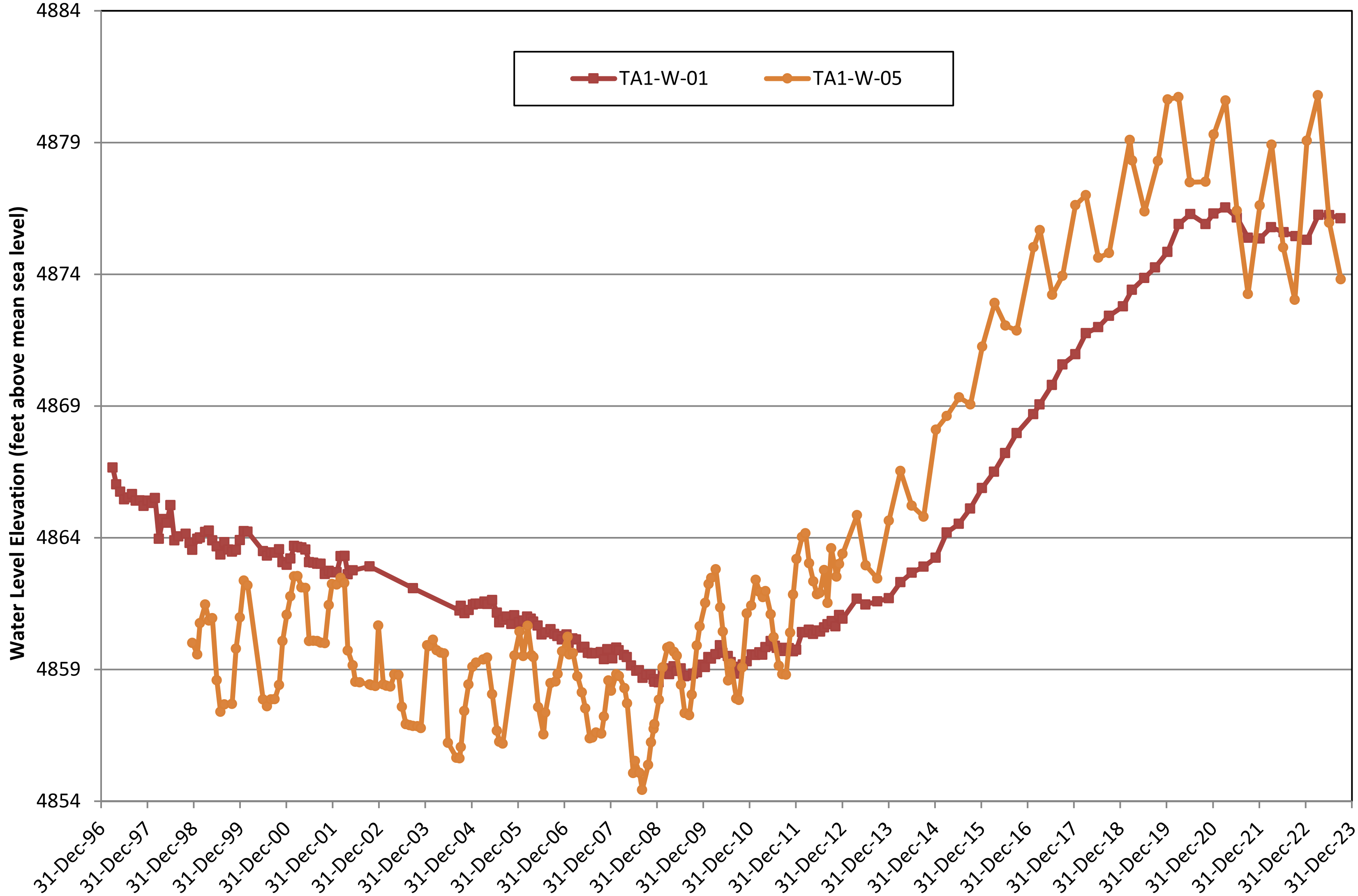

Figure 6B-1
Hydrographs for Monitoring Wells TA1-W-01 and TA1-W-05

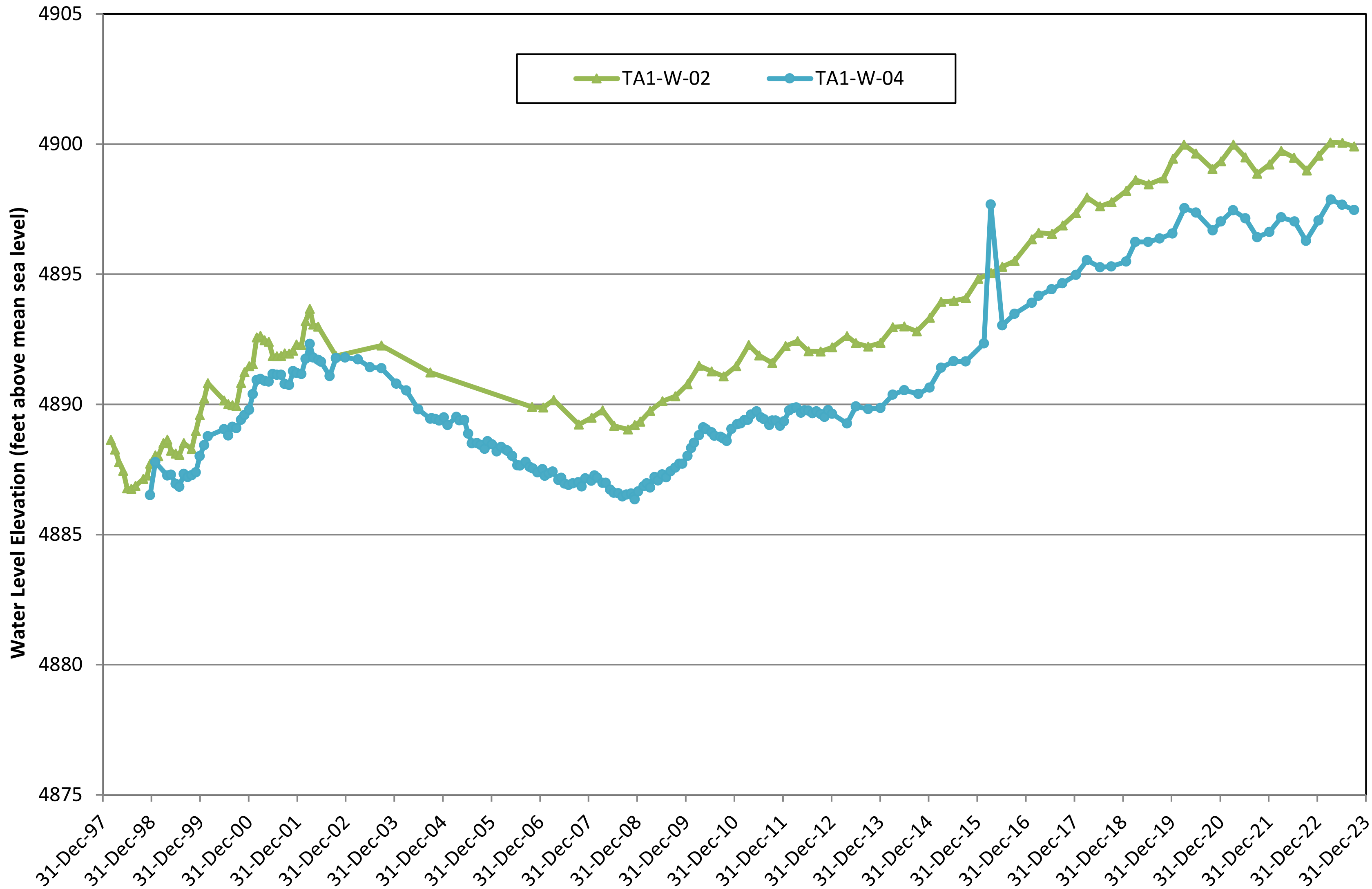

Figure 6B-2
Hydrographs for Monitoring Wells TA1-W-02 and TA1-W-04

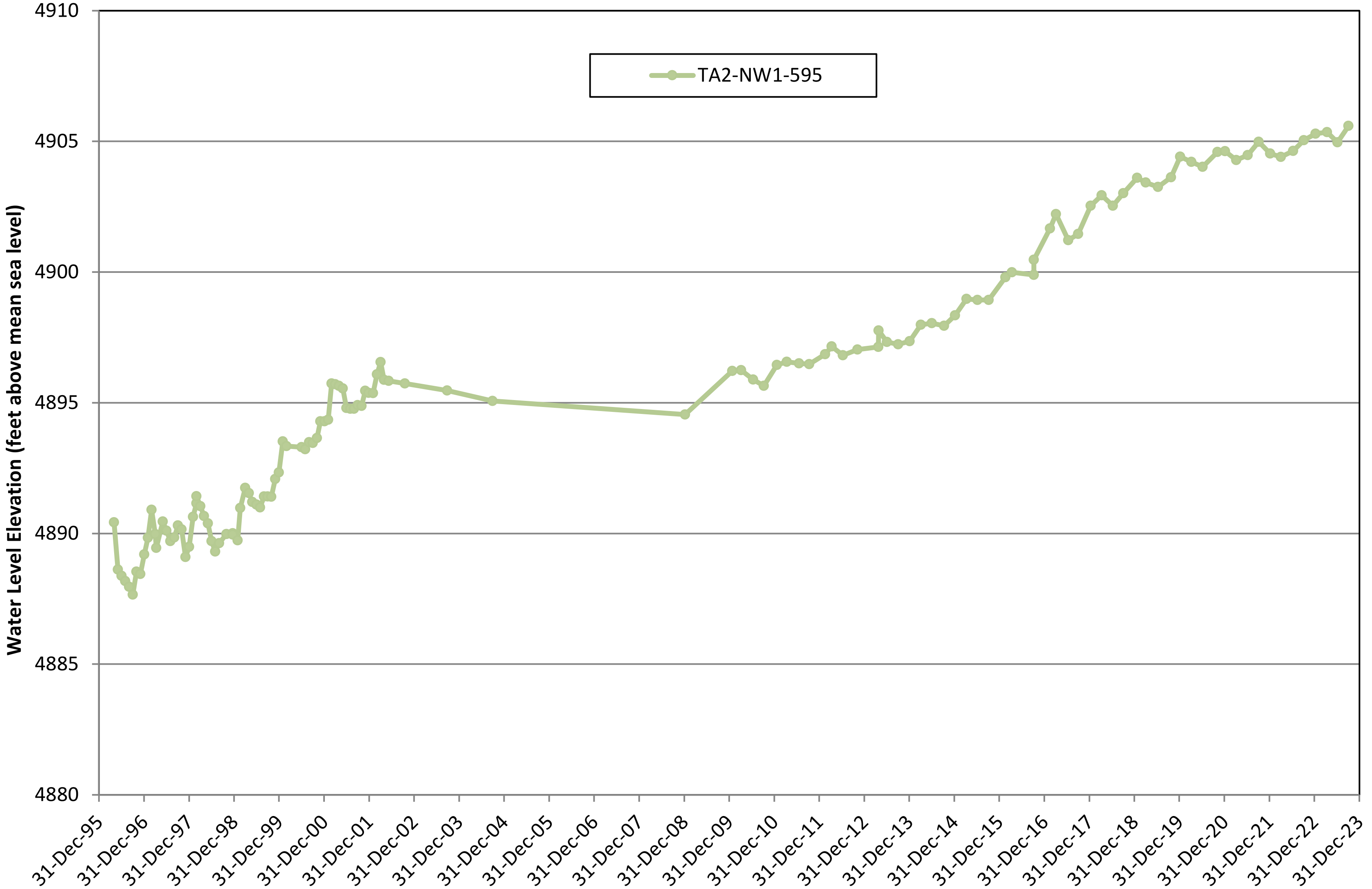

Figure 6B-3
Hydrograph for Monitoring Well TA2-NW1-595

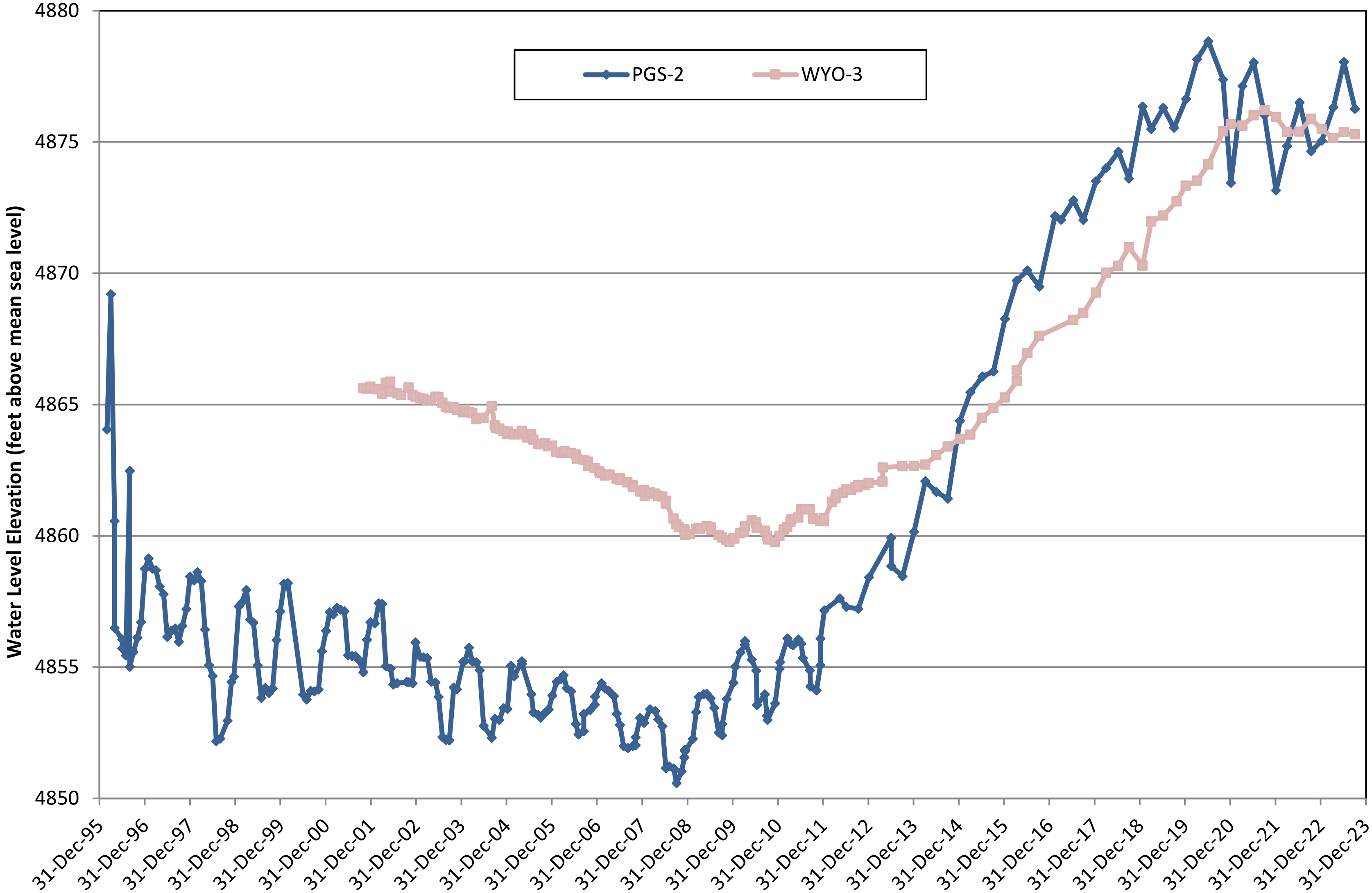

Figure 6B-4
Hydrographs for Monitoring Wells PGS-2 and WYO-3

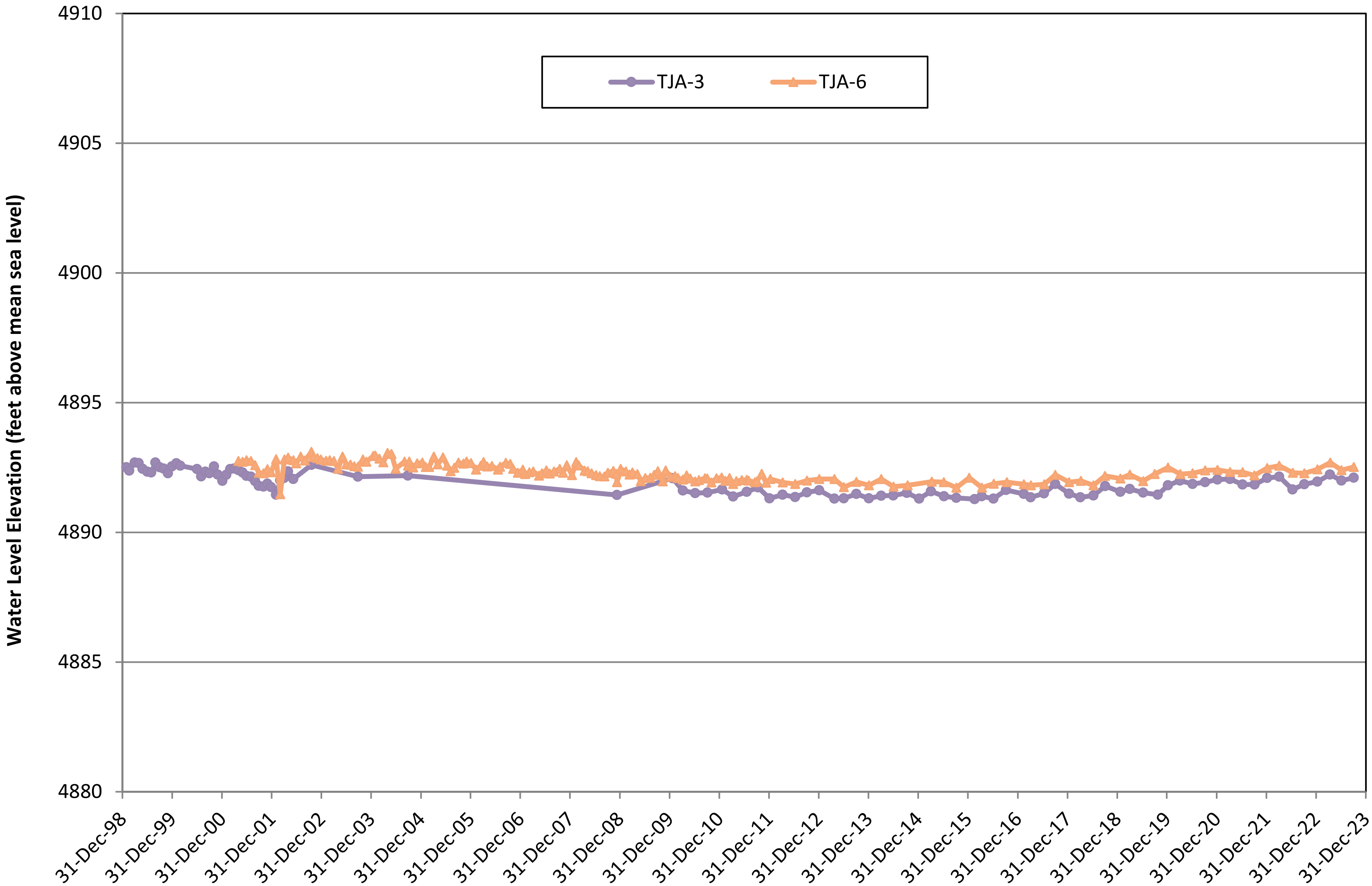

Figure 6B-5
Hydrographs for Monitoring Wells TJA-3 and TJA-6

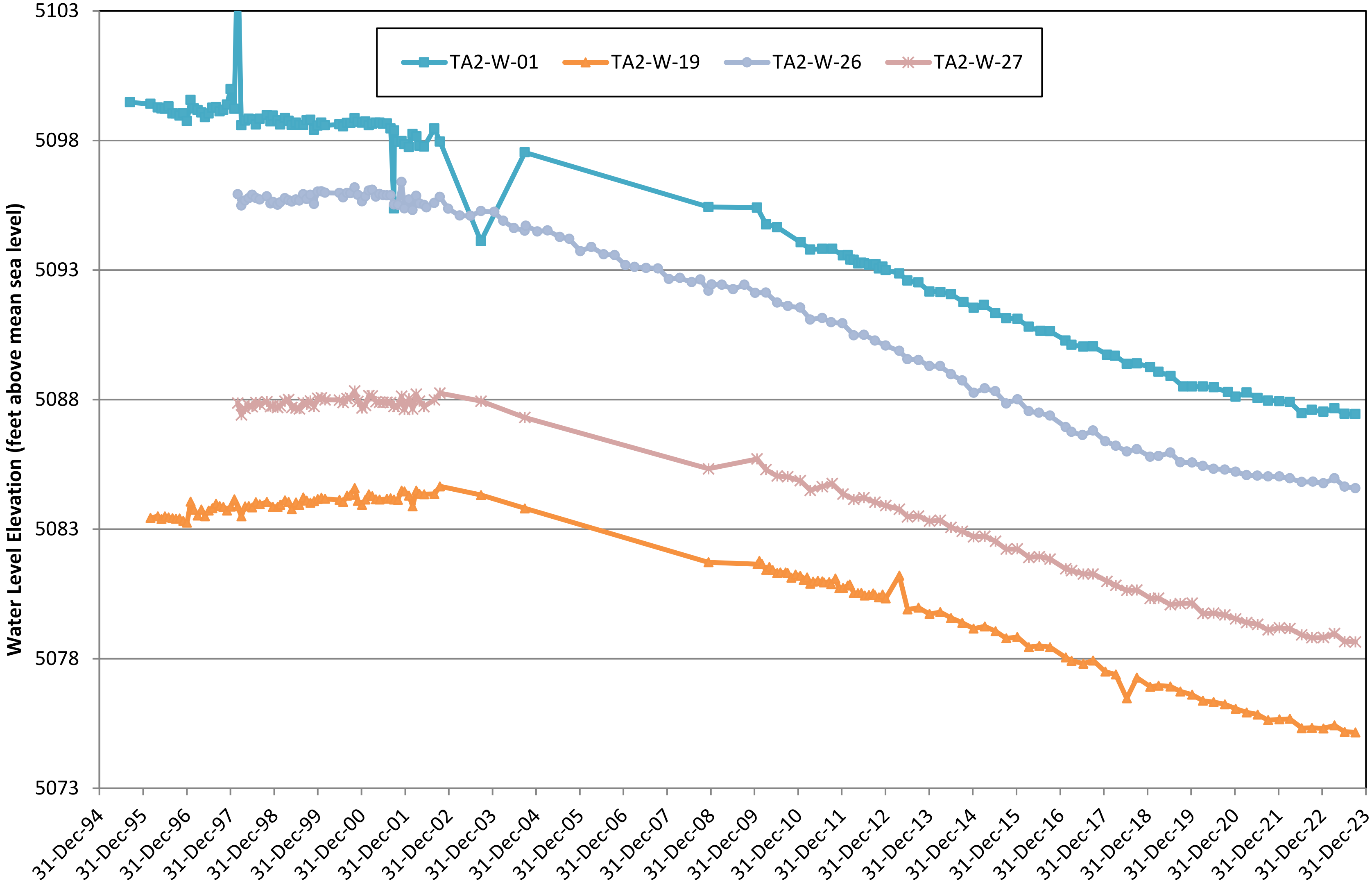

Figure 6B-6
Hydrographs for Monitoring Wells TA2-W-01, TA2-W-19, TA2-W-26, and TA2-W-27

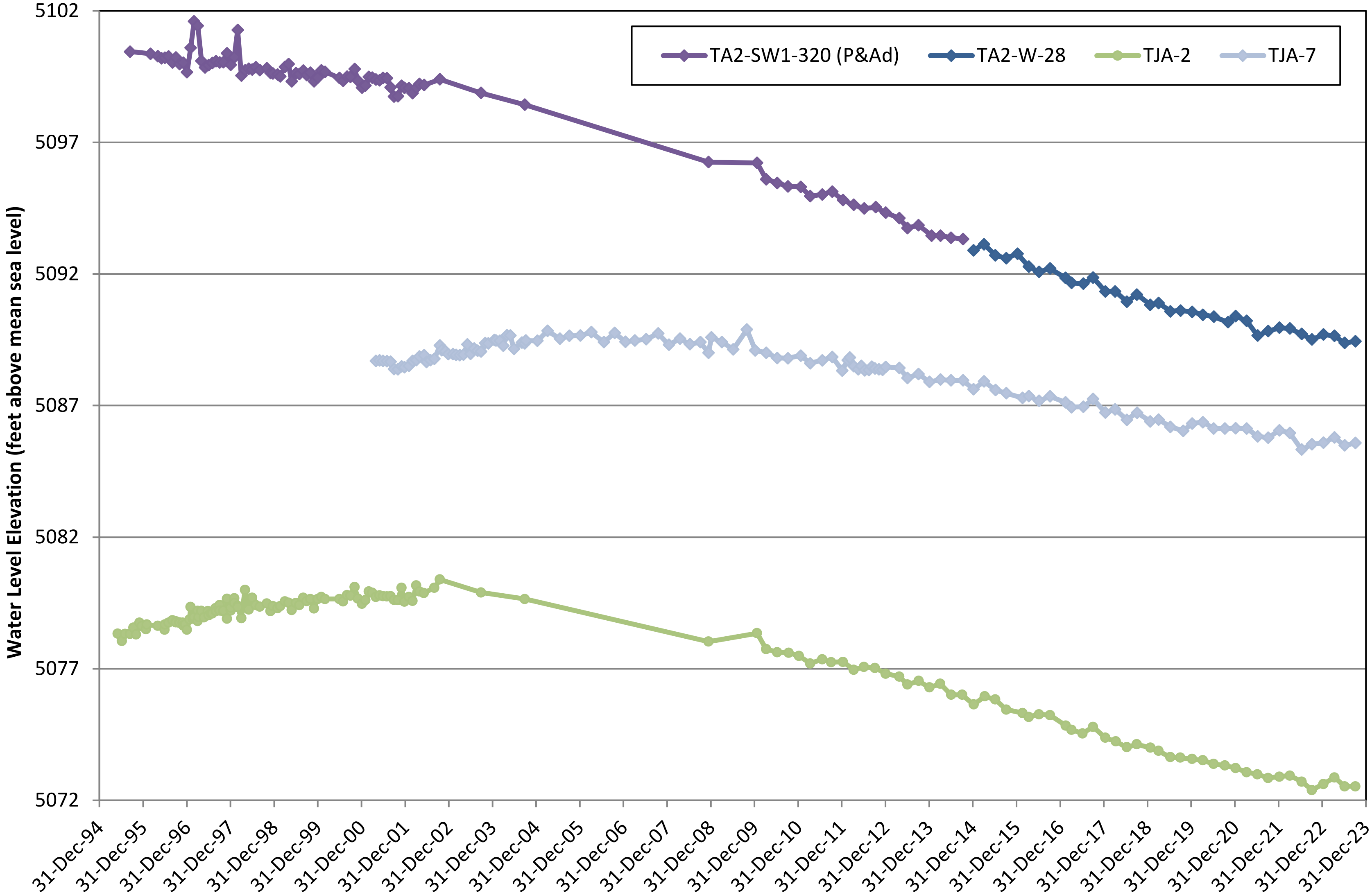

Figure 6B-7
Hydrographs for Monitoring Wells TA2-W-28, TJA-2, and TJA-7

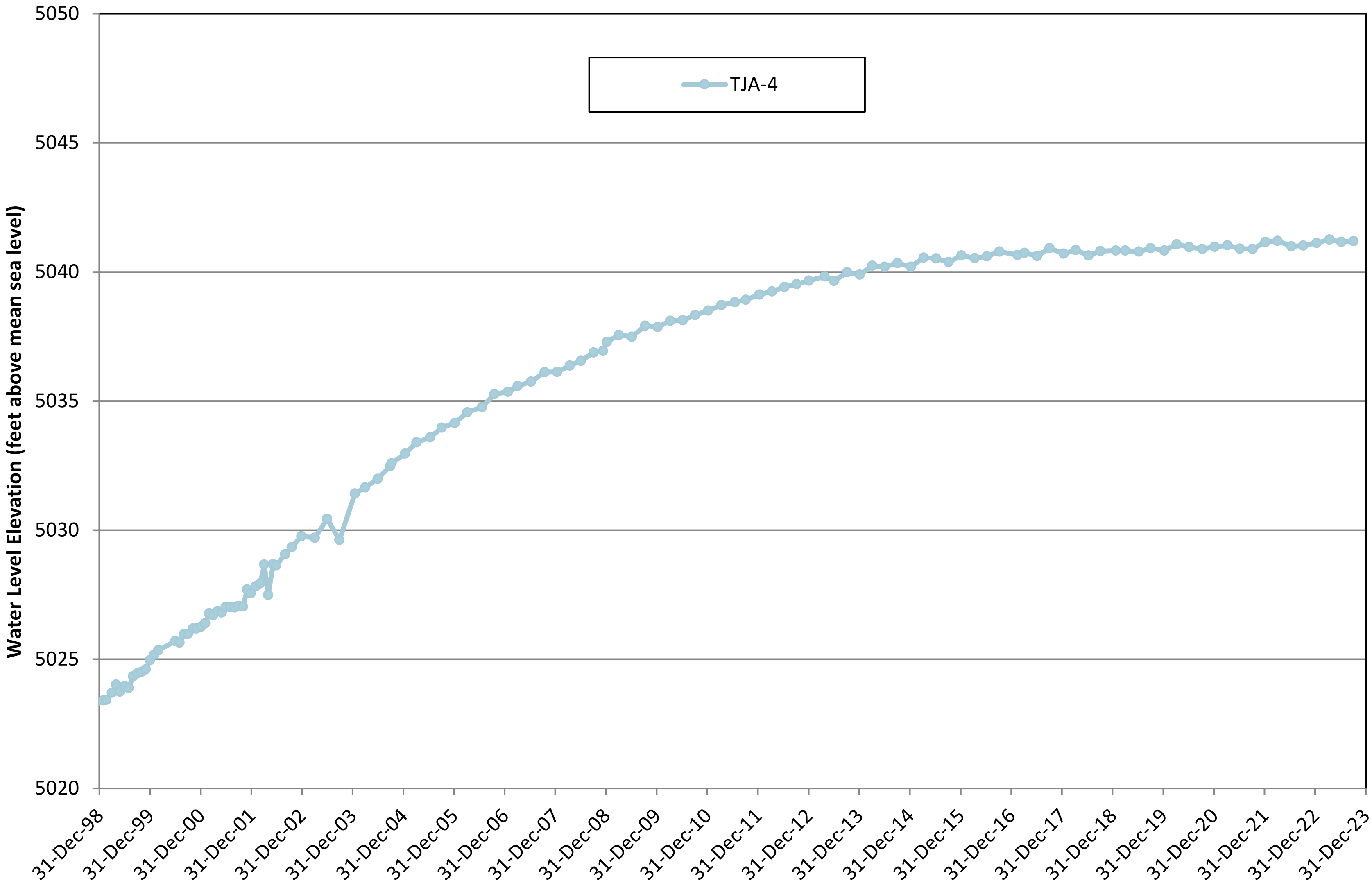

Figure 6B-8
Hydrograph for Monitoring Well TJA-4

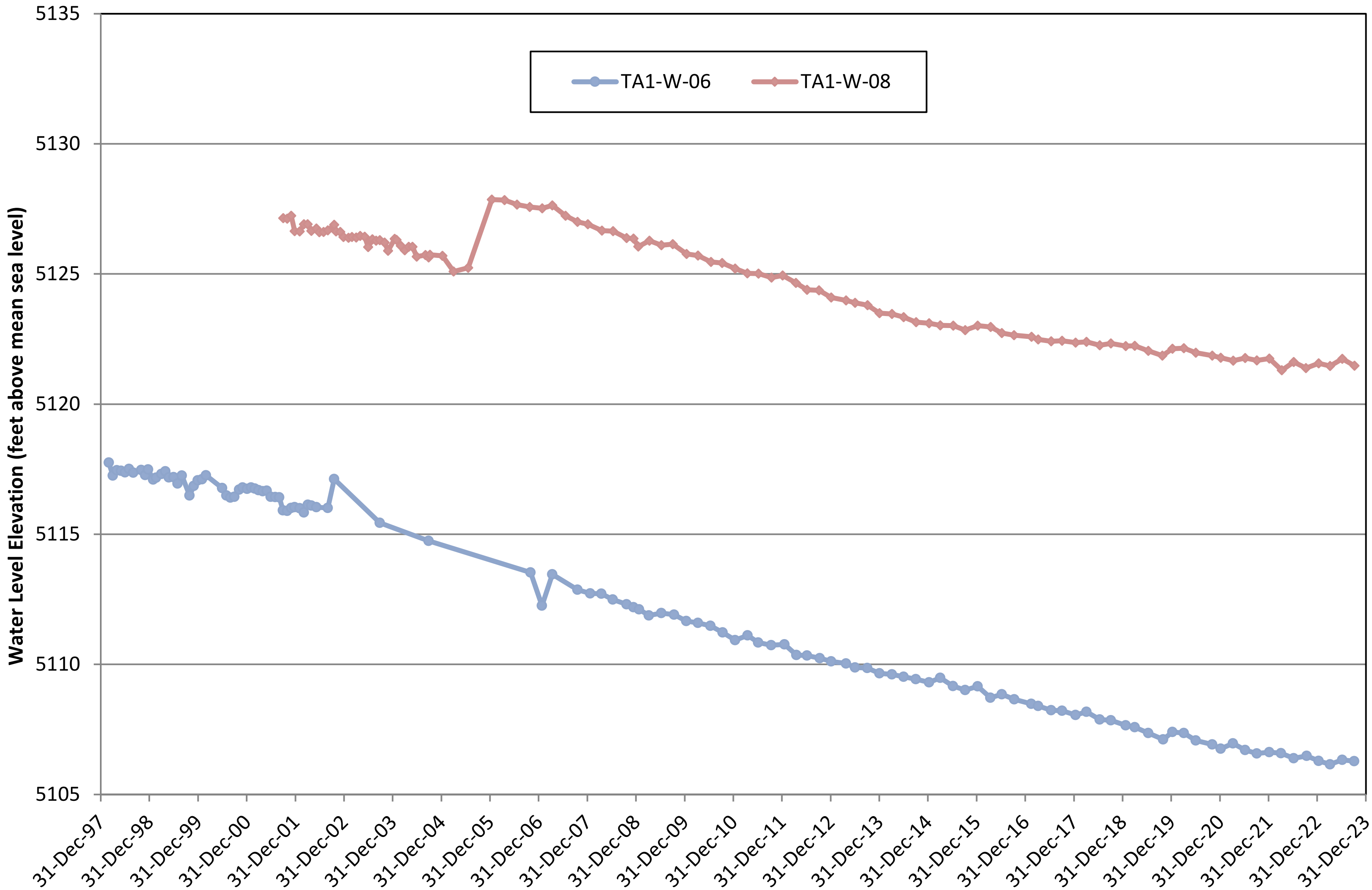

Figure 6B-9
Hydrographs for Monitoring Wells TA1-W-06 and TA1-W-08

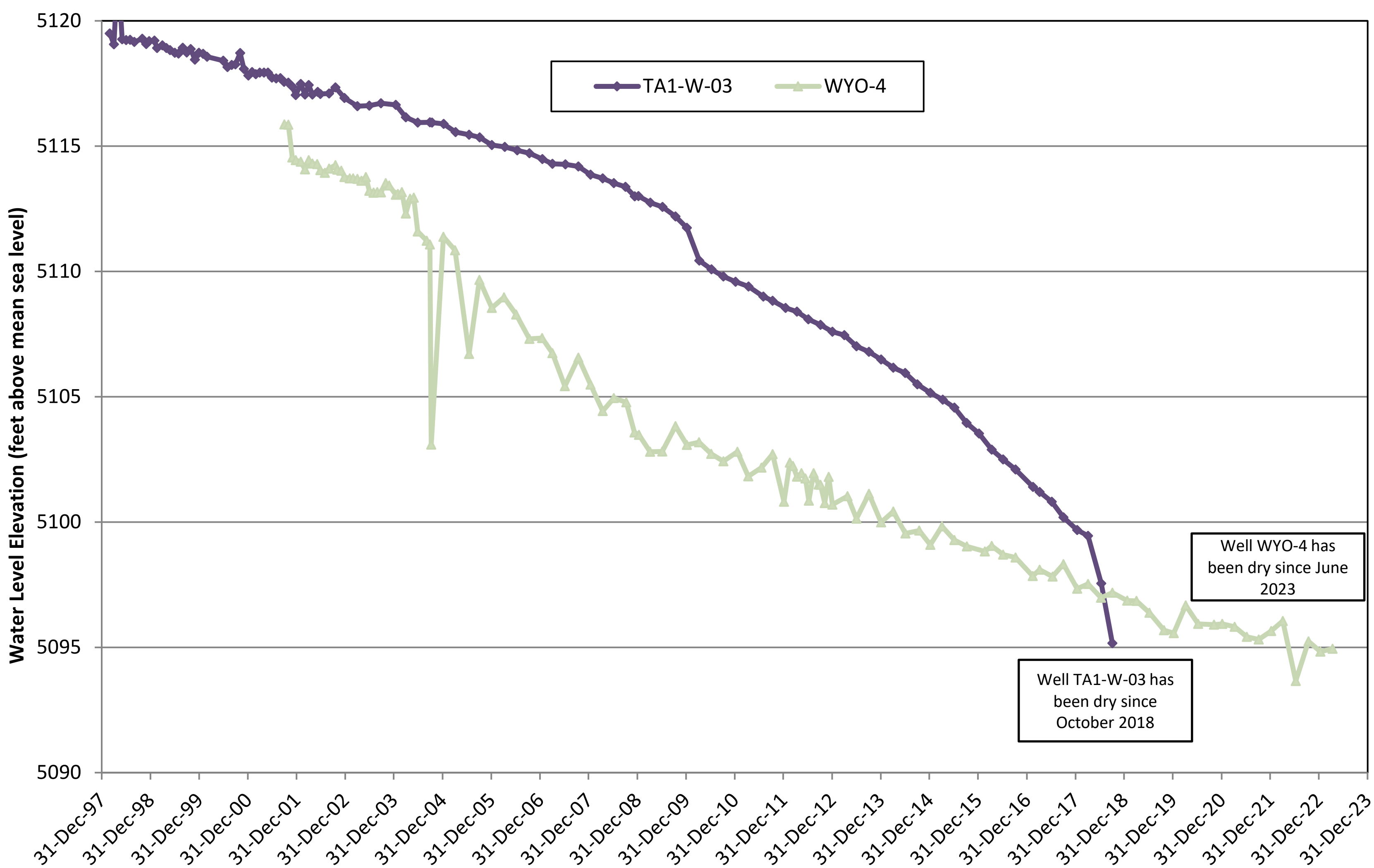

Figure 6B-10
Hydrographs for Monitoring Wells TA1-W-03 and WYO-4

Attachment 6C
Tijeras Arroyo Groundwater Analytical Results Tables

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Attachment 6C Tables

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Table 6C-1
Summary of Nitrate plus Nitrite Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA1-W-06 08-Mar-23	Nitrate plus nitrite	3.65	0.425	1.25	10.0			119689-002	EPA 353.2
TA1-W-06 (Duplicate) 08-Mar-23	Nitrate plus nitrite	3.88	0.425	1.25	10.0			119690-002	EPA 353.2
TA2-W-01 09-Mar-23	Nitrate plus nitrite	9.33	0.425	1.25	10.0			119693-002	EPA 353.2
TA2-W-19 13-Mar-23	Nitrate plus nitrite	**12.7**	0.425	1.25	10.0			119705-002	EPA 353.2
TA2-W-26 20-Mar-23	Nitrate plus nitrite	5.38	0.425	1.25	10.0			119717-002	EPA 353.2
TA2-W-26 (Duplicate) 20-Mar-23	Nitrate plus nitrite	5.35	0.425	1.25	10.0			119718-002	EPA 353.2
TA2-W-27 10-Mar-23	Nitrate plus nitrite	4.45	0.425	1.25	10.0			119697-002	EPA 353.2
TA2-W-27 (Duplicate) 10-Mar-23	Nitrate plus nitrite	4.08	0.425	1.25	10.0			119698-002	EPA 353.2
TA2-W-28 15-Mar-23	Nitrate plus nitrite	**17.9**	1.70	5.00	10.0			119711-002	EPA 353.2
TJA-2 14-Mar-23	Nitrate plus nitrite	**12.0**	0.850	2.50	10.0			119709-002	EPA 353.2
TJA-3 07-Mar-23	Nitrate plus nitrite	2.69	0.170	0.500	10.0			119685-002	EPA 353.2
TJA-4 16-Mar-23	Nitrate plus nitrite	**30.5**	1.70	5.00	10.0			119713-002	EPA 353.2
TJA-6 06-Mar-23	Nitrate plus nitrite	2.73	0.170	0.500	10.0			119683-002	EPA 353.2
TJA-7 21-Mar-23	Nitrate plus nitrite	**21.9**	0.850	2.50	10.0			119721-002	EPA 353.2

Refer to notes on page 6C-47.

Table 6C-1 (continued)
Summary of Nitrate plus Nitrite Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-W-19 01-Jun-23	Nitrate plus nitrite	**12.4**	0.170	0.500	10.0			120438-002	EPA 353.2
TA2-W-26 12-Jun-23	Nitrate plus nitrite	5.63	0.425	1.25	10.0			120456-002	EPA 353.2
TA2-W-26 (Duplicate) 12-Jun-23	Nitrate plus nitrite	5.70	0.425	1.25	10.0			120457-002	EPA 353.2
TA2-W-28 06-Jun-23	Nitrate plus nitrite	**18.9**	0.850	2.50	10.0		J	120444-002	EPA 353.2
TA2-W-28 (Duplicate) 06-Jun-23	Nitrate plus nitrite	**19.5**	0.850	2.50	10.0		J	120445-002	EPA 353.2
TJA-2 05-Jun-23	Nitrate plus nitrite	**12.5**	0.850	2.50	10.0		J	120440-002	EPA 353.2
TJA-3 31-May-23	Nitrate plus nitrite	2.75	0.0850	0.250	10.0			120436-002	EPA 353.2
TJA-4 07-Jun-23	Nitrate plus nitrite	**30.3**	4.25	12.5	10.0		J	120449-002	EPA 353.2
TJA-7 08-Jun-23	Nitrate plus nitrite	**20.8**	1.70	5.00	10.0			120452-002	EPA 353.2
TA1-W-01 05-Sep-23	Nitrate plus nitrite	3.15	0.170	0.500	10.0	N, *	J+	121040-002	EPA 353.2
TA1-W-02 23-Aug-23	Nitrate plus nitrite	1.23	0.0850	0.250	10.0			121016-002	EPA 353.2
TA1-W-02 (Duplicate) 23-Aug-23	Nitrate plus nitrite	1.24	0.0850	0.250	10.0			121017-002	EPA 353.2
TA1-W-04 25-Aug-23	Nitrate plus nitrite	1.94	0.0850	0.250	10.0			121023-002	EPA 353.2
TA1-W-04 (Duplicate) 25-Aug-23	Nitrate plus nitrite	1.93	0.0850	0.250	10.0			121024-002	EPA 353.2
TA1-W-05 24-Aug-23	Nitrate plus nitrite	1.32	0.170	0.500	10.0			121019-002	EPA 353.2
TA1-W-06 12-Sep-23	Nitrate plus nitrite	3.63	0.425	1.25	10.0			121057-002	EPA 353.2
TA1-W-08 13-Sep-23	Nitrate plus nitrite	8.20	1.70	5.00	10.0			121059-002	EPA 353.2

Refer to notes on page 6C-47.

Table 6C-1 (continued)
Summary of Nitrate plus Nitrite Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-NW1-595 07-Sep-23	Nitrate plus nitrite	4.05	0.425	1.25	10.0			121048-002	EPA 353.2
TA2-W-01 11-Sep-23	Nitrate plus nitrite	4.12	0.170	0.500	10.0			121052-002	EPA 353.2
TA2-W-19 19-Sep-23	Nitrate plus nitrite	**12.7**	0.850	2.50	10.0			121061-002	EPA 353.2
TA2-W-24 28-Aug-23	Nitrate plus nitrite	2.34	0.170	0.500	10.0			121031-002	EPA 353.2
TA2-W-25 06-Sep-23	Nitrate plus nitrite	3.75	0.425	1.25	10.0			121044-002	EPA 353.2
TA2-W-25 (Duplicate) 06-Sep-23	Nitrate plus nitrite	3.78	0.425	1.25	10.0			121045-002	EPA 353.2
TA2-W-26 26-Sep-23	Nitrate plus nitrite	5.47	0.170	0.500	10.0		J	121079-002	EPA 353.2
TA2-W-26 (Duplicate) 26-Sep-23	Nitrate plus nitrite	5.41	0.170	0.500	10.0		J	121080-002	EPA 353.2
TA2-W-27 18-Sep-23	Nitrate plus nitrite	4.28	0.170	0.500	10.0			121054-002	EPA 353.2
TA2-W-28 21-Sep-23	Nitrate plus nitrite	**18.7**	1.70	5.00	10.0			121070-002	EPA 353.2
TJA-2 20-Sep-23	Nitrate plus nitrite	**12.3**	0.170	0.500	10.0			121063-002	EPA 353.2
TJA-3 08-Sep-23	Nitrate plus nitrite	2.66	0.0850	0.250	10.0			121050-002	EPA 353.2
TJA-4 22-Sep-23	Nitrate plus nitrite	**30.3**	4.25	12.5	10.0			121073-002	EPA 353.2
TJA-5 21-Sep-23	Nitrate plus nitrite	**14.5**	1.70	5.00	10.0			121067-002	EPA 353.2
TJA-5 (Duplicate) 21-Sep-23	Nitrate plus nitrite	**13.4**	1.70	5.00	10.0			121068-002	EPA 353.2
TJA-6 29-Aug-23	Nitrate plus nitrite	2.79	0.170	0.500	10.0			121033-002	EPA 353.2
TJA-7 22-Sep-23	Nitrate plus nitrite	**20.7**	4.25	12.5	10.0			121075-002	EPA 353.2
WYO-3 30-Aug-23	Nitrate plus nitrite	2.62	0.170	0.500	10.0			121036-002	EPA 353.2

Refer to notes on page 6C-47.

Table 6C-1 (concluded)
Summary of Nitrate plus Nitrite Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-W-19 16-Nov-23	Nitrate plus nitrite	**12.2**	0.850	2.50	10.0			121397-002	EPA 353.2
TA2-W-19 (Duplicate) 16-Nov-23	Nitrate plus nitrite	**12.4**	0.850	2.50	10.0			121398-002	EPA 353.2
TA2-W-26 12-Dec-23	Nitrate plus nitrite	5.18	0.170	0.500	10.0			121414-002	EPA 353.2
TA2-W-26 (Duplicate) 12-Dec-23	Nitrate plus nitrite	5.14	0.170	0.500	10.0			121415-002	EPA 353.2
TA2-W-28 27-Nov-23	Nitrate plus nitrite	**18.2**	0.850	2.50	10.0			121404-002	EPA 353.2
TJA-2 17-Nov-23	Nitrate plus nitrite	**12.5**	0.850	2.50	10.0			121401-002	EPA 353.2
TJA-3 15-Nov-23	Nitrate plus nitrite	2.71	0.170	0.500	10.0			121392-002	EPA 353.2
TJA-3 (Duplicate) 15-Nov-23	Nitrate plus nitrite	2.69	0.170	0.500	10.0			121393-002	EPA 353.2
TJA-4 28-Nov-23	Nitrate plus nitrite	**31.3**	0.850	2.50	10.0			121410-002	EPA 353.2
TJA-7 29-Nov-23	Nitrate plus nitrite	**21.5**	0.850	2.50	10.0		J	121408-002	EPA 353.2

Refer to notes on page 6C-47.

Table 6C-2
Summary of Detected Volatile Organic Compounds, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA1-W-06	1,1-Dichloroethene	1.08	0.333	1.00	7.00			119689-001	SW846-8260D
08-Mar-23	Chloroform	0.360	0.333	1.00	80.0	J	J	119689-001	SW846-8260D
	Trichloroethene	0.480	0.333	1.00	5.00	J		119689-001	SW846-8260D
TA1-W-06 (Duplicate)	1,1-Dichloroethene	1.37	0.333	1.00	7.00			119690-001	SW846-8260D
08-Mar-23	Chloroform	0.380	0.333	1.00	80.0	J	J	119690-001	SW846-8260D
	Trichloroethene	0.500	0.333	1.00	5.00	J		119690-001	SW846-8260D
TA2-W-01 09-Mar-23	Trichloroethene	1.10	0.333	1.00	5.00			119693-001	SW846-8260D
TA2-W-19 13-Mar-23	Trichloroethene	1.90	0.333	1.00	5.00			119705-001	SW846-8260D
TA2-W-26	1,1-Dichloroethane	7.75	0.333	1.00	NE			119717-001	SW846-8260D
20-Mar-23	1,1-Dichloroethene	3.45	0.333	1.00	7.00			119717-001	SW846-8260D
	Acetone	1.98	1.74	5.00	NE	J	5.0U	119717-001	SW846-8260D
	Chloroform	0.830	0.333	1.00	80.0	J	J	119717-001	SW846-8260D
	Methylene chloride	1.35	0.500	5.00	5.00	B, J	5.0U	119717-001	SW846-8260D
	Tetrachloroethene	**11.9**	0.333	1.00	5.00			119717-001	SW846-8260D
	Trichloroethene	**22.4**	0.333	1.00	5.00			119717-001	SW846-8260D
	cis-1,2-Dichloroethene	5.64	0.333	1.00	70.0			119717-001	SW846-8260D
TA2-W-26 (Duplicate)	1,1-Dichloroethane	7.27	0.333	1.00	NE			119718-001	SW846-8260D
20-Mar-23	1,1-Dichloroethene	3.24	0.333	1.00	7.00			119718-001	SW846-8260D
	Acetone	1.90	1.74	5.00	NE	J	5.0U	119718-001	SW846-8260D
	Chloroform	0.770	0.333	1.00	80.0	J	J	119718-001	SW846-8260D
	Methylene chloride	1.43	0.500	5.00	5.00	B, J	5.0U	119718-001	SW846-8260D
	Tetrachloroethene	**10.6**	0.333	1.00	5.00			119718-001	SW846-8260D
	Trichloroethene	**20.7**	0.333	1.00	5.00			119718-001	SW846-8260D
	cis-1,2-Dichloroethene	5.18	0.333	1.00	70.0			119718-001	SW846-8260D
TA2-W-27	Tetrachloroethene	1.43	0.333	1.00	5.00			119697-001	SW846-8260D
10-Mar-23	Trichloroethene	1.00	0.333	1.00	5.00			119697-001	SW846-8260D
TA2-W-27 (Duplicate)	Tetrachloroethene	1.48	0.333	1.00	5.00			119698-001	SW846-8260D
10-Mar-23	Trichloroethene	1.03	0.333	1.00	5.00			119698-001	SW846-8260D
TA2-W-28 15-Mar-23	Methylene chloride	2.25	0.500	5.00	5.00	B, J	5.0U	119711-001	SW846-8260D
TJA-2	1,1-Dichloroethane	0.460	0.333	1.00	NE	J		119709-001	SW846-8260D
14-Mar-23	Methylene chloride	1.08	0.500	5.00	5.00	B, J	5.0U	119709-001	SW846-8260D
	Trichloroethene	3.94	0.333	1.00	5.00			119709-001	SW846-8260D
	cis-1,2-Dichloroethene	0.360	0.333	1.00	70.0	J		119709-001	SW846-8260D

Refer to notes on page 6C-47.

Table 6C-2 (continued)
Summary of Detected Volatile Organic Compounds, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TJA-3 07-Mar-23	Trichloroethene	0.410	0.333	1.00	5.00	J		119685-001	SW846-8260D
TJA-4 16-Mar-23	Methylene chloride	0.710	0.500	5.00	5.00	B, J	5.0U	119713-001	SW846-8260D
TJA-7 21-Mar-23	Acetone	2.07	1.74	5.00	NE	J	5.0U	119721-001	SW846-8260D
	Methylene chloride	1.94	0.500	5.00	5.00	B, J	5.0U	119721-001	SW846-8260D
	Tetrachloroethene	0.540	0.333	1.00	5.00	J		119721-001	SW846-8260D
	Trichloroethene	4.78	0.333	1.00	5.00			119721-001	SW846-8260D
TA2-W-19 01-Jun-23	Trichloroethene	1.90	0.333	1.00	5.00			120438-001	SW846-8260D
TA2-W-26 12-Jun-23	1,1-Dichloroethane	7.71	0.333	1.00	NE			120456-001	SW846-8260D
	1,1-Dichloroethene	3.22	0.333	1.00	7.00			120456-001	SW846-8260D
	Chloroform	0.770	0.333	1.00	80.0	J	J	120456-001	SW846-8260D
	Methylene chloride	0.800	0.500	5.00	5.00	J	5.0U	120456-001	SW846-8260D
	Tetrachloroethene	**10.4**	0.333	1.00	5.00			120456-001	SW846-8260D
	Trichloroethene	**21.5**	0.333	1.00	5.00			120456-001	SW846-8260D
	cis-1,2-Dichloroethene	6.71	0.333	1.00	70.0			120456-001	SW846-8260D
TA2-W-26 (Duplicate) 12-Jun-23	1,1-Dichloroethane	7.05	0.333	1.00	NE			120457-001	SW846-8260D
	1,1-Dichloroethene	2.97	0.333	1.00	7.00			120457-001	SW846-8260D
	Chloroform	0.790	0.333	1.00	80.0	J	J	120457-001	SW846-8260D
	Methylene chloride	0.710	0.500	5.00	5.00	J	5.0U	120457-001	SW846-8260D
	Tetrachloroethene	**10.7**	0.333	1.00	5.00			120457-001	SW846-8260D
	Trichloroethene	**21.4**	0.333	1.00	5.00			120457-001	SW846-8260D
	cis-1,2-Dichloroethene	6.59	0.333	1.00	70.0			120457-001	SW846-8260D
TJA-2 05-Jun-23	Trichloroethene	4.06	0.333	1.00	5.00			120440-001	SW846-8260D
	cis-1,2-Dichloroethene	0.350	0.333	1.00	70.0	J		120440-001	SW846-8260D
TJA-3 31-May-23	Trichloroethene	0.520	0.333	1.00	5.00	J		120436-001	SW846-8260D
TJA-7 08-Jun-23	Methylene chloride	0.910	0.500	5.00	5.00	J	5.0U	120452-001	SW846-8260D
	Trichloroethene	**5.52**	0.333	1.00	5.00			120452-001	SW846-8260D

Refer **to notes on page 6C-47.**

Table 6C-2 (continued)
Summary of Detected Volatile Organic Compounds, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA1-W-01 05-Sep-23	Methylene chloride	1.15	0.500	5.00	5.00	J	5.0UJ	121040-001	SW846-8260D
TA1-W-02 23-Aug-23	Methylene chloride	0.530	0.500	5.00	5.00	B, J	5.0UJ	121016-001	SW846-8260D
TA1-W-02 (Duplicate) 23-Aug-23	Methylene chloride	0.550	0.500	5.00	5.00	B, J	5.0UJ	121017-001	SW846-8260D
TA1-W-05 24-Aug-23	Methylene chloride	0.540	0.500	5.00	5.00	B, J	5.0UJ	121019-001	SW846-8260D
TA1-W-06 12-Sep-23	1,1-Dichloroethene	1.24	0.333	1.00	7.00			121057-001	SW846-8260D
	Chloroform	0.480	0.333	1.00	80.0	J	1.0U	121057-001	SW846-8260D
	Methylene chloride	1.63	0.500	5.00	5.00	B, J	5.0U	121057-001	SW846-8260D
	Trichloroethene	0.520	0.333	1.00	5.00	J		121057-001	SW846-8260D
TA1-W-08 13-Sep-23	Methylene chloride	1.56	0.500	5.00	5.00	B, J	5.0U	121059-001	SW846-8260D
TA2-NW1-595 07-Sep-23	Methylene chloride	1.77	0.500	5.00	5.00	J	5.0U	121048-001	SW846-8260D
TA2-W-01 11-Sep-23	Methylene chloride	1.61	0.500	5.00	5.00	B, J	5.0U	121052-001	SW846-8260D
	Trichloroethene	1.08	0.333	1.00	5.00			121052-001	SW846-8260D
TA2-W-19 19-Sep-23	Trichloroethene	1.88	0.333	1.00	5.00			121061-001	SW846-8260D
TA2-W-25 06-Sep-23	2-Hexanone	2.58	1.67	5.00	NE	B, J	5.0U	121044-001	SW846-8260D
TA2-W-25 (Duplicate) 06-Sep-23	2-Hexanone	1.72	1.67	5.00	NE	B, J	5.0U	121045-001	SW846-8260D
	Methylene chloride	2.15	0.500	5.00	5.00	J	5.0U	121045-001	SW846-8260D
TA2-W-26 26-Sep-23	1,1-Dichloroethane	5.15	0.333	1.00	NE			121079-001	SW846-8260D
	1,1-Dichloroethene	1.46	0.333	1.00	7.00			121079-001	SW846-8260D
	Chloroform	0.780	0.333	1.00	80.0	J	J	121079-001	SW846-8260D
	Methylene chloride	0.920	0.500	5.00	5.00	B, J	5.0U	121079-001	SW846-8260D
	Tetrachloroethene	**5.48**	0.333	1.00	5.00			121079-001	SW846-8260D
	Trichloroethene	**13.9**	0.333	1.00	5.00			121079-001	SW846-8260D
	cis-1,2-Dichloroethene	3.91	0.333	1.00	70.0			121079-001	SW846-8260D

Refer **to notes on page 6C-47.**

Table 6C-2 (continued)
Summary of Detected Volatile Organic Compounds, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-W-26 (Duplicate)	1,1-Dichloroethane	5.22	0.333	1.00	NE			121080-001	SW846-8260D
26-Sep-23	1,1-Dichloroethene	1.74	0.333	1.00	7.00			121080-001	SW846-8260D
	Chloroform	0.660	0.333	1.00	80.0	J	J	121080-001	SW846-8260D
	Methylene chloride	0.870	0.500	5.00	5.00	B, J	5.0U	121080-001	SW846-8260D
	Tetrachloroethene	**5.40**	0.333	1.00	5.00			121080-001	SW846-8260D
	Trichloroethene	**13.9**	0.333	1.00	5.00			121080-001	SW846-8260D
	cis-1,2-Dichloroethene	4.11	0.333	1.00	70.0			121080-001	SW846-8260D
TA2-W-27	Tetrachloroethene	1.33	0.333	1.00	5.00			121054-001	SW846-8260D
18-Sep-23	Trichloroethene	0.900	0.333	1.00	5.00	J		121054-001	SW846-8260D
TA2-W-28 21-Sep-23	Toluene	0.400	0.333	1.00	1000	J		121070-001	SW846-8260D
TJA-2	Trichloroethene	3.89	0.333	1.00	5.00			121063-001	SW846-8260D
20-Sep-23	cis-1,2-Dichloroethene	0.360	0.333	1.00	70.0	J		121063-001	SW846-8260D
TJA-3	Methylene chloride	1.61	0.500	5.00	5.00	B, J	5.0U	121050-001	SW846-8260D
08-Sep-23	Trichloroethene	0.600	0.333	1.00	5.00	J		121050-001	SW846-8260D
TJA-4 22-Sep-23	Methylene chloride	0.730	0.500	5.00	5.00	B, J	5.0U	121073-001	SW846-8260D
TJA-7	Methylene chloride	0.980	0.500	5.00	5.00	B, J	5.0U	121075-001	SW846-8260D
22-Sep-23	Trichloroethene	4.13	0.333	1.00	5.00			121075-001	SW846-8260D
TA2-W-19	Methylene chloride	0.520	0.500	5.00	5.00	J	5.0U	121397-001	SW846-8260D
16-Nov-23	Trichloroethene	2.23	0.333	1.00	5.00			121397-001	SW846-8260D
TA2-W-19 (Duplicate) 16-Nov-23	Trichloroethene	2.31	0.333	1.00	5.00			121398-001	SW846-8260D
TA2-W-26	1,1-Dichloroethane	6.18	0.333	1.00	NE			121414-001	SW846-8260D
12-Dec-23	1,1-Dichloroethene	2.67	0.333	1.00	7.00			121414-001	SW846-8260D
	Chloroform	0.630	0.333	1.00	80.0	J	J	121414-001	SW846-8260D
	Tetrachloroethene	**7.78**	0.333	1.00	5.00			121414-001	SW846-8260D
	Trichloroethene	**16.8**	0.333	1.00	5.00			121414-001	SW846-8260D
	cis-1,2-Dichloroethene	6.05	0.333	1.00	70.0			121414-001	SW846-8260D
TA2-W-26 (Duplicate)	1,1-Dichloroethane	5.98	0.333	1.00	NE			121415-001	SW846-8260D
12-Dec-23	1,1-Dichloroethene	2.53	0.333	1.00	7.00			121415-001	SW846-8260D
	Chloroform	0.690	0.333	1.00	80.0	J	J	121415-001	SW846-8260D
	Tetrachloroethene	**7.42**	0.333	1.00	5.00			121415-001	SW846-8260D
	Trichloroethene	**16.5**	0.333	1.00	5.00			121415-001	SW846-8260D
	cis-1,2-Dichloroethene	6.08	0.333	1.00	70.0			121415-001	SW846-8260D

Refer to notes on page 6C-47.

Table 6C-2 (concluded)
Summary of Detected Volatile Organic Compounds, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TJA-2 17-Nov-23	1,1-Dichloroethane	0.380	0.333	1.00	5.00	J		121401-001	SW846-8260D
	Methylene chloride	0.520	0.500	5.00	5.00	J	5.0U	121401-001	SW846-8260D
	Trichloroethene	4.58	0.333	1.00	5.00			121401-001	SW846-8260D
	cis-1,2-Dichloroethene	0.370	0.333	1.00	70.0	J		121401-001	SW846-8260D
TJA-3 15-Nov-23	Trichloroethene	0.520	0.333	1.00	5.00	J		121392-001	SW846-8260D
TJA-3 (Duplicate) 15-Nov-23	Trichloroethene	0.610	0.333	1.00	5.00	J		121393-001	SW846-8260D
TJA-7 09-Nov-23	Trichloroethene	**5.43**	0.333	1.00	5.00			121408-001	SW846-8260D

Refer to notes on page 6C-47.

Table 6C-3
Method Detection Limits for Volatile Organic Compounds (EPA Method 8260D),
Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Analyte	MDL[b] (µg/L)	Analyte	MDL[b] (µg/L)
1,1,1-Trichloroethane	0.333	Chlorobenzene	0.333
1,1,2,2-Tetrachloroethane	0.333	Chloroethane	0.333
1,1,2-Trichloroethane	0.333	Chloroform	0.333
1,1-Dichloroethane	0.333	Chloromethane	0.333
1,1-Dichloroethene	0.333	Cyclohexane	0.333
1,2,3-Trichlorobenzene	0.333	Dibromochloromethane	0.333
1,2,4-Trichlorobenzene	0.333	Dichlorodifluoromethane	0.355
1,2-Dibromo-3-chloropropane	0.333	Ethylbenzene	0.333
1,2-Dibromoethane	0.333	Isopropylbenzene	0.333
1,2-Dichlorobenzene	0.333	Methyl acetate	1.67
1,2-Dichloroethane	0.333	Methylcyclohexane	0.333
1,2-Dichloropropane	0.333	Methylene chloride	0.500
1,3-Dichlorobenzene	0.333	Styrene	0.333
1,4-Dichlorobenzene	0.333	Tert-butyl methyl ether	0.333
2,2-trifluoroethane, 1,1,2-Trichloro-1	2.98	Tetrachloroethene	0.333
2-Butanone	1.67	Toluene	0.333
2-Hexanone	1.67	Trichloroethene	0.333
4-methyl-, 2-Pentanone	1.67	Trichlorofluoromethane	0.333
Acetone	1.74	Vinyl chloride	0.333
Benzene	0.333	Xylene	1.00
Bromochloromethane	0.333	cis-1,2-Dichloroethene	0.333
Bromodichloromethane	0.333	cis-1,3-Dichloropropene	0.333
Bromoform	0.333	m-, p-Xylene	0.500
Bromomethane	0.337	o-Xylene	0.333
Carbon disulfide	1.67	trans-1,2-Dichloroethene	0.333
Carbon tetrachloride	0.333	trans-1,3-Dichloropropene	0.333

Refer to notes on page 6C-47.

Table 6C-4
Summary of Anions and Alkalinity Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA1-W-01	Bromide	0.196	0.0670	0.200	NE	J		121040-003	SW846-9056A
05-Sep-23	Chloride	13.3	0.670	2.00	NE			121040-003	SW846-9056A
	Fluoride	0.545	0.0330	0.100	4.0			121040-003	SW846-9056A
	Sulfate	69.1	1.33	4.00	NE			121040-003	SW846-9056A
	Bicarbonate Alkalinity	174	0.725	2.00	NE			121040-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		121040-004	SM 2320B
TA1-W-02	Bromide	0.226	0.0670	0.200	NE			121016-003	SW846-9056A
23-Aug-23	Chloride	15.7	0.670	2.00	NE			121016-003	SW846-9056A
	Fluoride	0.426	0.0330	0.100	4.0			121016-003	SW846-9056A
	Sulfate	77.3	1.33	4.00	NE			121016-003	SW846-9056A
	Bicarbonate Alkalinity	173	0.725	2.00	NE			121016-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		121016-004	SM 2320B
TA1-W-04	Bromide	0.175	0.0670	0.200	NE	J		121023-003	SW846-9056A
25-Aug-23	Chloride	13.4	0.670	2.00	NE			121023-003	SW846-9056A
	Fluoride	0.424	0.0330	0.100	4.0			121023-003	SW846-9056A
	Sulfate	61.4	1.33	4.00	NE			121023-003	SW846-9056A
	Bicarbonate Alkalinity	176	0.725	2.00	NE			121023-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		121023-004	SM 2320B
TA1-W-05	Bromide	0.144	0.0670	0.200	NE	J		121019-003	SW846-9056A
24-Aug-23	Chloride	10.8	0.670	2.00	NE			121019-003	SW846-9056A
	Fluoride	0.305	0.0330	0.100	4.0			121019-003	SW846-9056A
	Sulfate	94.9	1.33	4.00	NE			121019-003	SW846-9056A
	Bicarbonate Alkalinity	212	0.725	2.00	NE			121019-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		121019-004	SM 2320B
TA1-W-06	Bromide	1.38	0.0670	0.200	NE			121057-003	SW846-9056A
12-Sep-23	Chloride	105	1.34	4.00	NE			121057-003	SW846-9056A
	Fluoride	0.211	0.0330	0.100	4.0			121057-003	SW846-9056A
	Sulfate	200	2.66	8.00	NE			121057-003	SW846-9056A
	Bicarbonate Alkalinity	88.7	0.725	2.00	NE			121057-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		121057-004	SM 2320B
TA1-W-08	Bromide	2.93	0.0670	0.200	NE			121059-003	SW846-9056A
13-Sep-23	Chloride	227	6.70	20.0	NE			121059-003	SW846-9056A
	Fluoride	0.141	0.0330	0.100	4.0		J-	121059-003	SW846-9056A
	Sulfate	676	13.3	40.0	NE			121059-003	SW846-9056A
	Bicarbonate Alkalinity	81.4	0.725	2.00	NE			121059-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		121059-004	SM 2320B

Refer to notes on page 6C-47.

Table 6C-4 (continued)
Summary of Anions and Alkalinity Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-NW1-595	Bromide	1.11	0.0670	0.200	NE			121048-003	SW846-9056A
07-Sep-23	Chloride	67.6	0.670	2.00	NE			121048-003	SW846-9056A
	Fluoride	0.283	0.0330	0.100	4.0			121048-003	SW846-9056A
	Sulfate	83.8	1.33	4.00	NE			121048-003	SW846-9056A
	Bicarbonate Alkalinity	140	0.725	2.00	NE			121048-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		121048-004	SM 2320B
TA2-W-01	Bromide	1.34	0.0670	0.200	NE			121052-003	SW846-9056A
11-Sep-23	Chloride	91.8	1.34	4.00	NE			121052-003	SW846-9056A
	Fluoride	0.353	0.0330	0.100	4.0			121052-003	SW846-9056A
	Sulfate	62.0	2.66	8.00	NE			121052-003	SW846-9056A
	Bicarbonate Alkalinity	102	0.725	2.00	NE			121052-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		121052-004	SM 2320B
TA2-W-19	Bromide	0.744	0.0670	0.200	NE			121061-003	SW846-9056A
19-Sep-23	Chloride	54.2	0.670	2.00	NE			121061-003	SW846-9056A
	Fluoride	0.296	0.0330	0.100	4.0			121061-003	SW846-9056A
	Sulfate	56.5	1.33	4.00	NE			121061-003	SW846-9056A
	Bicarbonate Alkalinity	114	0.725	2.00	NE			121061-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		121061-004	SM 2320B
TA2-W-24	Bromide	0.177	0.0670	0.200	NE	J		121031-003	SW846-9056A
28-Aug-23	Chloride	13.7	0.670	2.00	NE			121031-003	SW846-9056A
	Fluoride	0.454	0.0330	0.100	4.0			121031-003	SW846-9056A
	Sulfate	45.6	1.33	4.00	NE			121031-003	SW846-9056A
	Bicarbonate Alkalinity	164	0.725	2.00	NE			121031-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		121031-004	SM 2320B
TA2-W-25	Bromide	0.238	0.0670	0.200	NE			121044-003	SW846-9056A
06-Sep-23	Chloride	15.3	0.335	1.00	NE			121044-003	SW846-9056A
	Fluoride	0.286	0.0330	0.100	4.0		J+	121044-003	SW846-9056A
	Sulfate	69.6	0.665	2.00	NE			121044-003	SW846-9056A
	Bicarbonate Alkalinity	171	0.725	2.00	NE			121044-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		121044-004	SM 2320B
TA2-W-26	Bromide	0.723	0.0670	0.200	NE			121079-003	SW846-9056A
26-Sep-23	Chloride	59.1	0.670	2.00	NE			121079-003	SW846-9056A
	Fluoride	0.355	0.0330	0.100	4.0			121079-003	SW846-9056A
	Sulfate	146	1.33	4.00	NE			121079-003	SW846-9056A
	Bicarbonate Alkalinity	143	0.725	2.00	NE			121079-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		121079-004	SM 2320B

Refer to notes on page 6C-47.

Table 6C-4 (continued)
Summary of Anions and Alkalinity Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-W-27	Bromide	1.44	0.0670	0.200	NE			121054-003	SW846-9056A
18-Sep-23	Chloride	106	1.34	4.00	NE			121054-003	SW846-9056A
	Fluoride	0.220	0.0330	0.100	4.0			121054-003	SW846-9056A
	Sulfate	151	2.66	8.00	NE			121054-003	SW846-9056A
	Bicarbonate Alkalinity	98.3	0.725	2.00	NE			121054-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		121054-004	SM 2320B
TA2-W-28	Bromide	0.737	0.0670	0.200	NE			121070-003	SW846-9056A
21-Sep-23	Chloride	45.5	0.670	2.00	NE			121070-003	SW846-9056A
	Fluoride	0.413	0.0330	0.100	4.0			121070-003	SW846-9056A
	Sulfate	16.8	0.133	0.400	NE		J	121070-003	SW846-9056A
	Bicarbonate Alkalinity	117	0.725	2.00	NE			121070-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		121070-004	SM 2320B
TJA-2	Bromide	0.801	0.0670	0.200	NE			121063-003	SW846-9056A
20-Sep-23	Chloride	57.8	0.670	2.00	NE			121063-003	SW846-9056A
	Fluoride	0.387	0.0330	0.100	4.0			121063-003	SW846-9056A
	Sulfate	49.6	1.33	4.00	NE			121063-003	SW846-9056A
	Bicarbonate Alkalinity	113	0.725	2.00	NE			121063-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		121063-004	SM 2320B
TJA-3	Bromide	0.172	0.0670	0.200	NE	J		121050-003	SW846-9056A
08-Sep-23	Chloride	12.8	0.670	2.00	NE			121050-003	SW846-9056A
	Fluoride	0.341	0.0330	0.100	4.0			121050-003	SW846-9056A
	Sulfate	77.1	1.33	4.00	NE			121050-003	SW846-9056A
	Bicarbonate Alkalinity	173	0.725	2.00	NE			121050-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		121050-004	SM 2320B
TJA-4	Bromide	0.370	0.0670	0.200	NE			121073-003	SW846-9056A
22-Sep-23	Chloride	20.9	0.335	1.00	NE			121073-003	SW846-9056A
	Fluoride	0.438	0.0330	0.100	4.0			121073-003	SW846-9056A
	Sulfate	16.9	0.133	0.400	NE			121073-003	SW846-9056A
	Bicarbonate Alkalinity	137	0.725	2.00	NE			121073-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		121073-004	SM 2320B
TJA-5	Bromide	0.269	0.0670	0.200	NE			121067-003	SW846-9056A
21-Sep-23	Chloride	16.6	0.670	2.00	NE			121067-003	SW846-9056A
	Fluoride	0.364	0.0330	0.100	4.0			121067-003	SW846-9056A
	Sulfate	109	1.33	4.00	NE			121067-003	SW846-9056A
	Bicarbonate Alkalinity	127	0.725	2.00	NE			121067-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		121067-004	SM 2320B

Refer to notes on page 6C-47.

Table 6C-4 (concluded)
Summary of Anions and Alkalinity Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TJA-6	Bromide	0.187	0.0670	0.200	NE	J		121033-003	SW846-9056A
29-Aug-23	Chloride	13.9	0.335	1.00	NE			121033-003	SW846-9056A
	Fluoride	0.431	0.0330	0.100	4.0			121033-003	SW846-9056A
	Sulfate	61.2	0.665	2.00	NE			121033-003	SW846-9056A
	Bicarbonate Alkalinity	164	0.725	2.00	NE			121033-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		121033-004	SM 2320B
TJA-7	Bromide	0.415	0.0670	0.200	NE			121075-003	SW846-9056A
22-Sep-23	Chloride	23.0	0.335	1.00	NE			121075-003	SW846-9056A
	Fluoride	0.427	0.0330	0.100	4.0			121075-003	SW846-9056A
	Sulfate	22.9	0.665	2.00	NE			121075-003	SW846-9056A
	Bicarbonate Alkalinity	132	0.725	2.00	NE			121075-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		121075-004	SM 2320B
WYO-3	Bromide	0.172	0.0670	0.200	NE	J		121036-003	SW846-9056A
30-Aug-23	Chloride	13.3	0.335	1.00	NE			121036-003	SW846-9056A
	Fluoride	0.475	0.0330	0.100	4.0			121036-003	SW846-9056A
	Sulfate	80.9	0.665	2.00	NE			121036-003	SW846-9056A
	Bicarbonate Alkalinity	174	0.725	2.00	NE			121036-004	SM 2320B
	Carbonate Alkalinity	ND	0.725	2.00	NE	U		121036-004	SM 2320B

Refer to notes on page 6C-47.

Table 6C-5
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA1-W-01	Aluminum	ND	0.0193	0.0500	NE	U		121040-005	SW846-6020B
05-Sep-23	Antimony	ND	0.00100	0.00300	0.006	U		121040-005	SW846-6020B
	Arsenic	ND	0.00200	0.00500	0.010	U		121040-005	SW846-6020B
	Barium	0.0527	0.000670	0.00400	2.00			121040-005	SW846-6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		121040-005	SW846-6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		121040-005	SW846-6020B
	Calcium	72.5	0.800	2.00	NE			121040-005	SW846-6020B
	Chromium	ND	0.00300	0.0100	0.100	U		121040-005	SW846-6020B
	Cobalt	ND	0.000300	0.00100	NE	U		121040-005	SW846-6020B
	Copper	ND	0.000300	0.00200	NE	U		121040-005	SW846-6020B
	Iron	ND	0.0330	0.100	NE	U		121040-005	SW846-6020B
	Lead	ND	0.000500	0.00200	NE	U		121040-005	SW846-6020B
	Magnesium	14.1	0.0100	0.0300	NE			121040-005	SW846-6020B
	Manganese	ND	0.00100	0.00500	NE	U		121040-005	SW846-6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		121040-005	SW846-7470A
	Molybdenum	0.00187	0.000200	0.00100	NE			121040-005	SW846-6020B
	Nickel	ND	0.000600	0.00200	NE	U		121040-005	SW846-6020B
	Potassium	2.53	0.0800	0.300	NE			121040-005	SW846-6020B
	Selenium	ND	0.00150	0.00500	0.050	U		121040-005	SW846-6020B
	Silver	ND	0.000300	0.00100	NE	U		121040-005	SW846-6020B
	Sodium	27.0	0.0800	0.250	NE			121040-005	SW846-6020B
	Thallium	ND	0.000600	0.00200	0.002	U		121040-005	SW846-6020B
	Uranium	0.00320	0.0000670	0.000200	0.030			121040-005	SW846-6020B
	Vanadium	0.00702	0.00330	0.0200	NE	J		121040-005	SW846-6020B
	Zinc	ND	0.00330	0.0200	NE	U		121040-005	SW846-6020B

Refer to notes on page 6C-47.

Table 6C-5 (continued)
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA1-W-02	Aluminum	ND	0.0193	0.0500	NE	U		121016-005	SW846-6020B
23-Aug-23	Antimony	ND	0.00100	0.00300	0.006	U		121016-005	SW846-6020B
	Arsenic	ND	0.00200	0.00500	0.010	U		121016-005	SW846-6020B
	Barium	0.0507	0.000670	0.00400	2.00			121016-005	SW846-6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		121016-005	SW846-6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		121016-005	SW846-6020B
	Calcium	72.8	0.800	2.00	NE			121016-005	SW846-6020B
	Chromium	ND	0.00300	0.0100	0.100	U		121016-005	SW846-6020B
	Cobalt	ND	0.000300	0.00100	NE	U		121016-005	SW846-6020B
	Copper	ND	0.000300	0.00200	NE	U		121016-005	SW846-6020B
	Iron	0.0536	0.0330	0.100	NE	J		121016-005	SW846-6020B
	Lead	ND	0.000500	0.00200	NE	U		121016-005	SW846-6020B
	Magnesium	13.0	0.0100	0.0300	NE			121016-005	SW846-6020B
	Manganese	ND	0.00100	0.00500	NE	U		121016-005	SW846-6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		121016-005	SW846-7470A
	Molybdenum	0.00149	0.000200	0.00100	NE			121016-005	SW846-6020B
	Nickel	ND	0.000600	0.00200	NE	U		121016-005	SW846-6020B
	Potassium	2.19	0.0800	0.300	NE			121016-005	SW846-6020B
	Selenium	ND	0.00150	0.00500	0.050	U		121016-005	SW846-6020B
	Silver	ND	0.000300	0.00100	NE	U		121016-005	SW846-6020B
	Sodium	23.2	0.0800	0.250	NE			121016-005	SW846-6020B
	Thallium	ND	0.000600	0.00200	0.002	U		121016-005	SW846-6020B
	Uranium	0.00310	0.0000670	0.000200	0.030			121016-005	SW846-6020B
	Vanadium	0.00625	0.00330	0.0200	NE	J		121016-005	SW846-6020B
	Zinc	ND	0.00330	0.0200	NE	U		121016-005	SW846-6020B

Refer to notes on page 6C-47.

Table 6C-5 (continued)
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA1-W-04	Aluminum	ND	0.0193	0.0500	NE	U		121023-005	SW846-6020B
25-Aug-23	Antimony	ND	0.00100	0.00300	0.006	U		121023-005	SW846-6020B
	Arsenic	ND	0.00200	0.00500	0.010	U		121023-005	SW846-6020B
	Barium	0.0700	0.000670	0.00400	2.00			121023-005	SW846-6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		121023-005	SW846-6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		121023-005	SW846-6020B
	Calcium	68.4	0.800	2.00	NE			121023-005	SW846-6020B
	Chromium	ND	0.00300	0.0100	0.100	U		121023-005	SW846-6020B
	Cobalt	ND	0.000300	0.00100	NE	U		121023-005	SW846-6020B
	Copper	ND	0.000300	0.00200	NE	U		121023-005	SW846-6020B
	Iron	ND	0.0330	0.100	NE	U		121023-005	SW846-6020B
	Lead	ND	0.000500	0.00200	NE	U		121023-005	SW846-6020B
	Magnesium	11.4	0.0100	0.0300	NE			121023-005	SW846-6020B
	Manganese	ND	0.00100	0.00500	NE	U		121023-005	SW846-6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		121023-005	SW846-7470A
	Molybdenum	0.00148	0.000200	0.00100	NE			121023-005	SW846-6020B
	Nickel	ND	0.000600	0.00200	NE	U		121023-005	SW846-6020B
	Potassium	2.13	0.0800	0.300	NE			121023-005	SW846-6020B
	Selenium	ND	0.00150	0.00500	0.050	U		121023-005	SW846-6020B
	Silver	ND	0.000300	0.00100	NE	U		121023-005	SW846-6020B
	Sodium	23.7	0.0800	0.250	NE			121023-005	SW846-6020B
	Thallium	ND	0.000600	0.00200	0.002	U		121023-005	SW846-6020B
	Uranium	0.00298	0.0000670	0.000200	0.030			121023-005	SW846-6020B
	Vanadium	0.00617	0.00330	0.0200	NE	J		121023-005	SW846-6020B
	Zinc	ND	0.00330	0.0200	NE	U		121023-005	SW846-6020B

Refer to notes on page 6C-47.

Table 6C-5 (continued)
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA1-W-05	Aluminum	ND	0.0193	0.0500	NE	U		121019-005	SW846-6020B
24-Aug-23	Antimony	ND	0.00100	0.00300	0.006	U		121019-005	SW846-6020B
	Arsenic	ND	0.00200	0.00500	0.010	U		121019-005	SW846-6020B
	Barium	0.0375	0.000670	0.00400	2.00			121019-005	SW846-6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		121019-005	SW846-6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		121019-005	SW846-6020B
	Calcium	90.1	0.800	2.00	NE			121019-005	SW846-6020B
	Chromium	ND	0.00300	0.0100	0.100	U		121019-005	SW846-6020B
	Cobalt	ND	0.000300	0.00100	NE	U		121019-005	SW846-6020B
	Copper	ND	0.000300	0.00200	NE	U		121019-005	SW846-6020B
	Iron	ND	0.0330	0.100	NE	U		121019-005	SW846-6020B
	Lead	ND	0.000500	0.00200	NE	U		121019-005	SW846-6020B
	Magnesium	12.5	0.0100	0.0300	NE			121019-005	SW846-6020B
	Manganese	ND	0.00100	0.00500	NE	U		121019-005	SW846-6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		121019-005	SW846-7470A
	Molybdenum	0.000712	0.000200	0.00100	NE	J		121019-005	SW846-6020B
	Nickel	ND	0.000600	0.00200	NE	U		121019-005	SW846-6020B
	Potassium	2.39	0.0800	0.300	NE			121019-005	SW846-6020B
	Selenium	ND	0.00150	0.00500	0.050	U		121019-005	SW846-6020B
	Silver	ND	0.000300	0.00100	NE	U		121019-005	SW846-6020B
	Sodium	32.7	0.0800	0.250	NE			121019-005	SW846-6020B
	Thallium	ND	0.000600	0.00200	0.002	U		121019-005	SW846-6020B
	Uranium	0.00342	0.0000670	0.000200	0.030			121019-005	SW846-6020B
	Vanadium	0.00651	0.00330	0.0200	NE	B, J	0.02U	121019-005	SW846-6020B
	Zinc	ND	0.00330	0.0200	NE	U		121019-005	SW846-6020B

Refer to notes on page 6C-47.

Table 6C-5 (continued)
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA1-W-06	Aluminum	0.0239	0.0193	0.0500	NE	J		121057-005	SW846-6020B
12-Sep-23	Antimony	ND	0.00100	0.00300	0.006	U		121057-005	SW846-6020B
	Arsenic	0.00201	0.00200	0.00500	0.010	J		121057-005	SW846-6020B
	Barium	0.0276	0.000670	0.00400	2.00			121057-005	SW846-6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		121057-005	SW846-6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		121057-005	SW846-6020B
	Calcium	138	0.800	2.00	NE			121057-005	SW846-6020B
	Chromium	ND	0.00300	0.0100	0.100	U		121057-005	SW846-6020B
	Cobalt	ND	0.000300	0.00100	NE	U		121057-005	SW846-6020B
	Copper	ND	0.000300	0.00200	NE	U		121057-005	SW846-6020B
	Iron	0.0344	0.0330	0.100	NE	J		121057-005	SW846-6020B
	Lead	ND	0.000500	0.00200	NE	U		121057-005	SW846-6020B
	Magnesium	18.1	0.0100	0.0300	NE			121057-005	SW846-6020B
	Manganese	ND	0.00100	0.00500	NE	U		121057-005	SW846-6020B
	Mercury	ND	0.0000670	0.000200	0.002	U	UJ	121057-005	SW846-7470A
	Molybdenum	0.00174	0.000200	0.00100	NE			121057-005	SW846-6020B
	Nickel	ND	0.000600	0.00200	NE	U		121057-005	SW846-6020B
	Potassium	2.39	0.0800	0.300	NE			121057-005	SW846-6020B
	Selenium	0.00800	0.00150	0.00500	0.050			121057-005	SW846-6020B
	Silver	ND	0.000300	0.00100	NE	U		121057-005	SW846-6020B
	Sodium	34.1	0.0800	0.250	NE			121057-005	SW846-6020B
	Thallium	ND	0.000600	0.00200	0.002	U		121057-005	SW846-6020B
	Uranium	0.00114	0.0000670	0.000200	0.030			121057-005	SW846-6020B
	Vanadium	0.00693	0.00330	0.0200	NE	J		121057-005	SW846-6020B
	Zinc	ND	0.00330	0.0200	NE	U		121057-005	SW846-6020B

Refer to notes on page 6C-47.

Table 6C-5 (continued)
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA1-W-08	Aluminum	ND	0.0193	0.0500	NE	U		121059-005	SW846-6020B
13-Sep-23	Antimony	ND	0.00100	0.00300	0.006	U		121059-005	SW846-6020B
	Arsenic	0.00357	0.00200	0.00500	0.010	J		121059-005	SW846-6020B
	Barium	0.0199	0.000670	0.00400	2.00			121059-005	SW846-6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		121059-005	SW846-6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		121059-005	SW846-6020B
	Calcium	341	0.800	2.00	NE			121059-005	SW846-6020B
	Chromium	ND	0.00300	0.0100	0.100	U		121059-005	SW846-6020B
	Cobalt	ND	0.000300	0.00100	NE	U		121059-005	SW846-6020B
	Copper	0.000301	0.000300	0.00200	NE	J		121059-005	SW846-6020B
	Iron	0.0513	0.0330	0.100	NE	J		121059-005	SW846-6020B
	Lead	ND	0.000500	0.00200	NE	U		121059-005	SW846-6020B
	Magnesium	44.9	0.0100	0.0300	NE			121059-005	SW846-6020B
	Manganese	ND	0.00100	0.00500	NE	U		121059-005	SW846-6020B
	Mercury	ND	0.0000670	0.000200	0.002	U	UJ	121059-005	SW846-7470A
	Molybdenum	0.00112	0.000200	0.00100	NE			121059-005	SW846-6020B
	Nickel	ND	0.000600	0.00200	NE	U		121059-005	SW846-6020B
	Potassium	3.55	0.0800	0.300	NE			121059-005	SW846-6020B
	Selenium	0.0320	0.00150	0.00500	0.050			121059-005	SW846-6020B
	Silver	ND	0.000300	0.00100	NE	U		121059-005	SW846-6020B
	Sodium	85.6	0.800	2.50	NE			121059-005	SW846-6020B
	Thallium	ND	0.000600	0.00200	0.002	U		121059-005	SW846-6020B
	Uranium	0.00160	0.0000670	0.000200	0.030			121059-005	SW846-6020B
	Vanadium	0.00680	0.00330	0.0200	NE	J		121059-005	SW846-6020B
	Zinc	ND	0.00330	0.0200	NE	U		121059-005	SW846-6020B

Refer to notes on page 6C-47.

Table 6C-5 (continued)
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-NW1-595	Aluminum	ND	0.0193	0.0500	NE	U		121048-005	SW846-6020B
07-Sep-23	Antimony	ND	0.00100	0.00300	0.006	U		121048-005	SW846-6020B
	Arsenic	ND	0.00200	0.00500	0.010	U		121048-005	SW846-6020B
	Barium	0.0386	0.000670	0.00400	2.00			121048-005	SW846-6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		121048-005	SW846-6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		121048-005	SW846-6020B
	Calcium	97.6	0.800	2.00	NE			121048-005	SW846-6020B
	Chromium	ND	0.00300	0.0100	0.100	U		121048-005	SW846-6020B
	Cobalt	ND	0.000300	0.00100	NE	U		121048-005	SW846-6020B
	Copper	ND	0.000300	0.00200	NE	U		121048-005	SW846-6020B
	Iron	ND	0.0330	0.100	NE	U		121048-005	SW846-6020B
	Lead	ND	0.000500	0.00200	NE	U		121048-005	SW846-6020B
	Magnesium	15.2	0.0100	0.0300	NE			121048-005	SW846-6020B
	Manganese	ND	0.00100	0.00500	NE	U		121048-005	SW846-6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		121048-005	SW846-7470A
	Molybdenum	0.00108	0.000200	0.00100	NE			121048-005	SW846-6020B
	Nickel	ND	0.000600	0.00200	NE	U		121048-005	SW846-6020B
	Potassium	2.31	0.0800	0.300	NE			121048-005	SW846-6020B
	Selenium	0.00557	0.00150	0.00500	0.050			121048-005	SW846-6020B
	Silver	ND	0.000300	0.00100	NE	U		121048-005	SW846-6020B
	Sodium	29.1	0.0800	0.250	NE			121048-005	SW846-6020B
	Thallium	ND	0.000600	0.00200	0.002	U		121048-005	SW846-6020B
	Uranium	0.00198	0.0000670	0.000200	0.030			121048-005	SW846-6020B
	Vanadium	0.00568	0.00330	0.0200	NE	J		121048-005	SW846-6020B
	Zinc	ND	0.00330	0.0200	NE	U		121048-005	SW846-6020B

Refer to notes on page 6C-47.

Table 6C-5 (continued)
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-W-01	Aluminum	ND	0.0193	0.0500	NE	U		121052-005	SW846-6020B
11-Sep-23	Antimony	ND	0.00100	0.00300	0.006	U		121052-005	SW846-6020B
	Arsenic	0.00296	0.00200	0.00500	0.010	B, J	0.005U	121052-005	SW846-6020B
	Barium	0.0653	0.000670	0.00400	2.00			121052-005	SW846-6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		121052-005	SW846-6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		121052-005	SW846-6020B
	Calcium	90.8	0.800	2.00	NE			121052-005	SW846-6020B
	Chromium	ND	0.00300	0.0100	0.100	U		121052-005	SW846-6020B
	Cobalt	ND	0.000300	0.00100	NE	U		121052-005	SW846-6020B
	Copper	ND	0.000300	0.00200	NE	U		121052-005	SW846-6020B
	Iron	0.0725	0.0330	0.100	NE	J		121052-005	SW846-6020B
	Lead	ND	0.000500	0.00200	NE	U		121052-005	SW846-6020B
	Magnesium	12.4	0.0100	0.0300	NE			121052-005	SW846-6020B
	Manganese	ND	0.00100	0.00500	NE	U		121052-005	SW846-6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		121052-005	SW846-7470A
	Molybdenum	0.00175	0.000200	0.00100	NE			121052-005	SW846-6020B
	Nickel	ND	0.000600	0.00200	NE	U		121052-005	SW846-6020B
	Potassium	1.69	0.0800	0.300	NE			121052-005	SW846-6020B
	Selenium	0.00541	0.00150	0.00500	0.050			121052-005	SW846-6020B
	Silver	ND	0.000300	0.00100	NE	U		121052-005	SW846-6020B
	Sodium	20.6	0.0800	0.250	NE			121052-005	SW846-6020B
	Thallium	ND	0.000600	0.00200	0.002	U		121052-005	SW846-6020B
	Uranium	0.00101	0.0000670	0.000200	0.030			121052-005	SW846-6020B
	Vanadium	0.00952	0.00330	0.0200	NE	B, J	0.02U	121052-005	SW846-6020B
	Zinc	ND	0.00330	0.0200	NE	U		121052-005	SW846-6020B

Refer to notes on page 6C-47.

Table 6C-5 (continued)
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-W-19	Aluminum	ND	0.0193	0.0500	NE	U		121061-005	SW846-6020B
19-Sep-23	Antimony	ND	0.00100	0.00300	0.006	U		121061-005	SW846-6020B
	Arsenic	0.00260	0.00200	0.00500	0.010	J		121061-005	SW846-6020B
	Barium	0.0525	0.000670	0.00400	2.00		J	121061-005	SW846-6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		121061-005	SW846-6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		121061-005	SW846-6020B
	Calcium	76.9	0.400	1.00	NE			121061-005	SW846-6020B
	Chromium	ND	0.00300	0.0100	0.100	U		121061-005	SW846-6020B
	Cobalt	ND	0.000300	0.00100	NE	U		121061-005	SW846-6020B
	Copper	ND	0.000300	0.00200	NE	U		121061-005	SW846-6020B
	Iron	ND	0.0330	0.100	NE	U		121061-005	SW846-6020B
	Lead	ND	0.000500	0.00200	NE	U		121061-005	SW846-6020B
	Magnesium	12.8	0.0100	0.0300	NE			121061-005	SW846-6020B
	Manganese	ND	0.00100	0.00500	NE	U		121061-005	SW846-6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		121061-005	SW846-7470A
	Molybdenum	0.00189	0.000200	0.00100	NE			121061-005	SW846-6020B
	Nickel	ND	0.000600	0.00200	NE	U		121061-005	SW846-6020B
	Potassium	1.91	0.0800	0.300	NE			121061-005	SW846-6020B
	Selenium	0.00466	0.00150	0.00500	0.050	J		121061-005	SW846-6020B
	Silver	ND	0.000300	0.00100	NE	U		121061-005	SW846-6020B
	Sodium	24.4	0.0800	0.250	NE			121061-005	SW846-6020B
	Thallium	ND	0.000600	0.00200	0.002	U		121061-005	SW846-6020B
	Uranium	0.00125	0.0000670	0.000200	0.030			121061-005	SW846-6020B
	Vanadium	0.00755	0.00330	0.0200	NE	J		121061-005	SW846-6020B
	Zinc	ND	0.00330	0.0200	NE	U		121061-005	SW846-6020B

Refer to notes on page 6C-47.

Table 6C-5 (continued)
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-W-24	Aluminum	ND	0.0193	0.0500	NE	U		121031-005	SW846-6020B
28-Aug-23	Antimony	ND	0.00100	0.00300	0.006	U		121031-005	SW846-6020B
	Arsenic	ND	0.00200	0.00500	0.010	U		121031-005	SW846-6020B
	Barium	0.0934	0.000670	0.00400	2.00			121031-005	SW846-6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		121031-005	SW846-6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		121031-005	SW846-6020B
	Calcium	58.2	0.800	2.00	NE			121031-005	SW846-6020B
	Chromium	ND	0.00300	0.0100	0.100	U		121031-005	SW846-6020B
	Cobalt	ND	0.000300	0.00100	NE	U		121031-005	SW846-6020B
	Copper	ND	0.000300	0.00200	NE	U		121031-005	SW846-6020B
	Iron	ND	0.0330	0.100	NE	U		121031-005	SW846-6020B
	Lead	ND	0.000500	0.00200	NE	U		121031-005	SW846-6020B
	Magnesium	10.7	0.0100	0.0300	NE			121031-005	SW846-6020B
	Manganese	0.00111	0.00100	0.00500	NE	J		121031-005	SW846-6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		121031-005	SW846-7470A
	Molybdenum	0.00263	0.000200	0.00100	NE			121031-005	SW846-6020B
	Nickel	ND	0.000600	0.00200	NE	U		121031-005	SW846-6020B
	Potassium	3.33	0.0800	0.300	NE			121031-005	SW846-6020B
	Selenium	ND	0.00150	0.00500	0.050	U		121031-005	SW846-6020B
	Silver	ND	0.000300	0.00100	NE	U		121031-005	SW846-6020B
	Sodium	22.6	0.0800	0.250	NE			121031-005	SW846-6020B
	Thallium	ND	0.000600	0.00200	0.002	U		121031-005	SW846-6020B
	Uranium	0.00278	0.0000670	0.000200	0.030			121031-005	SW846-6020B
	Vanadium	0.00640	0.00330	0.0200	NE	J		121031-005	SW846-6020B
	Zinc	ND	0.00330	0.0200	NE	U		121031-005	SW846-6020B

Refer to notes on page 6C-47.

Table 6C-5 (continued)
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-W-25	Aluminum	ND	0.0193	0.0500	NE	U		121044-005	SW846-6020B
06-Sep-23	Antimony	ND	0.00100	0.00300	0.006	U		121044-005	SW846-6020B
	Arsenic	ND	0.00200	0.00500	0.010	U		121044-005	SW846-6020B
	Barium	0.0388	0.000670	0.00400	2.00			121044-005	SW846-6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		121044-005	SW846-6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		121044-005	SW846-6020B
	Calcium	74.6	0.800	2.00	NE			121044-005	SW846-6020B
	Chromium	ND	0.00300	0.0100	0.100	U		121044-005	SW846-6020B
	Cobalt	ND	0.000300	0.00100	NE	U		121044-005	SW846-6020B
	Copper	ND	0.000300	0.00200	NE	U		121044-005	SW846-6020B
	Iron	ND	0.0330	0.100	NE	U		121044-005	SW846-6020B
	Lead	ND	0.000500	0.00200	NE	U		121044-005	SW846-6020B
	Magnesium	10.6	0.0100	0.0300	NE			121044-005	SW846-6020B
	Manganese	ND	0.00100	0.00500	NE	U		121044-005	SW846-6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		121044-005	SW846-7470A
	Molybdenum	0.00131	0.000200	0.00100	NE			121044-005	SW846-6020B
	Nickel	ND	0.000600	0.00200	NE	U		121044-005	SW846-6020B
	Potassium	1.77	0.0800	0.300	NE			121044-005	SW846-6020B
	Selenium	0.00231	0.00150	0.00500	0.050	J		121044-005	SW846-6020B
	Silver	ND	0.000300	0.00100	NE	U		121044-005	SW846-6020B
	Sodium	26.2	0.0800	0.250	NE			121044-005	SW846-6020B
	Thallium	ND	0.000600	0.00200	0.002	U		121044-005	SW846-6020B
	Uranium	0.00221	0.0000670	0.000200	0.030			121044-005	SW846-6020B
	Vanadium	0.00544	0.00330	0.0200	NE	J		121044-005	SW846-6020B
	Zinc	ND	0.00330	0.0200	NE	U		121044-005	SW846-6020B

Refer to notes on page 6C-47.

Table 6C-5 (continued)
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-W-26	Aluminum	0.187	0.0193	0.0500	NE			121079-005	SW846-6020B
26-Sep-23	Antimony	ND	0.00100	0.00300	0.006	U		121079-005	SW846-6020B
	Arsenic	0.00251	0.00200	0.00500	0.010	J		121079-005	SW846-6020B
	Barium	0.0545	0.000670	0.00400	2.00			121079-005	SW846-6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		121079-005	SW846-6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		121079-005	SW846-6020B
	Calcium	111	0.800	2.00	NE			121079-005	SW846-6020B
	Chromium	ND	0.00300	0.0100	0.100	U		121079-005	SW846-6020B
	Cobalt	ND	0.000300	0.00100	NE	U		121079-005	SW846-6020B
	Copper	0.000546	0.000300	0.00200	NE	J	0.002U	121079-005	SW846-6020B
	Iron	0.198	0.0330	0.100	NE			121079-005	SW846-6020B
	Lead	ND	0.000500	0.00200	NE	U		121079-005	SW846-6020B
	Magnesium	14.7	0.0100	0.0300	NE			121079-005	SW846-6020B
	Manganese	0.00297	0.00100	0.00500	NE	J	J-	121079-005	SW846-6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		121079-005	SW846-7470A
	Molybdenum	0.00117	0.000200	0.00100	NE			121079-005	SW846-6020B
	Nickel	ND	0.000600	0.00200	NE	U		121079-005	SW846-6020B
	Potassium	1.93	0.0800	0.300	NE			121079-005	SW846-6020B
	Selenium	0.00620	0.00150	0.00500	0.050			121079-005	SW846-6020B
	Silver	ND	0.000300	0.00100	NE	U		121079-005	SW846-6020B
	Sodium	28.1	0.0800	0.250	NE			121079-005	SW846-6020B
	Thallium	ND	0.000600	0.00200	0.002	U		121079-005	SW846-6020B
	Uranium	0.00183	0.0000670	0.000200	0.030			121079-005	SW846-6020B
	Vanadium	0.00739	0.00330	0.0200	NE	B, J	0.02U	121079-005	SW846-6020B
	Zinc	ND	0.00330	0.0200	NE	U		121079-005	SW846-6020B

Refer to notes on page 6C-47.

Table 6C-5 (continued)
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-W-27	Aluminum	ND	0.0193	0.0500	NE	U		121054-005	SW846-6020B
18-Sep-23	Antimony	ND	0.00100	0.00300	0.006	U		121054-005	SW846-6020B
	Arsenic	0.00284	0.00200	0.00500	0.010	J		121054-005	SW846-6020B
	Barium	0.0586	0.000670	0.00400	2.00		J	121054-005	SW846-6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		121054-005	SW846-6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		121054-005	SW846-6020B
	Calcium	120	0.400	1.00	NE			121054-005	SW846-6020B
	Chromium	ND	0.00300	0.0100	0.100	U		121054-005	SW846-6020B
	Cobalt	ND	0.000300	0.00100	NE	U		121054-005	SW846-6020B
	Copper	0.000355	0.000300	0.00200	NE	J		121054-005	SW846-6020B
	Iron	0.0562	0.0330	0.100	NE	J		121054-005	SW846-6020B
	Lead	ND	0.000500	0.00200	NE	U		121054-005	SW846-6020B
	Magnesium	16.8	0.0100	0.0300	NE			121054-005	SW846-6020B
	Manganese	ND	0.00100	0.00500	NE	U	UJ	121054-005	SW846-6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		121054-005	SW846-7470A
	Molybdenum	0.00160	0.000200	0.00100	NE			121054-005	SW846-6020B
	Nickel	ND	0.000600	0.00200	NE	U		121054-005	SW846-6020B
	Potassium	2.13	0.0800	0.300	NE			121054-005	SW846-6020B
	Selenium	0.00815	0.00150	0.00500	0.050			121054-005	SW846-6020B
	Silver	ND	0.000300	0.00100	NE	U		121054-005	SW846-6020B
	Sodium	29.3	0.0800	0.250	NE			121054-005	SW846-6020B
	Thallium	ND	0.000600	0.00200	0.002	U		121054-005	SW846-6020B
	Uranium	0.00115	0.0000670	0.000200	0.030			121054-005	SW846-6020B
	Vanadium	0.00660	0.00330	0.0200	NE	J		121054-005	SW846-6020B
	Zinc	ND	0.00330	0.0200	NE	U		121054-005	SW846-6020B

Refer to notes on page 6C-47.

Table 6C-5 (continued)
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-W-28	Aluminum	ND	0.0193	0.0500	NE	U		121070-005	SW846-6020B
21-Sep-23	Antimony	ND	0.00100	0.00300	0.006	U		121070-005	SW846-6020B
	Arsenic	ND	0.00200	0.00500	0.010	U		121070-005	SW846-6020B
	Barium	0.197	0.000670	0.00400	2.00			121070-005	SW846-6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		121070-005	SW846-6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		121070-005	SW846-6020B
	Calcium	75.0	0.800	2.00	NE		J	121070-005	SW846-6020B
	Chromium	ND	0.00300	0.0100	0.100	U		121070-005	SW846-6020B
	Cobalt	ND	0.000300	0.00100	NE	U		121070-005	SW846-6020B
	Copper	ND	0.000300	0.00200	NE	U		121070-005	SW846-6020B
	Iron	ND	0.0330	0.100	NE	U		121070-005	SW846-6020B
	Lead	ND	0.000500	0.00200	NE	U		121070-005	SW846-6020B
	Magnesium	13.0	0.0100	0.0300	NE		J	121070-005	SW846-6020B
	Manganese	ND	0.00100	0.00500	NE	U		121070-005	SW846-6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		121070-005	SW846-7470A
	Molybdenum	0.00193	0.000200	0.00100	NE			121070-005	SW846-6020B
	Nickel	ND	0.000600	0.00200	NE	U		121070-005	SW846-6020B
	Potassium	2.22	0.0800	0.300	NE			121070-005	SW846-6020B
	Selenium	0.00434	0.00150	0.00500	0.050	J		121070-005	SW846-6020B
	Silver	ND	0.000300	0.00100	NE	U		121070-005	SW846-6020B
	Sodium	20.3	0.0800	0.250	NE			121070-005	SW846-6020B
	Thallium	ND	0.000600	0.00200	0.002	U		121070-005	SW846-6020B
	Uranium	0.00144	0.0000670	0.000200	0.030			121070-005	SW846-6020B
	Vanadium	0.00786	0.00330	0.0200	NE	B, J	0.02U	121070-005	SW846-6020B
	Zinc	ND	0.00330	0.0200	NE	U		121070-005	SW846-6020B

Refer to notes on page 6C-47.

Table 6C-5 (continued)
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TJA-2	Aluminum	ND	0.0193	0.0500	NE	U		121063-005	SW846-6020B
20-Sep-23	Antimony	ND	0.00100	0.00300	0.006	U		121063-005	SW846-6020B
	Arsenic	0.00259	0.00200	0.00500	0.010	J		121063-005	SW846-6020B
	Barium	0.0492	0.000670	0.00400	2.00		J	121063-005	SW846-6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		121063-005	SW846-6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		121063-005	SW846-6020B
	Calcium	79.0	0.400	1.00	NE			121063-005	SW846-6020B
	Chromium	ND	0.00300	0.0100	0.100	U		121063-005	SW846-6020B
	Cobalt	ND	0.000300	0.00100	NE	U		121063-005	SW846-6020B
	Copper	ND	0.000300	0.00200	NE	U		121063-005	SW846-6020B
	Iron	0.0358	0.0330	0.100	NE	J		121063-005	SW846-6020B
	Lead	ND	0.000500	0.00200	NE	U		121063-005	SW846-6020B
	Magnesium	12.1	0.0100	0.0300	NE			121063-005	SW846-6020B
	Manganese	ND	0.00100	0.00500	NE	U		121063-005	SW846-6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		121063-005	SW846-7470A
	Molybdenum	0.00180	0.000200	0.00100	NE			121063-005	SW846-6020B
	Nickel	ND	0.000600	0.00200	NE	U		121063-005	SW846-6020B
	Potassium	1.84	0.0800	0.300	NE			121063-005	SW846-6020B
	Selenium	0.00465	0.00150	0.00500	0.050	J		121063-005	SW846-6020B
	Silver	ND	0.000300	0.00100	NE	U		121063-005	SW846-6020B
	Sodium	23.0	0.0800	0.250	NE			121063-005	SW846-6020B
	Thallium	ND	0.000600	0.00200	0.002	U		121063-005	SW846-6020B
	Uranium	0.00129	0.0000670	0.000200	0.030			121063-005	SW846-6020B
	Vanadium	0.00735	0.00330	0.0200	NE	J		121063-005	SW846-6020B
	Zinc	ND	0.00330	0.0200	NE	U		121063-005	SW846-6020B

Refer to notes on page 6C-47.

Table 6C-5 (continued)
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TJA-3	Aluminum	ND	0.0193	0.0500	NE	U		121050-005	SW846-6020B
08-Sep-23	Antimony	ND	0.00100	0.00300	0.006	U		121050-005	SW846-6020B
	Arsenic	0.00241	0.00200	0.00500	0.010	B, J	0.005U	121050-005	SW846-6020B
	Barium	0.0488	0.000670	0.00400	2.00			121050-005	SW846-6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		121050-005	SW846-6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		121050-005	SW846-6020B
	Calcium	75.2	0.800	2.00	NE			121050-005	SW846-6020B
	Chromium	ND	0.00300	0.0100	0.100	U		121050-005	SW846-6020B
	Cobalt	ND	0.000300	0.00100	NE	U		121050-005	SW846-6020B
	Copper	ND	0.000300	0.00200	NE	U		121050-005	SW846-6020B
	Iron	0.0544	0.0330	0.100	NE	J		121050-005	SW846-6020B
	Lead	ND	0.000500	0.00200	NE	U		121050-005	SW846-6020B
	Magnesium	11.8	0.0100	0.0300	NE			121050-005	SW846-6020B
	Manganese	ND	0.00100	0.00500	NE	U		121050-005	SW846-6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		121050-005	SW846-7470A
	Molybdenum	0.00149	0.000200	0.00100	NE			121050-005	SW846-6020B
	Nickel	ND	0.000600	0.00200	NE	U		121050-005	SW846-6020B
	Potassium	1.76	0.0800	0.300	NE			121050-005	SW846-6020B
	Selenium	ND	0.00150	0.00500	0.050	U		121050-005	SW846-6020B
	Silver	ND	0.000300	0.00100	NE	U		121050-005	SW846-6020B
	Sodium	24.6	0.0800	0.250	NE			121050-005	SW846-6020B
	Thallium	ND	0.000600	0.00200	0.002	U		121050-005	SW846-6020B
	Uranium	0.00252	0.0000670	0.000200	0.030			121050-005	SW846-6020B
	Vanadium	0.00859	0.00330	0.0200	NE	B, J	0.02U	121050-005	SW846-6020B
	Zinc	ND	0.00330	0.0200	NE	U		121050-005	SW846-6020B

Refer to notes on page 6C-47.

Table 6C-5 (continued)
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TJA-4	Aluminum	ND	0.0193	0.0500	NE	U		121073-005	SW846-6020B
22-Sep-23	Antimony	ND	0.00100	0.00300	0.006	U		121073-005	SW846-6020B
	Arsenic	0.00234	0.00200	0.00500	0.010	J		121073-005	SW846-6020B
	Barium	0.183	0.000670	0.00400	2.00			121073-005	SW846-6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		121073-005	SW846-6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		121073-005	SW846-6020B
	Calcium	70.8	0.400	1.00	NE			121073-005	SW846-6020B
	Chromium	ND	0.00300	0.0100	0.100	U		121073-005	SW846-6020B
	Cobalt	ND	0.000300	0.00100	NE	U		121073-005	SW846-6020B
	Copper	0.000414	0.000300	0.00200	NE	J		121073-005	SW846-6020B
	Iron	0.0431	0.0330	0.100	NE	J		121073-005	SW846-6020B
	Lead	ND	0.000500	0.00200	NE	U		121073-005	SW846-6020B
	Magnesium	14.2	0.0100	0.0300	NE			121073-005	SW846-6020B
	Manganese	ND	0.00100	0.00500	NE	U		121073-005	SW846-6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		121073-005	SW846-7470A
	Molybdenum	0.00186	0.000200	0.00100	NE			121073-005	SW846-6020B
	Nickel	ND	0.000600	0.00200	NE	U		121073-005	SW846-6020B
	Potassium	3.19	0.0800	0.300	NE			121073-005	SW846-6020B
	Selenium	0.00324	0.00150	0.00500	0.050	J		121073-005	SW846-6020B
	Silver	ND	0.000300	0.00100	NE	U		121073-005	SW846-6020B
	Sodium	25.9	0.0800	0.250	NE			121073-005	SW846-6020B
	Thallium	ND	0.000600	0.00200	0.002	U		121073-005	SW846-6020B
	Uranium	0.00279	0.0000670	0.000200	0.030			121073-005	SW846-6020B
	Vanadium	0.00701	0.00330	0.0200	NE	J		121073-005	SW846-6020B
	Zinc	ND	0.00330	0.0200	NE	U		121073-005	SW846-6020B

Refer to notes on page 6C-47.

Table 6C-5 (continued)
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TJA-5	Aluminum	ND	0.0193	0.0500	NE	U		121067-005	SW846-6020B
21-Sep-23	Antimony	ND	0.00100	0.00300	0.006	U		121067-005	SW846-6020B
	Arsenic	ND	0.00200	0.00500	0.010	U		121067-005	SW846-6020B
	Barium	0.0549	0.000670	0.00400	2.00			121067-005	SW846-6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		121067-005	SW846-6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		121067-005	SW846-6020B
	Calcium	83.3	0.800	2.00	NE		J	121067-005	SW846-6020B
	Chromium	0.00341	0.00300	0.0100	0.100	J		121067-005	SW846-6020B
	Cobalt	ND	0.000300	0.00100	NE	U		121067-005	SW846-6020B
	Copper	0.000472	0.000300	0.00200	NE	J	0.002U	121067-005	SW846-6020B
	Iron	ND	0.0330	0.100	NE	U		121067-005	SW846-6020B
	Lead	ND	0.000500	0.00200	NE	U		121067-005	SW846-6020B
	Magnesium	15.4	0.0100	0.0300	NE		J	121067-005	SW846-6020B
	Manganese	ND	0.00100	0.00500	NE	U		121067-005	SW846-6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		121067-005	SW846-7470A
	Molybdenum	0.00167	0.000200	0.00100	NE			121067-005	SW846-6020B
	Nickel	ND	0.000600	0.00200	NE	U		121067-005	SW846-6020B
	Potassium	1.98	0.0800	0.300	NE			121067-005	SW846-6020B
	Selenium	0.00457	0.00150	0.00500	0.050	J		121067-005	SW846-6020B
	Silver	ND	0.000300	0.00100	NE	U		121067-005	SW846-6020B
	Sodium	22.9	0.0800	0.250	NE			121067-005	SW846-6020B
	Thallium	ND	0.000600	0.00200	0.002	U		121067-005	SW846-6020B
	Uranium	0.00224	0.0000670	0.000200	0.030			121067-005	SW846-6020B
	Vanadium	0.00826	0.00330	0.0200	NE	B, J	0.02U	121067-005	SW846-6020B
	Zinc	ND	0.00330	0.0200	NE	U		121067-005	SW846-6020B

Refer to notes on page 6C-47.

Table 6C-5 (continued)
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TJA-6	Aluminum	ND	0.0193	0.0500	NE	U		121033-005	SW846-6020B
29-Aug-23	Antimony	ND	0.00100	0.00300	0.006	U		121033-005	SW846-6020B
	Arsenic	ND	0.00200	0.00500	0.010	U		121033-005	SW846-6020B
	Barium	0.0676	0.000670	0.00400	2.00			121033-005	SW846-6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		121033-005	SW846-6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		121033-005	SW846-6020B
	Calcium	62.0	0.800	2.00	NE			121033-005	SW846-6020B
	Chromium	ND	0.00300	0.0100	0.100	U		121033-005	SW846-6020B
	Cobalt	ND	0.000300	0.00100	NE	U		121033-005	SW846-6020B
	Copper	ND	0.000300	0.00200	NE	U		121033-005	SW846-6020B
	Iron	0.0906	0.0330	0.100	NE	J		121033-005	SW846-6020B
	Lead	ND	0.000500	0.00200	NE	U		121033-005	SW846-6020B
	Magnesium	12.3	0.0100	0.0300	NE			121033-005	SW846-6020B
	Manganese	ND	0.00100	0.00500	NE	U		121033-005	SW846-6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		121033-005	SW846-7470A
	Molybdenum	0.00208	0.000200	0.00100	NE			121033-005	SW846-6020B
	Nickel	ND	0.000600	0.00200	NE	U		121033-005	SW846-6020B
	Potassium	2.32	0.0800	0.300	NE			121033-005	SW846-6020B
	Selenium	ND	0.00150	0.00500	0.050	U		121033-005	SW846-6020B
	Silver	ND	0.000300	0.00100	NE	U		121033-005	SW846-6020B
	Sodium	23.8	0.0800	0.250	NE			121033-005	SW846-6020B
	Thallium	ND	0.000600	0.00200	0.002	U		121033-005	SW846-6020B
	Uranium	0.00314	0.0000670	0.000200	0.030			121033-005	SW846-6020B
	Vanadium	0.00848	0.00330	0.0200	NE	J		121033-005	SW846-6020B
	Zinc	ND	0.00330	0.0200	NE	U		121033-005	SW846-6020B

Refer to notes on page 6C-47.

Table 6C-5 (continued)
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TJA-7	Aluminum	ND	0.0193	0.0500	NE	U		121075-005	SW846-6020B
22-Sep-23	Antimony	ND	0.00100	0.00300	0.006	U		121075-005	SW846-6020B
	Arsenic	0.00259	0.00200	0.00500	0.010	J		121075-005	SW846-6020B
	Barium	0.236	0.000670	0.00400	2.00			121075-005	SW846-6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		121075-005	SW846-6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		121075-005	SW846-6020B
	Calcium	68.6	0.400	1.00	NE			121075-005	SW846-6020B
	Chromium	ND	0.00300	0.0100	0.100	U		121075-005	SW846-6020B
	Cobalt	0.00119	0.000300	0.00100	NE			121075-005	SW846-6020B
	Copper	0.000342	0.000300	0.00200	NE	J		121075-005	SW846-6020B
	Iron	0.0484	0.0330	0.100	NE	J		121075-005	SW846-6020B
	Lead	ND	0.000500	0.00200	NE	U		121075-005	SW846-6020B
	Magnesium	13.2	0.0100	0.0300	NE			121075-005	SW846-6020B
	Manganese	ND	0.00100	0.00500	NE	U		121075-005	SW846-6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		121075-005	SW846-7470A
	Molybdenum	0.00162	0.000200	0.00100	NE			121075-005	SW846-6020B
	Nickel	ND	0.000600	0.00200	NE	U		121075-005	SW846-6020B
	Potassium	2.03	0.0800	0.300	NE			121075-005	SW846-6020B
	Selenium	0.00469	0.00150	0.00500	0.050	J		121075-005	SW846-6020B
	Silver	ND	0.000300	0.00100	NE	U		121075-005	SW846-6020B
	Sodium	19.9	0.0800	0.250	NE			121075-005	SW846-6020B
	Thallium	ND	0.000600	0.00200	0.002	U		121075-005	SW846-6020B
	Uranium	0.00178	0.0000670	0.000200	0.030			121075-005	SW846-6020B
	Vanadium	0.00768	0.00330	0.0200	NE	J		121075-005	SW846-6020B
	Zinc	ND	0.00330	0.0200	NE	U		121075-005	SW846-6020B

Refer to notes on page 6C-47.

Table 6C-5 (concluded)
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
WYO-3	Aluminum	ND	0.0193	0.0500	NE	U		121036-005	SW846-6020B
30-Aug-23	Antimony	ND	0.00100	0.00300	0.006	U		121036-005	SW846-6020B
	Arsenic	ND	0.00200	0.00500	0.010	U		121036-005	SW846-6020B
	Barium	0.0513	0.000670	0.00400	2.00			121036-005	SW846-6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		121036-005	SW846-6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		121036-005	SW846-6020B
	Calcium	70.7	0.800	2.00	NE			121036-005	SW846-6020B
	Chromium	ND	0.00300	0.0100	0.100	U		121036-005	SW846-6020B
	Cobalt	ND	0.000300	0.00100	NE	U		121036-005	SW846-6020B
	Copper	ND	0.000300	0.00200	NE	U		121036-005	SW846-6020B
	Iron	ND	0.0330	0.100	NE	U		121036-005	SW846-6020B
	Lead	ND	0.000500	0.00200	NE	U		121036-005	SW846-6020B
	Magnesium	13.8	0.0100	0.0300	NE			121036-005	SW846-6020B
	Manganese	ND	0.00100	0.00500	NE	U		121036-005	SW846-6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		121036-005	SW846-7470A
	Molybdenum	0.00235	0.000200	0.00100	NE			121036-005	SW846-6020B
	Nickel	ND	0.000600	0.00200	NE	U		121036-005	SW846-6020B
	Potassium	2.50	0.0800	0.300	NE			121036-005	SW846-6020B
	Selenium	0.00157	0.00150	0.00500	0.050	J		121036-005	SW846-6020B
	Silver	ND	0.000300	0.00100	NE	U		121036-005	SW846-6020B
	Sodium	28.4	0.0800	0.250	NE			121036-005	SW846-6020B
	Thallium	ND	0.000600	0.00200	0.002	U		121036-005	SW846-6020B
	Uranium	0.00394	0.0000670	0.000200	0.030			121036-005	SW846-6020B
	Vanadium	0.00889	0.00330	0.0200	NE	J		121036-005	SW846-6020B
	Zinc	ND	0.00330	0.0200	NE	U		121036-005	SW846-6020B

Refer to notes on page 6C-47.

Table 6C-6
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA1-W-01	Americium-241	-1.21 ± 8.26	13.5	6.52	NE	U	BD	121040-006	EPA 901.1
05-Sep-23	Cesium-137	0.918 ± 1.85	3.27	1.55	NE	U	BD	121040-006	EPA 901.1
	Cobalt-60	-0.360 ± 1.62	2.94	1.34	NE	U	BD	121040-006	EPA 901.1
	Potassium-40	-2.90 ± 44.2	48.1	22.7	NE	U	BD	121040-006	EPA 901.1
	Gross Alpha	1.69	NA	NA	15 pCi/L	NA	None	121040-007	EPA 900.0/SW846-9310
	Gross Beta	3.62 ± 0.883	1.31	0.634	4 mrem/yr		J	121040-007	EPA 900.0/SW846-9310
	Tritium	20.0 ± 94.6	165	78.4	NE	U	BD	121040-008	EPA 906.0 M
TA1-W-02	Americium-241	-2.56 ± 9.50	16.6	8.03	NE	U	BD	121016-006	EPA 901.1
23-Aug-23	Cesium-137	0.453 ± 2.09	3.59	1.71	NE	U	BD	121016-006	EPA 901.1
	Cobalt-60	0.736 ± 2.30	4.09	1.91	NE	U	BD	121016-006	EPA 901.1
	Potassium-40	22.9 ± 65.3	37.2	17.3	NE	U	BD	121016-006	EPA 901.1
	Gross Alpha	0.18	NA	NA	15 pCi/L	NA	None	121016-007	EPA 900.0/SW846-9310
	Gross Beta	2.79 ± 0.595	0.826	0.396	4 mrem/yr			121016-007	EPA 900.0/SW846-9310
	Tritium	-10.2 ± 71.0	141	61.1	NE	U	BD	121016-008	EPA 906.0 M
TA1-W-04	Americium-241	4.46 ± 10.6	14.9	7.24	NE	U	BD	121023-006	EPA 901.1
25-Aug-23	Cesium-137	-4.05 ± 4.14	3.78	1.81	NE	U	BD	121023-006	EPA 901.1
	Cobalt-60	-0.512 ± 1.75	3.10	1.43	NE	U	BD	121023-006	EPA 901.1
	Potassium-40	-23.6 ± 39.7	51.0	24.3	NE	U	BD	121023-006	EPA 901.1
	Gross Alpha	0.64	NA	NA	15 pCi/L	NA	None	121023-007	EPA 900.0/SW846-9310
	Gross Beta	3.39 ± 0.980	1.51	0.734	4 mrem/yr		J	121023-007	EPA 900.0/SW846-9310
	Tritium	-43.8 ± 71.9	144	64.8	NE	U	BD	121023-008	EPA 906.0 M
TA1-W-05	Americium-241	-6.51 ± 9.37	14.1	6.82	NE	U	BD	121019-006	EPA 901.1
24-Aug-23	Cesium-137	-0.542 ± 1.81	3.10	1.47	NE	U	BD	121019-006	EPA 901.1
	Cobalt-60	0.864 ± 2.09	3.52	1.62	NE	U	BD	121019-006	EPA 901.1
	Potassium-40	26.7 ± 55.1	30.9	14.1	NE	U	BD	121019-006	EPA 901.1
	Gross Alpha	9.11	NA	NA	15 pCi/L	NA	None	121019-007	EPA 900.0/SW846-9310
	Gross Beta	2.81 ± 0.746	1.11	0.534	4 mrem/yr		J	121019-007	EPA 900.0/SW846-9310
	Tritium	28.7 ± 80.8	144	64.8	NE	U	BD	121019-008	EPA 906.0 M
TA1-W-06	Americium-241	3.67 ± 6.28	10.2	4.94	NE	U	BD	121057-006	EPA 901.1
12-Sep-23	Cesium-137	-1.73 ± 3.32	2.87	1.35	NE	U	BD	121057-006	EPA 901.1
	Cobalt-60	0.275 ± 1.74	3.16	1.46	NE	U	BD	121057-006	EPA 901.1
	Potassium-40	-15.0 ± 39.9	40.9	19.2	NE	U	BD	121057-006	EPA 901.1
	Gross Alpha	0.71	NA	NA	15 pCi/L	NA	None	121057-007	EPA 900.0/SW846-9310
	Gross Beta	3.10 ± 1.23	1.94	0.938	4 mrem/yr		J	121057-007	EPA 900.0/SW846-9310
	Tritium	24.9 ± 105	182	86.7	NE	U	BD	121057-008	EPA 906.0 M

Refer to notes on page 6C-47.

Table 6C-6 (continued)
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA1-W-08	Americium-241	-4.81 ± 14.3	22.9	11.0	NE	U	BD	121059-006	EPA 901.1
13-Sep-19	Cesium-137	-0.563 ± 1.53	2.60	1.21	NE	U	BD	121059-006	EPA 901.1
	Cobalt-60	-1.81 ± 1.88	2.74	1.23	NE	U	BD	121059-006	EPA 901.1
	Potassium-40	15.8 ± 38.7	49.5	23.3	NE	U	BD	121059-006	EPA 901.1
	Gross Alpha	1.17	NA	NA	15 pCi/L	NA	None	121059-007	EPA 900.0/SW846-9310
	Gross Beta	5.71 ± 2.43	3.85	1.86	4 mrem/yr		J	121059-007	EPA 900.0/SW846-9310
	Tritium	-7.62 ± 102	180	85.9	NE	U	BD	121059-008	EPA 906.0 M
TA2-NW1-595	Americium-241	2.14 ± 13.1	16.5	7.94	NE	U	BD	121048-006	EPA 901.1
07-Sep-23	Cesium-137	-3.84 ± 3.45	2.95	1.38	NE	U	BD	121048-006	EPA 901.1
	Cobalt-60	-1.03 ± 1.68	2.84	1.27	NE	U	BD	121048-006	EPA 901.1
	Potassium-40	25.7 ± 45.4	29.9	13.4	NE	U	BD	121048-006	EPA 901.1
	Gross Alpha	0.14	NA	NA	15 pCi/L	NA	None	121048-007	EPA 900.0/SW846-9310
	Gross Beta	2.88 ± 0.808	1.21	0.584	4 mrem/yr		J	121048-007	EPA 900.0/SW846-9310
	Tritium	-31.9 ± 102	183	87.4	NE	U	BD	121048-008	EPA 906.0 M
TA2-W-01	Americium-241	8.06 ± 9.06	14.3	6.89	NE	U	BD	121052-006	EPA 901.1
11-Sep-23	Cesium-137	1.10 ± 2.48	3.11	1.47	NE	U	BD	121052-006	EPA 901.1
	Cobalt-60	2.44 ± 2.03	3.55	1.64	NE	U	BD	121052-006	EPA 901.1
	Potassium-40	-12.5 ± 44.3	45.8	21.5	NE	U	BD	121052-006	EPA 901.1
	Gross Alpha	0.83	NA	NA	15 pCi/L	NA	None	121052-007	EPA 900.0/SW846-9310
	Gross Beta	2.70 ± 1.05	1.64	0.790	4 mrem/yr		J	121052-007	EPA 900.0/SW846-9310
	Tritium	-83.4 ± 97.0	178	85.1	NE	U	BD	121052-008	EPA 906.0 M
TA2-W-19	Americium-241	3.00 ± 13.6	23.4	11.2	NE	U	BD	121061-006	EPA 901.1
19-Sep-23	Cesium-137	1.44 ± 2.28	3.68	1.73	NE	U	BD	121061-006	EPA 901.1
	Cobalt-60	-0.228 ± 2.35	4.19	1.92	NE	U	BD	121061-006	EPA 901.1
	Potassium-40	53.2 ± 37.2	58.4	27.4	NE	U	BD	121061-006	EPA 901.1
	Gross Alpha	0.57	NA	NA	15 pCi/L	NA	None	121061-007	EPA 900.0/SW846-9310
	Gross Beta	2.16 ± 0.722	1.11	0.533	4 mrem/yr		J	121061-007	EPA 900.0/SW846-9310
	Tritium	0.101 ± 69.3	131	58.1	NE	U	BD	121061-008	EPA 906.0 M
TA2-W-24	Americium-241	8.50 ± 15.5	25.4	12.2	NE	U	BD	121031-006	EPA 901.1
28-Aug-23	Cesium-137	0.0365 ± 1.83	3.22	1.52	NE	U	BD	121031-006	EPA 901.1
	Cobalt-60	0.0445 ± 1.84	3.42	1.57	NE	U	BD	121031-006	EPA 901.1
	Potassium-40	41.8 ± 43.7	32.4	14.7	NE	X	R	121031-006	EPA 901.1
	Gross Alpha	2.46	NA	NA	15 pCi/L	NA	None	121031-007	EPA 900.0/SW846-9310
	Gross Beta	4.86 ± 0.704	0.909	0.438	4 mrem/yr			121031-007	EPA 900.0/SW846-9310
	Tritium	42.2 ± 83.3	146	65.3	NE	U	BD	121031-008	EPA 906.0 M

Refer to notes on page 6C-47.

Table 6C-6 (continued)
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d] (pCi/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TA2-W-25	Americium-241	6.05 ± 14.1	22.1	10.7	NE	U	BD	121044-006	EPA 901.1
06-Sep-23	Cesium-137	1.72 ± 1.88	3.20	1.51	NE	U	BD	121044-006	EPA 901.1
	Cobalt-60	1.92 ± 2.05	3.72	1.72	NE	U	BD	121044-006	EPA 901.1
	Potassium-40	31.3 ± 45.7	33.0	15.1	NE	U	BD	121044-006	EPA 901.1
	Gross Alpha	-2.11	NA	NA	15 pCi/L	NA	None	121044-007	EPA 900.0/SW846-9310
	Gross Beta	2.21 ± 0.794	1.24	0.602	4 mrem/yr		J	121044-007	EPA 900.0/SW846-9310
	Tritium	-94.8 ± 98.4	182	86.9	NE	U	BD	121044-008	EPA 906.0 M
TA2-W-26	Americium-241	10.9 ± 14.4	22.0	10.7	NE	U	BD	121079-006	EPA 901.1
26-Sep-23	Cesium-137	3.78 ± 2.69	3.31	1.55	NE	X	R	121079-006	EPA 901.1
	Cobalt-60	-0.430 ± 2.29	4.12	1.90	NE	U	BD	121079-006	EPA 901.1
	Potassium-40	-14.4 ± 48.6	52.8	24.8	NE	U	BD	121079-006	EPA 901.1
	Gross Alpha	0.13	NA	NA	15 pCi/L	NA	None	121079-007	EPA 900.0/SW846-9310
	Gross Beta	3.43 ± 0.816	1.20	0.579	4 mrem/yr		J	121079-007	EPA 900.0/SW846-9310
	Tritium	41.4 ± 74.8	130	57.9	NE	U	BD	121079-008	EPA 906.0 M
TA2-W-27	Americium-241	5.90 ± 15.3	23.9	11.6	NE	U	BD	121054-006	EPA 901.1
18-Sep-23	Cesium-137	0.940 ± 1.85	3.23	1.53	NE	U	BD	121054-006	EPA 901.1
	Cobalt-60	1.12 ± 1.85	3.47	1.59	NE	U	BD	121054-006	EPA 901.1
	Potassium-40	54.1 ± 48.2	33.0	15.1	NE		J	121054-006	EPA 901.1
	Gross Alpha	-0.36	NA	NA	15 pCi/L	NA	None	121054-007	EPA 900.0/SW846-9310
	Gross Beta	2.35 ± 1.37	2.24	1.09	4 mrem/yr		J	121054-007	EPA 900.0/SW846-9310
	Tritium	-35.9 ± 64.5	132	58.4	NE	U	BD	121054-008	EPA 906.0 M
TA2-W-28	Americium-241	-1.01 ± 13.4	22.8	10.9	NE	U	BD	121070-006	EPA 901.1
21-Sep-23	Cesium-137	2.73 ± 2.44	3.87	1.83	NE	U	BD	121070-006	EPA 901.1
	Cobalt-60	-2.32 ± 2.63	3.86	1.76	NE	U	BD	121070-006	EPA 901.1
	Potassium-40	37.6 ± 31.6	54.1	25.3	NE	U	BD	121070-006	EPA 901.1
	Gross Alpha	0.60	NA	NA	15 pCi/L	NA	None	121070-007	EPA 900.0/SW846-9310
	Gross Beta	2.13 ± 0.850	1.34	0.650	4 mrem/yr		J	121070-007	EPA 900.0/SW846-9310
	Tritium	53.8 ± 77.0	131	58.1	NE	U	BD	121070-008	EPA 906.0 M
TJA-2	Americium-241	2.68 ± 19.9	19.7	9.51	NE	U	BD	121063-006	EPA 901.1
20-Sep-23	Cesium-137	0.478 ± 6.72	3.67	1.73	NE	U	BD	121063-006	EPA 901.1
	Cobalt-60	1.22 ± 2.17	4.11	1.89	NE	U	BD	121063-006	EPA 901.1
	Potassium-40	-41.0 ± 54.6	52.6	24.6	NE	U	BD	121063-006	EPA 901.1
	Gross Alpha	-0.10	NA	NA	15 pCi/L	NA	None	121063-007	EPA 900.0/SW846-9310
	Gross Beta	1.68 ± 0.756	1.20	0.579	4 mrem/yr		J	121063-007	EPA 900.0/SW846-9310
	Tritium	-2.33 ± 69.2	132	58.3	NE	U	BD	121063-008	EPA 906.0 M

Refer to notes on page 6C-47.

Table 6C-6 (continued)
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d] (pCi/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
TJA-3 08-Sep-23	Americium-241	-3.35 ± 9.27	16.0	7.76	NE	U	BD	121050-006	EPA 901.1
	Cesium-137	0.498 ± 2.13	3.65	1.74	NE	U	BD	121050-006	EPA 901.1
	Cobalt-60	0.355 ± 1.99	3.58	1.65	NE	U	BD	121050-006	EPA 901.1
	Potassium-40	29.9 ± 63.5	36.5	16.9	NE	U	BD	121050-006	EPA 901.1
	Gross Alpha	0.38	NA	NA	15 pCi/L	NA	None	121050-007	EPA 900.0/SW846-9310
	Gross Beta	2.90 ± 0.614	0.861	0.414	4 mrem/yr		J	121050-007	EPA 900.0/SW846-9310
	Tritium	53.9 ± 107	182	86.6	NE	U	BD	121050-008	EPA 906.0 M
TJA-4 22-Sep-23	Americium-241	0.876 ± 3.82	6.62	3.20	NE	U	BD	121073-006	EPA 901.1
	Cesium-137	0.590 ± 1.65	2.97	1.40	NE	U	BD	121073-006	EPA 901.1
	Cobalt-60	-0.404 ± 1.56	2.84	1.29	NE	U	BD	121073-006	EPA 901.1
	Potassium-40	13.1 ± 41.0	28.0	12.7	NE	U	BD	121073-006	EPA 901.1
	Gross Alpha	1.94	NA	NA	15 pCi/L	NA	None	121073-007	EPA 900.0/SW846-9310
	Gross Beta	3.31 ± 0.952	1.49	0.726	4 mrem/yr		J	121073-007	EPA 900.0/SW846-9310
	Tritium	-5.93 ± 68.3	131	58.0	NE	U	BD	121073-008	EPA 906.0 M
TJA-5 21-Sep-23	Americium-241	5.20 ± 7.01	11.8	5.72	NE	U	BD	121067-006	EPA 901.1
	Cesium-137	0.294 ± 1.40	2.49	1.17	NE	U	BD	121067-006	EPA 901.1
	Cobalt-60	-0.669 ± 1.43	2.45	1.11	NE	U	BD	121067-006	EPA 901.1
	Potassium-40	8.85 ± 51.3	27.0	12.3	NE	U	BD	121067-006	EPA 901.1
	Gross Alpha	1.87	NA	NA	15 pCi/L	NA	None	121067-007	EPA 900.0/SW846-9310
	Gross Beta	1.83 ± 0.603	0.892	0.426	4 mrem/yr		J	121067-007	EPA 900.0/SW846-9310
	Tritium	68.3 ± 80.0	133	58.8	NE	U	BD	121067-008	EPA 906.0 M
TJA-6 29-Aug-23	Americium-241	3.54 ± 3.94	5.97	2.90	NE	U	BD	121033-006	EPA 901.1
	Cesium-137	2.24 ± 3.48	4.98	2.34	NE	U	BD	121033-006	EPA 901.1
	Cobalt-60	-2.64 ± 3.51	5.33	2.42	NE	U	BD	121033-006	EPA 901.1
	Potassium-40	-73.2 ± 68.0	80.8	38.0	NE	U	BD	121033-006	EPA 901.1
	Gross Alpha	0.90	NA	NA	15 pCi/L	NA	None	121033-007	EPA 900.0/SW846-9310
	Gross Beta	3.05 ± 0.709	1.02	0.490	4 mrem/yr		J	121033-007	EPA 900.0/SW846-9310
	Tritium	-24.3 ± 91.3	163	77.7	NE	U	BD	121033-008	EPA 906.0 M
TJA-7 22-Sep-23	Americium-241	4.65 ± 16.5	29.8	14.4	NE	U	BD	121075-006	EPA 901.1
	Cesium-137	2.14 ± 2.24	3.87	1.82	NE	U	BD	121075-006	EPA 901.1
	Cobalt-60	0.598 ± 2.24	4.24	1.94	NE	U	BD	121075-006	EPA 901.1
	Potassium-40	-39.8 ± 46.8	59.0	27.7	NE	U	BD	121075-006	EPA 901.1
	Gross Alpha	1.36	NA	NA	15 pCi/L	NA	None	121075-007	EPA 900.0/SW846-9310
	Gross Beta	2.12 ± 0.528	0.744	0.355	4 mrem/yr		J	121075-007	EPA 900.0/SW846-9310
	Tritium	6.99 ± 70.1	131	58.0	NE	U	BD	121075-008	EPA 906.0 M

Refer to notes on page 6C-47.

Table 6C-6 (concluded)
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, and Tritium Results, Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d] (pCi/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
WYO-3	Americium-241	-1.71 ± 3.34	5.24	2.54	NE	U	BD	121036-006	EPA 901.1
30-Aug-23	Cesium-137	1.99 ± 4.27	4.41	2.08	NE	U	BD	121036-006	EPA 901.1
	Cobalt-60	1.60 ± 2.50	4.62	2.12	NE	U	BD	121036-006	EPA 901.1
	Potassium-40	-7.08 ± 42.7	57.4	26.8	NE	U	BD	121036-006	EPA 901.1
	Gross Alpha	0.89	NA	NA	15 pCi/L	NA	None	121036-007	EPA 900.0/SW846-9310
	Gross Beta	3.88 ± 0.861	1.23	0.595	4 mrem/yr			121036-007	EPA 900.0/SW846-9310
	Tritium	-102 ± 86.7	163	77.6	NE	U	BD	121036-008	EPA 906.0 M

Refer to notes on page 6C-47.

Table 6C-7
Summary of Field Water Quality Measurements[h], Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Sample Date	Temperature (^{0}C)	Specific Conductivity (μmho/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
TA1-W-06	08-Mar-23	17.92	773.53	192.6	7.61	3.64	88.75	6.94
TA2-W-01	09-Mar-23	19.60	566.85	190.2	7.70	0.87	93.53	7.05
TA2-W-19	13-Mar-23	17.98	536.32	190.2	7.70	0.66	103.71	8.13
TA2-W-26	20-Mar-23	16.62	524.65	166.3	7.63	4.19	87.37	7.29
TA2-W-27	10-Mar-23	18.67	778.99	191.4	7.63	0.78	93.11	7.15
TA2-W-28	15-Mar-23	18.92	462.91	198.4	7.64	0.66	99.16	7.58
TJA-2	14-Mar-23	17.53	505.46	200.9	7.64	0.30	98.41	7.71
TJA-3	07-Mar-23	18.87	484.75	194.0	7.49	0.13	87.09	6.67
TJA-4	16-Mar-23	16.03	476.44	187.7	7.57	0.81	68.54	5.66
TJA-6	06-Mar-23	19.89	451.59	188.5	7.63	3.64	76.45	5.60
TJA-7	21-Mar-23	14.08	429.73	191.9	7.63	0.48	83.16	7.27
TA2-W-19	01-Jun-23	19.66	534.24	163.1	7.62	0.35	101.66	7.46
TA2-W-26	12-Jun-23	20.49	582.02	181.7	7.53	1.94	100.70	7.30
TA2-W-28	06-Jun-23	19.98	494.45	148.3	7.63	0.61	101.21	7.44
TJA-2	05-Jun-23	19.99	552.07	171.7	7.62	0.56	98.59	7.26
TJA-3	31-May-23	21.34	499.03	167.4	7.44	0.22	90.84	6.54
TJA-4	07-Jun-23	20.29	544.32	158.0	7.57	1.62	70.03	5.11
TJA-7	08-Jun-23	19.76	485.72	153.5	7.62	0.66	95.47	7.04
TA1-W-01	05-Sep-23	21.42	487.93	169.7	7.51	0.20	87.80	6.29
TA1-W-02	23-Aug-23	21.68	485.12	155.1	7.47	1.66	79.87	5.65
TA1-W-04	25-Aug-23	20.80	451.30	171.9	7.45	0.10	83.68	6.08
TA1-W-05	24-Aug-23	20.59	542.13	173.8	7.30	0.53	100.38	7.31
TA1-W-06	12-Sep-23	18.12	803.34	162.4	7.57	1.20	91.79	7.08
TA1-W-08	13-Sep-23	17.89	1784.4	140.7	7.46	0.02	94.07	7.21
TA2-NW1-595	07-Sep-23	21.41	630.76	171.7	7.55	0.13	111.53	8.04
TA2-W-01	11-Sep-23	21.26	616.83	127.8	7.65	0.02	95.08	7.20
TA2-W-19	19-Sep-23	18.37	520.73	124.0	7.67	0.03	110.94	8.43
TA2-W-24	28-Aug-23	21.60	422.38	144.2	7.52	0.49	58.15	4.18
TA2-W-25	06-Sep-23	20.89	484.89	142.1	7.55	0.94	104.15	7.56
TA2-W-26	26-Sep-23	19.87	719.10	215.6	7.55	4.29	100.62	7.46
TA2-W-27	18-Sep-23	20.60	790.23	94.5	7.57	0.08	100.39	7.32
TA2-W-28	21-Sep-23	19.04	479.63	103.2	7.57	0.44	89.87	6.83

Refer to notes on page 6C-47.

Table 6C-7 (concluded)
Summary of Field Water Quality Measurements[h], Tijeras Arroyo Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Sample Date	Temperature (^0C)	Specific Conductivity (μmho/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
TJA-2	20-Sep-23	18.39	529.03	160.1	7.63	0.02	100.15	7.63
TJA-3	08-Sep-23	21.77	497.19	166.1	7.50	0.08	94.51	6.76
TJA-4	22-Sep-23	19.74	533.63	147.1	7.59	0.14	75.25	5.58
TJA-5	21-Sep-23	19.66	541.62	170.2	7.62	0.02	118.05	8.76
TJA-6	29-Aug-23	22.72	455.99	166.5	7.50	0.34	83.17	5.83
TJA-7	22-Sep-23	19.15	528.10	87.5	7.65	0.66	91.02	7.26
WYO-3	30-Aug-23	21.03	489.47	186.0	7.59	0.53	112.82	8.17
TA2-W-19	16-Nov-23	17.55	517.31	180.9	7.44	0.51	103.56	8.02
TA2-W-26	12-Dec-23	17.10	591.81	177.4	7.70	3.65	94.20	7.37
TA2-W-28	27-Nov-23	14.71	401.01	143.5	7.73	1.93	90.99	7.54
TJA-2	17-Nov-23	19.19	547.25	144.4	7.70	0.22	100.60	7.53
TJA-3	15-Nov-23	20.41	469.98	163.4	7.39	0.02	85.31	6.27
TJA-4	28-Nov-23	17.72	526.86	151.8	7.61	0.62	67.26	5.24
TJA-7	29-Nov-23	17.40	441.66	185.7	7.45	0.69	91.81	7.15

Refer to notes on page 6C-47.

Notes for Tijeras Arroyo Groundwater Analytical Results Tables

Green shading denotes monitoring wells that are screened in the Perched Groundwater System.
Purple shading denotes the monitoring well that is screened in the Merging Zone (below the Perching Horizon and above the Regional Aquifer).
Monitoring wells screened in the Regional Aquifer are not shaded.

%	= percent
CFR	= Code of Federal Regulations
EPA	= U.S. Environmental Protection Agency
ID	= identifier
µg/L	= micrograms per liter
mg/L	= milligrams per liter
mrem/yr	= millirem per year
No.	= number
pCi/L	= picocuries per liter

[a]Result or Activity

Result applies to Tables 6C-1, 6C-2, 6C-4, and 6C-5. Activity applies to Table 6C-6.

Activity	= Gross alpha activity measurements were corrected by subtracting out the total uranium activity (40 CFR Part 141). Activities of zero or less are considered to be not detected.
Bold	= Value exceed the established MCL.
ND	= not detected (at MDL).

[b]MDL or MDA

The MDL applies to Tables 6C-1 through 6C-5. MDA applies to Table 6C-6.

MDA	= The minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level.
MDL	= Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
NA	= Not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.

[c]PQL or Critical Level

The PQL applies to Tables 6C-1, 6C-2, 6C-4, and 6C-5. Critical Level applies to Table 6C-6.

Critical Level	= The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero, analyte is matrix specific.
NA	= Not applicable for gross alpha activities. The critical level could not be calculated as the gross alpha activity was corrected by subtracting out the total uranium activity.
PQL	= Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

[d]MCL

MCL = Maximum contaminant level. Established by the EPA Office of Water, National Primary Drinking Water Standards, (EPA, March 2018).

- The total for trihalomethanes (including bromodichloromethane and chloroform) is 80.0 µg/L.

The following are the MCLs for gross alpha particles and beta particles in community water systems:

- 15 pCi/L = Gross alpha particle activity, excluding total uranium (40 CFR Parts 9, 141, and 142, Table 6A-1-4).
- 4 mrem/yr = any combination of beta and/or gamma emitting radionuclides (as dose rate).

NE = Not established.

Notes for Tijeras Arroyo Groundwater Analytical Results Tables (continued)

[e]Lab Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

B	= The analyte was found in the blank above the effective MDL.
J	= Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
N	= Results associated with a spike analysis that was outside control limits.
NA	= Not applicable.
U	= Analyte is absent or below the method detection limit.
X	= Uncertain identification for gamma spectroscopy. %
*	= Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where the concentration falls below the effective PQL.

[f]Validation Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

BD	= Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J	= The associated value is an estimated quantity.
J+	= The associated numerical value is an estimated quantity with a suspected positive bias.
J-	= The associated numerical value is an estimated quantity with a suspected negative bias.
None	= No data validation for corrected gross alpha activity.
U	= The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.
UJ	= The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R	= The data are unusable, and resampling or reanalysis are necessary for verification.

[g]Analytical Method

Rice, E.W., Baird, R.B., Eaton, A.D., and Clesceri, L.S. (2012). *Standard Methods for the Examination of Water and Wastewater*, 23rd ed., 2017. American Public Health Association, American Water Works Association, and Water Environment Federation.

U.S. Environmental Protection Agency. (1980). *Prescribed Procedures for Measurement of Radioactivity in Drinking Water,* EPA-600/4-80-032.

U.S. Environmental Protection Agency. (1984). *Methods for Chemical Analysis of Water and Wastes,* EPA 600-4-79-020.

U.S. Environmental Protection Agency. (1986, as updated). *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* SW-846, 3rd ed., Rev.1.

SM	= Standard Method
SW	= Solid Waste

Notes for Tijeras Arroyo Groundwater Analytical Results Tables (concluded)

[h]**Field Water Quality Measurements**
Field measurements collected prior to sampling.

˚C = degrees Celsius
% Sat = percent saturation
mho/cm = micromhos per centimeter
mg/L = milligrams per liter
mV = millivolts
NTU = nephelometric turbidity units
pH = potential of hydrogen (negative logarithm of the hydrogen ion concentration)

[I] **RPD** = Relative percent difference is calculated with the following equation and rounded to nearest whole number.

$$RPD = \frac{|R_1 - R_2|}{[(R_1 + R_2)/2]} \times 100$$

R_1 = analysis result
R_2 = duplicate analysis result

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Attachment 6D
Tijeras Arroyo Groundwater Plots

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Attachment 6D Plots

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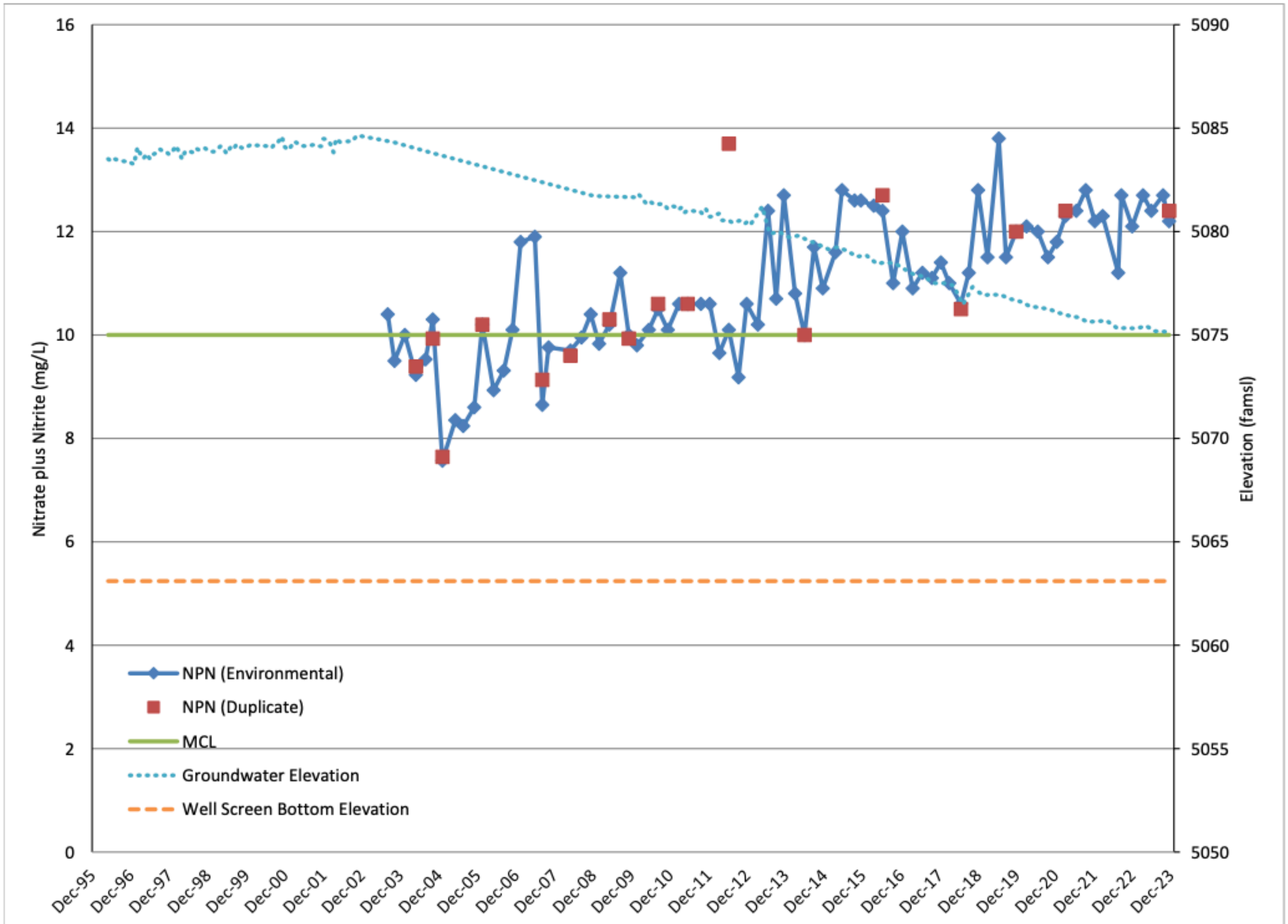

Figure 6D-1
Nitrate plus Nitrite Concentrations, TA2-W-19

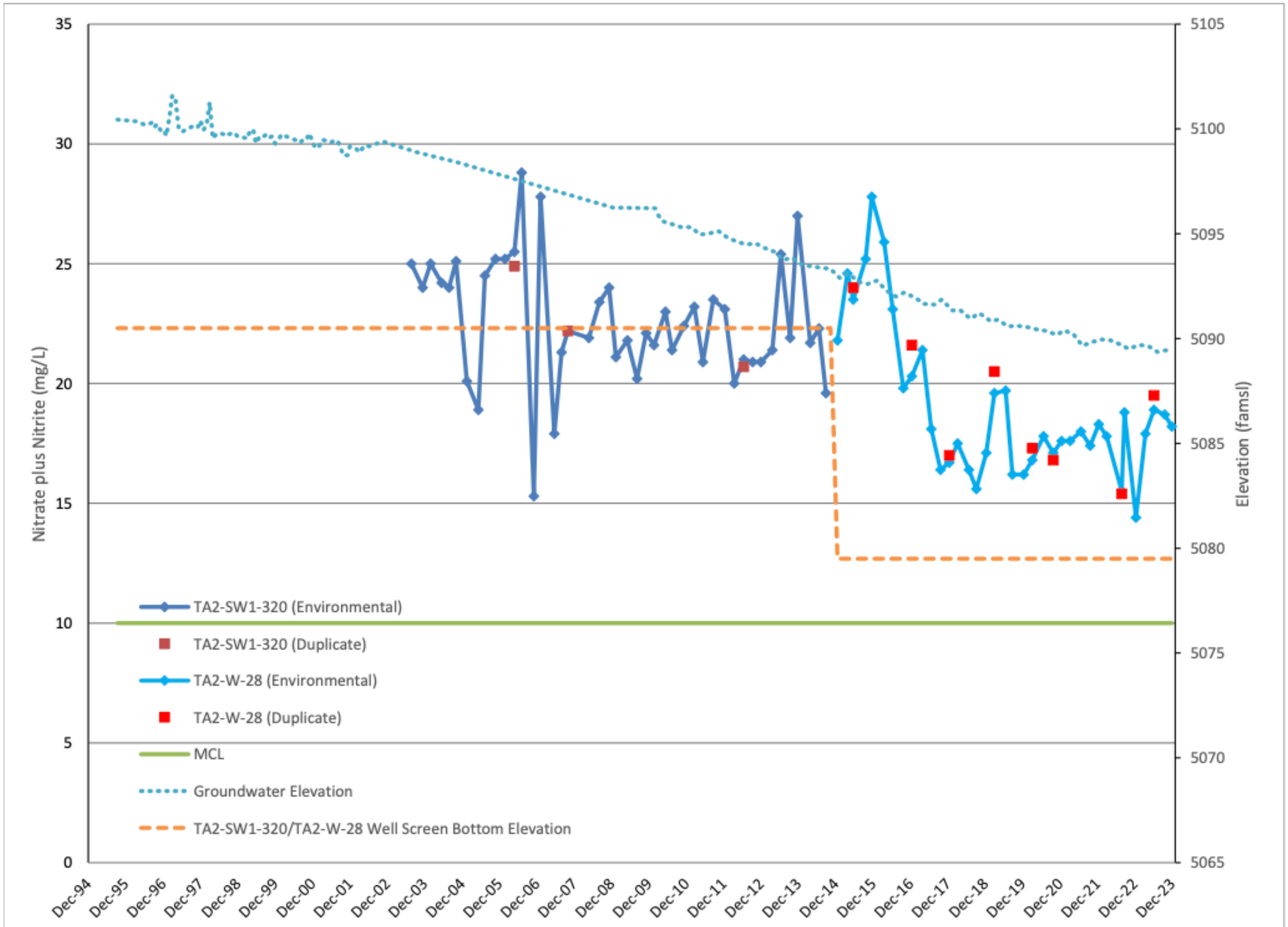

Figure 6D-2
Nitrate plus Nitrite Concentrations, TA2-W-28 and TA2-SW1-320

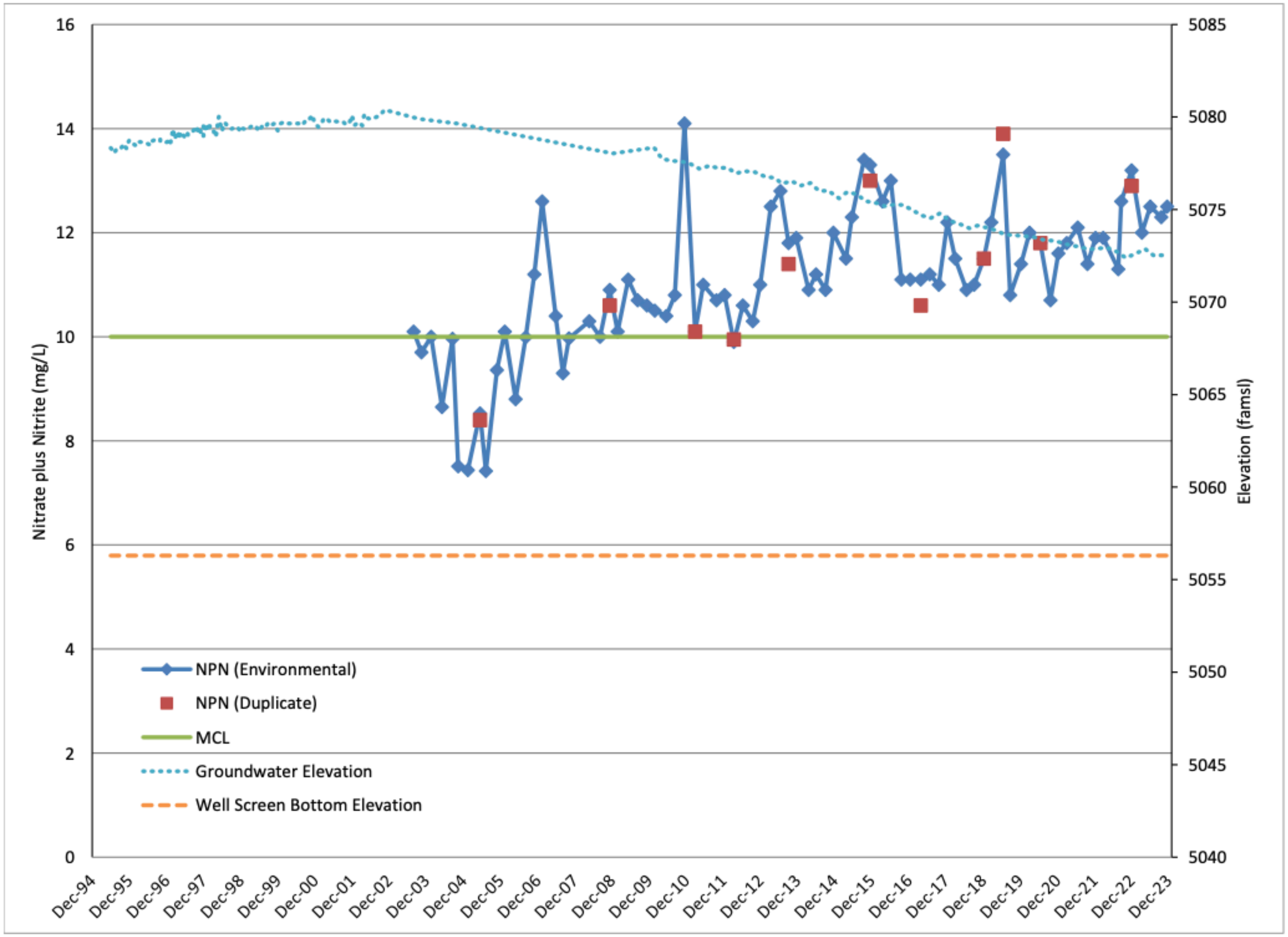

Figure 6D-3
Nitrate plus Nitrite Concentrations, TJA-2

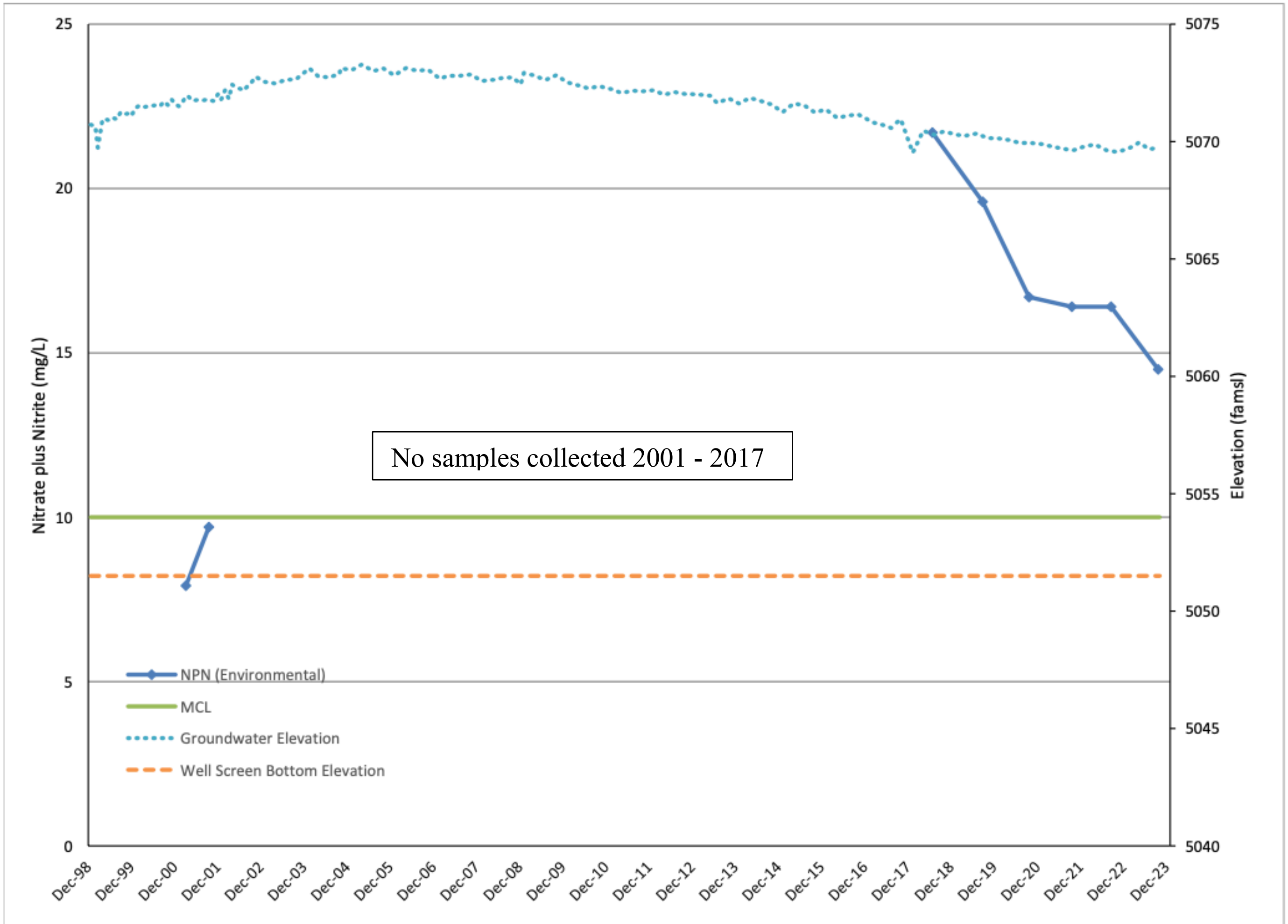

Figure 6D-4
Nitrate plus Nitrite Concentrations, TJA-5

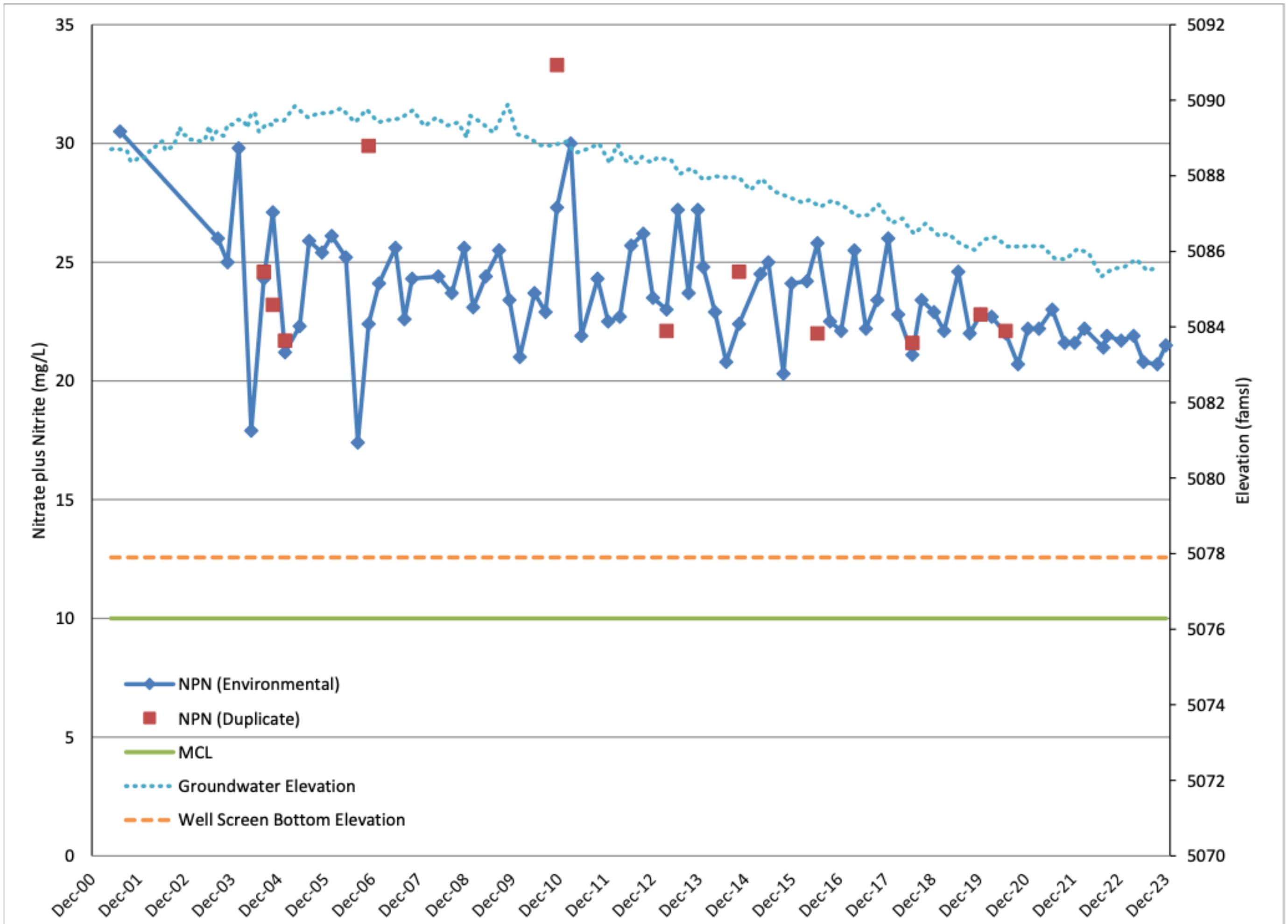

Figure 6D-5
Nitrate plus Nitrite Concentrations, TJA-7

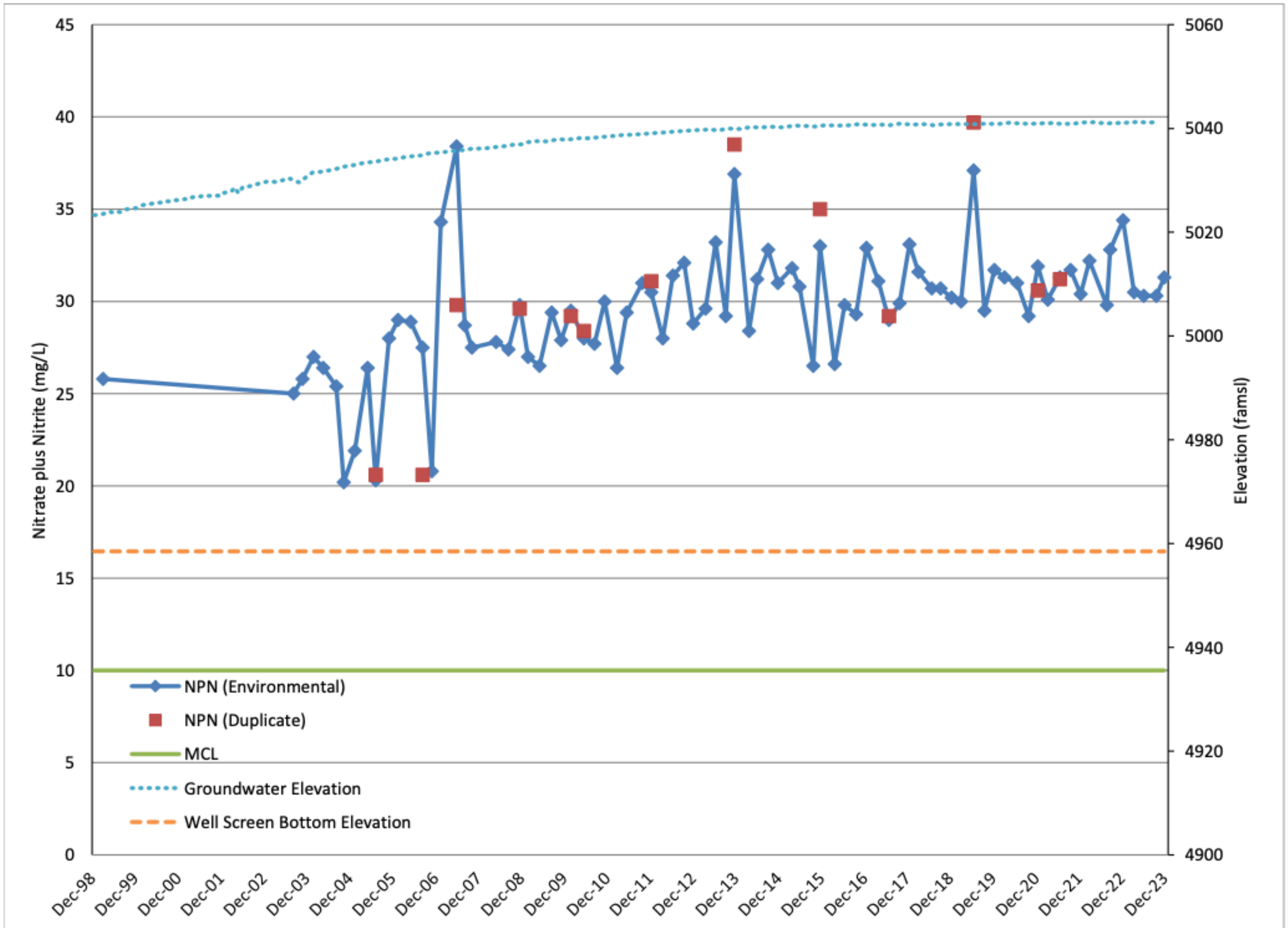

Figure 6D-6
Nitrate plus Nitrite Concentrations, TJA-4

Chapter 6.0
Tijeras Arroyo Groundwater References

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7.0 Burn Site Groundwater Area of Concern

7.1 Introduction

This chapter summarizes the calendar year (CY) 2023 groundwater monitoring activities and results for the Burn Site Groundwater (BSG) Area of Concern (AOC).

Located in the Manzanita Mountains (Figure 7-1), the BSG AOC is an area with low concentrations of nitrate in a fractured bedrock aquifer system. Nitrate has been identified as a constituent of concern (COC) in the groundwater based on detections above the U.S. Environmental Protection Agency (EPA) maximum contaminant level (MCL) in samples collected from several monitoring wells. Since August 1998, the maximum concentration of nitrate detected has been 49.6 milligrams per liter (mg/L). The EPA MCL and State of New Mexico drinking water standard for nitrate (as nitrogen) is 10 mg/L (only EPA MCLs are included in the data tables).

7.1.1 Location

The Coyote Canyon Test Area is located along the eastern part of Kirtland Air Force Base (KAFB). The Burn Site is in Lurance Canyon, one of three canyons located on the eastern edge of the Coyote Canyon Test Area and in the Manzanita Mountains. Two other canyons, Madera Canyon and Sol se Mete Canyon, intersect Lurance Canyon immediately west of the Burn Site. These three canyons are the headwaters of Arroyo del Coyote, which is a tributary to Tijeras Arroyo. Testing activities at the Lurance Canyon Burn Site Testing Facility, which includes the Burn Site, began in 1967.

The BSG AOC is located along the eastern margin of the Albuquerque Basin. The terrain is characterized by large topographic relief exceeding 500 feet (ft). Lurance Canyon, deeply incised into Paleozoic and Precambrian rocks, provides local westward drainage of ephemeral surface water flows to Arroyo del Coyote.

7.1.2 Site History

Groundwater issues at the BSG AOC are primarily associated with two Solid Waste Management Units (SWMUs) that have completed corrective action. The Lurance Canyon Burn Site (SWMU 94) and the nearby Lurance Canyon Explosive Test Site (SWMU 65) have been used since 1967. Most of the operational activities have involved testing the fire survivability of transportation containers, weapon components, simulated weapons, and satellite components. Historical operations (Attachment 7A, Table 7A-1) included open detonation of high explosive (HE) compounds and ammonium-nitrate slurry, along with open burning of HE compounds, liquid-slurry propellants, and solid propellants. Most HE tests occurred between 1967 and 1975 and were completely phased out by the 1980s.

Burn testing began in the early 1970s and has continued to the present. Early burn testing was conducted in unlined pits excavated in native soil and alluvium. By 1975, portable steel burn pans were used for open burning, mostly using jet propellant, fuel grade 4 (JP-4). Several engineered structures, such as the Light Air Transport Accident Resistant Container Unit, were used at the Burn Site. The structures mostly used JP-4 and occasionally used diesel fuel and gasoline to create the high temperatures associated with transportation accidents. In the mid-1990s, jet propellant fuel grade 8 replaced JP-4 as the petroleum fuel used for burn tests. Most test structures have been dismantled. Over the past decade, the amount of testing at the Lurance Canyon Burn Site Testing Facility has been significantly reduced, with most burn tests conducted at the Thermal Test Complex in Technical Area-III. The only remaining test cell is the Fire Laboratory for Accreditation of Modeling by Experiment. Portable burn pans up to 25 ft in diameter are occasionally used.

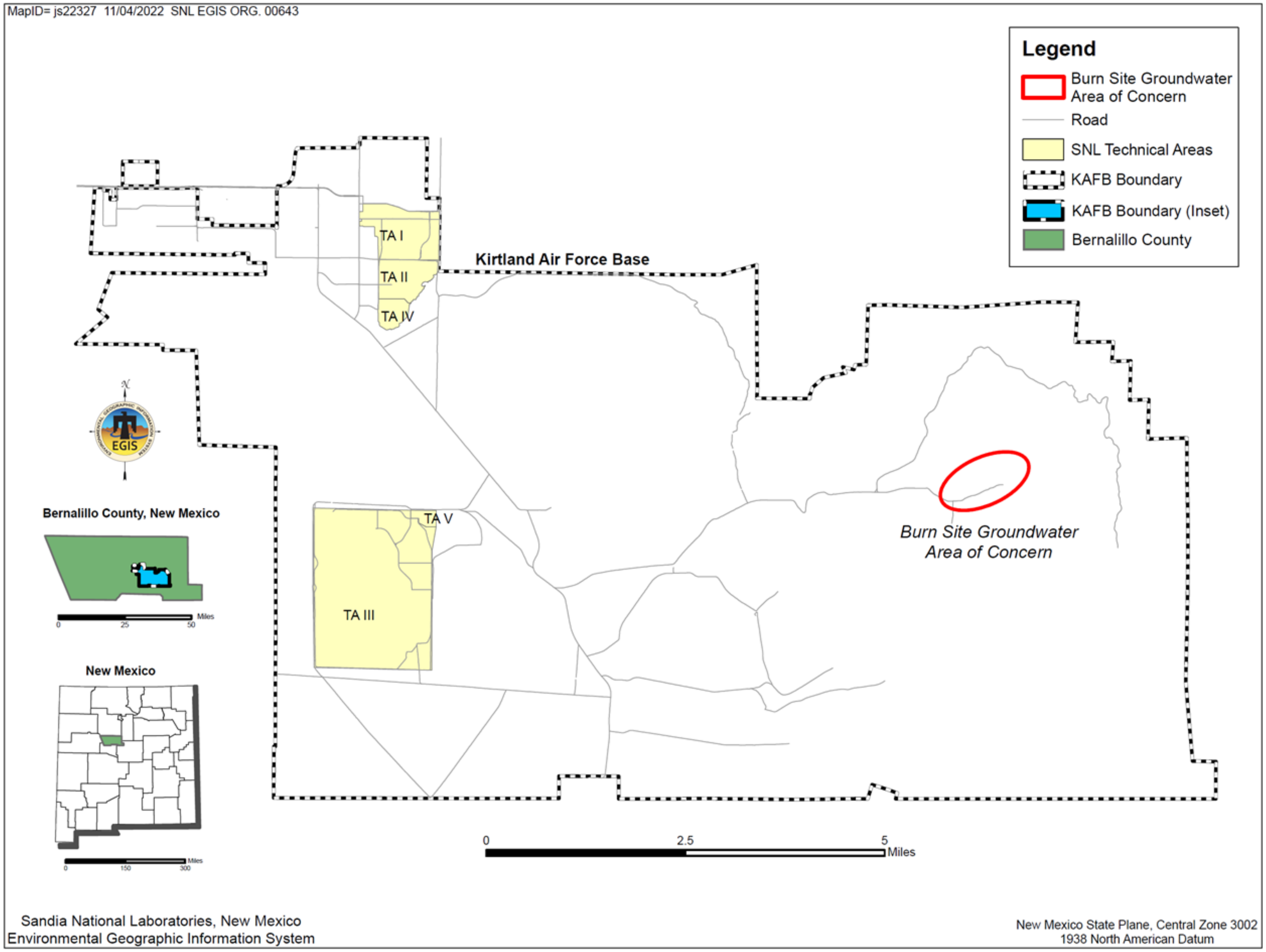

Figure 7-1
Location of the Burn Site Groundwater Area of Concern

7.1.3 Monitoring History

Groundwater samples collected in 1996 from the Burn Site Well (a non-potable production well used for fire suppression) contained elevated concentrations of nitrate (maximum of 27 mg/L in August 1996). In 1997, New Mexico Environment Department (NMED) Hazardous Waste Bureau, U.S. Department of Energy (DOE)/National Nuclear Security Administration (NNSA), and Sandia National Laboratories, New Mexico (SNL/NM) personnel agreed to investigate the source of this contamination. Later in 1997, monitoring wells CYN-MW1D and CYN-MW2S were installed downgradient of the Burn Site Well (Table 7-1). Samples from CYN-MW1D contained nitrate concentrations exceeding the EPA MCL. Two more monitoring wells, CYN-MW3 and CYN-MW4, were installed in 1999 to further characterize the study area. Based on regulatory requirements, monitoring wells CYN-MW6, CYN-MW7, and CYN-MW8 were installed from 2005 through 2006. Figure 7-2 shows the current BSG AOC monitoring well network.

Previous monitoring reports include analytical results for monitoring well CYN-MW5, which is located approximately 1.7 miles west of the BSG AOC. CYN-MW5 was installed at SWMU 49 in 2001 as part of the investigation of drain and septic system sites. CYN-MW5 was sampled for eight quarters as part of the drain and septic system investigation and was incorporated into the BSG AOC investigation as a downgradient well. However, in a February 2005 letter, the NMED stated that it would not consider CYN-MW5 a downgradient well because it was located over two miles away from the Burn Site (NMED, February 2005). Based on the NMED determination, CYN-MW5 has not been sampled as part of the BSG AOC investigation since the third quarter of fiscal year 2005. CYN-MW5 was added to the Groundwater Monitoring Program annual groundwater sampling event in CY 2019, and current monitoring data from this well is discussed in Chapter 2.0.

Since the initial discovery of nitrate at the BSG AOC, numerous characterization activities have been performed. These activities are summarized in a timeline (Attachment 7A, Table 7A-1). The results of earlier characterization activities are summarized in the *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Burn Site* (SNL/NM, June 2004a) and subsequent update (SNL/NM, April 2008a).

In April 2004, the *Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act 74-4-10: Sandia National Laboratories Consent Order* (Consent Order) (NMED, April 2004) took effect and identified the Burn Site as an area of groundwater contamination. In response to the Consent Order, DOE/NNSA and SNL/NM personnel submitted the *Corrective Measures Evaluation Work Plan for Sandia National Laboratories/New Mexico Burn Site* (June 2004 CME Work Plan) (SNL/NM, June 2004b) and the *Interim Measures Work Plan, Burn Site Groundwater* (IMWP) (SNL/NM, May 2005) to the NMED in June 2004 and May 2005, respectively. As required by the IMWP, three monitoring wells (CYN-MW6, CYN-MW7, and CYN-MW8) were installed near the Burn Site in December 2005 and January 2006. Quarterly sampling of these three monitoring wells for eight quarters began in March 2006 and was completed in December 2007. Groundwater samples from the two monitoring wells (CYN-MW7 and CYN-MW8) located downgradient of monitoring well CYN-MW1D were analyzed for nitrate and other analytes. Groundwater samples from CYN-MW6 (adjacent to SWMU 94F) were analyzed for nitrate, total petroleum hydrocarbons as gasoline range organics (GRO), diesel range organics (DRO), and other parameters.

Table 7-1
Groundwater Monitoring Wells at the Burn Site Groundwater Area of Concern

Well ID	Installation Year	WQ	WL	Comments
12AUP01	1996			Alluvial-underflow monitoring well, plugged and abandoned in November 2012
Burn Site Well	1986		✓	Non-potable bedrock production well, inactive since 2003
CYN-MW1D	1997			Bedrock groundwater well, plugged and abandoned in November 2012
CYN-MW2S	1997			Alluvial-underflow monitoring well, plugged and abandoned in November 2012
CYN-MW3	1999		✓	Bedrock groundwater well
CYN-MW4	1999	✓	✓	Bedrock groundwater well
CYN-MW6	2005		✓	Bedrock groundwater well
CYN-MW7	2005	✓	✓	Bedrock groundwater well
CYN-MW8	2006	✓	✓	Bedrock groundwater well
CYN-MW9	2010	✓	✓	Bedrock groundwater well
CYN-MW10	2010	✓	✓	Bedrock groundwater well
CYN-MW11	2010	✓	✓	Bedrock groundwater well
CYN-MW12	2010	✓	✓	Bedrock groundwater well
CYN-MW13	2012	✓	✓	Bedrock groundwater well, replaced CYN-MW1D
CYN-MW14A	2014	✓	✓	Bedrock groundwater well
CYN-MW15	2014		✓	Bedrock groundwater well, replaced CYN-MW6, well dry for both 2023 sampling events
CYN-MW16	2019	✓	✓	Bedrock groundwater well
CYN-MW17	2019	✓	✓	Bedrock groundwater well
CYN-MW18	2019	✓	✓	Bedrock groundwater well
CYN-MW19	2019	✓	✓	Bedrock groundwater well
Total	----	13	17	Total for AGMR reporting

Notes:
Check marks in the WQ and WL columns indicate sampling and measurements were obtained.
Water level checks in CYN-MW3 confirm that the groundwater elevation is below the bottom of the screen (dry).
AGMR = annual groundwater monitoring report
CYN = Canyons
ID = identifier
MW = Monitoring Well
WL = water level
WQ = water quality

Based on a letter from the NMED (April 2009), DOE/NNSA and SNL/NM personnel were required to further characterize the nature and extent of the perchlorate contamination at the BSG AOC and therefore submitted the *Burn Site Groundwater Characterization Work Plan, Installation of Groundwater Monitoring Wells CYN-MW9, CYN-MW10, and CYN-MW11, Collection of Subsurface Soil Samples* (BSG Characterization Work Plan) to the NMED in November 2009 (SNL/NM, November 2009). The NMED conditionally approved the work plan in February 2010 (NMED, February 2010). The work plan was implemented in July 2010 and four monitoring wells (CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12) were installed to determine the extent of groundwater contamination. These four monitoring wells were sampled for the first time in September 2010.

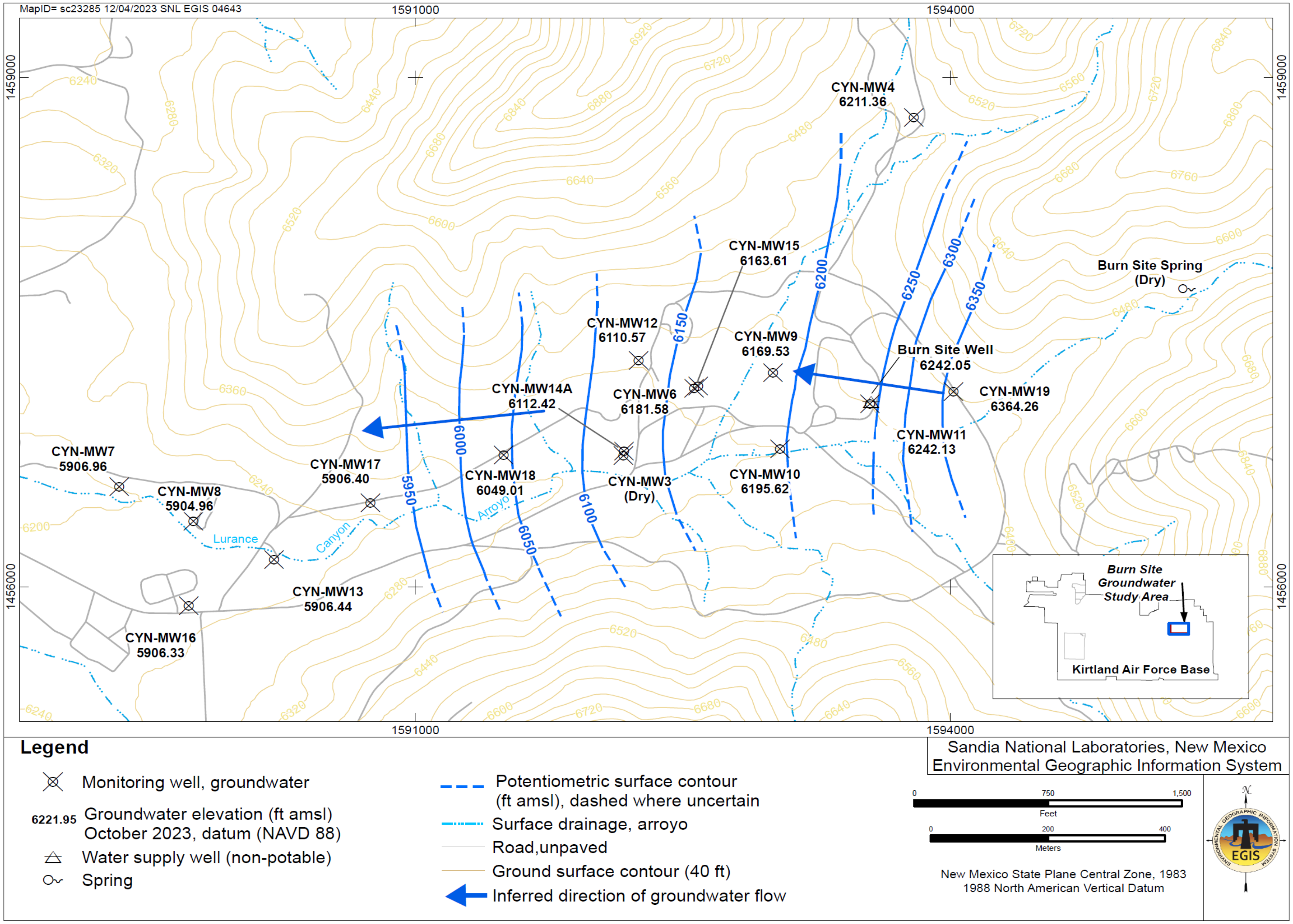

Figure 7-2
Localized Potentiometric Surface of the Burn Site Groundwater Area of Concern (October 2023)

In February 2012, DOE/NNSA and SNL/NM personnel submitted a work plan to decommission three obsolete monitoring wells (12AUP01, CYN-MW1D, and CYN-MW2S) and install a replacement monitoring well (CYN-MW13) (SNL/NM, February 2012). 12AUP01 and CYN-MW2S were screened at the contact of unconsolidated coarse sand and gravel (alluvium) and underlying bedrock. Although alluvium at this contact was dry during drilling, these wells were installed in anticipation of recharge occurring after rainfall events. However, these wells were consistently dry. CYN-MW1D was constructed with a nonstandard completion (low carbon steel screen and riser pipe), had very turbid water, and exhibited inconsistent and potentially anomalous nitrate concentrations. A video log showed that this well was heavily corroded. The NMED approved the work plan in April 2012 (NMED, April 2012). The three obsolete monitoring wells (12AUP01, CYN-MW1D, and CYN-MW2S) were decommissioned in November 2012 and the replacement monitoring well (CYN-MW13) was installed in December 2012 near CYN-MW1D.

In August 2013, DOE/NNSA and SNL/NM personnel submitted an extension request to the NMED for the *Burn Site Groundwater Corrective Measures Evaluation Report* (BSG CME Report), which was due at the NMED by March 31, 2014 (DOE, August 2013). DOE/NNSA and SNL/NM personnel requested the extension to consider recently collected groundwater sample analytical results from replacement monitoring well CYN-MW13 that could impact the BSG CME Report.

In October 2013, the DOE Office of Environmental Management submitted the *Internal Remedy Review of the Burn Site Groundwater Area of Concern, Sandia National Laboratories, Albuquerque, New Mexico* (Internal Remedy Review) memorandum to the DOE/NNSA Sandia Field Office (DOE, October 2013). This memorandum stated that additional characterization activities should be conducted at the BSG AOC before a CME was prepared. The Internal Remedy Review recommended a weight-of-evidence approach to determine the source(s) of nitrate contamination.

In September 2013, DOE/NNSA and SNL/NM personnel submitted a work plan to install two monitoring wells (SNL/NM, September 2013a). The NMED approved the work plan in June 2014 (NMED, June 2014a). The work plan discussed the need to install two replacement monitoring wells (CYN-MW14 and CYN-MW15) because of declining water levels at the Burn Site. CYN-MW14 was planned to replace CYN-MW3, whereas CYN-MW15 was planned to replace CYN-MW6. In December 2014, CYN-MW14A (note the ‘A’ suffix, as multiple boreholes were needed to complete this well) and CYN-MW15 were installed (SNL/NM, April 2015). The installation of a direct replacement for CYN-MW3 was not possible because the shallow water-bearing fracture zone was not encountered by either of the two nearby boreholes. A deeper-than-planned monitoring well, CYN-MW14A was installed near CYN-MW3. CYN-MW15 was installed as planned (at a similar water-bearing fracture depth) near CYN-MW6.

In January 2019, DOE/NNSA and SNL/NM personnel submitted a work plan to install up to eight monitoring wells (SNL/NM, January 2019). The NMED approved the work plan in February 2019 (NMED, February 2019). Based on NMED requirements (NMED, June 2018), the work plan discussed the need to install four monitoring wells (CYN-MW16, CYN-MW17, CYN-MW18, and CYN-MW19) to help define the extent of nitrate concentrations in the groundwater and refine the potentiometric surface. Specifically, these monitoring wells were required to define the upgradient and downgradient extent of the nitrate plume and provide information on the 2,000-ft data gap between existing monitoring wells CYN-MW3 and CYN-MW13. CYN- MW16, CYN-MW17, CYN-MW18, and CYN-MW19 were installed in CY 2019. The potential installation of up to four additional monitoring wells (SNL/NM, January 2019) was evaluated after the July 2021 sampling event when eight quarters of water level and validated analytical sample data were available. DOE/NNSA and SNL/NM personnel proposed to the NMED that the existing BSG AOC monitoring well network was sufficient to characterize the extent of nitrate contamination (DOE, November 2021) and the NMED agreed that the four additional monitoring wells were not required (NMED, December 2021).

7.1.4 Current Monitoring Well Network

Currently, a non-potable production well (Burn Site Well) and 16 monitoring wells are in place at the BSG AOC to monitor water levels and water quality. The monitoring wells are CYN-MW3, CYN-MW4, CYN-MW6, CYN- MW7, CYN-MW8, CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12, CYN-MW13, CYN- MW14A, CYN-MW15, CYN-MW16, CYN-MW17, CYN-MW18, and CYN-MW19 (Figure 7-2). During the CY 2023 sampling events, CYN-MW3 was dry and CYN-MW6 and CYN-MW15 had minimal groundwater in the screened interval and did not produce adequate volume for sample collection.

7.1.5 Summary of Calendar Year 2023 Activities

BSG AOC groundwater monitoring activities in CY 2023 included:

- Semiannual collection and analysis of groundwater samples from monitoring wells CYN-MW4, CYN-MW7, CYN- MW8, CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12, CYN-MW13, CYN- MW14A, CYN-MW16, CYN-MW17, CYN-MW18, and CYN-MW19 in April/May and October/November 2023.
- Submittal of the *Burn Site Groundwater Area of Concern Current Conceptual Model Corrective Measures Evaluation Report* (SNL/NM, January 2023) to the NMED.
- Submittal of the *Comprehensive Site-Wide Groundwater Monitoring Plan (Revised), Calendar Year 2024* (SNL/NM, April 2023) to the NMED.
- Preparation of analytical results tables (Attachment 7B), concentration versus time plots (Attachment 7C), and hydrographs (Attachment 7D) in support of this *Annual Groundwater Monitoring Report, Calendar Year 2023.*

7.1.6 Conceptual Site Model

BSG AOC groundwater flow is controlled by the local geologic framework and structural features described in the following sections and shown schematically on Figure 7-3.

7.1.6.1 Regional Hydrogeologic Conditions

The Manzanita Mountains are composed of a complex sequence of uplifted Precambrian metamorphic and granitic units that were subjected to several episodes of significant deformation. These units are capped by Paleozoic sandstones, shales, and limestones of the Sandia, Gray Mesa, and Atrasado Formations (the Gray Mesa and Atrasado Formations are part of the Madera Group; Kues, 2001). The geologic history of the Manzanita Mountains is thoroughly described in *Groundwater Investigation, Canyons Test Area, Operable Unit 1333, Burn Site, Lurance Canyon* (SNL/NM, November 2001) and utilizes the model presented by Brown et al. (1999). The local geology is also summarized in the *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Burn Site* (SNL/NM, April 2008a) and *Burn Site Groundwater Area of Concern Current Conceptual Model Corrective Measures Evaluation Report* (SNL/NM, January 2023).

Groundwater in the Manzanita Mountains predominantly occurs in fractured metamorphic and intrusive units that consist of metavolcanics, quartzite, metasediments (schists and phyllites), and the Manzanita Granite. The groundwater migrates through bedrock fractures in a generally westward direction. The only intermittent spring in the immediate area, the Burn Site Spring (Figure 7-2), is located upgradient and upslope of the testing facilities at a limestone outcrop. No flow has been observed at this spring since 2007.

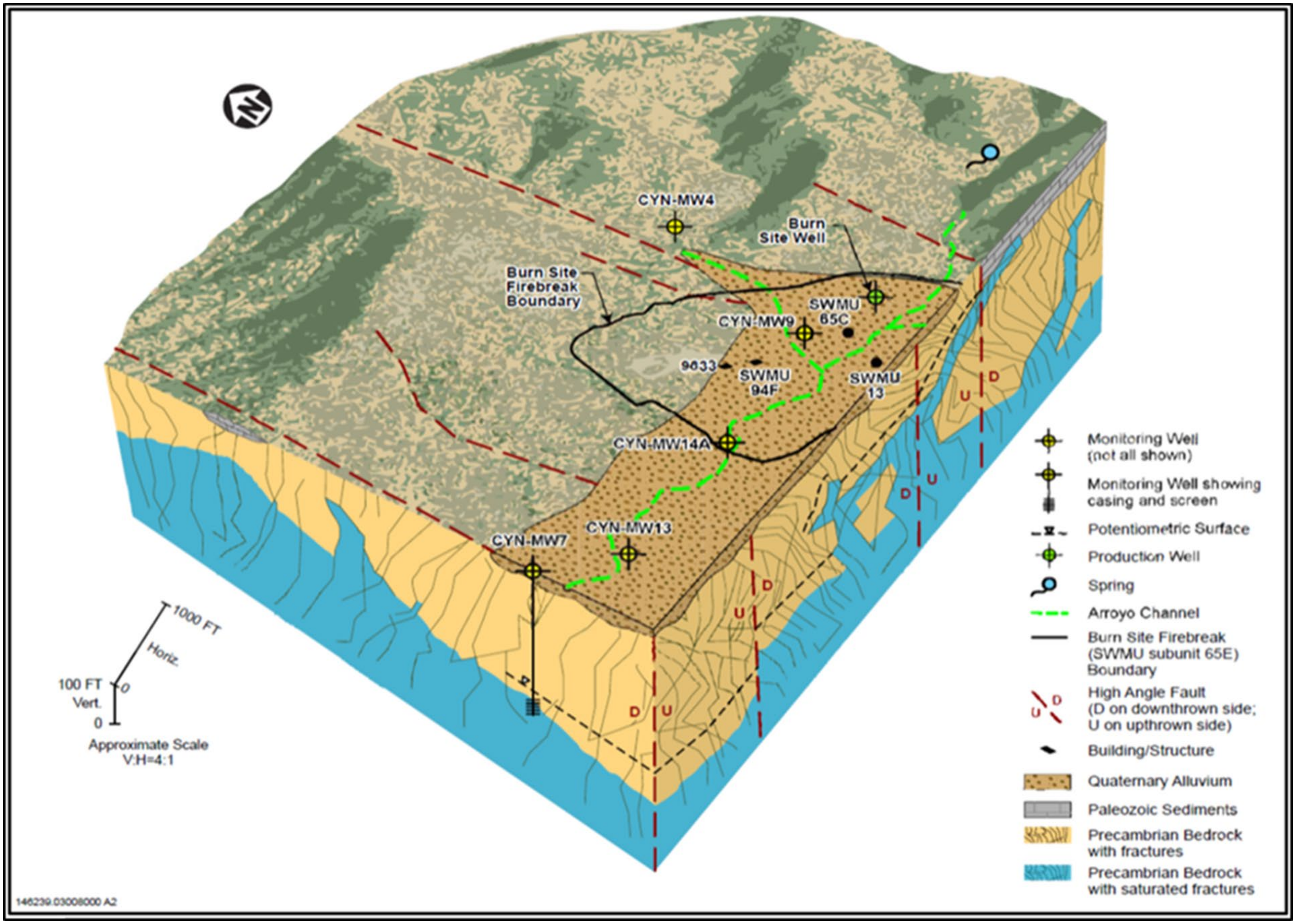

Figure 7-3
Conceptual Site Model for the Burn Site Groundwater Area of Concern

The matrix permeability of the fractured bedrock units is low, and most groundwater is produced from discontinuous water-bearing fracture zones. The groundwater discharges to small ephemeral springs located at the base of the Manzanita Mountains, approximately 3 miles west of the Burn Site. The groundwater from these springs at the base of the Manzanita Mountains is of a different geochemical character than that under the BSG AOC. Additionally, some groundwater may discharge as underflow to the Regional Aquifer in unconsolidated sedimentary deposits of the Albuquerque Basin after crossing the Tijeras Fault Zone.

The Precambrian metamorphic rocks (predominantly schists and phyllite) and the Precambrian intrusive rocks (predominantly granitic gneiss) are typically fractured as a result of the long and complex history of regional deformation. Drill core data, borehole video logging, and outcrop exposures indicate that some fractures in shallow bedrock are filled with chemical precipitates, such as calcium carbonate. The carbonate precipitation likely occurred when the water table was regionally elevated prior to the development of the Rio Grande. As chemical precipitates filled the fractures, permeability was effectively reduced, possibly creating a semiconfined unit above underlying bedrock with open fractures.

The Burn Site is bisected by a north-south trending fault system consisting locally of several high angle normal and reverse faults that are mostly downfaulted to the east (Karlstrom et al., 2000). Faults (where exposed) are characterized by zones of crushing and brecciation. The Burn Site Fault trends north to south in the vicinity of the Burn Site Well and monitoring well CYN-MW4. Nearby outcrops indicate that the fault displacement is approximately 160 ft (SNL/NM, June 2004a). Based on water levels measured in the monitoring wells installed in 2019, current interpretations suggest that faults between monitoring wells CYN-MW17 and CYN-MW18 significantly control the potentiometric surface.

The BSG AOC canyon floor consists of unconsolidated deposits over bedrock. These deposits are typically sand and gravel derived from erosion of upslope colluvium and bedrock or aeolian deposits derived from the basin to the west. They range in thickness from 21 to 55 ft in boreholes drilled at the BSG AOC and pinch-out against nearby bedrock outcrops along the steep canyon slopes.

7.1.6.2 Hydrogeologic Conditions at the Burn Site Groundwater Area of Concern

When the Burn Site Well was installed in 1986, the depth to the groundwater bearing fracture zone was approximately 222 ft below ground surface. Following completion of the well in fractured bedrock, the water level rose approximately 154 ft above the fracture zone due to an upward hydraulic gradient. The fractured rocks of the Manzanita Mountains are recharged by infiltration of precipitation, largely resulting from summer thundershowers and, to a lesser degree, winter snowfall at the higher elevations. Groundwater recharge is restricted by high evapotranspiration rates (losses to the atmosphere by evaporation and plant transpiration), the low permeability of the bedrock matrix, and the discontinuous nature of the bedrock fractures.

Regionally, groundwater in the western Manzanita Mountains generally flows toward the west from a groundwater flow divide located east of the BSG AOC. Groundwater flow along Lurance Canyon discharges primarily as direct underflow to the unconsolidated basin fill deposits of the Albuquerque Basin. Based on field observations, some discharge also occurs at ephemeral and perennial springs along the mountain front. Much of the flow that discharges from these springs undergoes evapotranspiration. Some flow from the springs infiltrates nearby alluvial deposits.

Most precipitation falls between July and September, mainly in the form of brief heavy rain. The average annual precipitation in this drainage basin is estimated to range between 12 and 16 inches (SNL/NM, April 2008a). In 2019, a meteorological observation tower (LC1) was installed in Lurance Canyon west of the Burn Site (Figure 1-4). A total of 9.23 inches of precipitation was measured at LC1 in CY 2023 (Table 2-3). In an unusual precipitation year, March, September, November, and December were the wettest months at this meteorological observation tower (Figure 2B-11). There are no annual precipitation data for LC1 from years prior to 2020, but 10 years of data from other meteorological observation towers in the vicinity show that CY 2023 was a drier year than normal (Section 2.6.2.1). Potential evapotranspiration in the Albuquerque area greatly exceeds precipitation. Because much of the rainfall in the Lurance Canyon drainage occurs during the summer, losses to evapotranspiration are high. A small percentage of precipitation may infiltrate into the exposed bedrock or into alluvial deposits along the canyon floor.

Ephemeral surface water flows occur in response to precipitation in the drainage basin. In 1997, two shallow monitoring wells (CYN-MW2S and 12AUP01) were constructed in Lurance Canyon to monitor groundwater potentially occurring within the channel deposits at the contact with underlying Precambrian bedrock. No groundwater was present in either shallow monitoring well until September 2, 2004. After a series of rain events, 1-2 inches of water was measured in 12AUP01. The water level remained constant for about one month. However, no water has been measured in 12AUP01 since 2005 and no groundwater has ever been measured in CYN-MW2S. Both monitoring wells were plugged and abandoned in 2012 (SNL/NM, March 2013). It is likely that saturation in the alluvium only occurs after a series of heavy rain events. Episodic accumulation of precipitation may provide a mechanism for recharging the brecciated fault zones and non-cemented fractures in the underlying bedrock.

7.1.6.3 Local Direction of Groundwater Flow

Figure 7-2 presents the October 2023 potentiometric surface map of the BSG AOC and Table 7-2 presents the data used to construct the map. The general direction of groundwater flow beneath the BSG AOC is to the west, as inferred from the orientation of the potentiometric surface. With the addition of the four newest monitoring wells at the Burn Site, a more detailed interpretation of the potentiometric surface for the fractured bedrock aquifer system was possible. The interpretation of the potentiometric surface in the western part of the BSG AOC changed significantly between CY 2018 and CY 2019 based on the data from the newly installed monitoring wells. Most notably, a new interpretation of the potentiometric surface contour shifted the 6,000-ft contour eastward approximately 400 ft.

The CY 2023 potentiometric surface (Figure 7-2) depicts a steep groundwater gradient from easternmost monitoring well CYN-MW19 to monitoring well CYN-MW17 in the west, with nearly 458 ft of groundwater elevation difference over approximately 3,200 ft (0.6 miles), a gradient of 0.14. In contrast, the five westernmost monitoring wells (CYN-MW7, CYN-MW8, CYN-MW13, CYN-MW16, and CYN-MW17) spread along a down-canyon distance of approximately 1,200 ft have groundwater elevations within a narrow range of approximately 2 ft, essentially a zero gradient. The gradient between CYN-MW17 and CYN-MW7 has less than 1 ft of groundwater elevation difference over 1,400 ft (0.27 miles), and although it is located further west (presumably the downgradient direction) the groundwater elevation at CYN-MW7 is slightly higher than that at CYN-MW17. Of the five western monitoring wells, CYN-MW8 has the lowest groundwater elevation and is therefore the most downgradient well at the BSG AOC.

Table 7-2
Groundwater Elevations Measured in October 2023 at Monitoring Wells Completed in the Fractured Bedrock Aquifer System at the Burn Site Groundwater Area of Concern

Well ID	Measuring Point (ft amsl) NAVD 88	Date Measured	Depth to Water (ft btoc)	Water Elevation (ft amsl)
Burn Site Well	6374.66	09-Oct-2023	132.61	6242.05
CYN-MW3	6313.26	09-Oct-2023	--	--
CYN-MW4	6455.48	09-Oct-2023	244.12	6211.36
CYN-MW6	6343.37	09-Oct-2023	161.79	6181.58
CYN-MW7	6216.35	09-Oct-2023	309.39	5906.96
CYN-MW8	6230.11	09-Oct-2023	325.15	5904.96
CYN-MW9	6360.67	09-Oct-2023	191.14	6169.53
CYN-MW10	6345.45	09-Oct-2023	149.83	6195.62
CYN-MW11	6374.41	09-Oct-2023	132.28	6242.13
CYN-MW12	6345.16	09-Oct-2023	234.59	6110.57
CYN-MW13	6237.79	09-Oct-2023	331.35	5906.44
CYN-MW14A	6315.85	09-Oct-2023	203.43	6112.42
CYN-MW15	6344.44	09-Oct-2023	180.83	6163.61
CYN-MW16	6249.60	09-Oct-2023	343.27	5906.33
CYN-MW17	6268.95	09-Oct-2023	362.55	5906.40
CYN-MW18	6304.02	09-Oct-2023	255.01	6049.01
CYN-MW19	6410.43	09-Oct-2023	46.17	6364.26

Notes:
amsl = above mean sea level
btoc = below top of casing
CYN = Canyons
ft = feet
ID = identifier
MW = Monitoring Well
NAVD 88 = North American Vertical Datum of 1988
-- = No data, monitoring well dry during this measurement period.

The flat gradient in the western part of the BSG AOC may be related to (or controlled by) several high-angle faults that offset Precambrian and Paleozoic bedrock in the area west of monitoring well CYN-MW18 (Karlstrom et al., 2000). Another explanation for the flat groundwater gradient is that the area is possibly influenced by localized groundwater flow emanating from Sol se Mete Canyon, a large surface drainage south of the BSG AOC that merges with Lurance Canyon just west of monitoring wells CYN-MW7 and CYN-MW16.

No production wells are located near the BSG AOC except the Burn Site Well, which was only rarely used for non-potable applications, such as fire suppression in testing structures and fuel pool tests. The well was last used in 2003. The submersible pump was removed from the well in December 2014 and has not been reinstalled. Water levels in the Paleozoic and Precambrian bedrock near the BSG AOC are not influenced by production well pumping from the basin fill deposits of the Albuquerque Basin (Regional Aquifer), which are located to the west of the Tijeras Fault Zone.

The variability of hydraulic gradients in Lurance Canyon indicates that localized controls are associated with brecciated fault zones in the low-permeability fractured bedrock at the BSG AOC. Limited groundwater flow velocity information is based on COC first arrival estimates. Based on petroleum fuel releases from SWMU 94F arriving at monitoring well CYN-MW1D, the minimum apparent velocity of the COCs was initially estimated to be approximately 160 ft per year (ft/yr) (SNL/NM, April 2008a). However, recent geochemical studies indicate that inferring such a groundwater velocity may not be valid because fracture connectivity may be limited. No information is available about vertical flow velocity within the fractured bedrock aquifer system at the BSG AOC. However, vertical movement of groundwater within the brecciated fault zones probably occurs as rapid, partially saturated to saturated flow.

Filled fractures within the upper portion of the metamorphic and intrusive rocks may act as a semiconfining unit restricting vertical flow. These concepts were corroborated by an aquifer pumping test conducted in March 2017. The test showed significant compartmentalization of groundwater into distinct hydraulic domains such that some portions of the fractured bedrock aquifer system are unconfined and respond to infiltration of precipitation, whereas other portions are semiconfined to confined. Some faults and fractures are sealed and act as barriers to groundwater flow (SNL/NM, December 2017).

Water levels at the Burn Site have been routinely monitored since 1999. Attachment 7D, (Figures 7D-1 through 7D-9 [hydrographs]) shows the water levels for the monitoring wells completed in bedrock. There are no active production wells in the area or substantial seasonal variations in these water levels The wide range of hydraulic gradients in Lurance Canyon and the lack of correlation between water level fluctuations in these monitoring wells support the assessment that the BSG AOC low-permeability fractured bedrock aquifer system is poorly interconnected. Water level fluctuations may be the result of local heterogeneities in hydraulic properties related to the water-bearing fracture zones.

The five monitoring wells in the lower (western) part of the canyon (CYN-MW7, CYN-MW8, CYN-MW13, CYN-MW16, and CYN-MW17) have exhibited little variability over time, with a steady decline of approximately 0.75 ft/yr (Figure 7D-4). The monitoring wells in the upper part of the canyon, most notably CYN-MW6, CYN-MW9, CYN-MW10, CYN-MW11 (and Burn Site Well), and CYN-MW15, showed significant increases in water levels during a two-year interval starting in early 2014, apparently in response to intense thunderstorms in the 2014 and 2015 monsoon seasons. The water levels in these five monitoring wells rebounded by 14.79 to 19.65 ft between July 2014 and October 2015 (Figures 7D-3, 7D-6, and 7D-7). However, these five monitoring wells, and most of the remaining monitoring wells, currently show declining groundwater elevations of 3 or more ft/yr (Figures 7D-1 through 7D-3, 7D-6 through 7D-8).

7.1.6.4 Contaminant Sources

The nitrate in the BSG AOC may be derived from both natural and anthropogenic sources. The NMED-specified background concentration for nitrate in groundwater is 4 mg/L (NMED, September 1997). This value was based on a study by the NMED (Moats and Winn, January 1995). However, those authors considered the background concentration to not be reliably established due to the lack of suitable (convincingly uncontaminated) wells available at that time. Potential natural sources include weathering of rocks, atmospheric deposition, and grading of soils and alluvium. Evaporation and transpiration of rainwater that has infiltrated canyon alluvial sediments might have increased nitrate concentrations. Potential anthropogenic nitrate sources include the use of ammonium-nitrate slurry, wastewater discharges, and the degradation of HE compounds. SNL/NM personnel have conducted several soil sampling events at the BSG AOC to identify the source of nitrate; however, no conclusive source has been identified, most likely because chemical releases ceased decades ago and precipitation has leached the nitrate from the soil.

Evidence indicates that evaporation and transpiration may concentrate nitrate in sediments beneath ephemeral drainages in the vicinity of the Manzanita Mountains. This evidence includes nitrate concentrations that exceed the EPA MCL in the groundwater beneath these drainages and a chloride-to-nitrate ratio in the groundwater that is similar to that of rainfall (McQuillan and Space, 1995). In more recent studies, the United States Geological Survey has attributed naturally occurring accumulations of geologic nitrate in unconsolidated sediments along Tijeras Arroyo to a similar evaporation and transpiration mechanism (see Section 6.1.7.5 for further discussion).

SWMU 65 is located in the center of the BSG AOC and contained open-air detonation areas where nitrate-based explosives were used. The detonations dispersed explosive compounds across the ground surface, and subsequent degradation (weathering) of these explosive compounds most likely released some nitrate. Testing at SWMU 94 also involved burn tests involving large volumes of ammonium-nitrate slurry, HE compounds (both nitrate-based and plastic explosives), and rocket propellants. Nitrate is highly soluble in water and precipitation can enhance its migration to groundwater. In addition to nitrate, petroleum fuel products were detected in soil samples and potential impacts to groundwater were evaluated.

7.1.6.5 Contaminant Distribution and Transport in Groundwater

In October 1991, nitrate above the EPA MCL of 10 mg/L was first detected in groundwater samples from the Burn Site Well. Since the installation of the monitoring wells listed in Table 7-3, nitrate concentrations that exceed the EPA MCL have consistently been detected in groundwater samples. Nitrate concentrations in groundwater samples from monitoring wells CYN-MW4, CYN-MW7, CYN-MW8, CYN-MW17, CYN-MW18, and CYN-MW19 have not exceeded the EPA MCL and are not included in Table 7-3.

Potential downgradient receptors of the nitrate plume are Coyote Springs, approximately 3 miles west of the BSG AOC, and the Albuquerque Bernalillo County Water Utility Authority (ABCWUA) and KAFB well fields, located approximately 7 to 12 miles west-northwest of the BSG AOC. Numerical simulations predict that the nitrate concentrations will decrease to below the EPA MCL at the Coyote Springs ecological receptor, and to below the laboratory method detection limits (MDLs) in the Regional Aquifer, through dispersion and dilution as the nitrate-impacted groundwater moves into the more hydraulically conductive alluvial-fan and ancestral Rio Grande deposits west of Coyote Springs. Numerical simulations also predict that groundwater travel times from the BSG AOC to the ABCWUA and KAFB well fields will exceed 600 years (SNL/NM, May 2005).

Table 7-3
Summary of Historical Nitrate Concentrations in Groundwater Monitoring Wells that Exceed the EPA MCL[a] at the Burn Site Groundwater Area of Concern

Well ID	Historical Maximum NPN Concentration (mg/L)	Approximate Distance and Direction from Burn Site Well
Burn Site Well	27.0	Not applicable
CYN-MW1D	28.0	3,400 ft west-southwest
CYN-MW3	14.7	1,400 ft west
CYN-MW6	39.9	1,000 ft west
CYN-MW9	49.6	600 ft west-northwest
CYN-MW10	25.8	600 ft west-southwest
CYN-MW11	25.4	10 ft south
CYN-MW12	20.2	1,300 ft west-northwest
CYN-MW13	40.0	3,400 ft west-southwest
CYN-MW14A	15.7	1,400 ft west
CYN-MW15	29.8	1,000 ft west
CYN-MW16	11.7	4,000 ft west-southwest

Notes:
[a]EPA MCL for nitrate is 10 mg/L.
CYN = Canyons
EPA = U.S. Environmental Protection Agency
ft = feet
ID = identifier
MCL = maximum contaminant level
mg/L = milligrams per liter
MW = Monitoring Well
NPN = nitrate plus nitrite (as nitrogen)

7.2 Regulatory Criteria

The NMED Hazardous Waste Bureau provides regulatory oversight of SNL/NM Environmental Restoration Operations, as well as implements and enforces regulations mandated by the Resource Conservation and Recovery Act (RCRA). All SWMUs and AOCs at SNL/NM are listed in the *Resource Conservation and Recovery Act Facility Operating Permit for Sandia National Laboratories, EPA ID No. NM5890110518* (RCRA Permit) (NMED, January 2015, as modified).

All BSG AOC corrective action requirements are specified in the Consent Order. The BSG AOC groundwater monitoring activities are not associated with a single SWMU but are more regional in nature. Before the Consent Order took effect in April 2004, BSG AOC investigations were conducted voluntarily by SNL/NM personnel.

Initially, BSG AOC groundwater monitoring was initiated to satisfy the RCRA Permit requirements for SWMU characterization. The Consent Order transferred regulatory authority for corrective action requirements from the RCRA Permit to the Consent Order. The BSG AOC investigation must comply with the Consent Order requirements for site characterization and the development of a CME.

In response to the Consent Order, DOE/NNSA and SNL/NM personnel submitted the *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Burn Site* (SNL/NM, April 2008a) and the *Corrective Measures Evaluation Work Plan, Burn Site Groundwater* (April 2008 CME Work Plan) (SNL/NM, April 2008b) to the NMED. The current conceptual model provided site-specific characteristics by which remedial alternatives were evaluated. The April 2008 CME Work Plan described and justified the remedial alternatives considered and the methods and criteria to be used in the evaluation. The April 2008 CME Work Plan was completed with *RCRA Corrective Action Plan* (EPA, 1994) guidance to comply with Consent Order Requirements.

In a March 1, 2005 letter, the NMED disapproved the June 2004 CME Work Plan and offered the following statements/requirements:

- DOE/NNSA and SNL/NM personnel must prepare and submit an IMWP within 90 days from receipt of the letter (by May 30, 2005).
- The NMED requires additional characterization of the nitrate-contaminated groundwater near the BSG AOC. Specifically, the downgradient extent of groundwater with nitrate concentrations greater than 10 mg/L shall be determined.
- The NMED does not accept the June 2004 CME Work Plan (SNL/NM, June 2004b) because it is not satisfied with the existing characterization of nitrate-contaminated groundwater near the BSG AOC.
- The NMED also requires the installation of one additional monitoring well "adjacent to SWMU 94F in order to establish groundwater conditions in this petroleum-contamination source area."

DOE/NNSA and SNL/NM personnel submitted the IMWP to the NMED in May 2005. The IMWP proposed the installation of additional groundwater monitoring wells to characterize the extent of nitrate contamination in the fractured bedrock aquifer system downgradient of monitoring well CYN-MW1D and fuel-related compounds downgradient of SWMU 94F (SNL/NM, May 2005). The selected interim measures included additional well installation, groundwater monitoring, and institutional controls. These interim measures were proposed to serve three purposes: (1) provide data to support the CME, (2) monitor the migration of the nitrate plume to provide an early warning if an impact to downgradient ecological receptors (Coyote Springs) became apparent, and (3) protect human health and the environment by limiting exposure to contaminated groundwater by restricting access to the monitoring wells.

In support of the selected interim measures, the IMWP included the following reports as attachments:

- Remedial Alternatives Data Gaps Review
- Nitrate Source Evaluation
- Evaluation of Contaminant Transport

The Remedial Alternatives Data Gaps Review included detailed definitions of remedial alternatives and a preliminary evaluation of data gaps (SNL/NM, May 2005). One of the data gaps included determining background nitrate concentrations in soil/rock and evaluating the potential for a residual source of nitrate in the vadose zone. The investigation initiated to fill this data gap and the analytical results was presented in the Nitrate Source Evaluation. The Evaluation of Contaminant Transport consisted of a cross-sectional modeling approach to simulate transport and dilution of nitrate between the current location of nitrate within the BSG AOC and potential human and ecological receptors.

Data collected as part of the additional IMWP-required characterization were incorporated into an updated version of the Conceptual Site Model that provided the basis for the technically defensible remediation program documented in the April 2008 CME Work Plan (SNL/NM, April 2008b), the results of which were documented in the more recent BSG CME Report. The April 2008 CME Work Plan was developed to address the concerns outlined in the March 1, 2005 letter from the NMED and to comply with Consent Order requirements. The April 2008 CME Work Plan provided information and data gathered during interim measures and performance and compliance goals and objectives for the possible remediation of the BSG AOC.

In an April 30, 2009 letter titled *Perchlorate Contamination in Groundwater, Sandia National Laboratories, EPA ID #NM5890110518* (NMED, April 2009), the NMED discussed the occurrence of perchlorate in groundwater at concentrations at or greater than 1 microgram per liter (µg/L) at various locations at SNL/NM. The NMED stated in the letter that DOE/NNSA and SNL/NM personnel must characterize the nature and extent of the potential perchlorate contamination at the BSG AOC and submit to the NMED a plan for such characterization. DOE/NNSA and SNL/NM personnel met with the NMED in June and July 2009, submitted a letter requesting an extension of the November 30, 2009 due date (DOE, July 2009), and incorporated the results of the discussions into the BSG Characterization Work Plan (SNL/NM, November 2009), including such items as number and locations of wells and boreholes.

The NMED conditionally approved the BSG Characterization Work Plan in February 2010. The work plan was implemented in July 2010. Subsurface soil sampling was completed at 10 deep soil borehole locations to determine contaminant sources and four monitoring wells were installed to determine the extent of groundwater contamination. Due to an outstanding schedule commitment, DOE/NNSA and SNL/NM personnel submitted an extension request for the BSG CME Report in September 2010 (SNL/NM, September 2010). The NMED approved this request (NMED, October 2010), extending the due date to March 31, 2014. In January 2014, DOE/NNSA and SNL/NM personnel requested an additional extension of the due date to March 31, 2016 (DOE, January 2014). The NMED approved this request in June 2014 (NMED, June 2014b).

In June 2016, DOE/NNSA and SNL/NM personnel submitted the *Aquifer Pumping Test Work Plan for the Burn Site Groundwater Area of Concern* (SNL/NM, June 2016a), which the NMED quickly approved (NMED, June 2016). Field work associated with the aquifer pumping test was performed in 2017, and in December 2017, DOE/NNSA and SNL/NM personnel submitted the *Aquifer Pumping Test Report for the Burn Site Groundwater Area of Concern* (Aquifer Test Report) to the NMED (SNL/NM, December 2017). The NMED approved the Aquifer Test Report in early 2018 (NMED, January 2018).

Based on the Aquifer Test Report findings, DOE/NNSA and SNL/NM personnel presented recommendations for additional site characterization to the NMED (DOE, June 2018). However, the NMED disapproved the proposed recommendations and required submittal of a well installation work plan (NMED, June 2018). DOE/NNSA and SNL/NM personnel submitted the *Monitoring Well Installation Work Plan, Burn Site Groundwater Monitoring Wells CYN-MW16 through CYN-MW23* to the NMED in January 2019 (SNL/NM, January 2019). The NMED approved the work plan in February 2019 (NMED, February 2019). Based on the work plan, four monitoring wells were installed in the fall of 2019. The well installation activities were documented in the *Monitoring Well Installation Report, Burn Site Groundwater Monitoring Wells CYN-MW16 through CYN-MW19* (SNL/NM, May 2020), which the NMED approved (NMED, July 2020a). In November 2021, DOE/NNSA and SNL/NM personnel proposed to the NMED that the existing BSG AOC monitoring well network was sufficient to characterize the extent of nitrate contamination (DOE, November 2021) and the NMED agreed (NMED, December 2021). This decision allowed DOE/NNSA and SNL/NM personnel to prepare the *Burn Site Groundwater Area of Concern Current Conceptual Model Corrective Measures Evaluation Report* (SNL/NM, January 2023) recently submitted to the NMED.

This chapter and its attachments include groundwater monitoring data for both hazardous and radioactive constituents; however, the monitoring data for radionuclides (gamma spectroscopy, gross alpha/beta activity, and tritium) are provided voluntarily by DOE/NNSA and SNL/NM personnel. The voluntary inclusion of such radionuclide information shall not be enforceable and shall not constitute the basis for any enforcement because such information falls wholly outside the requirements of the Consent Order (NMED, April 2004), as Section III.A of the Consent Order specifies.

7.3 Scope of Activities

Section 7.1.5 lists the BSG AOC groundwater monitoring activities completed in CY 2023. Table 7-4 lists the two sampling events with the monitoring wells sampled and sampling and analysis plans implemented. Table 7-5 lists the analytical parameters and monitoring wells sampled during each event.

Field quality control (QC) samples (Section 1.3.4) were collected at the same time as the groundwater samples (also referred to as environmental samples). The field QC samples included environmental duplicate, equipment blank (EB), field blank (FB), and trip blank (TB) samples.

7.4 Field Methods and Measurements

The groundwater samples were collected with a submersible Bennett piston pump. Section 1.3 describes in detail how the CY 2023 groundwater data for the BSG AOC were collected and analyzed. Figure 7-2 and Table 7-2 present the water level information used to construct the potentiometric surface map. Figures 7D-1 through 7D-9 (Attachment 7D)) present the hydrographs for groundwater elevation measurements at the BSG AOC.

7.5 Analytical Methods

The off-site laboratory analyzed the groundwater samples using the applicable EPA and DOE-specified methods and protocols identified in Section 1.3.2 (Tables 1-5 and 1-6).

Table 7-4
Groundwater Monitoring Well Network and Sampling Dates for the Burn Site Groundwater Area of Concern, Calendar Year 2023

Date of Sampling Event	Wells Sampled		SAP
April/May 2023	CYN-MW4 CYN-MW7 CYN-MW8 CYN-MW9 CYN-MW10 CYN-MW11 CYN-MW12	CYN-MW13 CYN-MW14A CYN-MW16 CYN-MW17 CYN-MW18 CYN-MW19	*Burn Site Groundwater Monitoring, Mini-SAP for Third Quarter, Fiscal Year 2023* (SNL/NM, March 2023)
October/November 2023	CYN-MW4 CYN-MW7 CYN-MW8 CYN-MW9 CYN-MW10 CYN-MW11 CYN-MW12	CYN-MW13 CYN-MW14A CYN-MW16 CYN-MW17 CYN-MW18 CYN-MW19	*Burn Site Groundwater Monitoring, Mini-SAP for First Quarter, Fiscal Year 2024* (SNL/NM, September 2023)

Notes:
CYN = Canyons
MW = Monitoring Well
SAP = Sampling and Analysis Plan
SNL = Sandia National Laboratories

Table 7-5
Parameters Sampled at Burn Site Groundwater Area of Concern Wells for Each Sampling Event, Calendar Year 2023

Parameter	April/May 2023	
Alkalinity[a] Anions (Bromide, Chloride, Fluoride, Sulfate)[a] DRO Gamma Spectroscopy (short list[b])[a] GRO Gross Alpha/Beta Activity[a] HE Compounds[a] Isotopic Uranium[a] NPN TAL Metals[a] Tritium[a] VOCs[a]	CYN-MW4 CYN-MW7 CYN-MW8 CYN-MW9 CYN-MW9 (Duplicate) CYN-MW10 CYN-MW11 CYN-MW11 (Duplicate)	CYN-MW12 CYN-MW13 CYN-MW14A CYN-MW16 CYN-MW17 CYN-MW18 CYN-MW18 (Duplicate) CYN-MW19
Parameter	**October/November 2023**	
DRO GRO NPN	CYN-MW4 CYN-MW7 CYN-MW7 (Duplicate) CYN-MW8 CYN-MW9 CYN-MW10 CYN-MW11 CYN-MW12	CYN-MW13 CYN-MW13 (Duplicate) CYN-MW14A CYN-MW16 CYN-MW16 (Duplicate) CYN-MW17 CYN-MW18 CYN-MW19

Notes:
[a]Analyses performed for waste characterization purposes.
[b]Gamma spectroscopy short list includes americium-241, cesium-137, cobalt-60, and potassium-40.
CYN = Canyons
DRO = diesel range organics
GRO = gasoline range organics
HE = high explosive
MW = Monitoring Well
NPN = nitrate plus nitrate (as nitrogen)
TAL = Target Analyte List
VOC = volatile organic compound

7.6 Summary of Calendar Year 2023 Analytical Results

This section summarizes the CY 2023 groundwater monitoring results for the BSG AOC, including exceedances of regulatory standards and trends in COC concentrations. Attachment 7B (Tables 7B-1 through 7B-9) presents the analytical results and field water quality parameter measurements for all CY 2023 sampling events. All analytical results (Tables 7B-1 through 7B-8) were reviewed and qualified during the data validation process and include the laboratory and validation qualifiers. Attachment 7C (Figures 7C-1 through 7C-5) presents nitrate plus nitrite (NPN) (reported as nitrogen) concentration trend plots for the monitoring wells that currently have NPN concentrations exceeding the EPA MCL.

Table 7B-1 presents the analytical results for volatile organic compounds (VOCs) detected above the MDLs. Table 7B-2 lists the MDLs for all analyzed VOCs and Table 7B-3 lists the MDLs for all analyzed HE compounds. During the April/May 2023 sampling event, no validated detections of VOCs were reported above the MDLs except for acetone and 1,2,4- trichlorobenzene. Acetone was reported for monitoring well CYN-MW4 at a concentration of 2.05 mg/L, and 1,2,4- trichlorobenzene below the EPA MCL of 70 mg/L was reported for monitoring well CYN-MW11 at a concentration of 0.490 mg/L. Acetone for monitoring wells CYN-MW7, CYN-MW8, CYN-MW11, CYN-MW12, CYN-MW14A, and CYN-MW17 was qualified as not detected at the practical quantitation level (PQL) during data validation because it was reported at concentrations less than the PQL in the associated environmental, method blank, TB, or FB samples. Methylene chloride for monitoring wells CYN-MW7, CYN-MW8, CYN-MW16, CYN-MW17, CYN-MW18, and CYN- MW19 was qualified as not detected at the PQL during data validation because it was reported in the associated environmental, TB, or method blank samples at concentrations less than the PQL. 1,2,3-trichlorobenze for monitoring wells CYN-MW4 and CYN-MW11 was qualified as not detected at the PQL during data validation because it was reported at concentrations less than the PQL in both the environmental and method blank samples. No other VOCs or HE compounds were detected.

Table 7B-4 presents the analytical results for NPN and Figure 7-4 presents the BSG AOC NPN concentration contours for the October/November 2023 sampling event. NPN exceeded the EPA MCL of 10 mg/L in samples from five monitoring wells (CYN-MW9, CYN-MW10, CYN-MW12, CYN-MW13, and CYN-MW14A). NPN in samples from the other monitoring wells was detected above the MDL but below the EPA MCL (Table 7B-4). NPN concentrations in samples from the four newest monitoring wells significantly changed the interpretation of the contaminant distribution in the central and western part of the BSG AOC starting in CY 2019. As currently depicted for CY 2023 (Figure 7-4), there are two distinct plumes with elevated NPN concentrations; it is unknown if the plumes are derived from the same source. NPN below the EPA MCL in samples from monitoring wells CYN-MW17 and CYN-MW18 demonstrates that the two plumes are not contiguous and that the areal extent of NPN exceeding the EPA MCL is much less than previously thought. NPN is currently below the EPA MCL at new monitoring wells CYN-MW16 and CYN-MW19, which delineate the western and eastern extents of the NPN plume, respectively.

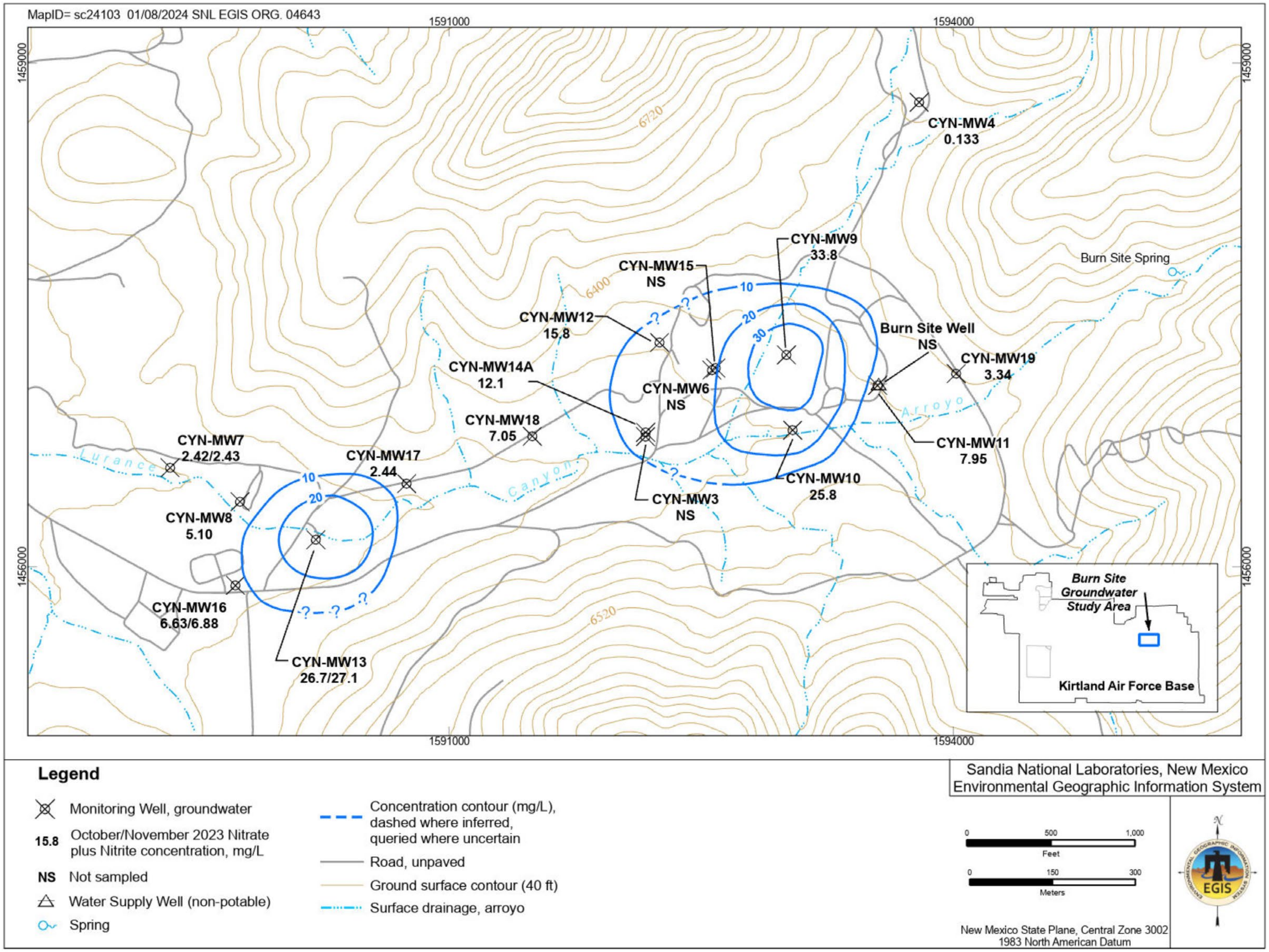

Figure 7-4
Nitrate Plus Nitrite Concentration Contour Map for the Burn Site Groundwater Area of Concern, October/November 2023

The NPN concentrations for monitoring wells exceeding the EPA MCL in CY 2023 were as follows:

- Monitoring well CYN-MW9 had reported concentrations of 33.6 mg/L (May 2023), 33.3 mg/L (May 2023, environmental duplicate sample), and 33.8 mg/L (October 2023). The historical NPN concentrations for CYN-MW9 are all above the EPA MCL, and the range is approximately 29 to 50 mg/L, with an overall stable trend with high variability over the life of the well (Figure 7C-1).
- Monitoring well CYN-MW10 had reported concentrations of 20.9 mg/L (May 2023) and 25.8 mg/L (October 2023). The historical range of NPN concentrations for CYN-MW10 is approximately 4 to 26 mg/L, with increasing concentrations since December 2020 with high variability over the life of the well (Figure 7C-2).
- Monitoring well CYN-MW12 had reported concentrations of 16.6 mg/L (May 2023) and 15.8 mg/L (October 2023). The historical NPN concentrations for CYN-MW12 are all above the EPA MCL, and the range is approximately 11 to 20 mg/L, with slightly increasing concentrations with high variability over the life of the well (Figure 7C-3).
- Monitoring well CYN-MW13 had reported concentrations of 26.2 mg/L (May 2023), 26.7 mg/L (November 2023), and 27.1 mg/L (November 2023, environmental duplicate sample). The historical NPN concentrations for CYN-MW13 are all above the EPA MCL, and the range is approximately 26 to 40 mg/L, with an overall slightly decreasing trend over the life of the well (Figure 7C-4).
- Monitoring well CYN-MW14A had reported concentrations of 12.3 mg/L (May 2023) and 12.1 mg/L (October 2023). The historical NPN concentrations for CYN- MW14A are all at or above the EPA MCL, and the range is approximately 10 to 16 mg/L, with an overall stable trend over the life of the well (Figure 7C-5).

Table 7B-5 presents the analytical results for DRO and GRO. EPA MCLs for DRO and GRO have not been established. No detections of DRO or GRO were reported for any samples collected during the April/May 2023 sampling event with one exception. DRO was reported for monitoring well CYN-MW7 at a concentration of 91.6 μg/L. DRO for CYN-MW7 was qualified as not detected at the PQL during data validation because it was reported at concentrations less than the PQL in the environmental and method blank samples. During the October/November 2023 sampling event, DRO was reported below the PQL in the environmental and environmental duplicate samples from monitoring wells CYN-MW4, CYN-MW7, CYN-MW16, CYN-MW17, and CYN-MW19. DRO has historically not been detected in samples from this site. After discussions with the laboratory, it was determined that the samples from these five wells had low levels of hydrocarbons within the diesel retention time window; however, the peak pattern differed from that of diesel. Based on professional judgment, the associated sample results for CYN-MW4, CYN-MW7, CYN-MW16, CYN-MW17, and CYN-MW19 were qualified not usable.

Table 7B-6 presents the analytical results for anions (bromide, chloride, fluoride, and sulfate) and total alkalinity. None of the analytes exceeded established EPA MCLs.

Table 7B-7 presents the analytical results for total metals. No metals exceeded established EPA MCLs.

Table 7B-8 presents the analytical results for gamma spectroscopy short list (americium-241, cesium-137, cobalt-60, and potassium-40), gross alpha/beta activity, isotopic uranium, and tritium. All results were below established EPA MCLs. The cesium-137 result for monitoring well CYN-MW16 was rejected by the laboratory because the peak did not meet identification criteria and was qualified as unusable during data validation. Gross alpha activity was measured as a radiological screening tool and in accordance with the *National Primary Drinking Water Regulations* (40 CFR Part 141, December 1975, as updated). An SNL/NM health physicist further reviewed the results to assure that the samples were nonradioactive. The gross alpha activity results were below the EPA MCL of 15 picocuries per liter for all samples.

Table 7B-9 presents the field water quality parameter measurements obtained during purging of each monitoring well (Section 1.3.1.2) during the CY 2023 sampling events. The field water quality parameters measured consisted of temperature, specific conductivity, oxidation-reduction potential, potential of hydrogen, turbidity, and dissolved oxygen. These parameters were measured to evaluate water chemistry stability and ensure the collection of representative groundwater samples.

7.7 Quality Control Results

This section summarizes the CY 2023 field QC sample results and their impact on data quality. Section 1.3 describes how the field QC samples were collected and prepared. Table 1-7 (Section 1.3.4) lists each field QC sample type and purpose.

Relative percent differences (RPDs) were calculated for analytes detected above the MDL in the environmental and environmental duplicate samples. The environmental samples showed good agreement with the environmental duplicate samples for all CY 2023 sampling events based on the RPD of 4 or less for all calculated parameters.

The EB sample results were as follows:

- **April/May 2023 Sampling Event at Monitoring Wells CYN-MW9, CYN-MW11, and CYN- MW18—**The EB samples were collected before sampling began and were analyzed for all parameters. Acetone, alkalinity, bromodichloromethane, chloride, chloroform, copper, dibromochloromethane, DRO, manganese, mercury, methylene chloride, sodium, sulfate, and vanadium were detected above the MDLs. No corrective action was necessary for acetone, alkalinity, bromodichloromethane, chloride, chloroform, dibromochloromethane, DRO, sodium, or sulfate because these analytes were not detected in the associated environmental samples or were detected at concentrations less than 10 times the associated environmental sample result. Copper and manganese for CYN-MW11 and vanadium for CYN-MW9 were qualified as not detected at the PQL during data validation because these metals were reported at concentrations less than the PQL in both the environmental and associated EB samples.
- **October/November 2023 Sampling Event at Monitoring Wells CYN-MW7, CYN-MW13, and CYN-MW16—**The EB samples were collected before sampling began and were analyzed for the same parameters as the associated environmental samples. No concentrations of GRO or NPN were detected above the MDLs in any EB sample. DRO was detected below the PQL in the EB samples associated with CYN-MW7 and CYN-MW16 but were qualified as unusable during data validation because it was determined that the samples had low levels of hydrocarbons within the diesel retention time window but that the peak pattern differed from that of diesel.

FB samples were collected for VOCs (April/May sampling event) and GRO (both sampling events). The FB sample results were as follows:

- **April/May 2023 Sampling Event at Monitoring Wells CYN-MW8, CYN-MW14A, and CYN-MW17—**No GRO was detected above the MDLs in any FB sample. Acetone, bromodichloromethane, chloroform, chloromethane, dibromochloromethane, and methylene chloride were detected in the VOC FB samples. Methylene chloride was considered non-detect during data validation. No corrective action was necessary because, except for acetone, these compounds were not detected in the associated environmental samples. Acetone for CYN-MW8 was qualified as not detected at the PQL during data validation because acetone was reported at concentrations less than the PQL in the associated environmental and FB samples.
- **October/November 2023 Sampling Event at Monitoring Wells CYN-MW8, CYN-MW11, and CYN-MW12—**No parameters were detected above the MDLs in the FB samples.

TB samples are submitted whenever groundwater samples are collected for VOC and GRO analyses. The TB sample results were as follows:

- **April/May 2023 Sampling Event**—A total of 17 VOC and GRO TBs were submitted during this sampling event. GRO was not detected in any TB sample. Acetone, 1,2-dichlorobenzene, and methylene chloride were detected in the TB samples. No corrective action was required for 1,2- dichlorobenzene because this compound was not detected above the MDL in the associated environmental sample. Acetone for monitoring well CYN-MW11 and methylene chloride for monitoring wells CYN-MW16 and CYN-MW18 were qualified as not detected at the PQL during data validation because these compounds were reported at concentrations less than the PQL in the associated environmental and TB samples.
- **October/November 2023 Sampling Event**—A total of 17 GRO TBs were submitted during this sampling event. GRO was not reported above the MDLs in any TB samples.

7.8 Variances and Nonconformances

Groundwater sampling at monitoring well CYN-MW15 has become problematic. During the April/May and October/November 2023 sampling events, the well purged dry and did not recover sufficient volume for sample collection. SNL/NM personnel notified the NMED of this by email on May 22, 2023 and met with the NMED on August 2 and September 25, 2023 to discuss the well's status and determine a course of action. The well's status was fully documented in the *Environmental Restoration Operations Consolidated Quarterly Report, January 2024* (SNL/NM, January 2024). SNL/NM personnel will continue to monitor the water level in the well and will evaluate the possibility of redeveloping the well. The Environmental Restoration Operations Program will continue to update the NMED on the well's status through consolidated quarterly reports and annual groundwater monitoring reports (AGMRs). No other variances from the requirements specified in the BSG AOC mini-sampling and analysis plans (Table 7-4) were identified for the CY 2023 sampling events.

Monitoring well CYN-MW4 was sampled on two dates during the April/May 2023 sampling event. Potential mislabeling of several CYN-MW4 samples occurred on April 25, 2023, so supplemental samples for VOC and GRO analyses were collected on May 5, 2023.

7.9 Summary and Conclusions

The BSG AOC is located in the vicinity of the active Lurance Canyon Burn Site Testing Facility. Groundwater investigations were initiated in 1997 at the NMED's request after elevated nitrate concentrations were discovered in the Burn Site Well (non-potable production well).

BSG AOC monitoring wells were sampled in April/May and October/November 2023. The samples were analyzed for VOCs, HE compounds, DRO, GRO, NPN, Target Analyte List metals, anions (bromide, chloride, fluoride, and sulfate), alkalinity, gamma spectroscopy (short list), gross alpha/beta activity, isotopic uranium, and tritium. The analytical results were compared to the EPA MCLs for drinking water (EPA, March 2018), where established.

In CY 2023, NPN was the only COC that exceeded the EPA MCL. NPN was detected at concentrations exceeding the EPA MCL of 10 mg/L in samples from five BSG AOC monitoring wells: CYN-MW9, CYN-MW10, CYN-MW12, CYN-MW13, and CYN-MW14A. The maximum concentration reported in CY 2023 was 33.8 mg/L in the sample collected from CYN-MW9 during the October/November 2023 sampling event. As Figure 7-4 shows, two distinct NPN plumes exceeding the EPA MCL of 10 mg/L have been identified. The areal extent of NPN contamination has been fully delineated by the current BSG AOC monitoring well network.

7.10 Summary of Future Activities

BSG AOC groundwater monitoring activities in CY 2024 will include:

- Semiannual collection and analysis of groundwater samples from 14 monitoring wells (CYN-MW4, CYN-MW7, CYN-MW8, CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12, CYN- MW13, CYN-MW14A, CYN-MW15 [if water levels recover], CYN-MW16, CYN-MW17, CYN- MW18, and CYN-MW19) during the second and fourth quarters of CY 2024 (SNL/NM, April 2023). At a minimum, the analytes will consist of NPN, DRO, and GRO.
- Quarterly groundwater elevation measurements at 16 monitoring wells and the Burn Site Well.
- Annual reporting of the CY 2024 groundwater monitoring activities and results in the CY 2024 AGMR.
- Submittal of the *Comprehensive Site-Wide Groundwater Monitoring Plan, Calendar Year 2025* to the NMED in April 2024.
- Preparation and submittal of a Corrective Measures Implementation Plan if the NMED approves the *Burn Site Groundwater Area of Concern Current Conceptual Model Corrective Measures Evaluation Report* (SNL/NM, January 2023).

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Attachment 7A
Historical Timeline of the Burn Site Groundwater Area of Concern

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Table 7A-1
Historical Timeline of the Burn Site Groundwater Area of Concern

Month	Year	Event	Reference
	1967-early 1980s	HE outdoor testing conducted at the BSG AOC until early 1980s. Burn testing began in 1970s using excavation pits and portable burn pans with JP-4. Open detonations of HE materials conducted. Wastewater discharged into unlined pits.	SNL/NM, November 2001
	1987	Eighteen potential SWMUs were identified in the area during the Comprehensive Environmental Assessment and Response Program investigation. HE compounds, nitrate, and diesel range organics identified as potential COCs.	DOE, September 1987
February	1996	Burn Site Well (a non-potable production well) was installed at the eastern edge of the HE testing area.	SNL/NM, April 2008a
November	1996	Groundwater sample from Burn Site Well yielded a nitrate concentration of 25 mg/L.	SNL/NM, January 2005
July	1997	NMED/DOE OB, DOE, and SNL/NM personnel agreed on installation of deep and shallow monitoring wells and one year of quarterly sampling.	SNL/NM, July 1997
November	1997	Monitoring wells CYN-MW2S and 12AUP01 were installed to serve as piezometers. Piezometers are constructed of narrow-diameter casing and not used for collecting groundwater samples.	SNL/NM, June 1998
December	1997	Monitoring well CYN-MW1D installed.	SNL/NM, June 1998
February	1998	Site-Wide Hydrogeologic Characterization Project, Calendar Year 1995 Annual Report containing description of BSG hydrogeology submitted to the NMED.	SNL/NM, February 1998
March	1999	GWPP Fiscal Year 1998 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL/NM, March 1999
June	1999	Monitoring wells CYN-MW3 and CYN-MW4 installed.	SNL/NM, November 2001
	Various (e.g., 1994)	BSG AOC SWMUs 94 and 65 proposed and approved for NFA/CAC.	Numerous references, for example: SNL/NM, February 2004
March	2000	GWPP Fiscal Year 1999 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL/NM, March 2000
April	2001	GWPP Fiscal Year 2000 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL/NM, April 2001
August	2001	Monitoring well CYN-MW5 installed 1.7 miles west of the BSG AOC.	SNL/NM, June 2005
November	2001	Comprehensive BSG Investigation Report documenting hydrogeologic characteristics of the study area prepared.	SNL/NM, November 2001
March	2002	GWPP Fiscal Year 2001 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL/NM, March 2002
March	2003	GWPP Fiscal Year 2002 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL/NM, March 2003
June	2003	Further refinements of the hydrogeologic setting of the BSG AOC are presented.	Van Hart, June 2003
	2003	Burn Site Well (non-potable production well) removed from use.	None
March	2004	GWPP Fiscal Year 2003 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL/NM, March 2004
April	2004	Compliance Order on Consent lists BSG as an AOC that requires a CME.	NMED, April 2004
June	2004	A CCM of the BSG AOC prepared.	SNL/NM, June 2004a
June	2004	A CME Work Plan for the BSG AOC prepared.	SNL/NM, June 2004b
January	2005	Nitrate source evaluation of deep soil in the BSG AOC performed.	SNL/NM, January 2005
February	2005	NMED required additional site characterization and the preparation of an Interim Measures Work Plan.	NMED, February 2005

Refer to Notes at end of table.

Table 7A-1 (continued)
Historical Timeline of the Burn Site Groundwater Area of Concern

Month	Year	Event	Reference
May	2005	BSG Interim Measures Work Plan submitted to the NMED.	SNL/NM, May 2005
July	2005	NMED sent an RSI for the Interim Measures Work Plan.	NMED, July 2005
August	2005	Response for RSI is submitted to the NMED.	SNL/NM, August 2005
October	2005	GWPP Fiscal Year 2004 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL/NM, October 2005
December	2005	Monitoring wells CYN-MW6 and CYN-MW7 installed.	SNL/NM, October 2006
January	2006	Monitoring well CYN-MW8 installed.	SNL/NM, October 2006
March	2007	GWPP Fiscal Year 2006 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL/NM, March 2007
March	2008	GWPP Fiscal Year 2007 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL/NM, March 2008
April	2008	BSG CCM resubmitted to the NMED.	SNL/NM, April 2008a
April	2008	BSG CME Work Plan resubmitted to the NMED.	SNL/NM, April 2008b
April	2009	NMED required supplemental characterization of soil and groundwater in the BSG AOC.	NMED, April 2009
June	2009	GWPP Calendar Year 2008 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL/NM, June 2009
November	2009	BSG Characterization Work Plan submitted to the NMED.	SNL/NM, November 2009
February	2010	Received notice of conditional approval for the November 2009 BSG Characterization Work Plan.	NMED, February 2010
July	2010	Completed subsurface soil sampling at 10 deep soil boring locations to determine contaminant sources.	SNL/NM, November 2009
July	2010	Installed four groundwater monitoring wells (CYN-MW9, CYN-MW10, CYN-MW11, and CYN-MW12) to determine extent of groundwater contamination.	SNL/NM, January 2012
September	2010	An extension request for the BSG CME Report submitted to the NMED.	SNL/NM, September 2010
October	2010	Received approval of a time extension for submittal of the BSG CME Report.	NMED, October 2010
October	2010	GWPP Calendar Year 2009 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL/NM, October 2010
August	2011	Received approval of the April 2008 CME Work Plan.	NMED, August 2011
September	2011	GWPP Calendar Year 2010 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL/NM, September 2011
January	2012	Summary Report for BSG Characterization Field Program submitted to the NMED.	SNL/NM, January 2012
February	2012	Monitoring Well Plug and Abandonment Plan and Well Construction Plan for BSG wells and status of CYN-MW3 submitted to the NMED.	SNL/NM, February 2012
April	2012	Received notice of approval for the 2012 BSG Monitoring Well Plug and Abandonment Plan and Well Construction Plan.	NMED, April 2012
June	2012	Received notice of approval for the January 2012 Summary Report for the BSG Characterization Field Program.	NMED, June 2012
September	2012	GWPP Calendar Year 2011 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL/NM, September 2012
December	2012	Completed field program to decommission BSG monitoring wells 12AUP01, CYN-MW1D, CYN-MW2S, and install monitoring well CYN-MW13.	SNL/NM, March 2013
August	2013	Submitted an Extension Request to the NMED for the BSG CME Report to March 31, 2014.	DOE, August 2013
September	2013	Groundwater sampling analytical results for BSG wells reported in the Calendar Year 2012 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, September 2013b

Refer to Notes at end of table.

Table 7A-1 (continued)
Historical Timeline of the Burn Site Groundwater Area of Concern

Month	Year	Event	Reference
September	2013	Monitoring Well Plug and Abandonment Plan and Well Construction Plan for Installation of Groundwater Monitoring Wells CYN-MW14 and CYN-MW15 submitted to the NMED.	SNL/NM, September 2013a
October	2013	DOE Office of Environmental Management submitted the first Internal Remedy Review of the BSG AOC to DOE/NNSA Sandia Field Office.	DOE, October 2013
January	2014	DOE/NNSA requested an extension to the delivery date of the BSG CME Report to March 31, 2016.	DOE, January 2014
June	2014	Received approval for the installation of groundwater monitoring wells CYN-MW14A and CYN-MW15.	NMED, June 2014a
June	2014	NMED approved the proposed extension request for the BSG CME Report to March 31, 2016.	NMED, June 2014b
June	2014	Groundwater sampling analytical results for BSG wells reported in the Calendar Year 2013 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, June 2014
November	2014	DOE Office of Environmental Management submitted the second Internal Remedy Review of the BSG AOC to DOE/NNSA Sandia Field Office.	DOE, November 2014
December	2014	Installed groundwater monitoring wells CYN-MW14A and CYN-MW15.	SNL/NM, April 2015
April	2015	Summary Report for Installation of Groundwater Monitoring Wells CYN-MW14A and CYN-MW15 submitted to the NMED.	SNL/NM, April 2015
May	2015	DOE Office of Environmental Management submitted the third Internal Remedy Review of the BSG AOC to DOE/NNSA Sandia Field Office.	DOE, May 2015
June	2015	Received approval for the Installation Report for CYN-MW14A and CYN-MW15.	NMED, June 2015
June	2015	Groundwater sampling analytical results for BSG wells reported in the Calendar Year 2014 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, June 2015
March	2016	Proposed weight-of-evidence activities and schedule milestones for implementation of the studies.	DOE, March 2016
April	2016	NMED approved the activities and milestones proposed by DOE/NNSA for the weight-of-evidence activities.	NMED, April 2016
June	2016	Aquifer Pumping Test Work Plan submitted to the NMED.	SNL/NM, June 2016a
June	2016	Groundwater sampling analytical results for BSG wells reported in the Calendar Year 2015 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, June 2016b
June	2016	Aquifer Pumping Test Work Plan approved.	NMED, June 2016
July	2016	Prepared stable isotope denitrification and groundwater age dating report summary.	Madrid et. al., July 2016
March	2017	Field requirements of the Aquifer Pumping Test were completed, including long-term transducer study, step drawdown test, constant rate test, and groundwater interval sampling for nitrate.	SNL/NM, December 2017
May	2017	Preliminary results of the pumping test were shared with NMED on May 10, 2017 at the NMED District 1 office.	SNL/NM, December 2017
June	2017	Groundwater sampling analytical results for BSG wells reported in the Calendar Year 2016 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, July 2017
November	2017	Requested an extension for the submittal of recommendations for further characterization activities.	DOE, November 2017
November	2017	Extension request approved.	NMED, November 2017
December	2017	Aquifer Pumping Test Report submitted to the NMED.	SNL/NM, December 2017

Refer to Notes at end of table.

Table 7A-1 (continued)
Historical Timeline of the Burn Site Groundwater Area of Concern

Month	Year	Event	Reference
January	2018	Aquifer Pumping Test Report approved.	NMED, January 2018
June	2018	Proposed recommendations for additional site characterization.	DOE, June 2018
June	2018	NMED disapproved the proposed recommendations and required the submittal of a Well Installation Work Plan.	NMED, June 2018
June	2018	Groundwater sampling analytical results for BSG wells reported in the Calendar Year 2017 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, June 2018
January	2019	Monitoring Well Installation Work Plan for CYN-MW16 through CYN-MW23 submitted to the NMED.	SNL/NM, January 2019
February	2019	NMED approved the Monitoring Well Installation Work Plan.	NMED, February 2019
June	2019	Groundwater sampling analytical results for BSG wells reported in the Calendar Year 2018 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, June 2019
September	2019	Monitoring well field program started.	SNL/NM, May 2020
December	2019	Monitoring well field program completed. Four monitoring wells (CYN-MW16, CYN-MW17, CYN-MW18, and CYN-MW19) were installed and sampled.	SNL/NM, May 2020
May	2020	Monitoring Well Installation Report for CYN-MW16 through CYN-MW19 submitted to the NMED.	SNL/NM, May 2020
June	2020	Extension request for CCM/CME submitted to the NMED.	SNL/NM, June 2020a
June	2020	Groundwater sampling analytical results for BSG wells reported in the Calendar Year 2019 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, June 2020b
July	2020	NMED approved the Monitoring Well Installation Report.	NMED, July 2020a
July	2020	NMED approved the CCM/CME extension request (new due date is January 31, 2023).	NMED, July 2020b
September	2020	Preliminary results from the first four quarterly sampling events at the four new monitoring wells were shared with the NMED on September 23, 2020.	SNL/NM, June 2021
November	2020	Final perchlorate sampling event at CYN-MW15 based on four consecutive non detections.	SNL/NM, April 2021
May	2021	Preliminary results from the first six quarterly sampling events at the four new monitoring wells were shared with the NMED on May 11, 2021.	SNL/NM, October 2021
June	2021	Groundwater sampling analytical results for BSG wells reported in the Calendar Year 2020 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, June 2021
November	2021	An evaluation of the groundwater monitoring well network was sent to the NMED on November 5, 2021.	DOE, November 2021
December	2021	NMED approved the evaluation of the groundwater monitoring well network.	NMED, December 2021
June	2022	Groundwater sampling analytical results for BSG wells reported in the Calendar Year 2021 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, June 2022
January	2023	Submitted the BSG AOC CCM/CME Report to NMED.	SNL/NM, January 2023
May	2023	Email notification sent to the NMED regarding the status of monitoring well CYN-MW15.	SNL/NM, January 2024
June	2023	Groundwater sampling analytical results for BSG well reported in the Calendar Year 2022 SNL/NM Annual Groundwater Monitoring Report.	SNL/NM, June 2023

Notes:
AOC = Area of Concern
BSG = Burn Site Groundwater
CAC = Corrective Action Complete
CCM = Current Conceptual Model
CME = Corrective Measures Evaluation

Table 7A-1 (concluded)
Historical Timeline of the Burn Site Groundwater Area of Concern

Notes (concluded):

CYN	= Canyons
COC	= constituent of concern
DOE	= U.S. Department of Energy
GWPP	= Groundwater Protection Program
HE	= high explosive
JP-4	= jet propellant, fuel grade 4
mg/L	= milligram(s) per liter
MW	= Monitoring Well
NFA	= No Further Action
NMED	= New Mexico Environment Department
NNSA	= National Nuclear Security Administration
OB	= Oversight Bureau
RSI	= Request for Supplemental Information
SNL	= Sandia National Laboratories
SNL/NM	= Sandia National Laboratories, New Mexico
SWMU	= Solid Waste Management Unit

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Attachment 7B
Burn Site Groundwater Analytical Results Tables

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Attachment 7B Tables

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Table 7B-1
Summary of Detected Volatile Organic Compounds, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW4	1,2,3-Trichlorobenzene	0.390	0.333	1.00	NE	B, J	1.0U	120243-001	SW846-8260D
05-May-23	Acetone	2.05	1.74	5.00	NE	J		120243-001	SW846-8260D
CYN-MW7	Acetone	1.83	1.74	5.00	NE	B, J	5.0U	120134-001	SW846-8260D
27-Apr-23	Methylene chloride	1.11	0.500	5.00	5.00	B, J	5.0U	120134-001	SW846-8260D
CYN-MW8	Acetone	2.31	1.74	5.00	NE	J	5.0U	120139-001	SW846-8260D
02-May-23	Methylene chloride	0.750	0.500	5.00	5.00	B, J	5.0U	120139-001	SW846-8260D
CYN-MW11	1,2,3-Trichlorobenzene	0.770	0.333	1.00	NE	B, J	1.0U	120150-001	SW846-8260D
08-May-23	1,2,4-Trichlorobenzene	0.490	0.333	1.00	70	J		120150-001	SW846-8260D
	Acetone	1.92	1.74	5.00	NE	J	5.0U	120150-001	SW846-8260D
CYN-MW12 10-May-23	Acetone	2.37	1.74	5.00	NE	B, J	5.0U	120158-001	SW846-8260D
CYN-MW14A 09-May-23	Acetone	2.59	1.74	5.00	NE	B, J	5.0U	120154-001	SW846-8260D
CYN-MW16 04-May-23	Methylene chloride	1.82	0.500	5.00	5.00	J	5.0U	120146-001	SW846-8260D
CYN-MW17	Acetone	2.14	1.74	5.00	NE	B, J	5.0U	120132-001	SW846-8260D
26-April-23	Methylene chloride	0.930	0.500	5.00	5.00	B, J	5.0U	120132-001	SW846-8260D
CYN-MW18 03-May-23	Methylene chloride	0.910	0.500	5.00	5.00	J	5.0U	120143-001	SW846-8260D
CYN-MW19 01-May-23	Methylene chloride	0.910	0.500	5.00	5.00	B, J	5.0U	120136-001	SW846-8260D

Refer to Notes on page 7B-33.

Table 7B-2
Method Detection Limits for Volatile Organic Compounds (EPA Method[g] SW846-8260D), Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Analyte	MDL[b] (µg/L)	Analyte	MDL[b] (µg/L)
1,1,1-Trichloroethane	0.333	Chlorobenzene	0.333
1,1,2,2-Tetrachloroethane	0.333	Chloroethane	0.333
1,1,2-Trichloroethane	0.333	Chloroform	0.333
1,1-Dichloroethane	0.333	Chloromethane	0.333
1,1-Dichloroethene	0.333	Cyclohexane	0.333
1,2,3-Trichlorobenzene	0.333	Dibromochloromethane	0.333
1,2,4-Trichlorobenzene	0.333	Dichlorodifluoromethane	0.355
1,2-Dibromo-3-chloropropane	0.333	Ethylbenzene	0.333
1,2-Dibromoethane	0.333	Isopropylbenzene	0.333
1,2-Dichlorobenzene	0.333	Methyl acetate	1.67
1,2-Dichloroethane	0.333	Methylcyclohexane	0.333
1,2-Dichloropropane	0.333	Methylene chloride	0.500
1,3-Dichlorobenzene	0.333	Styrene	0.333
1,4-Dichlorobenzene	0.333	Tert-butyl methyl ether	0.333
2,2-trifluoroethane, 1,1,2-Trichloro-1	2.98	Tetrachloroethene	0.333
2-Butanone	1.67	Toluene	0.333
2-Hexanone	1.67	Trichloroethene	0.333
4-methyl-, 2-Pentanone	1.67	Trichlorofluoromethane	0.333
Acetone	1.74	Vinyl chloride	0.333
Benzene	0.333	Xylene	1.00
Bromochloromethane	0.333	cis-1,2-Dichloroethene	0.333
Bromodichloromethane	0.333	cis-1,3-Dichloropropene	0.333
Bromoform	0.333	m-,p-Xylene	0.500
Bromomethane	0.337	o-Xylene	0.333
Carbon disulfide	1.67	trans-1,2-Dichloroethene	0.333
Carbon tetrachloride	0.333	trans-1,3-Dichloropropene	0.333

Refer to Notes on page 7B-33.

Table 7B-3
Method Detection Limits for High Explosive Compounds (EPA Method[g] SW846-8330B), Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Analyte	MDL[b] (µg/L)
1,3,5-Trinitrobenzene	0.0808 – 0.0868
1,3-Dinitrobenzene	0.0808 – 0.0868
2,4,6-Trinitrotoluene	0.0808 – 0.0868
2,4-Dinitrotoluene	0.0808 – 0.0868
2,6-Dinitrotoluene	0.0808 – 0.0868
2-Amino-4,6-dinitrotoluene	0.0808 – 0.0868
2-Nitrotoluene	0.0828 – 0.0889
3-Nitrotoluene	0.0808 – 0.0868
4-Amino-2,6-dinitrotoluene	0.0808 – 0.0868
4-Nitrotoluene	0.151 – 0.163
HMX	0.0808 – 0.0868
Nitro-benzene	0.0808 – 0.0868
Pentaerythritol tetranitrate	0.101 – 0.108
RDX	0.0808 – 0.0868
Tetryl	0.0808 – 0.0868

Refer to Notes on page 7B-33.

Table 7B-4
Summary of Nitrate plus Nitrite Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW4 25-Apr-23	Nitrate plus nitrite	0.120	0.0170	0.050	10.0			120129-005	EPA 353.2
CYN-MW7 27-Apr-23	Nitrate plus nitrite	2.17	0.425	1.25	10.0			120134-005	EPA 353.2
CYN-MW8 02-May-23	Nitrate plus nitrite	4.45	0.425	1.25	10.0			120139-005	EPA 353.2
CYN-MW9 18-May-23	Nitrate plus nitrite	**33.6**	8.50	25.0	10.0			120221-005	EPA 353.2
CYN-MW9 (Duplicate) 18-May-23	Nitrate plus nitrite	**33.3**	8.50	25.0	10.0			120222-005	EPA 353.2
CYN-MW10 11-May-23	Nitrate plus nitrite	**20.9**	1.70	5.00	10.0			120160-005	EPA 353.2
CYN-MW11 08-May-23	Nitrate plus nitrite	7.43	0.425	1.25	10.0			120150-005	EPA 353.2
CYN-MW11 (Duplicate) 08-May-23	Nitrate plus nitrite	7.33	0.425	1.25	10.0			120151-005	EPA 353.2
CYN-MW12 10-May-23	Nitrate plus nitrite	**16.6**	1.70	5.00	10.0			120158-005	EPA 353.2
CYN-MW13 17-May-23	Nitrate plus nitrite	**26.2**	8.50	25.0	10.0			120211-005	EPA 353.2
CYN-MW14A 09-May-23	Nitrate plus nitrite	**12.3**	1.70	5.00	10.0			120154-005	EPA 353.2
CYN-MW16 04-May-23	Nitrate plus nitrite	6.25	0.425	1.25	10.0			120146-005	EPA 353.2
CYN-MW17 26-Apr-23	Nitrate plus nitrite	2.42	0.0850	0.250	10.0			120132-005	EPA 353.2
CYN-MW18 03-May-23	Nitrate plus nitrite	6.33	0.425	1.25	10.0			120143-005	EPA 353.2
CYN-MW18 (Duplicate) 03-May-23	Nitrate plus nitrite	6.43	0.425	1.25	10.0			120144-005	EPA 353.2
CYN-MW19 01-May-23	Nitrate plus nitrite	2.83	0.425	1.25	10.0			120136-005	EPA 353.2

Refer to Notes on page 7B-33.

Table 7B-4 (concluded)
Summary of Nitrate plus Nitrite Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW4 19-Oct-23	Nitrate plus nitrite	0.133	0.0170	0.0500	10.0			121253-003	EPA 353.2
CYN-MW7 18-Oct-23	Nitrate plus nitrite	2.42	0.0850	0.250	10.0			121259-003	EPA 353.2
CYN-MW7 (Duplicate) 18-Oct-23	Nitrate plus nitrite	2.43	0.0850	0.250	10.0			121260-003	EPA 353.2
CYN-MW8 25-Oct-23	Nitrate plus nitrite	5.10	0.425	1.25	10.0			121268-003	EPA 353.2
CYN-MW9 31-Oct-23	Nitrate plus nitrite	**33.8**	0.850	2.50	10.0			121291-003	EPA 353.2
CYN-MW10 31-Oct-23	Nitrate plus nitrite	**25.8**	0.850	2.50	10.0			121284-003	EPA 353.2
CYN-MW11 30-Oct-23	Nitrate plus nitrite	7.95	0.425	1.25	10.0			121280-003	EPA 353.2
CYN-MW12 26-Oct-23	Nitrate plus nitrite	**15.8**	1.70	5.00	10.0			121275-003	EPA 353.2
CYN-MW13 01-Nov-23	Nitrate plus nitrite	**26.7**	0.850	2.50	10.0			121288-003	EPA 353.2
CYN-MW13 (Duplicate) 01-Nov-23	Nitrate plus nitrite	**27.1**	0.850	2.50	10.0			121289-003	EPA 353.2
CYN-MW14A 25-Oct-23	Nitrate plus nitrite	**12.1**	0.425	1.25	10.0			121270-003	EPA 353.2
CYN-MW16 17-Oct-23	Nitrate plus nitrite	6.63	0.425	1.25	10.0			121264-003	EPA 353.2
CYN-MW16 (Duplicate) 17-Oct-23	Nitrate plus nitrite	6.88	0.425	1.25	10.0			121265-003	EPA 353.2
CYN-MW17 19-Oct-23	Nitrate plus nitrite	2.44	0.170	0.500	10.0		J	121255-003	EPA 353.2
CYN-MW18 26-Oct-23	Nitrate plus nitrite	7.05	0.850	2.50	10.0			121272-003	EPA 353.2
CYN-MW19 23-Oct-23	Nitrate plus nitrite	3.34	0.170	0.500	10.0		J	121262-003	EPA 353.2

Refer to Notes on page 7B-33.

Table 7B-5
Summary of Diesel Range Organics and Gasoline Range Organics Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW4 25-Apr-23	Diesel Range Organics	ND	75.0	200	NE	U		120129-004	SW846-3535A/8015D
CYN-MW4 05-May-23	Gasoline Range Organics	ND	16.7	100	NE	U		120243-002	SW846-8015D GRO
CYN-MW7	Diesel Range Organics	91.6	78.4	209	NE	B, J, N, *	209UJ	120134-004	SW846-3535A/8015D
27-Apr-23	Gasoline Range Organics	ND	16.7	100	NE	U		120134-002	SW846-8015D GRO
CYN-MW8	Diesel Range Organics	ND	75.0	200	NE	U		120139-004	SW846-3535A/8015D
02-May-23	Gasoline Range Organics	ND	16.7	100	NE	U		120139-002	SW846-8015D GRO
CYN-MW9	Diesel Range Organics	ND	77.1	206	NE	U		120221-004	SW846-3535A/8015D
18-May-23	Gasoline Range Organics	ND	16.7	100	NE	U		120221-002	SW846-8015D GRO
CYN-MW9 (Duplicate)	Diesel Range Organics	ND	81.2	216	NE	U		120222-004	SW846-3535A/8015D
18-May-23	Gasoline Range Organics	ND	16.7	100	NE	U		120222-002	SW846-8015D GRO
CYN-MW10	Diesel Range Organics	ND	78.0	208	NE	U		120160-004	SW846-3535A/8015D
11-May-23	Gasoline Range Organics	ND	16.7	100	NE	U		120160-002	SW846-8015D GRO
CYN-MW11	Diesel Range Organics	ND	75.0	200	NE	U		120150-004	SW846-3535A/8015D
08-May-23	Gasoline Range Organics	ND	16.7	100	NE	U		120150-002	SW846-8015D GRO
CYN-MW11 (Duplicate)	Diesel Range Organics	ND	80.6	215	NE	U		120151-004	SW846-3535A/8015D
08-May-23	Gasoline Range Organics	ND	16.7	100	NE	U		120151-002	SW846-8015D GRO
CYN-MW12	Diesel Range Organics	ND	82.2	219	NE	U		120158-004	SW846-3535A/8015D
10-May-23	Gasoline Range Organics	ND	16.7	100	NE	U		120158-002	SW846-8015D GRO
CYN-MW13	Diesel Range Organics	ND	75.0	200	NE	U		120211-004	SW846-3535A/8015D
17-May-23	Gasoline Range Organics	ND	16.7	100	NE	U		120211-002	SW846-8015D GRO
CYN-MW14A	Diesel Range Organics	ND	75.0	200	NE	U		120154-004	SW846-3535A/8015D
09-May-23	Gasoline Range Organics	ND	16.7	100	NE	U		120154-002	SW846-8015D GRO
CYN-MW16	Diesel Range Organics	ND	80.9	216	NE	U		120146-004	SW846-3535A/8015D
04-May-23	Gasoline Range Organics	ND	16.7	100	NE	U		120146-002	SW846-8015D GRO
CYN-MW17	Diesel Range Organics	ND	75.0	200	NE	N, U, *	UJ	120132-004	SW846-3535A/8015D
26-Apr-23	Gasoline Range Organics	ND	16.7	100	NE	U		120132-002	SW846-8015D GRO
CYN-MW18	Diesel Range Organics	ND	76.0	203	NE	U		120143-004	SW846-3535A/8015D
03-May-23	Gasoline Range Organics	ND	16.7	100	NE	U		120143-002	SW846-8015D GRO
CYN-MW18 (Duplicate)	Diesel Range Organics	ND	78.9	210	NE	U		120144-004	SW846-3535A/8015D
03-May-23	Gasoline Range Organics	ND	16.7	100	NE	U		120144-002	SW846-8015D GRO
CYN-MW19	Diesel Range Organics	ND	76.8	205	NE	N, U, *	UJ	120136-004	SW846-3535A/8015D
01-May-23	Gasoline Range Organics	ND	16.7	100	NE	U		120136-002	SW846-8015D GRO

Refer to Notes on page 7B-33.

Table 7B-5 (concluded)
Summary of Diesel Range Organics and Gasoline Range Organics Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (µg/L)	MDL[b] (µg/L)	PQL[c] (µg/L)	MCL[d] (µg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW4	Diesel Range Organics	109	81.5	217	NE	J, *	R	121253-002	SW846-3535A/8015D
19-Oct-23	Gasoline Range Organics	ND	16.7	100	NE	U		121253-001	SW846-8015D GRO
CYN-MW7	Diesel Range Organics	109	75.0	200	NE	J, *	R	121259-002	SW846-3535A/8015D
18-Oct-23	Gasoline Range Organics	ND	16.7	100	NE	U		121259-001	SW846-8015D GRO
CYN-MW7 (Duplicate)	Diesel Range Organics	80.0	79.3	212	NE	J, *	R	121260-002	SW846-3535A/8015D
18-Oct-23	Gasoline Range Organics	ND	16.7	100	NE	U		121260-001	SW846-8015D GRO
CYN-MW8	Diesel Range Organics	ND	75.0	200	NE	U		121268-002	SW846-3535A/8015D
25-Oct-23	Gasoline Range Organics	ND	16.7	100	NE	U		121268-001	SW846-8015D GRO
CYN-MW9	Diesel Range Organics	ND	79.8	213	NE	U		121291-002	SW846-3535A/8015D
31-Oct-23	Gasoline Range Organics	ND	16.7	100	NE	U		121291-001	SW846-8015D GRO
CYN-MW10	Diesel Range Organics	ND	82.5	220	NE	U		121284-002	SW846-3535A/8015D
31-Oct-23	Gasoline Range Organics	ND	16.7	100	NE	U		121284-001	SW846-8015D GRO
CYN-MW11	Diesel Range Organics	ND	75.0	200	NE	U		121280-002	SW846-3535A/8015D
30-Oct-23	Gasoline Range Organics	ND	16.7	100	NE	U		121280-001	SW846-8015D GRO
CYN-MW12	Diesel Range Organics	ND	77.4	206	NE	U		121275-002	SW846-3535A/8015D
26-Oct-23	Gasoline Range Organics	ND	16.7	100	NE	U		121275-001	SW846-8015D GRO
CYN-MW13	Diesel Range Organics	ND	81.3	217	NE	U		121288-002	SW846-3535A/8015D
01-Nov-23	Gasoline Range Organics	ND	16.7	100	NE	U		121288-001	SW846-8015D GRO
CYN-MW13 (Duplicate)	Diesel Range Organics	ND	82.0	219	NE	U		121289-002	SW846-3535A/8015D
01-Nov-23	Gasoline Range Organics	ND	16.7	100	NE	U		121289-001	SW846-8015D GRO
CYN-MW14A	Diesel Range Organics	ND	77.6	207	NE	U		121270-002	SW846-3535A/8015D
25-Oct-23	Gasoline Range Organics	ND	16.7	100	NE	U		121270-001	SW846-8015D GRO
CYN-MW16	Diesel Range Organics	ND	75.0	200	NE	U		121264-002	SW846-3535A/8015D
17-Oct-23	Gasoline Range Organics	ND	16.7	100	NE	U		121264-001	SW846-8015D GRO
CYN-MW16 (Duplicate)	Diesel Range Organics	115	84.5	225	NE	J	R	121265-002	SW846-3535A/8015D
17-Oct-23	Gasoline Range Organics	ND	16.7	100	NE	U		121265-001	SW846-8015D GRO
CYN-MW17	Diesel Range Organics	135	79.7	213	NE	J, *	R	121255-002	SW846-3535A/8015D
19-Oct-23	Gasoline Range Organics	ND	16.7	100	NE	U		121255-001	SW846-8015D GRO
CYN-MW18	Diesel Range Organics	ND	79.5	212	NE	U		121272-002	SW846-3535A/8015D
26-Oct-23	Gasoline Range Organics	ND	16.7	100	NE	U		121272-001	SW846-8015D GRO
CYN-MW19	Diesel Range Organics	89.9	82.1	219	NE	J, *	R	121262-002	SW846-3535A/8015D
23-Oct-23	Gasoline Range Organics	ND	16.7	100	NE	U		121262-001	SW846-8015D GRO

Refer to Notes on page 7B-33.

Table 7B-6
Summary of Anion Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW4	Bromide	0.369	0.0670	0.200	NE			120129-006	SW846-9056A
25-Apr-23	Chloride	24.6	0.670	2.00	NE			120129-006	SW846-9056A
	Fluoride	0.725	0.0330	0.100	4.0			120129-006	SW846-9056A
	Sulfate	138	1.33	4.00	NE			120129-006	SW846-9056A
	Total Alkalinity as $CaCO_3$	231	1.45	4.00	NE			120129-007	SM 2320B
CYN-MW7	Bromide	0.611	0.0670	0.200	NE			120134-006	SW846-9056A
27-Apr-23	Chloride	43.0	0.670	2.00	NE			120134-006	SW846-9056A
	Fluoride	1.28	0.0330	0.100	4.0			120134-006	SW846-9056A
	Sulfate	87.0	1.33	4.00	NE			120134-006	SW846-9056A
	Total Alkalinity as $CaCO_3$	277	1.45	4.00	NE			120134-007	SM 2320B
CYN-MW8	Bromide	0.786	0.0670	0.200	NE			120139-006	SW846-9056A
02-May-23	Chloride	56.1	1.34	4.00	NE			120139-006	SW846-9056A
	Fluoride	1.39	0.0330	0.100	4.0			120139-006	SW846-9056A
	Sulfate	122	2.66	8.00	NE			120139-006	SW846-9056A
	Total Alkalinity as $CaCO_3$	253	0.725	2.00	NE			120139-007	SM 2320B
CYN-MW9	Bromide	0.647	0.0670	0.200	NE			120221-006	SW846-9056A
18-May-23	Chloride	50.8	0.670	2.00	NE			120221-006	SW846-9056A
	Fluoride	0.600	0.0330	0.100	4.0			120221-006	SW846-9056A
	Sulfate	136	1.33	4.00	NE			120221-006	SW846-9056A
	Total Alkalinity as $CaCO_3$	274	0.725	2.00	NE			120221-007	SM 2320B
CYN-MW10	Bromide	0.804	0.0670	0.200	NE			120160-006	SW846-9056A
11-May-23	Chloride	52.2	1.34	4.00	NE			120160-006	SW846-9056A
	Fluoride	0.535	0.0330	0.100	4.0			120160-006	SW846-9056A
	Sulfate	168	2.66	8.00	NE			120160-006	SW846-9056A
	Total Alkalinity as $CaCO_3$	265	0.725	2.00	NE			120160-007	SM 2320B
CYN-MW11	Bromide	1.30	0.0670	0.200	NE			120150-006	SW846-9056A
08-May-23	Chloride	94.4	1.34	4.00	NE			120150-006	SW846-9056A
	Fluoride	0.725	0.0330	0.100	4.0			120150-006	SW846-9056A
	Sulfate	213	2.66	8.00	NE			120150-006	SW846-9056A
	Total Alkalinity as $CaCO_3$	229	0.725	2.00	NE			120150-007	SM 2320B
CYN-MW12	Bromide	1.45	0.0670	0.200	NE			120158-006	SW846-9056A
10-May-23	Chloride	122	2.68	8.00	NE			120158-006	SW846-9056A
	Fluoride	1.03	0.0330	0.100	4.0			120158-006	SW846-9056A
	Sulfate	348	5.32	16.0	NE			120158-006	SW846-9056A
	Total Alkalinity as $CaCO_3$	243	0.725	2.00	NE			120158-007	SM 2320B

Refer to Notes on page 7B-33.

Table 7B-6 (concluded)
Summary of Anion Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW13	Bromide	0.364	0.0670	0.200	NE			120211-006	SW846-9056A
17-May-23	Chloride	23.6	0.670	2.00	NE			120211-006	SW846-9056A
	Fluoride	1.67	0.0330	0.100	4.0			120211-006	SW846-9056A
	Sulfate	91.1	1.33	4.00	NE			120211-006	SW846-9056A
	Total Alkalinity as $CaCO_3$	184	0.725	2.00	NE			120211-007	SM 2320B
CYN-MW14A	Bromide	0.840	0.0670	0.200	NE			120154-006	SW846-9056A
09-May-23	Chloride	64.1	1.34	4.00	NE			120154-006	SW846-9056A
	Fluoride	0.988	0.0330	0.100	4.0			120154-006	SW846-9056A
	Sulfate	194	2.66	8.00	NE			120154-006	SW846-9056A
	Total Alkalinity as $CaCO_3$	249	0.725	2.00	NE			120154-007	SM 2320B
CYN-MW16	Bromide	0.642	0.0670	0.200	NE			120146-006	SW846-9056A
04-May-23	Chloride	54.4	0.670	2.00	NE			120146-006	SW846-9056A
	Fluoride	1.48	0.0330	0.100	4.0			120146-006	SW846-9056A
	Sulfate	148	1.33	4.00	NE			120146-006	SW846-9056A
	Total Alkalinity as $CaCO_3$	213	0.725	2.00	NE			120146-007	SM 2320B
CYN-MW17	Bromide	0.609	0.0670	0.200	NE			120132-006	SW846-9056A
26-Apr-23	Chloride	33.0	0.670	2.00	NE			120132-006	SW846-9056A
	Fluoride	1.88	0.0330	0.100	4.0			120132-006	SW846-9056A
	Sulfate	79.1	1.33	4.00	NE			120132-006	SW846-9056A
	Total Alkalinity as $CaCO_3$	181	1.45	4.00	NE			120132-007	SM 2320B
CYN-MW18	Bromide	0.671	0.0670	0.200	NE			120143-006	SW846-9056A
03-May-23	Chloride	45.4	1.68	5.00	NE			120143-006	SW846-9056A
	Fluoride	2.06	0.0330	0.100	4.0			120143-006	SW846-9056A
	Sulfate	200	3.33	10.0	NE			120143-006	SW846-9056A
	Total Alkalinity as $CaCO_3$	203	0.725	2.00	NE			120143-007	SM 2320B
CYN-MW19	Bromide	0.520	0.0670	0.200	NE			120136-006	SW846-9056A
01-May-23	Chloride	32.8	0.670	2.00	NE			120136-006	SW846-9056A
	Fluoride	0.591	0.0330	0.100	4.0			120136-006	SW846-9056A
	Sulfate	133	1.33	4.00	NE			120136-006	SW846-9056A
	Total Alkalinity as $CaCO_3$	257	1.45	4.00	NE			120136-007	SM 2320B

Refer to Notes on page 7B-33.

Table 7B-7
Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW4	Aluminum	ND	0.0193	0.0500	NE	U		120129-008	SW846-3005A/6020B
25-Apr-23	Antimony	ND	0.00100	0.00300	0.006	U		120129-008	SW846-3005A/6020B
	Arsenic	0.00213	0.00200	0.00500	0.010	J		120129-008	SW846-3005A/6020B
	Barium	0.0399	0.000670	0.00400	2.00			120129-008	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120129-008	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		120129-008	SW846-3005A/6020B
	Calcium	76.5	0.800	2.00	NE			120129-008	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120129-008	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120129-008	SW846-3005A/6020B
	Copper	0.000366	0.000300	0.00200	NE	J		120129-008	SW846-3005A/6020B
	Iron	ND	0.0330	0.100	NE	U		120129-008	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120129-008	SW846-3005A/6020B
	Magnesium	37.0	0.0100	0.0300	NE			120129-008	SW846-3005A/6020B
	Manganese	0.00210	0.00100	0.00500	NE	J		120129-008	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U	UJ	120129-008	SW846-7470A
	Nickel	ND	0.000600	0.00200	NE	U		120129-008	SW846-3005A/6020B
	Potassium	6.57	0.0800	0.300	NE			120129-008	SW846-3005A/6020B
	Selenium	0.0139	0.00150	0.00500	0.050			120129-008	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120129-008	SW846-3005A/6020B
	Sodium	44.3	0.0800	0.250	NE			120129-008	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120129-008	SW846-3005A/6020B
	Vanadium	ND	0.00330	0.0200	NE	U		120129-008	SW846-3005A/6020B
	Zinc	0.00550	0.00330	0.0200	NE	J		120129-008	SW846-3005A/6020B

Refer to Notes on page 7B-33.

Table 7B-7 (continued)
Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW7	Aluminum	ND	0.0193	0.0500	NE	U		120134-008	SW846-3005A/6020B
27-Apr-23	Antimony	ND	0.00100	0.00300	0.006	U		120134-008	SW846-3005A/6020B
	Arsenic	0.00272	0.00200	0.00500	0.010	J		120134-008	SW846-3005A/6020B
	Barium	0.110	0.000670	0.00400	2.00			120134-008	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120134-008	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		120134-008	SW846-3005A/6020B
	Calcium	99.0	0.800	2.00	NE			120134-008	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120134-008	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120134-008	SW846-3005A/6020B
	Copper	0.000394	0.000300	0.00200	NE	J		120134-008	SW846-3005A/6020B
	Iron	0.0750	0.0330	0.100	NE	J		120134-008	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120134-008	SW846-3005A/6020B
	Magnesium	20.0	0.0100	0.0300	NE			120134-008	SW846-3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	U	UJ	120134-008	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		120134-008	SW846-7470A
	Nickel	ND	0.000600	0.00200	NE	U		120134-008	SW846-3005A/6020B
	Potassium	2.47	0.0800	0.300	NE			120134-008	SW846-3005A/6020B
	Selenium	0.00377	0.00150	0.00500	0.050	J		120134-008	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120134-008	SW846-3005A/6020B
	Sodium	36.8	0.0800	0.250	NE			120134-008	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120134-008	SW846-3005A/6020B
	Vanadium	0.00684	0.00330	0.0200	NE	J		120134-008	SW846-3005A/6020B
	Zinc	0.00417	0.00330	0.0200	NE	J		120134-008	SW846-3005A/6020B

Refer to Notes on page 7B-33.

Table 7B-7 (continued)
Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW8	Aluminum	ND	0.0193	0.0500	NE	U		120139-008	SW846-3005A/6020B
02-May-23	Antimony	ND	0.00100	0.00300	0.006	U		120139-008	SW846-3005A/6020B
	Arsenic	0.00245	0.00200	0.00500	0.010	J		120139-008	SW846-3005A/6020B
	Barium	0.0559	0.000670	0.00400	2.00			120139-008	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120139-008	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		120139-008	SW846-3005A/6020B
	Calcium	107	0.800	2.00	NE			120139-008	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120139-008	SW846-3005A/6020B
	Cobalt	0.000328	0.000300	0.00100	NE	J		120139-008	SW846-3005A/6020B
	Copper	0.000323	0.000300	0.00200	NE	J		120139-008	SW846-3005A/6020B
	Iron	0.0841	0.0330	0.100	NE	J		120139-008	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120139-008	SW846-3005A/6020B
	Magnesium	22.6	0.0100	0.0300	NE			120139-008	SW846-3005A/6020B
	Manganese	0.00185	0.00100	0.00500	NE	B, J	0.005U	120139-008	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		120139-008	SW846-7470A
	Nickel	ND	0.000600	0.00200	NE	U		120139-008	SW846-3005A/6020B
	Potassium	2.26	0.0800	0.300	NE			120139-008	SW846-3005A/6020B
	Selenium	0.00582	0.00150	0.00500	0.050			120139-008	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120139-008	SW846-3005A/6020B
	Sodium	39.5	0.0800	0.250	NE			120139-008	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120139-008	SW846-3005A/6020B
	Vanadium	0.00568	0.00330	0.0200	NE	J		120139-008	SW846-3005A/6020B
	Zinc	0.00498	0.00330	0.0200	NE	J		120139-008	SW846-3005A/6020B

Refer to Notes on page 7B-33.

Table 7B-7 (continued)
Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW9	Aluminum	ND	0.0193	0.0500	NE	U		120221-008	SW846-3005A/6020B
18-May-23	Antimony	ND	0.00100	0.00300	0.006	U		120221-008	SW846-3005A/6020B
	Arsenic	0.00303	0.00200	0.00500	0.010	J		120221-008	SW846-3005A/6020B
	Barium	0.0696	0.000670	0.00400	2.00			120221-008	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120221-008	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		120221-008	SW846-3005A/6020B
	Calcium	143	0.800	2.00	NE			120221-008	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120221-008	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120221-008	SW846-3005A/6020B
	Copper	0.000362	0.000300	0.00200	NE	J		120221-008	SW846-3005A/6020B
	Iron	0.0671	0.0330	0.100	NE	J		120221-008	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120221-008	SW846-3005A/6020B
	Magnesium	41.0	0.0100	0.0300	NE			120221-008	SW846-3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	U		120221-008	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		120221-008	SW846-7470A
	Nickel	ND	0.000600	0.00200	NE	U		120221-008	SW846-3005A/6020B
	Potassium	2.57	0.0800	0.300	NE			120221-008	SW846-3005A/6020B
	Selenium	0.00539	0.00150	0.00500	0.050			120221-008	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120221-008	SW846-3005A/6020B
	Sodium	33.3	0.0800	0.250	NE			120221-008	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120221-008	SW846-3005A/6020B
	Vanadium	0.00677	0.00330	0.0200	NE	J	0.020U	120221-008	SW846-3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	U		120221-008	SW846-3005A/6020B

Refer to Notes on page 7B-33.

Table 7B-7 (continued)
Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW10	Aluminum	ND	0.0193	0.0500	NE	U		120160-008	SW846-3005A/6020B
11-May-23	Antimony	ND	0.00100	0.00300	0.006	U		120160-008	SW846-3005A/6020B
	Arsenic	0.00233	0.00200	0.00500	0.010	J		120160-008	SW846-3005A/6020B
	Barium	0.0697	0.000670	0.00400	2.00			120160-008	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120160-008	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		120160-008	SW846-3005A/6020B
	Calcium	139	0.400	1.00	NE			120160-008	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120160-008	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120160-008	SW846-3005A/6020B
	Copper	ND	0.000300	0.00200	NE	U		120160-008	SW846-3005A/6020B
	Iron	0.0615	0.0330	0.100	NE	J		120160-008	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120160-008	SW846-3005A/6020B
	Magnesium	35.7	0.0100	0.0300	NE			120160-008	SW846-3005A/6020B
	Manganese	ND	0.0010	0.00500	NE	U		120160-008	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		120160-008	SW846-7470A
	Nickel	ND	0.000600	0.00200	NE	U		120160-008	SW846-3005A/6020B
	Potassium	2.14	0.0800	0.300	NE			120160-008	SW846-3005A/6020B
	Selenium	0.00651	0.00150	0.00500	0.050			120160-008	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120160-008	SW846-3005A/6020B
	Sodium	39.3	0.0800	0.250	NE			120160-008	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120160-008	SW846-3005A/6020B
	Vanadium	0.00682	0.00330	0.0200	NE	B, J	0.02U	120160-008	SW846-3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	U		120160-008	SW846-3005A/6020B

Refer to Notes on page 7B-33.

Table 7B-7 (continued)
Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW11	Aluminum	ND	0.0193	0.0500	NE	U		120150-008	SW846-3005A/6020B
08-May-23	Antimony	ND	0.00100	0.00300	0.006	U		120150-008	SW846-3005A/6020B
	Arsenic	0.00231	0.00200	0.00500	0.010	J		120150-008	SW846-3005A/6020B
	Barium	0.0651	0.000670	0.00400	2.00			120150-008	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120150-008	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		120150-008	SW846-3005A/6020B
	Calcium	139	0.800	2.00	NE			120150-008	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120150-008	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120150-008	SW846-3005A/6020B
	Copper	0.000358	0.000300	0.00200	NE	J	0.002U	120150-008	SW846-3005A/6020B
	Iron	0.0393	0.0330	0.100	NE	J		120150-008	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120150-008	SW846-3005A/6020B
	Magnesium	45.3	0.0100	0.0300	NE			120150-008	SW846-3005A/6020B
	Manganese	0.00265	0.00100	0.00500	NE	J	0.005U	120150-008	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		120150-008	SW846-7470A
	Nickel	ND	0.000600	0.00200	NE	U		120150-008	SW846-3005A/6020B
	Potassium	3.48	0.0800	0.300	NE			120150-008	SW846-3005A/6020B
	Selenium	0.00586	0.00150	0.00500	0.050			120150-008	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120150-008	SW846-3005A/6020B
	Sodium	41.8	0.0800	0.250	NE			120150-008	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120150-008	SW846-3005A/6020B
	Vanadium	0.00557	0.00330	0.0200	NE	B, J	0.02U	120150-008	SW846-3005A/6020B
	Zinc	0.00674	0.00330	0.0200	NE	J		120150-008	SW846-3005A/6020B

Refer to Notes on page 7B-33.

Table 7B-7 (continued)
Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW12	Aluminum	ND	0.0193	0.0500	NE	U		120158-008	SW846-3005A/6020B
10-May-23	Antimony	ND	0.00100	0.00300	0.006	U		120158-008	SW846-3005A/6020B
	Arsenic	0.00227	0.00200	0.00500	0.010	J		120158-008	SW846-3005A/6020B
	Barium	0.0398	0.000670	0.00400	2.00			120158-008	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120158-008	SW846-3005A/6020B
	Cadmium	0.000367	0.000300	0.00100	0.005	J		120158-008	SW846-3005A/6020B
	Calcium	202	0.800	2.00	NE			120158-008	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120158-008	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120158-008	SW846-3005A/6020B
	Copper	0.000536	0.000300	0.00200	NE	J		120158-008	SW846-3005A/6020B
	Iron	ND	0.0330	0.100	NE	U		120158-008	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120158-008	SW846-3005A/6020B
	Magnesium	55.2	0.100	0.300	NE			120158-008	SW846-3005A/6020B
	Manganese	0.00479	0.00100	0.00500	NE	J		120158-008	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		120158-008	SW846-7470A
	Nickel	ND	0.000600	0.00200	NE	U		120158-008	SW846-3005A/6020B
	Potassium	2.76	0.0800	0.300	NE			120158-008	SW846-3005A/6020B
	Selenium	0.0131	0.00150	0.00500	0.050			120158-008	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120158-008	SW846-3005A/6020B
	Sodium	46.1	0.800	2.50	NE			120158-008	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120158-008	SW846-3005A/6020B
	Vanadium	ND	0.00330	0.0200	NE	U		120158-008	SW846-3005A/6020B
	Zinc	0.0161	0.00330	0.0200	NE	J		120158-008	SW846-3005A/6020B

Refer to Notes on page 7B-33.

Table 7B-7 (continued)
Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW13	Aluminum	ND	0.0193	0.0500	NE	U		120211-008	SW846-3005A/6020B
17-May-23	Antimony	0.00118	0.00100	0.00300	0.006	J		120211-008	SW846-3005A/6020B
	Arsenic	0.00216	0.00200	0.00500	0.010	J		120211-008	SW846-3005A/6020B
	Barium	0.0954	0.000670	0.00400	2.00			120211-008	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120211-008	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		120211-008	SW846-3005A/6020B
	Calcium	104	0.800	2.00	NE			120211-008	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120211-008	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120211-008	SW846-3005A/6020B
	Copper	ND	0.000300	0.00200	NE	U		120211-008	SW846-3005A/6020B
	Iron	0.0461	0.0330	0.100	NE	J		120211-008	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120211-008	SW846-3005A/6020B
	Magnesium	19.7	0.0100	0.0300	NE			120211-008	SW846-3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	U		120211-008	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		120211-008	SW846-7470A
	Nickel	ND	0.000600	0.00200	NE	U		120211-008	SW846-3005A/6020B
	Potassium	1.89	0.0800	0.300	NE			120211-008	SW846-3005A/6020B
	Selenium	0.00344	0.00150	0.00500	0.050	J		120211-008	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120211-008	SW846-3005A/6020B
	Sodium	25.6	0.0800	0.250	NE			120211-008	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120211-008	SW846-3005A/6020B
	Vanadium	0.00590	0.00330	0.0200	NE	J		120211-008	SW846-3005A/6020B
	Zinc	0.00422	0.00330	0.0200	NE	J		120211-008	SW846-3005A/6020B

Refer to Notes on page 7B-33.

Table 7B-7 (continued)
Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW14A	Aluminum	ND	0.0193	0.0500	NE	U		120154-008	SW846-3005A/6020B
09-May-23	Antimony	ND	0.00100	0.00300	0.006	U		120154-008	SW846-3005A/6020B
	Arsenic	0.00246	0.00200	0.00500	0.010	J		120154-008	SW846-3005A/6020B
	Barium	0.0363	0.000670	0.00400	2.00		J	120154-008	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120154-008	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		120154-008	SW846-3005A/6020B
	Calcium	139	0.800	2.00	NE			120154-008	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120154-008	SW846-3005A/6020B
	Cobalt	0.00102	0.000300	0.00100	NE			120154-008	SW846-3005A/6020B
	Copper	0.000418	0.000300	0.00200	NE	J		120154-008	SW846-3005A/6020B
	Iron	0.0432	0.0330	0.100	NE	J		120154-008	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120154-008	SW846-3005A/6020B
	Magnesium	34.6	0.0100	0.0300	NE			120154-008	SW846-3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	U		120154-008	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		120154-008	SW846-7470A
	Nickel	ND	0.000600	0.00200	NE	U		120154-008	SW846-3005A/6020B
	Potassium	2.26	0.0800	0.300	NE			120154-008	SW846-3005A/6020B
	Selenium	0.00975	0.00150	0.00500	0.050			120154-008	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120154-008	SW846-3005A/6020B
	Sodium	40.2	0.0800	0.250	NE			120154-008	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120154-008	SW846-3005A/6020B
	Vanadium	0.00596	0.00330	0.0200	NE	B, J	0.02U	120154-008	SW846-3005A/6020B
	Zinc	0.00376	0.00330	0.0200	NE	J		120154-008	SW846-3005A/6020B

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Table 7B-7 (continued)
Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW16 04-May-23	Aluminum	ND	0.0193	0.0500	NE	U		120146-008	SW846-3005A/6020B
	Antimony	ND	0.00100	0.00300	0.006	U		120146-008	SW846-3005A/6020B
	Arsenic	0.00215	0.00200	0.00500	0.010	J		120146-008	SW846-3005A/6020B
	Barium	0.0670	0.000670	0.00400	2.00			120146-008	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120146-008	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U	UJ	120146-008	SW846-3005A/6020B
	Calcium	105	0.800	2.00	NE			120146-008	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120146-008	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120146-008	SW846-3005A/6020B
	Copper	ND	0.000300	0.00200	NE	U		120146-008	SW846-3005A/6020B
	Iron	ND	0.0330	0.100	NE	U		120146-008	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120146-008	SW846-3005A/6020B
	Magnesium	19.4	0.0100	0.0300	NE			120146-008	SW846-3005A/6020B
	Manganese	0.00349	0.00100	0.00500	NE	J		120146-008	SW846-3005A/6020B
	Mercury	0.00008	0.0000670	0.000200	0.002	B, J	0.0002U	120146-008	SW846-7470A
	Nickel	0.000733	0.000600	0.00200	NE	J		120146-008	SW846-3005A/6020B
	Potassium	2.33	0.0800	0.300	NE			120146-008	SW846-3005A/6020B
	Selenium	0.00624	0.00150	0.00500	0.050			120146-008	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120146-008	SW846-3005A/6020B
	Sodium	34.4	0.0800	0.250	NE			120146-008	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120146-008	SW846-3005A/6020B
	Vanadium	0.00561	0.00330	0.0200	NE	J		120146-008	SW846-3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	U		120146-008	SW846-3005A/6020B

Refer to Notes on page 7B-33.

Table 7B-7 (continued)
Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW17	Aluminum	ND	0.0193	0.0500	NE	U		120132-008	SW846-3005A/6020B
26-Apr-23	Antimony	ND	0.00100	0.00300	0.006	U		120132-008	SW846-3005A/6020B
	Arsenic	0.00299	0.00200	0.00500	0.010	J		120132-008	SW846-3005A/6020B
	Barium	0.0780	0.000670	0.00400	2.00			120132-008	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120132-008	SW846-3005A/6020B
	Cadmium	0.000436	0.000300	0.00100	0.005	J		120132-008	SW846-3005A/6020B
	Calcium	71.0	0.800	2.00	NE			120132-008	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120132-008	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120132-008	SW846-3005A/6020B
	Copper	ND	0.000300	0.00200	NE	U		120132-008	SW846-3005A/6020B
	Iron	0.0580	0.0330	0.100	NE	J		120132-008	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120132-008	SW846-3005A/6020B
	Magnesium	14.6	0.0100	0.0300	NE			120132-008	SW846-3005A/6020B
	Manganese	0.00480	0.00100	0.00500	NE	J		120132-008	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		120132-008	SW846-7470A
	Nickel	ND	0.000600	0.00200	NE	U		120132-008	SW846-3005A/6020B
	Potassium	1.77	0.0800	0.300	NE			120132-008	SW846-3005A/6020B
	Selenium	0.00465	0.00150	0.00500	0.050	J		120132-008	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120132-008	SW846-3005A/6020B
	Sodium	28.7	0.0800	0.250	NE			120132-008	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120132-008	SW846-3005A/6020B
	Vanadium	0.00688	0.00330	0.0200	NE	J		120132-008	SW846-3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	U		120132-008	SW846-3005A/6020B

Refer to Notes on page 7B-33.

Table 7B-7 (continued)
Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW18	Aluminum	ND	0.0193	0.0500	NE	U		120143-008	SW846-3005A/6020B
03-May-23	Antimony	ND	0.00100	0.00300	0.006	U		120143-008	SW846-3005A/6020B
	Arsenic	0.00207	0.00200	0.00500	0.010	J		120143-008	SW846-3005A/6020B
	Barium	0.0441	0.000670	0.00400	2.00			120143-008	SW846-3005A/6020B
	Beryllium	0.00183	0.000200	0.000500	0.004			120143-008	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		120143-008	SW846-3005A/6020B
	Calcium	122	0.800	2.00	NE			120143-008	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120143-008	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120143-008	SW846-3005A/6020B
	Copper	0.000579	0.000300	0.00200	NE	J		120143-008	SW846-3005A/6020B
	Iron	0.0735	0.0330	0.100	NE	J		120143-008	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120143-008	SW846-3005A/6020B
	Magnesium	28.5	0.0100	0.0300	NE			120143-008	SW846-3005A/6020B
	Manganese	0.119	0.00100	0.00500	NE			120143-008	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U		120143-008	SW846-7470A
	Nickel	ND	0.000600	0.00200	NE	U		120143-008	SW846-3005A/6020B
	Potassium	2.06	0.0800	0.300	NE			120143-008	SW846-3005A/6020B
	Selenium	0.00604	0.00150	0.00500	0.050			120143-008	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120143-008	SW846-3005A/6020B
	Sodium	34.5	0.0800	0.250	NE			120143-008	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120143-008	SW846-3005A/6020B
	Vanadium	0.00419	0.00330	0.0200	NE	J		120143-008	SW846-3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	U		120143-008	SW846-3005A/6020B

Refer to Notes on page 7B-33.

Table 7B-7 (concluded)
Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Result[a] (mg/L)	MDL[b] (mg/L)	PQL[c] (mg/L)	MCL[d] (mg/L)	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW19	Aluminum	ND	0.0193	0.0500	NE	U		120136-008	SW846-3005A/6020B
01-May-23	Antimony	ND	0.00100	0.00300	0.006	U		120136-008	SW846-3005A/6020B
	Arsenic	ND	0.00200	0.00500	0.010	U		120136-008	SW846-3005A/6020B
	Barium	0.0660	0.000670	0.00400	2.00		J	120136-008	SW846-3005A/6020B
	Beryllium	ND	0.000200	0.000500	0.004	U		120136-008	SW846-3005A/6020B
	Cadmium	ND	0.000300	0.00100	0.005	U		120136-008	SW846-3005A/6020B
	Calcium	99.2	0.800	2.00	NE			120136-008	SW846-3005A/6020B
	Chromium	ND	0.00300	0.0100	0.100	U		120136-008	SW846-3005A/6020B
	Cobalt	ND	0.000300	0.00100	NE	U		120136-008	SW846-3005A/6020B
	Copper	0.000431	0.000300	0.00200	NE	J		120136-008	SW846-3005A/6020B
	Iron	0.0585	0.0330	0.100	NE	J		120136-008	SW846-3005A/6020B
	Lead	ND	0.000500	0.00200	NE	U		120136-008	SW846-3005A/6020B
	Magnesium	31.7	0.0100	0.0300	NE			120136-008	SW846-3005A/6020B
	Manganese	ND	0.00100	0.00500	NE	U		120136-008	SW846-3005A/6020B
	Mercury	ND	0.0000670	0.000200	0.002	U	0.0002UJ	120136-008	SW846-7470A
	Nickel	ND	0.000600	0.00200	NE	U		120136-008	SW846-3005A/6020B
	Potassium	1.97	0.0800	0.300	NE			120136-008	SW846-3005A/6020B
	Selenium	0.00678	0.00150	0.00500	0.050			120136-008	SW846-3005A/6020B
	Silver	ND	0.000300	0.00100	NE	U		120136-008	SW846-3005A/6020B
	Sodium	23.6	0.0800	0.250	NE			120136-008	SW846-3005A/6020B
	Thallium	ND	0.000600	0.00200	0.002	U		120136-008	SW846-3005A/6020B
	Vanadium	0.00511	0.00330	0.0200	NE	J		120136-008	SW846-3005A/6020B
	Zinc	ND	0.00330	0.0200	NE	U		120136-008	SW846-3005A/6020B

Refer to Notes on page 7B-33.

Table 7B-8
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Isotopic Uranium, and Tritium Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW4 25-Apr-23	Americium-241	2.38 ± 13.5	22.4	10.9	NE	U	BD	120129-009	EPA 901.1
	Cesium-137	0.303 ± 4.02	5.01	2.39	NE	U	BD	120129-009	EPA 901.1
	Cobalt-60	1.37 ± 2.29	4.30	1.98	NE	U	BD	120129-009	EPA 901.1
	Potassium-40	1.32 ± 58.0	40.0	18.3	NE	U	BD	120129-009	EPA 901.1
	Gross Alpha	-6.64	NA	NA	15 pCi/L	NA	None	120129-010	EPA 900.0
	Gross Beta	10.6 ± 0.983	1.05	0.505	4 mrem/yr			120129-010	EPA 900.0
	Uranium-233/234	36.1 ± 3.35	0.0894	0.0397	NE			120129-011	HASL-300
	Uranium-235/236	0.385 ± 0.0913	0.0765	0.0320	NE			120129-011	HASL-300
	Uranium-238	4.55 ± 0.485	0.0612	0.0256	NE			120129-011	HASL-300
	Tritium	13.8 ± 84.5	158	69.2	4 mrem/yr	U	BD	120129-012	EPA 906.0M
CYN-MW7 27-Apr-23	Americium-241	10.8 ± 9.53	14.1	6.85	NE	U	BD	120134-009	EPA 901.1
	Cesium-137	-0.886 ± 3.90	4.68	2.25	NE	U	BD	120134-009	EPA 901.1
	Cobalt-60	1.20 ± 2.08	3.80	1.77	NE	U	BD	120134-009	EPA 901.1
	Potassium-40	-16.8 ± 34.8	47.0	22.1	NE	U	BD	120134-009	EPA 901.1
	Gross Alpha	-5.99	NA	NA	15 pCi/L	NA	None	120134-010	EPA 900.0
	Gross Beta	8.16 ± 1.38	1.99	0.970	4 mrem/yr			120134-010	EPA 900.0
	Uranium-233/234	18.6 ± 1.82	0.104	0.0461	NE			120134-011	HASL-300
	Uranium-235/236	0.272 ± 0.0815	0.0888	0.0372	NE			120134-011	HASL-300
	Uranium-238	2.42 ± 0.302	0.0711	0.0297	NE			120134-011	HASL-300
	Tritium	-18.8 ± 79.8	159	69.5	4 mrem/yr	U	BD	120134-012	EPA 906.0M
CYN-MW8 02-May-23	Americium-241	5.28 ± 20.2	34.2	16.9	NE	U	BD	120139-009	EPA 901.1
	Cesium-137	-3.19 ± 3.71	4.94	2.39	NE	U	BD	120139-009	EPA 901.1
	Cobalt-60	0.385 ± 3.22	5.72	2.74	NE	U	BD	120139-009	EPA 901.1
	Potassium-40	17.7 ± 71.2	59.0	28.3	NE	U	BD	120139-009	EPA 901.1
	Gross Alpha	-4.09	NA	NA	15 pCi/L	NA	None	120139-010	EPA 900.0
	Gross Beta	8.28 ± 1.37	1.86	0.901	4 mrem/yr			120139-010	EPA 900.0
	Uranium-233/234	23.7 ± 2.20	0.0856	0.0380	NE			120139-011	HASL-300
	Uranium-235/236	0.246 ± 0.0723	0.0732	0.0306	NE			120139-011	HASL-300
	Uranium-238	2.54 ± 0.296	0.0586	0.0245	NE			120139-011	HASL-300
	Tritium	109 ± 101	160	69.7	4 mrem/yr	U	BD	120139-012	EPA 906.0M

Refer to Notes on page 7B-33.

Table 7B-8 (continued)
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Isotopic Uranium, and Tritium Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW9	Americium-241	-7.72 ± 15.9	27.6	13.4	NE	U	BD	120221-009	EPA 901.1
18-May-23	Cesium-137	1.31 ± 2.45	3.93	1.86	NE	U	BD	120221-009	EPA 901.1
	Cobalt-60	0.244 ± 2.50	4.52	2.08	NE	U	BD	120221-009	EPA 901.1
	Potassium-40	11.3 ± 52.3	63.7	30.1	NE	U	BD	120221-009	EPA 901.1
	Gross Alpha	-2.61	NA	NA	15 pCi/L	NA	None	120221-010	EPA 900.0
	Gross Beta	6.41 ± 1.60	2.35	1.13	4 mrem/yr		J	120221-010	EPA 900.0
	Uranium-233/234	9.22 ± 1.01	0.0951	0.0419	NE			120221-011	HASL-300
	Uranium-235/236	0.157 ± 0.0614	0.0909	0.0385	NE		J	120221-011	HASL-300
	Uranium-238	2.51 ± 0.325	0.0913	0.0400	NE			120221-011	HASL-300
	Tritium	51.5 ± 112	195	90.8	4 mrem/yr	U	BD	120221-012	EPA 906.0M
CYN-MW10	Americium-241	-4.44 ± 9.77	16.3	7.87	NE	U	BD	120160-009	EPA 901.1
11-May-23	Cesium-137	-1.70 ± 2.59	2.69	1.27	NE	U	BD	120160-009	EPA 901.1
	Cobalt-60	-0.663 ± 1.64	2.85	1.30	NE	U	BD	120160-009	EPA 901.1
	Potassium-40	-8.53 ± 35.3	45.6	21.6	NE	U	BD	120160-009	EPA 901.1
	Gross Alpha	-0.17	NA	NA	15 pCi/L	NA	None	120160-010	EPA 900.0
	Gross Beta	5.19 ± 1.20	1.75	0.842	4 mrem/yr		J	120160-010	EPA 900.0
	Uranium-233/234	5.83 ± 0.704	0.113	0.0500	NE			120160-011	HASL-300
	Uranium-235/236	0.147 ± 0.0627	0.108	0.0459	NE		J	120160-011	HASL-300
	Uranium-238	2.04 ± 0.293	0.109	0.0477	NE			120160-011	HASL-300
	Tritium	32.7 ± 110	194	90.5	4 mrem/yr	U	BD	120160-012	EPA 906.0M
CYN-MW11	Americium-241	-1.90 ± 10.2	17.9	8.68	NE	U	BD	120150-009	EPA 901.1
08-May-23	Cesium-137	1.36 ± 2.44	3.73	1.78	NE	U	BD	120150-009	EPA 901.1
	Cobalt-60	-0.382 ± 2.30	3.96	1.84	NE	U	BD	120150-009	EPA 901.1
	Potassium-40	-44.0 ± 55.5	60.0	28.6	NE	U	BD	120150-009	EPA 901.1
	Gross Alpha	-1.89	NA	NA	15 pCi/L	NA	None	120150-010	EPA 900.0
	Gross Beta	4.42 ± 1.30	1.98	0.961	4 mrem/yr		J	120150-010	EPA 900.0
	Uranium-233/234	5.91 ± 0.758	0.130	0.0568	NE			120150-011	HASL-300
	Uranium-235/236	0.0894 ± 0.0541	0.124	0.0521	NE	U	BD	120150-011	HASL-300
	Uranium-238	1.78 ± 0.286	0.125	0.0542	NE			120150-011	HASL-300
	Tritium	110 ± 119	195	91.2	4 mrem/yr	U	BD	120150-012	EPA 906.0M

Refer to Notes on page 7B-33.

Table 7B-8 (continued)
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Isotopic Uranium, and Tritium Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW12	Americium-241	-0.447 ± 7.21	11.8	5.69	NE	U	BD	120158-009	EPA 901.1
10-May-23	Cesium-137	0.288 ± 1.64	2.89	1.37	NE	U	BD	120158-009	EPA 901.1
	Cobalt-60	0.0124 ± 1.57	2.89	1.33	NE	U	BD	120158-009	EPA 901.1
	Potassium-40	-28.6 ± 32.5	39.2	18.4	NE	U	BD	120158-009	EPA 901.1
	Gross Alpha	-2.51	NA	NA	15 pCi/L	NA	None	120158-010	EPA 900.0
	Gross Beta	6.66 ± 1.71	2.49	1.20	4 mrem/yr		J	120158-010	EPA 900.0
	Uranium-233/234	13.6 ± 1.47	0.0964	0.0425	NE			120158-011	HASL-300
	Uranium-235/236	0.238 ± 0.0760	0.0922	0.0390	NE		J	120158-011	HASL-300
	Uranium-238	2.77 ± 0.356	0.0926	0.0406	NE			120158-011	HASL-300
	Tritium	-86.8 ± 103	198	92.1	4 mrem/yr	U	BD	120158-012	EPA 906.0M
CYN-MW13	Americium-241	0.0357 ± 15.9	27.6	13.5	NE	U	BD	120211-009	EPA 901.1
17-May-23	Cesium-137	1.55 ± 1.90	3.24	1.55	NE	U	BD	120211-009	EPA 901.1
	Cobalt-60	-3.98 ± 4.76	3.82	1.79	NE	U	BD	120211-009	EPA 901.1
	Potassium-40	-45.9 ± 49.4	51.6	24.6	NE	U	BD	120211-009	EPA 901.1
	Gross Alpha	-1.47	NA	NA	15 pCi/L	NA	None	120211-010	EPA 900.0
	Gross Beta	4.74 ± 1.25	1.87	0.907	4 mrem/yr		J	120211-010	EPA 900.0
	Uranium-233/234	10.1 ± 1.06	0.0843	0.0371	NE			120211-011	HASL-300
	Uranium-235/236	0.146 ± 0.0537	0.0805	0.0341	NE		J	120211-011	HASL-300
	Uranium-238	1.62 ± 0.220	0.0809	0.0354	NE			120211-011	HASL-300
	Tritium	-28.4 ± 106	194	90.6	4 mrem/yr	U	BD	120211-012	EPA 906.0M
CYN-MW14A	Americium-241	19.8 ± 24.7	36.5	17.9	NE	U	BD	120154-009	EPA 901.1
09-May-23	Cesium-137	-0.549 ± 4.55	5.26	2.53	NE	U	BD	120154-009	EPA 901.1
	Cobalt-60	1.04 ± 3.29	5.97	2.82	NE	U	BD	120154-009	EPA 901.1
	Potassium-40	-17.4 ± 52.5	65.7	31.2	NE	U	BD	120154-009	EPA 901.1
	Gross Alpha	3.78	NA	NA	15 pCi/L	NA	None	120154-010	EPA 900.0
	Gross Beta	6.55 ± 1.57	2.23	1.07	4 mrem/yr		J	120154-010	EPA 900.0
	Uranium-233/234	12.2 ± 1.33	0.100	0.0442	NE			120154-011	HASL-300
	Uranium-235/236	0.208 ± 0.0713	0.0958	0.0405	NE		J	120154-011	HASL-300
	Uranium-238	2.71 ± 0.351	0.0962	0.0422	NE			120154-011	HASL-300
	Tritium	67.4 ± 115	197	91.7	4 mrem/yr	U	BD	120154-012	EPA 906.0M

Refer to Notes on page 7B-33.

Table 7B-8 (continued)
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Isotopic Uranium, and Tritium Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW16 04-May-23	Americium-241	24.2 ± 23.4	33.1	16.1	NE	U	BD	120146-009	EPA 901.1
	Cesium-137	3.73 ± 2.07	3.70	1.76	NE	X	R	120146-009	EPA 901.1
	Cobalt-60	-0.612 ± 2.29	3.94	1.83	NE	U	BD	120146-009	EPA 901.1
	Potassium-40	10.4 ± 54.5	40.1	18.6	NE	U	BD	120146-009	EPA 901.1
	Gross Alpha	-0.31	NA	NA	15 pCi/L	NA	None	120146-010	EPA 900.0
	Gross Beta	4.50 ± 1.26	1.92	0.932	4 mrem/yr		J	120146-010	EPA 900.0
	Uranium-233/234	9.23 ± 0.935	0.0992	0.0440	NE			120146-011	HASL-300
	Uranium-235/236	0.143 ± 0.0580	0.0849	0.0355	NE		J	120146-011	HASL-300
	Uranium-238	1.64 ± 0.222	0.0680	0.0284	NE			120146-011	HASL-300
	Tritium	62.7 ± 93.9	161	70.3	4 mrem/yr	U	BD	120146-012	EPA 906.0M
CYN-MW17 26-Apr-23	Americium-241	-3.26 ± 13.5	14.9	7.20	NE	U	BD	120132-009	EPA 901.1
	Cesium-137	-0.491 ± 2.12	3.60	1.71	NE	U	BD	120132-009	EPA 901.1
	Cobalt-60	-2.19 ± 2.31	3.37	1.54	NE	U	BD	120132-009	EPA 901.1
	Potassium-40	-13.2 ± 46.2	53.4	25.2	NE	U	BD	120132-009	EPA 901.1
	Gross Alpha	1.01	NA	NA	15 pCi/L	NA	None	120132-010	EPA 900.0
	Gross Beta	4.66 ± 0.815	1.07	0.515	4 mrem/yr			120132-010	EPA 900.0
	Uranium-233/234	5.17 ± 0.569	0.105	0.0465	NE			120132-011	HASL-300
	Uranium-235/236	0.0484 ± 0.0352	0.0896	0.0375	NE	U	BD	120132-011	HASL-300
	Uranium-238	1.08 ± 0.170	0.0717	0.0300	NE			120132-011	HASL-300
	Tritium	82.7 ± 95.0	157	68.7	4 mrem/yr	U	BD	120132-012	EPA 906.0M
CYN-MW18 03-May-23	Americium-241	-5.37 ± 13.6	23.9	11.6	NE	U	BD	120143-009	EPA 901.1
	Cesium-137	-0.0248 ± 2.79	4.27	2.03	NE	U	BD	120143-009	EPA 901.1
	Cobalt-60	2.27 ± 3.06	5.39	2.53	NE	U	BD	120143-009	EPA 901.1
	Potassium-40	-19.6 ± 43.1	60.1	28.4	NE	U	BD	120143-009	EPA 901.1
	Gross Alpha	0.91	NA	NA	15 pCi/L	NA	None	120143-010	EPA 900.0
	Gross Beta	6.49 ± 1.42	2.11	1.03	4 mrem/yr			120143-010	EPA 900.0
	Uranium-233/234	6.69 ± 0.690	0.0917	0.0407	NE			120143-011	HASL-300
	Uranium-235/236	0.141 ± 0.0583	0.0785	0.0329	NE		J	120143-011	HASL-300
	Uranium-238	1.63 ± 0.216	0.0628	0.0263	NE			120143-011	HASL-300
	Tritium	77.4 ± 96.5	162	70.5	4 mrem/yr	U	BD	120143-012	EPA 906.0M

Refer to Notes on page 7B-33.

Table 7B-8 (concluded)
Summary of Gamma Spectroscopy, Gross Alpha, Gross Beta, Isotopic Uranium, and Tritium Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	Critical Level[c] (pCi/L)	MCL[d]	Laboratory Qualifier[e]	Validation Qualifier[f]	Sample No.	Analytical Method[g]
CYN-MW19	Americium-241	11.8 ± 22.5	38.0	18.6	NE	U	BD	120136-009	EPA 901.1
01-May-23	Cesium-137	0.0783 ± 4.11	4.60	2.21	NE	U	BD	120136-009	EPA 901.1
	Cobalt-60	0.476 ± 2.52	4.50	2.10	NE	U	BD	120136-009	EPA 901.1
	Potassium-40	40.2 ± 70.3	41.1	19.1	NE	U	BD	120136-009	EPA 901.1
	Gross Alpha	1.41	NA	NA	15 pCi/L	NA	None	120136-010	EPA 900.0
	Gross Beta	2.83 ± 1.14	1.78	0.861	4 mrem/yr		J	120136-010	EPA 900.0
	Uranium-233/234	5.65 ± 0.630	0.113	0.0502	NE			120136-011	HASL-300
	Uranium-235/236	0.110 ± 0.0642	0.0967	0.0405	NE		J	120136-011	HASL-300
	Uranium-238	2.29 ± 0.300	0.0774	0.0323	NE			120136-011	HASL-300
	Tritium	35.2 ± 88.3	159	69.4	4 mrem/yr	U	BD	120136-012	EPA 906.0M

Refer to Notes on page 7B-33.

Table 7B-9
Summary of Field Water Quality Measurements[h], Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2023

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmho/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
CYN-MW4	25-Apr-23	17.88	603.55	153.7	7.41	0.57	64.29	4.75
CYN-MW4	05-May-23	18.26	655.69	192.7	7.32	0.39	60.24	4.56
CYN-MW7	27-Apr-23	18.73	706.61	180.5	7.21	0.55	66.66	5.01
CYN-MW8	02-May-23	19.10	803.35	178.5	7.20	0.49	72.56	5.39
CYN-MW9	18-May-23	18.11	1004.0	176.2	7.02	0.67	54.73	4.29
CYN-MW10	11-May-23	16.86	917.33	188.3	7.42	0.38	74.79	5.81
CYN-MW11	08-May-23	18.77	1014.9	163.2	7.28	0.24	10.93	0.82
CYN-MW12	10-May-23	20.09	1358.9	177.9	7.02	0.39	21.34	1.55
CYN-MW13	17-May-23	19.26	716.70	156.8	7.28	0.58	53.17	3.96
CYN-MW14A	09-May-23	19.43	949.08	184.8	7.28	0.30	27.29	2.02
CYN-MW16	04-May-23	18.40	697.87	154.3	7.25	0.40	16.87	1.27
CYN-MW17	26-Apr-23	17.80	511.17	156.5	7.12	0.31	50.85	3.90
CYN-MW18	03-May-23	20.14	852.44	186.3	6.85	0.63	11.78	0.86
CYN-MW19	01-May-23	17.13	688.19	159.7	7.51	0.44	76.91	5.96
CYN-MW4	19-Oct-23	18.43	649.75	118.5	7.41	0.02	53.88	4.12
CYN-MW7	18-Oct-23	20.09	610.72	113.6	7.21	1.87	69.99	5.15
CYN-MW8	25-Oct-23	17.00	758.89	113.6	7.27	0.02	67.51	5.29
CYN-MW9	31-Oct-23	12.11	1128.5	96.7	7.03	1.85	47.99	4.41
CYN-MW10	31-Oct-23	14.20	896.89	116.7	7.44	0.09	68.31	5.61
CYN-MW11	30-Oct-23	14.89	905.45	87.0	7.28	0.02	9.55	0.80
CYN-MW12	26-Oct-23	17.49	1512.6	65.4	7.04	6.32	19.58	1.58
CYN-MW13	01-Nov-23	18.06	677.40	101.4	7.28	0.08	53.75	4.16
CYN-MW14A	25-Oct-23	16.42	1045.1	60.4	7.29	0.30	27.54	2.19
CYN-MW16	17-Oct-23	20.59	611.03	87.1	7.31	0.20	18.03	1.32
CYN-MW17	19-Oct-23	19.39	621.38	64.3	7.10	0.41	47.20	3.80
CYN-MW18	26-Oct-23	19.09	837.10	91.1	6.90	1.54	11.54	0.87
CYN-MW19	23-Oct-23	19.23	679.02	113.8	7.47	0.09	77.90	6.06

Refer to Notes on page 7B-33.

Notes for Burn Site Groundwater Analytical Results Tables

%	= percent
$CaCO_3$	= calcium carbonate
CFR	= Code of Federal Regulations
EPA	= U.S. Environmental Protection Agency
HMX	= octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
ID	= identifier
µg/L	= micrograms per liter
mg/L	= milligrams per liter
mrem/yr	= millirem per year
No.	= number
pCi/L	= picocuries per liter
RDX	= hexahydro-1,3,5-trinitro-1,3,5-triazine
Tetryl	= methyl-2,4,6-trinitrophenylnitramine

[a]Result or Activity

Result applies to Tables 7B-1 and 7B-4 through 7B-7. Activity applies to Table 7B-8.

Activity	= Gross alpha activity measurements were corrected by subtracting the total uranium activity (40 CFR Part 141). Activities of zero or less are considered to be not detected.
Bold	= Value exceeded the established MCL.
ND	= not detected (at MDL)

[b]MDL or MDA

The MDL applies to Tables 7B-1 through 7B-7. MDA applies to Table 7B-8.

MDA	= The minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level.
MDL	= Method detection limit. The minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix specific.
NA	= Not applicable for gross alpha activities. The MDA could not be calculated as the gross alpha activity was corrected by subtracting the total uranium activity.

[c]PQL or Critical Level

The PQL applies to Tables 7B-1 and 7B-4 through 7B-7. Critical level applies to Table 7B-8.

Critical Level	= The minimum activity that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix specific.
NA	= Not applicable for gross alpha activities. The critical level could not be calculated as the gross alpha activity was corrected by subtracting the total uranium activity.
PQL	= Practical quantitation limit. The lowest concentration of analytes in a sample that can be reliably determined within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions.

[d]MCL

MCL = Maximum contaminant level. Established by the EPA Office of Water, National Primary Drinking Water Standards (EPA, March 2018).
The following are the MCLs for gross alpha particles and beta particles in community water systems:

- 15 pCi/L = gross alpha particle activity, excluding total uranium (40 CFR Part 141)
- 4 mrem/yr = any combination of beta and/or gamma emitting radionuclides (as dose rate)

NE = not established

[e]Laboratory Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

B	= The analyte was detected in the blank above the effective MDL.
J	= Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
N	= Results associated with a spike analysis that was outside control limits.
NA	= not applicable
U	= Analyte is absent or below the method detection limit.
X	= Uncertain identification for gamma spectroscopy.
*	= Recovery or relative percent difference (RPD) not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPDs are not applicable where the concentration falls below the effective PQL.

[f]Validation Qualifier

If cell is blank, then all quality control samples met acceptance criteria with respect to submitted samples.

BD	= Below detection limit as used in radiochemistry to identify results that are not statistically different from zero.
J	= The associated value is an estimated quantity.
None	= No data validation for corrected gross alpha activity.
R	= The data are unusable, and resampling or reanalysis is necessary for verification.
U	= The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.
UJ	= The analyte was analyzed for but was not detected. The associated numerical value is an estimate and may be inaccurate or imprecise.

Notes for Burn Site Groundwater Analytical Results Tables (concluded)

[g]Analytical Method

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DOE = U.S. Department of Energy
HASL = Health and Safety Laboratory
SM = Standard Method
SW = Solid Waste

[h]Field Water Quality Measurements

Field measurements collected prior to sampling.
°C = degrees Celsius
% Sat = percent saturation
μmho/cm = micromhos per centimeter
mg/L = milligrams per liter
mV = millivolts
NTU = nephelometric turbidity units
pH = potential of hydrogen (negative logarithm of the hydrogen ion concentration)

Attachment 7C
Burn Site Groundwater Plots

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Attachment 7C Plots

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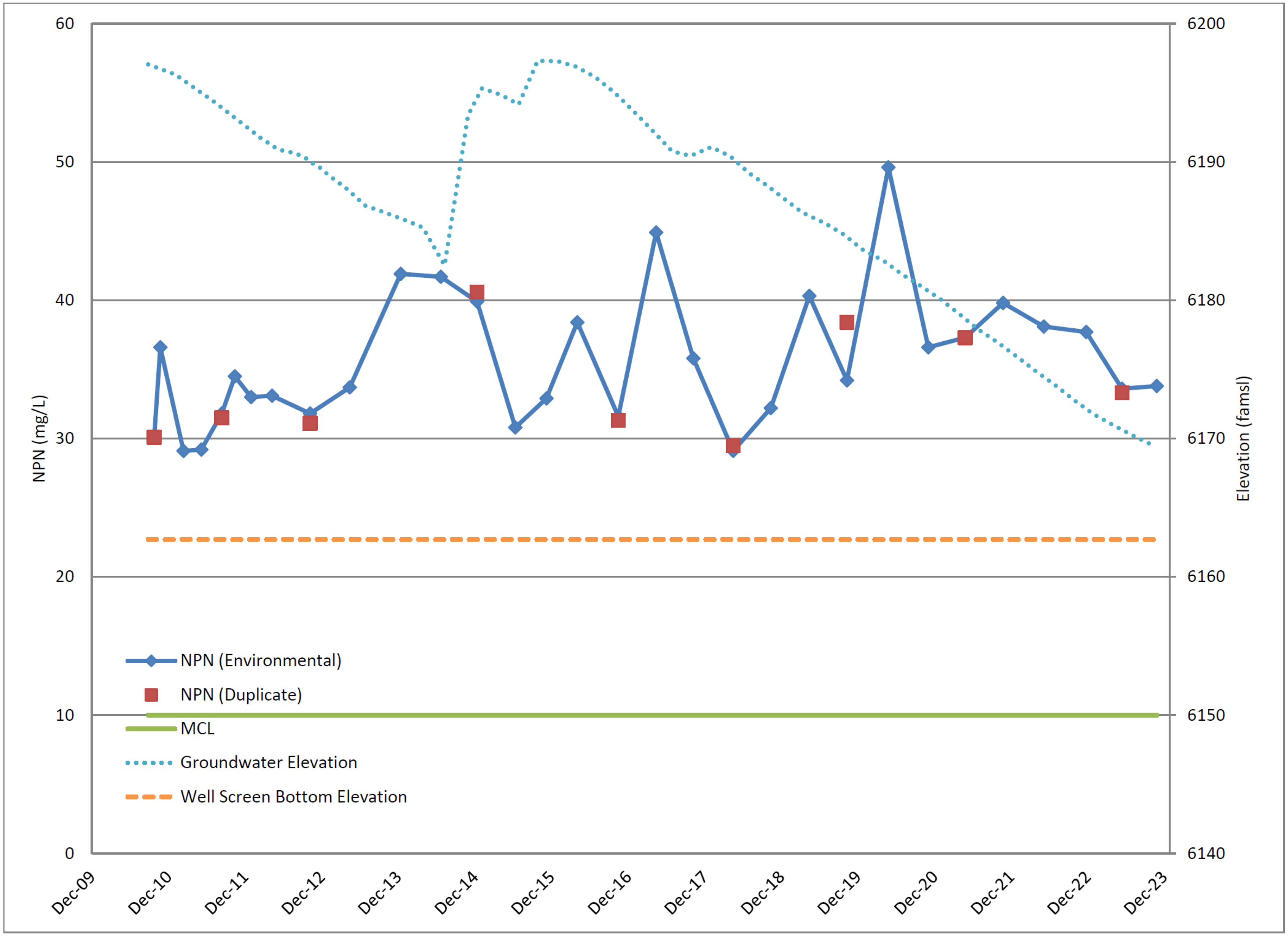

Figure 7C-1
Nitrate plus Nitrite Concentrations, CYN-MW9

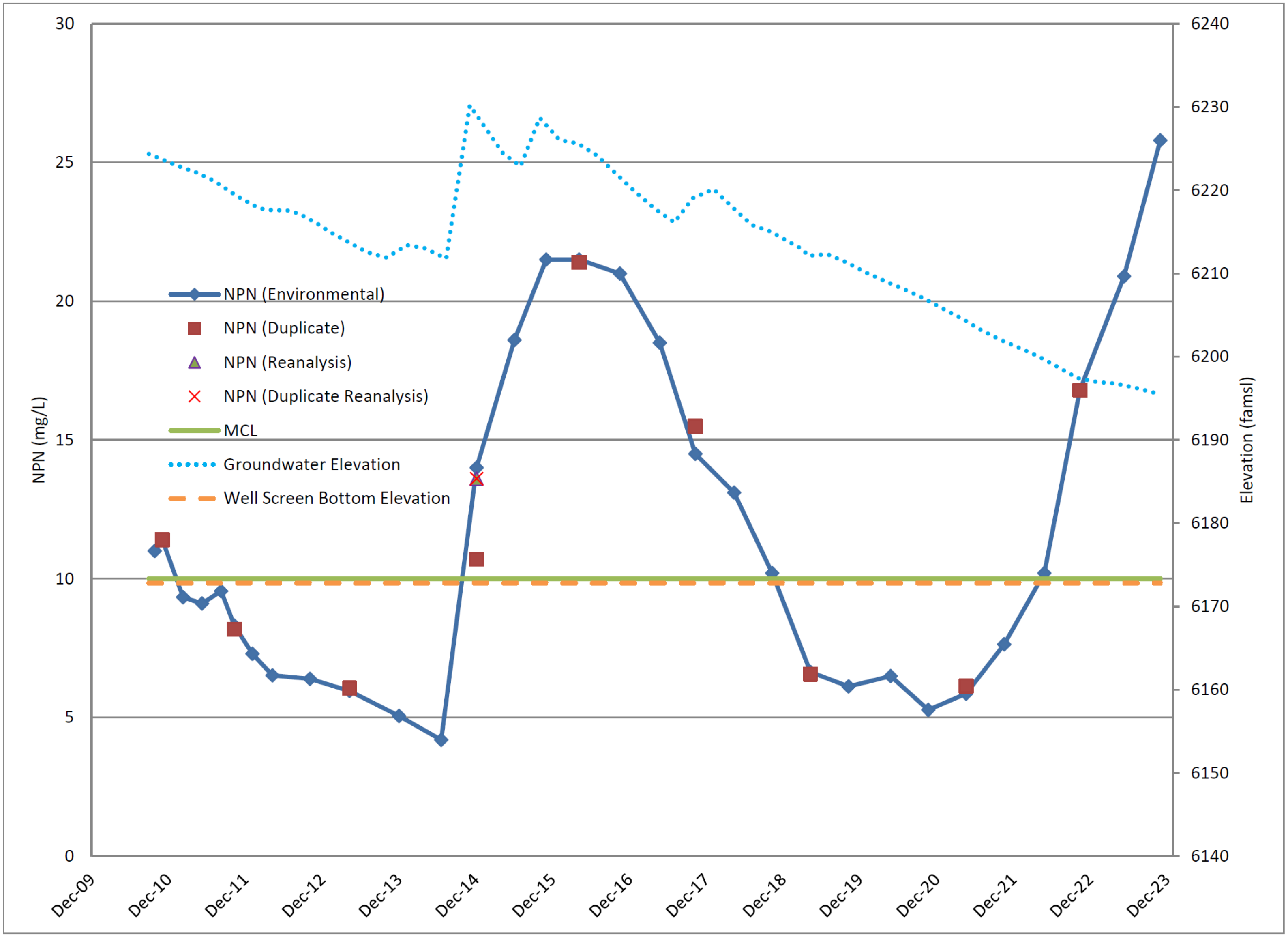

Figure 7C-2
Nitrate plus Nitrite Concentrations, CYN-MW10

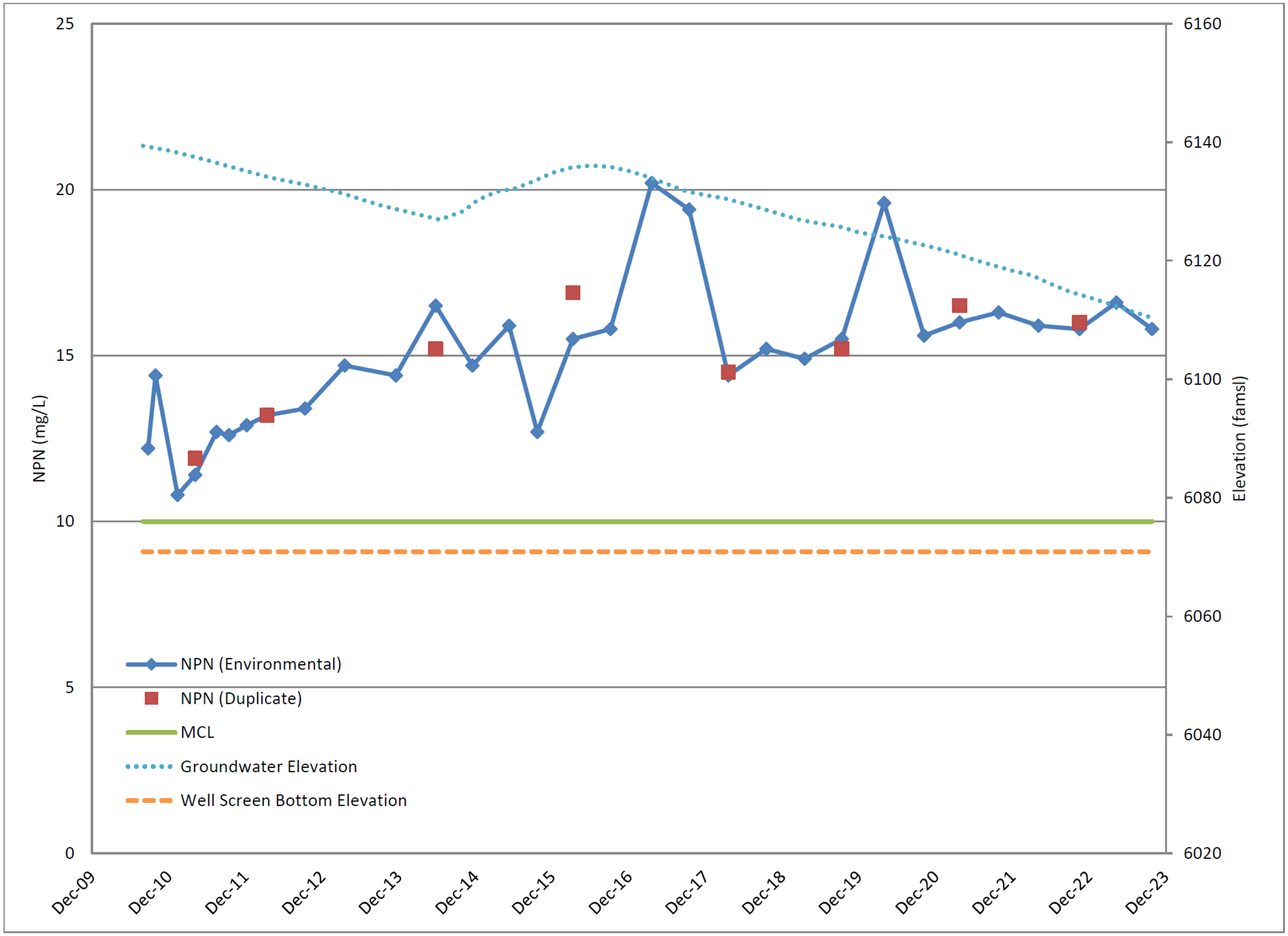

Figure 7C-3
Nitrate plus Nitrite Concentrations, CYN-MW12

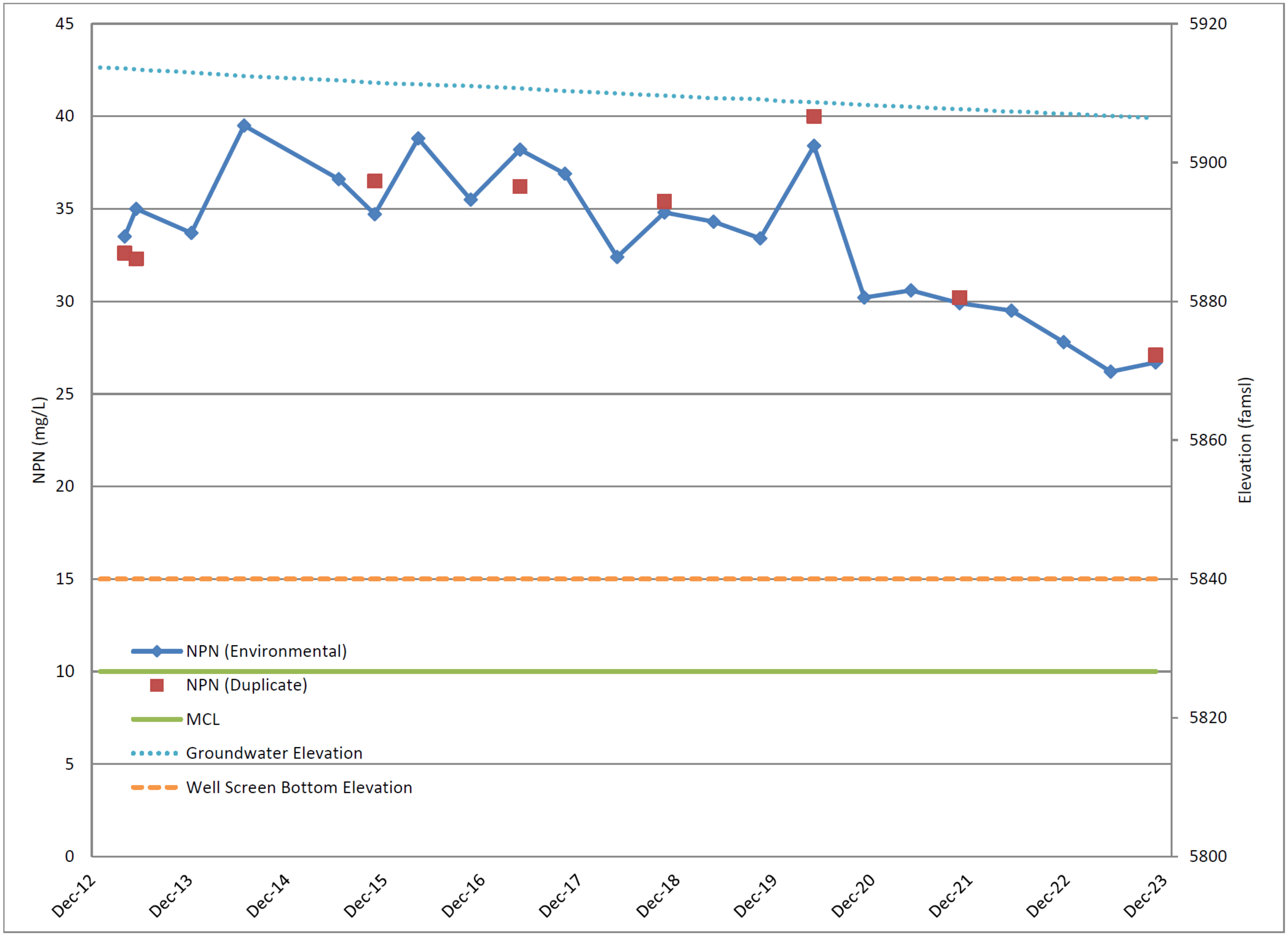

Figure 7C-4
Nitrate plus Nitrite Concentrations, CYN-MW13

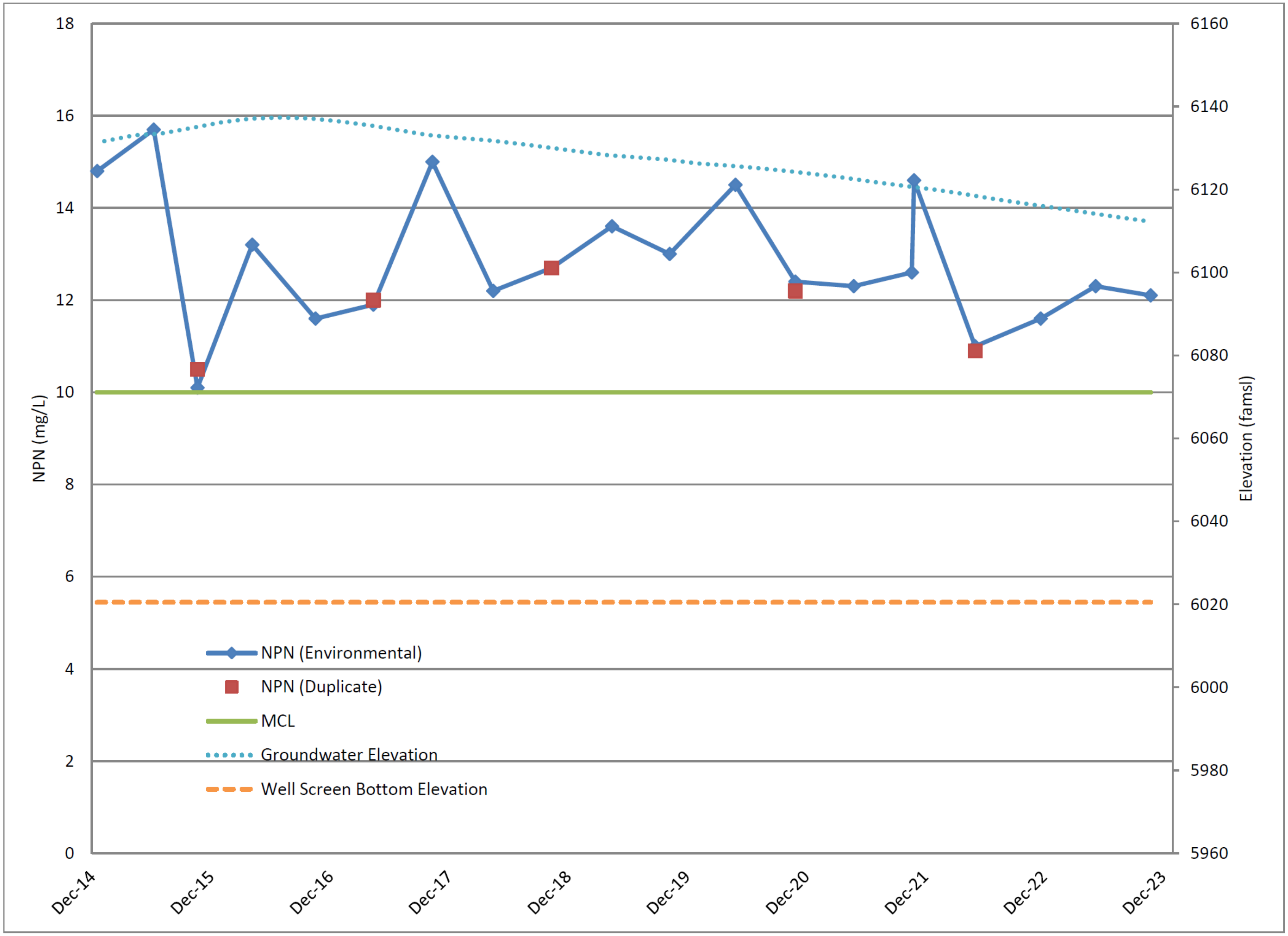

Figure 7C-5
Nitrate plus Nitrite Concentrations, CYN-MW14A

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Attachment 7D
Burn Site Groundwater Hydrographs

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Attachment 7D Hydrographs

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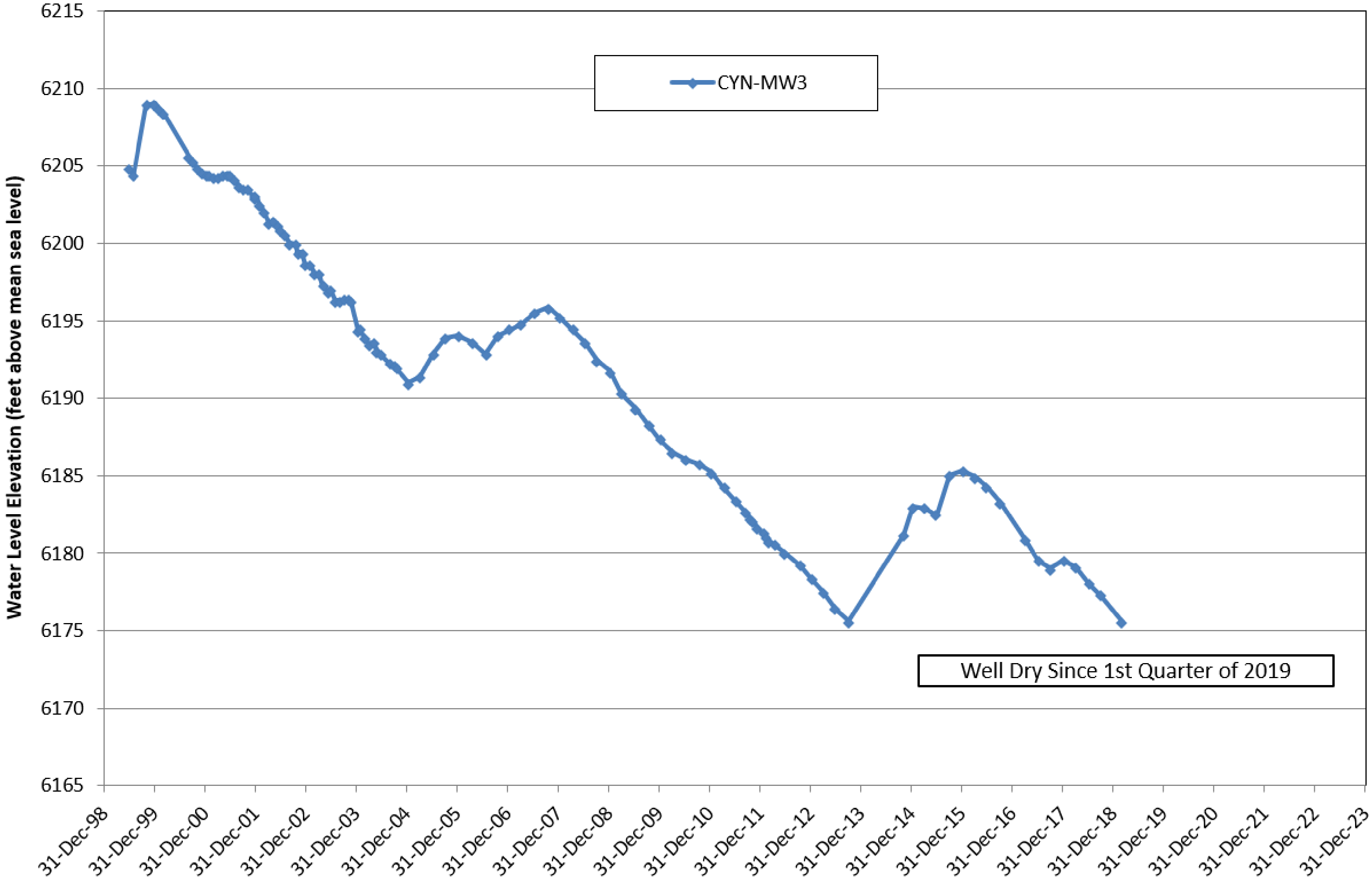

Figure 7D-1
Burn Site Groundwater Area of Concern Wells (1 of 9)

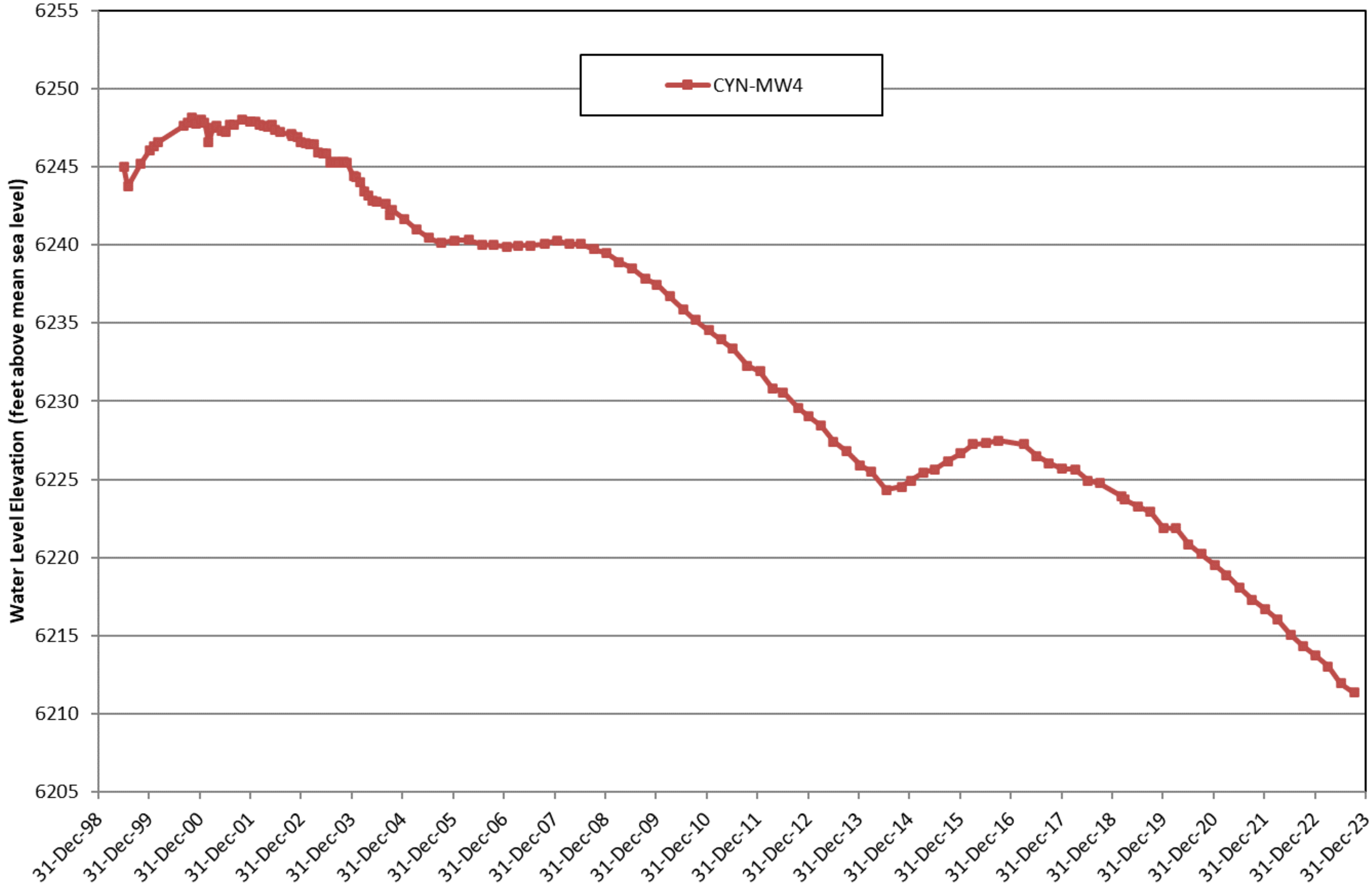

Figure 7D-2
Burn Site Groundwater Area of Concern Wells (2 of 9)

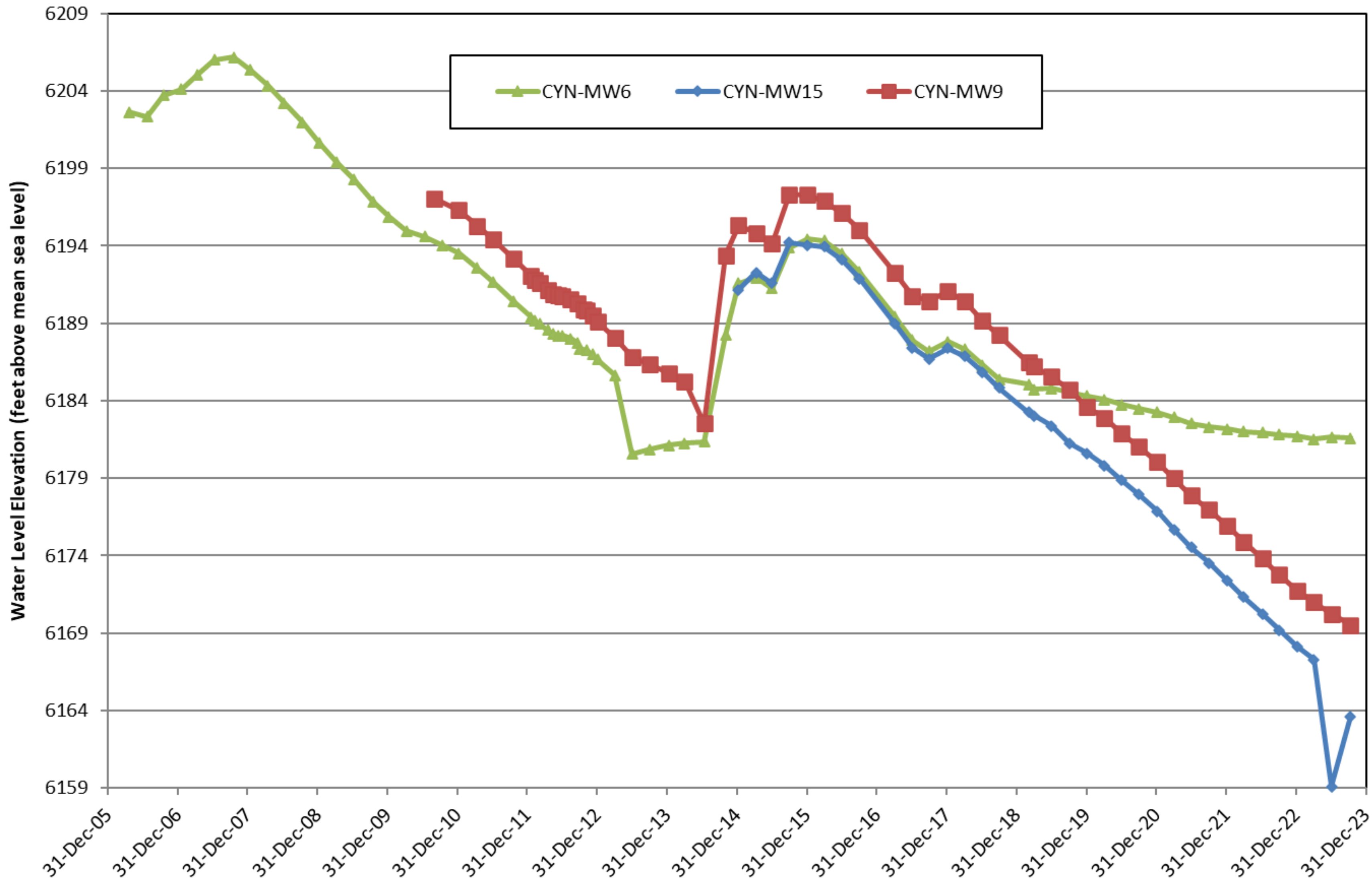

Figure 7D-3
Burn Site Groundwater Area of Concern Wells (3 of 9)

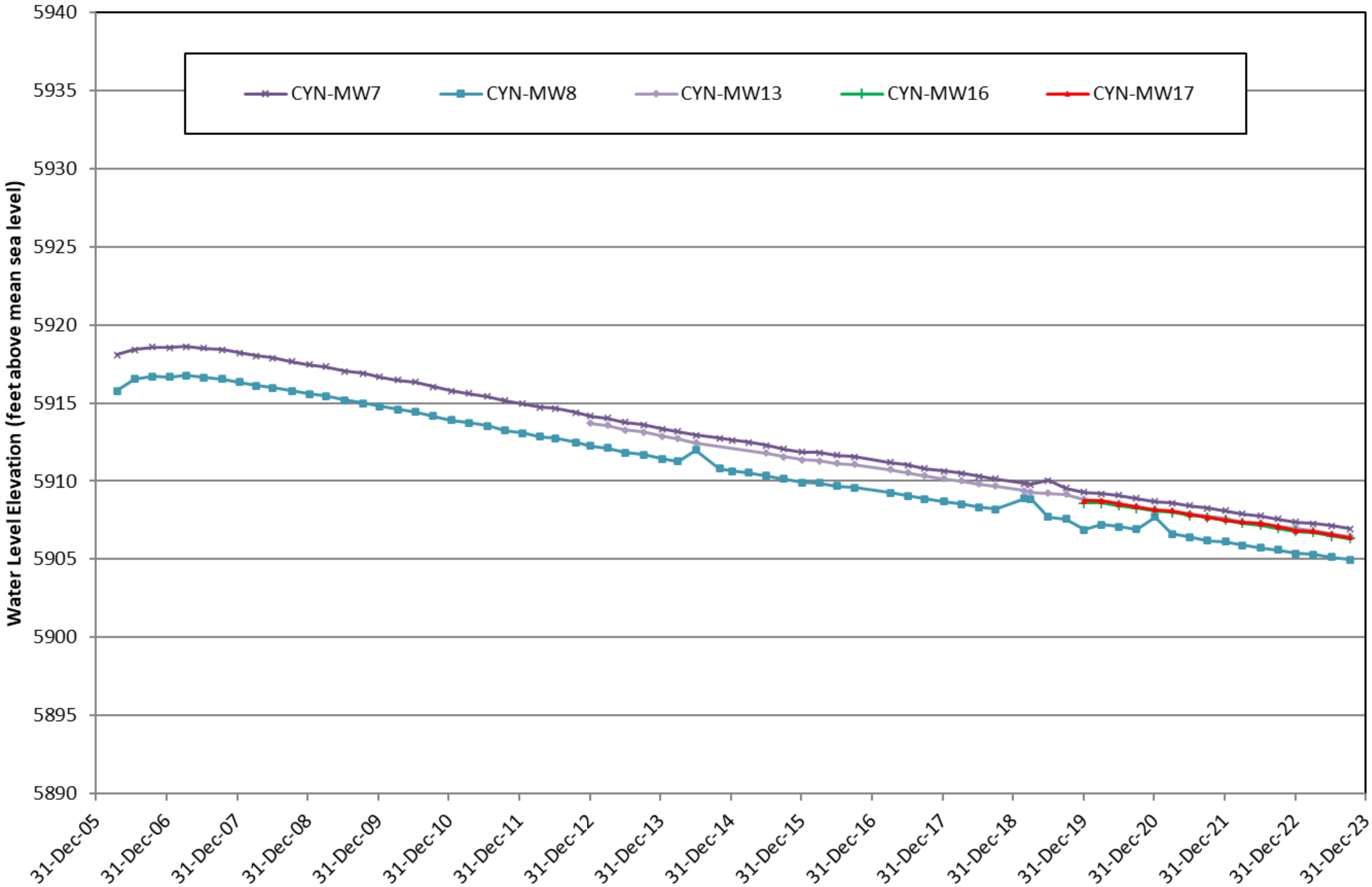

Figure 7D-4
Burn Site Groundwater Area of Concern Wells (4 of 9)

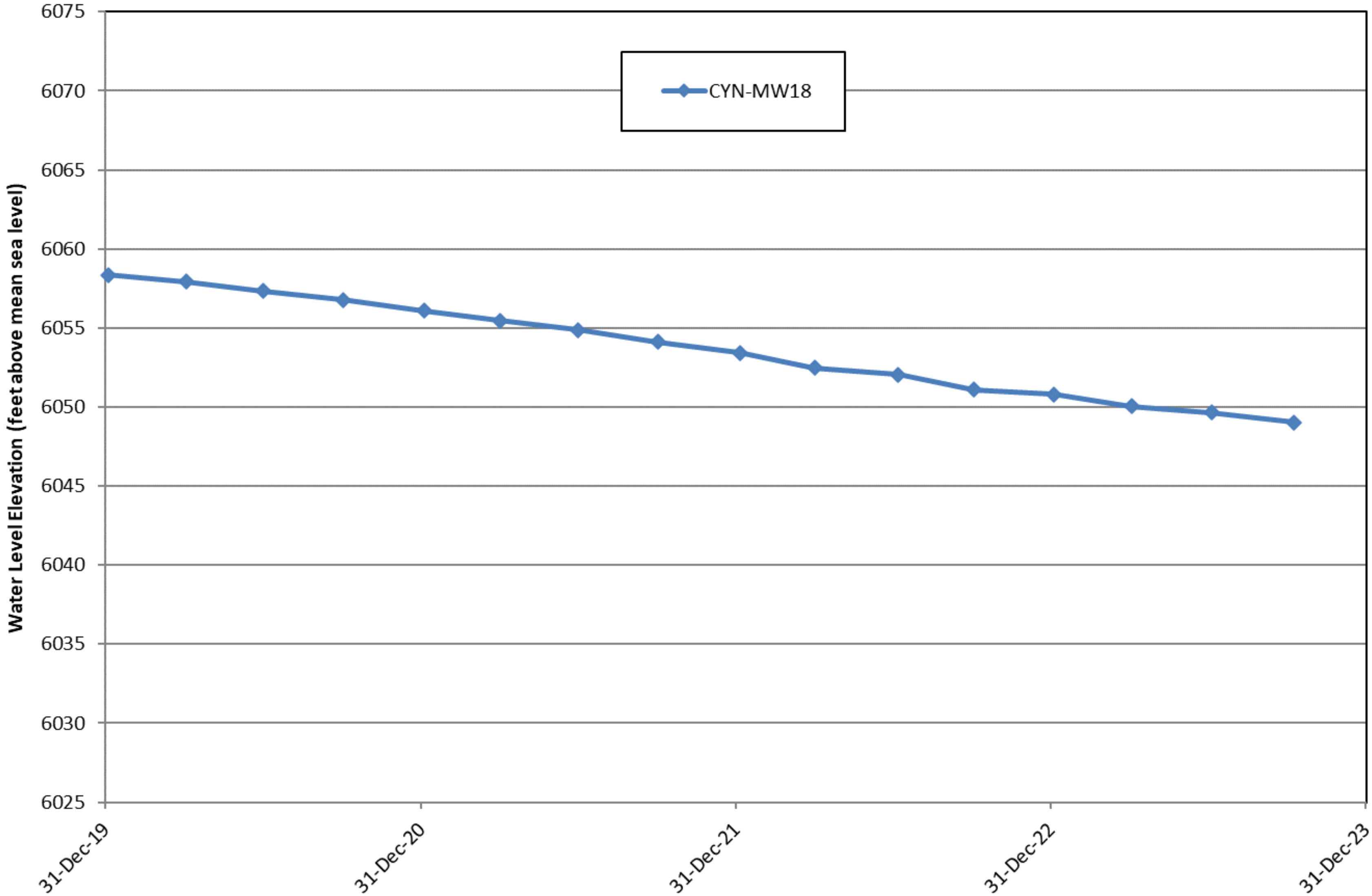

Figure 7D-5
Burn Site Groundwater Area of Concern Wells (5 of 9)

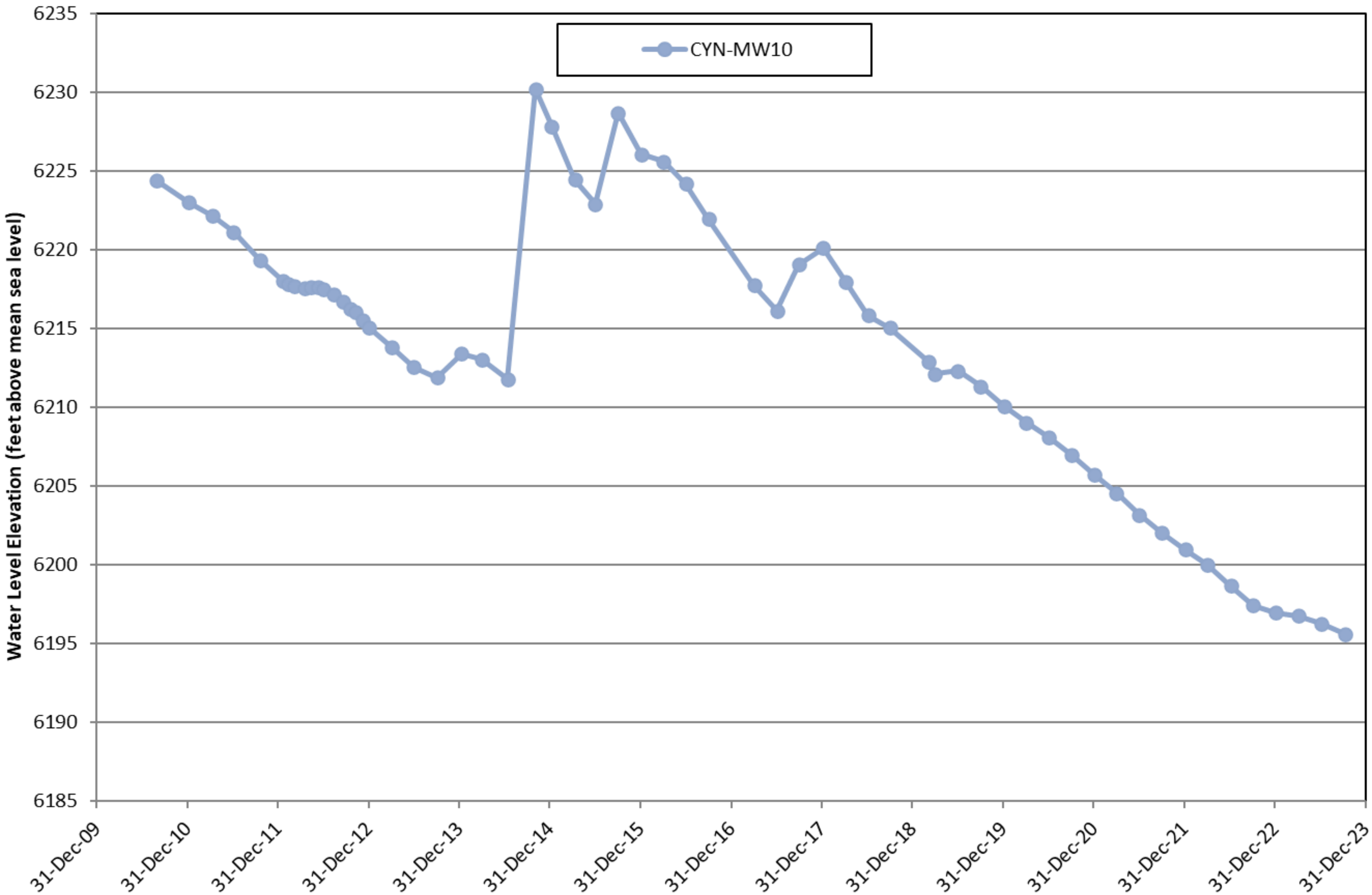

Figure 7D-6
Burn Site Groundwater Area of Concern Wells (6 of 9)

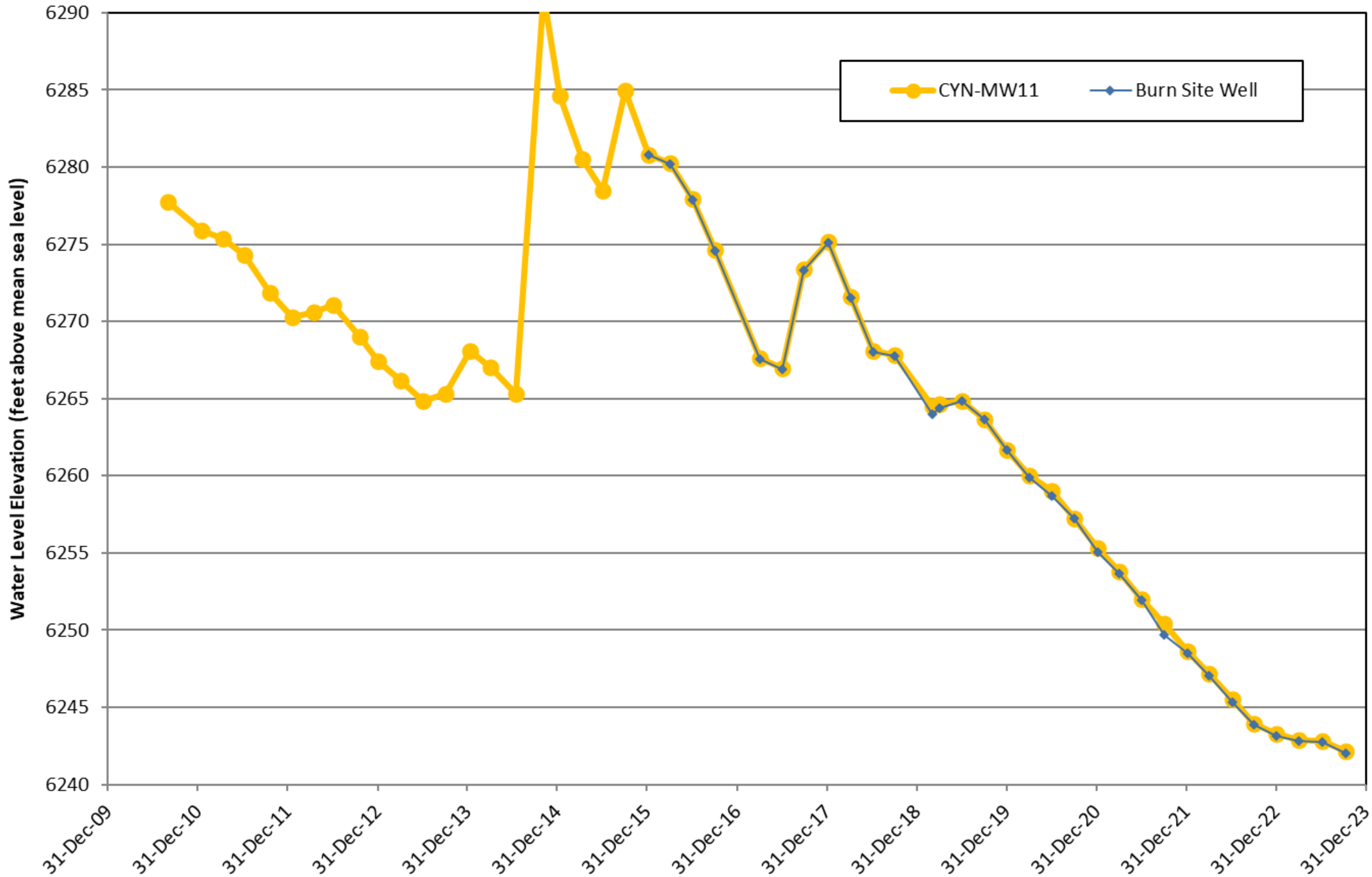

Figure 7D-7
Burn Site Groundwater Area of Concern Wells (7 of 9)

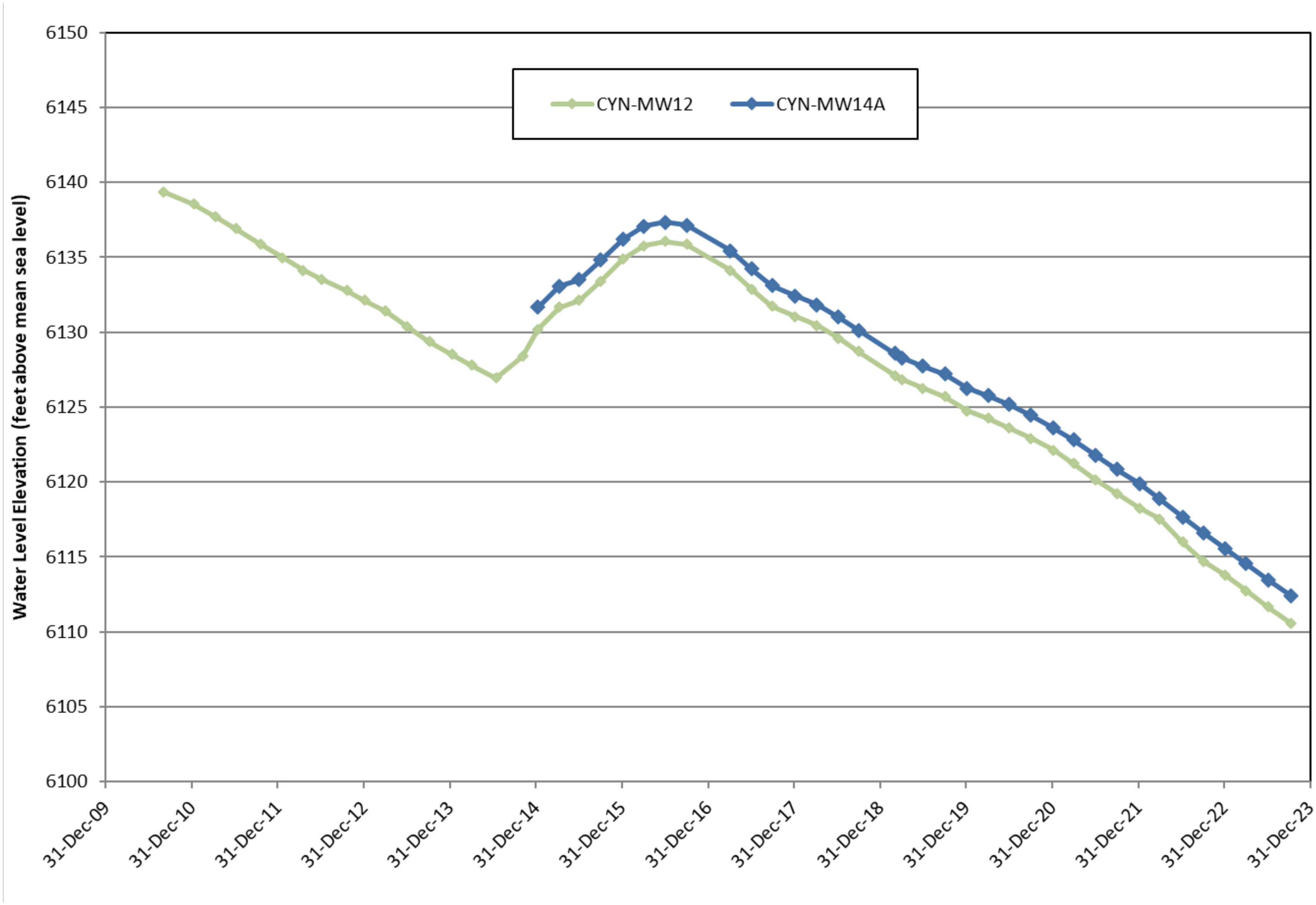

Figure 7D-8
Burn Site Groundwater Area of Concern Wells (8 of 9)

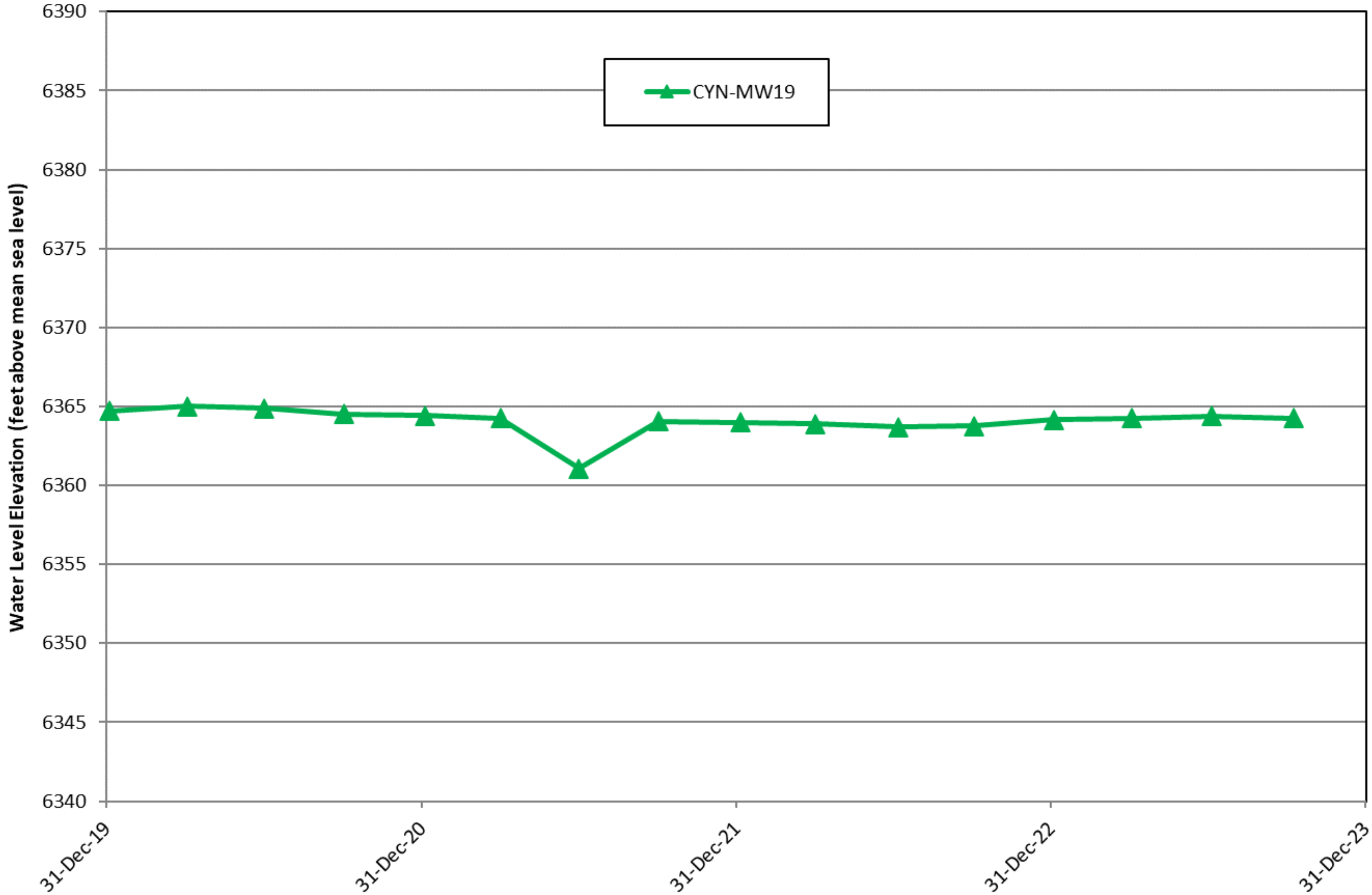

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Figure 7D-9
Burn Site Groundwater Area of Concern Wells (9 of 9)

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Chapter 7.0
Burn Site Groundwater References

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Table 1
Inventory of Active and Decommissioned Base-Wide Groundwater Monitoring, Production, and Extraction Wells Located at Sandia National Laboratories, New Mexico[a], Kirtland Air Force Base, and Surrounding Areas

Well ID	Type	Measuring Point[b, c] (ft amsl, NAVD 88)	Ground Surface[c] (ft amsl, NAVD 88)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Top of Screen (ft amsl)	Bottom of Screen (ft amsl)	Casing Total Depth (ft bgs)	Casing, Inner Diameter (inches)	Casing Material	Lithology of Screened Interval	Installation Date	P&A Date, If Applicable
Chemical Waste Landfill and Vicinity													
CWL-BW1	MW	5437.95	5436.0	445.0	495.0	4991.0	4941.0	495.0	2.1	SS	Regional Aquifer – SFG sediments	08-Jul-1985	Aug-2003
CWL-BW2	MW	5436.21	5434.3	490.0	980.0	4944.3	4454.3	980.0	5.6	S/SS	Regional Aquifer – SFG sediments	17-Sep-1985	2003
CWL-BW3	MW	5432.76	5431.6	485.0	505.0	4946.6	4926.6	507.5	4.8	PVC	Regional Aquifer – SFG sediments	22-Sep-1988	12-Nov-2012
CWL-BW4	MW	5427.67	5431.7	485.0	505.0	4946.7	4926.7	510.0	4.8	PVC	Regional Aquifer – SFG sediments	06-May-1994	Jan-1997
CWL-BW4A	MW	5434.03	5431.8	485.0	505.0	4946.8	4926.8	510.0	4.8	PVC	Regional Aquifer – SFG sediments	16-May-1994	14-Apr-2010
CWL-BW5	MW	5434.79	5432.2	500.0	520.0	4932.2	4912.2	525.0	4.8	PVC	Regional Aquifer – SFG sediments	11-May-2010	
CWL-MW1	MW	5425.88	5423.7	535.0	575.0	4888.7	4848.7	610.0	2.1	SS	Regional Aquifer – SFG sediments	01-Sep-1985	Sep-1997
CWL-MW1A	MW	5424.16	5423.1	474.0	494.0	4949.1	4929.1	495.0	4.8	PVC	Regional Aquifer – SFG sediments	31-Jul-1988	11-Nov-2012
CWL-MW2	MW	5421.22	5419.1	520.0	650.0	4899.1	4769.1	650.0	2.1	SS	Regional Aquifer – SFG sediments	22-Sep-1985	Sep-1997
CWL-MW2A	MW	5421.25	5419.8	473.0	493.0	4946.8	4926.8	495.0	5.0	PVC	Regional Aquifer – SFG sediments	01-Aug-1988	Jun-2004
CWL-MW2BL	MW	5421.85	5420.1	532.5	552.5	4887.6	4867.6	557.5	4.8	PVC	Regional Aquifer – SFG sediments	05-Jun-1994	10-Nov-2012
CWL-MW2BU	MW	5421.88	5420.1	476.0	496.0	4944.1	4924.1	501.0	1.9	PVC	Regional Aquifer – SFG sediments	05-Jun-1994	10-Nov-2012
CWL-MW3	MW	5421.50	5419.5	525.0	565.0	4894.5	4854.5	615.0	2.1	SS	Regional Aquifer – SFG sediments	26-Sep-1985	Sep-1997
CWL-MW3A	MW	5420.45	5419.1	470.0	490.0	4949.1	4929.1	492.0	4.8	PVC/SS	Regional Aquifer – SFG sediments	11-Aug-1988	10-Nov-2012
CWL-MW4	MW	5423.00	5421.0	478.0	498.0	4943.0	4923.0	503.0	3.8	PVC/SS	Regional Aquifer – SFG sediments	04-May-1990	14-Apr-2010
CWL-MW5L	MW	5418.47	5416.7	533.0	553.0	4883.7	4863.7	558.0	1.9	PVC	Regional Aquifer – SFG sediments	19-Apr-1994	14-Apr-2010
CWL-MW5U	MW	5418.68	5416.7	477.0	497.0	4939.7	4919.7	502.0	4.8	PVC	Regional Aquifer – SFG sediments	19-Apr-1994	14-Apr-2010
CWL-MW6L	MW	5419.80	5417.3	539.0	559.0	4878.3	4858.3	564.0	1.9	PVC	Regional Aquifer – SFG sediments	04-May-1994	14-Apr-2010
CWL-MW6U	MW	5419.45	5417.3	477.0	497.0	4940.3	4920.3	502.0	4.8	PVC	Regional Aquifer – SFG sediments	04-May-1994	14-Apr-2010
CWL-MW7	MW	5421.98	5419.9	618.0	638.0	4801.9	4781.9	643.0	4.8	PVC	Regional Aquifer – SFG sediments	20-Mar-2003	12-Nov-2012
CWL-MW8	MW	5421.71	5419.8	612.0	632.0	4807.8	4787.8	637.0	4.8	PVC	Regional Aquifer – SFG sediments	02-Apr-2003	12-Nov-2012
CWL-MW9	MW	5426.12	5423.5	495.0	515.0	4928.5	4908.5	520.0	4.8	PVC	Regional Aquifer – SFG sediments	13-May-2010	
CWL-MW10	MW	5424.58	5422.2	493.0	513.0	4929.2	4909.2	518.0	4.8	PVC	Regional Aquifer – SFG sediments	27-May-2010	
CWL-MW11	MW	5423.24	5420.8	491.0	511.0	4929.8	4909.8	516.0	4.8	PVC	Regional Aquifer – SFG sediments	27-May-2010	
MRN-1	MW	5308.54	5306.4	546.7	586.7	4759.7	4719.7	606.7	4.8	SS	Regional Aquifer – SFG sediments	22-Jan-1995	Aug-2001
MRN-2	MW	5308.18	5306.2	410.0	440.0	4896.2	4866.2	450.0	3.7	PVC	Regional Aquifer – SFG sediments	28-Jan-1995	
MRN-3D	MW	5309.34	5306.8	660.3	680.3	4646.5	4626.5	685.3	4.8	PVC	Regional Aquifer – SFG sediments	20-Jul-2003	
SWTA-3	MW	5323.24	5321.6	407.2	427.2	4914.4	4894.4	432.2	4.8	PVC/SS	Regional Aquifer – SFG sediments	06-Sep-1989	Apr-1998
SWTA3-MW2	MW	5325.60	5323.2	455.0	475.0	4868.2	4848.2	480.0	4.8	PVC	Regional Aquifer – SFG sediments	07-May-2002	
SWTA3-MW3	MW	5323.94	5321.4	619.0	639.0	4702.4	4682.4	659.4	4.8	PVC	Regional Aquifer – SFG sediments	20-Feb-2004	
SWTA3-MW4	MW	5324.81	5322.3	430.0	450.0	4892.3	4872.3	460.0	4.7	PVC	Regional Aquifer – SFG sediments	26-Aug-2005	
Lurance Canyon and Burn Site Vicinity													
12AUP01	MW	6357.00	6355.0	52.5	57.5	6302.5	6297.5	58.1	2.0	PVC	Alluvium and bedrock (granitic gneiss)	19-Nov-1996	14-Nov-2012
CCBA-MW1	MW	5902.34	5899.9	60.0	80.0	5839.9	5819.9	85.0	4.7	PVC	Alluvium and bedrock (granite)	01-Sep-2011	
CCBA-MW2	MW	5939.28	5937.0	98.0	118.0	5839.0	5819.0	123.0	4.7	PVC	Bedrock (granite)	31-Aug-2011	

Table 1 (continued)
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Lurance Canyon and Burn Site Vicinity (Continued)													
CYN-MW1D	MW	6239.59	6236.7	372.0	382.0	5864.7	5854.7	392.0	5.1	S	Bedrock (granitic gneiss)	22-Dec-1997	15-Nov-2012
CYN-MW2S	MW	6239.41	6236.7	23.6	28.6	6213.1	6208.1	34.2	4.0	PVC	Alluvium and bedrock (granitic gneiss)	22-Dec-1997	15-Nov-2012
CYN-MW3	MW	6313.26	6311.9	120.0	130.0	6191.9	6181.9	135.0	5.0	PVC	Bedrock (metamorphics)	18-Jun-1999	
CYN-MW4	MW	6455.48	6454.7	260.0	280.0	6194.7	6174.7	290.0	5.0	PVC	Bedrock (quartzite)	18-Jun-1999	
CYN-MW5	MW	5984.23	5981.3	135.0	155.0	5846.3	5826.3	160.0	5.0	PVC	Bedrock (quartzite)	15-Aug-2001	
CYN-MW6	MW	6343.37	6340.5	141.5	161.3	6199.0	6179.2	161.7	5.0	PVC	Bedrock (metamorphics)	09-Dec-2005	
CYN-MW7	MW	6216.35	6213.7	315.0	334.2	5898.7	5879.5	339.9	5.0	PVC	Bedrock (granitic gneiss)	06-Dec-2005	
CYN-MW8	MW	6230.11	6227.8	338.5	358.3	5889.3	5869.5	363.4	5.0	PVC	Bedrock (granitic gneiss)	12-Jan-2006	
CYN-MW9	MW	6360.67	6358.5	175.8	195.8	6182.7	6162.7	200.8	4.8	PVC	Bedrock (metamorphics)	27-Jul-2010	
CYN-MW10	MW	6345.45	6342.8	150.4	170.4	6192.4	6172.4	175.4	4.8	PVC	Bedrock (metamorphics)	28-Jul-2010	
CYN-MW11	MW	6374.41	6371.9	229.8	249.8	6142.1	6122.1	254.8	4.8	PVC	Bedrock (metamorphics)	29-Jul-2010	
CYN-MW12	MW	6345.16	6342.9	252.5	272.5	6090.4	6070.4	277.5	4.8	PVC	Bedrock (metamorphics)	29-Jul-2010	
CYN-MW13	MW	6237.79	6236.0	376.8	396.8	5859.2	5839.2	402.2	4.8	PVC	Bedrock (granitic gneiss)	05-Dec-2012	
CYN-MW14A	MW	6315.85	6313.5	263.6	293.6	6049.9	6019.9	298.6	4.8	PVC	Bedrock (metamorphics)	09-Dec-2014	
CYN-MW15	MW	6344.44	6342.3	162.2	192.2	6180.1	6150.1	195.0	4.8	PVC	Bedrock (metamorphics)	08-Dec-2014	
CYN-MW16	MW	6249.60	6247.4	375.6	405.6	5871.8	5841.8	410.6	4.8	PVC	Bedrock (granitic gneiss)	5-Nov-2019	
CYN-MW17	MW	6268.95	6266.6	370.3	400.3	5896.3	5866.3	405.3	4.8	PVC	Bedrock (granitic gneiss)	6-Nov-2019	
CYN-MW18	MW	6304.02	6301.5	270.4	300.4	6031.1	6001.1	305.4	4.8	PVC	Bedrock (metamorphics)	7-Nov-2019	
CYN-MW19	MW	6410.43	6408.1	59.3	89.3	6348.8	6318.8	94.3	4.8	PVC	Bedrock (metamorphics)	8-Nov-2019	
Greystone-MW2	MW	5814.20	5811.4	60.0	80.0	5751.4	5731.4	85.0	4.8	PVC	Alluvium in arroyo, recent	25-Apr-2002	
Mixed Waste Landfill and Vicinity													
MWL-BW1	MW	5387.18	5385.4	452.2	472.2	4933.2	4913.2	477.2	5.0	PVC	Regional Aquifer – SFG sediments	01-Jul-1989	24-Jan-2008
MWL-BW2	MW	5391.02	5388.7	467.0	497.0	4921.7	4891.7	502.0	4.8	PVC	Regional Aquifer – SFG sediments	22-Jan-2008	
MWL-MW1	MW	5384.21	5381.8	456.0	476.0	4925.8	4905.8	478.0	5.0	PVC/S	Regional Aquifer – SFG sediments	01-Oct-1988	Jul-2008
MWL-MW2	MW	5379.93	5378.4	452.0	472.0	4926.4	4906.4	477.0	5.0	PVC/SS	Regional Aquifer – SFG sediments	01-Aug-1989	Jul-2008
MWL-MW3	MW	5383.99	5381.7	451.3	471.3	4930.4	4910.4	476.3	4.8	PVC/SS	Regional Aquifer – SFG sediments	22-Aug-1989	Jul-2008
MWL-MW4[d]	MW	5391.70	5390.2	488.4[d]	508.4[d]	4901.8[d]	4881.8[d]	553.9[d]	4.8	PVC	Regional Aquifer – SFG sediments	10-Feb-1993	
MWL-MW5	MW	5382.56	5380.4	496.5	516.5	4883.9	4863.9	521.5	4.8	PVC	Regional Aquifer – SFG sediments	19-Nov-2000	
MWL-MW6	MW	5375.31	5372.7	505.5	525.5	4867.2	4847.2	530.5	4.8	PVC	Regional Aquifer – SFG sediments	19-Oct-2000	
MWL-MW7	MW	5383.30	5380.9	464.7	494.0	4916.2	4886.9	498.8	4.8	PVC	Regional Aquifer – SFG sediments	24-Jun-2008	
MWL-MW8	MW	5384.67	5382.4	465.0	495.0	4917.4	4887.4	500.0	4.8	PVC	Regional Aquifer – SFG sediments	26-Jun-2008	
MWL-MW9	MW	5381.91	5379.3	465.0	495.0	4914.3	4884.3	500.0	4.8	PVC	Regional Aquifer – SFG sediments	30-Jun-2008	
NWTA3-MW1	MW	5336.48	5332.9	434.9	454.9	4898.0	4878.0	460.4	4.8	PVC	Regional Aquifer – SFG sediments	20-Sep-1989	12-Sep-2002
NWTA3-MW2	MW	5337.49	5335.5	455.0	475.0	4880.5	4860.5	505.0	4.8	PVC	Regional Aquifer – SFG sediments	25-Aug-2000	
NWTA3-MW3D	MW	5340.80	5335.7	654.4	674.4	4681.3	4661.3	679.4	4.8	PVC	Regional Aquifer – SFG sediments	09-Jul-2003	
PL-1	MW	5334.99	5333.4	440.0	470.0	4893.4	4863.4	480.0	2.0	PVC	Regional Aquifer – SFG sediments	28-Oct-1994	12-Sep-2009
PL-2	MW	5336.01	5333.0	577.0	597.0	4756.0	4736.0	617.0	4.8	SS	Regional Aquifer – SFG sediments	18-Nov-1994	

Table 1 (continued)
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Mixed Waste Landfill and Vicinity (Continued)													
PL-3	MW	5334.64	5332.8	445.0	465.0	4887.8	4867.8	475.0	3.8	PVC	Regional Aquifer – SFG sediments	04-Dec-1994	12-Sep-2009
PL-4	MW	5334.98	5332.7	464.0	494.0	4868.7	4838.7	499.0	4.8	PVC	Regional Aquifer – SFG sediments	28-Sep-2009	
Coyote Test Field and Vicinity													
CTF-MW1	MW	6082.63	6079.7	240.0	260.0	5839.7	5819.7	265.0	5.0	PVC	Bedrock (granite)	16-Aug-2001	
CTF-MW2	MW	5578.60	5575.6	110.0	130.0	5465.6	5445.6	135.0	5.0	PVC	Bedrock (granite)	18-Aug-2001	
CTF-MW3	MW	5522.82	5519.8	340.0	360.0	5179.8	5159.8	365.0	5.0	PVC	Bedrock (granite)	21-Aug-2001	
LMF-1	MW	5628.60	5626.5	310.0	350.0	5316.5	5276.5	360.0	4.1	PVC	Bedrock (limestone)	11-Aug-1995	15-Jan-1998
OBS-MW1	MW	5871.42	5869.1	135.0	155.0	5734.1	5714.1	160.0	4.7	PVC	Bedrock (granite)	31-Aug-2011	
OBS-MW2	MW	5863.16	5860.8	234.0	254.0	5626.8	5606.8	259.0	4.7	PVC	Bedrock (granite)	30-Aug-2011	
OBS-MW3	MW	5865.50	5863.3	190.0	210.0	5673.3	5653.3	215.0	4.7	PVC	Bedrock (granite)	30-Aug-2011	
SFR-1D[e]	MW	5399.13	5396.9	348.0	368.0	5048.9	5028.9	378.0	3.8	PVC	Regional Aquifer – SFG sediments	06-Aug-1992	
SFR-1S[e]	MW	5399.16	5396.9	152.0	172.0	5244.9	5224.9	182.0	1.9	PVC	Regional Aquifer – SFG sediments	08-Aug-1992	
SFR-2S	MW	5432.77	5430.3	97.0	117.0	5333.3	5313.3	122.0	3.8	PVC	Regional Aquifer – SFG sediments	20-Aug-1992	
SFR-3D	MW	5497.94	5496.1	311.5	351.5	5184.6	5144.6	361.5	1.9	PVC	Regional Aquifer – SFG sediments	05-Nov-1992	
SFR-3P	MW	5499.63	5497.2	175.0	195.0	5322.2	5302.2	205.0	3.8	PVC	Regional Aquifer – SFG sediments	12-Jul-1993	
SFR-3S	MW	5498.24	5496.1	182.0	212.0	5314.1	5284.1	222.0	1.9	PVC	Regional Aquifer – SFG sediments	10-Nov-1992	
SFR-3T	MW	5498.66	5496.9	713.0	733.0	4783.9	4763.9	753.0	5.4	SS	Bedrock (sandstone)	23-Sep-1993	
SFR-4P	MW	5573.33	5571.3	344.0	354.0	5227.3	5217.3	364.0	1.9	PVC	Bedrock (sandstone)	29-Jul-1993	
SFR-4T	MW	5573.95	5572.4	340.0	360.0	5232.4	5212.4	380.0	4.8	PVC/SS	Bedrock (sandstone)	30-Sep-1993	
STW-1	MW	5535.53	5533.3	149.8	169.8	5383.5	5363.5	179.8	4.3	PVC	Regional Aquifer – SFG sediments	18-Jun-1995	23-Sep-1997
TRE-1	MW	5497.25	5495.2	255.0	295.0	5240.2	5200.2	305.0	4.3	PVC	Regional Aquifer – SFG sediments	31-Jul-1995	
TRE-2	MW	5497.20	5495.2	150.0	170.0	5345.2	5325.2	190.0	2.0	PVC	Regional Aquifer – SFG sediments	31-Jul-1995	
TRN-1	MW	5735.62	5733.6	320.0	340.0	5413.6	5393.6	350.0	3.8	PVC	Bedrock (sandstone)	12-Oct-1994	
TRS-1D	MW	5779.80	5777.5	266.4	306.4	5511.1	5471.1	316.4	1.9	PVC	Bedrock (limestone)	06-Sep-1995	
TRS-1S	MW	5780.07	5777.5	164.0	204.0	5613.5	5573.5	214.8	1.9	PVC	Bedrock (limestone)	06-Sep-1995	
TRS-2	MW	5780.76	5778.3	165.0	205.0	5613.3	5573.3	210.0	4.5	S	Bedrock (limestone)	09-Sep-1995	
Tijeras Arroyo Groundwater													
PGS-1	MW	5407.41	5407.9	503.0	513.0	4904.9	4894.9	538.0	5.0	SS	Regional Aquifer – SFG sediments	12-Oct-1994	Apr-1998
PGS-2[f]	MW	5408.29	5407.9	535.0[f]	565.0[f]	4872.9	4842.9	655.0	5.0	SS	Regional Aquifer – SFG sediments	22-Sep-1995	
TA1-W-01	MW	5403.82	5401.8	575.0	595.0	4826.8	4806.8	600.0	4.8	PVC	Regional Aquifer – SFG sediments	22-Mar-1997	
TA1-W-02	MW	5416.62	5416.9	540.0	560.0	4876.9	4856.9	565.6	5.0	PVC	Regional Aquifer – SFG sediments	27-Feb-1998	
TA1-W-03	MW	5457.03	5454.9	337.0	357.0	5117.9	5097.9	362.6	5.0	PVC	PGWS – SFG sediments	27-Jan-1998	
TA1-W-04	MW	5460.98	5458.3	576.0	596.0	4882.3	4862.3	601.7	5.0	PVC	Regional Aquifer – SFG sediments	06-Oct-1998	
TA1-W-05	MW	5433.84	5434.2	597.5	617.5	4836.7	4816.7	623.2	5.0	PVC	Regional Aquifer – SFG sediments	16-Nov-1998	
TA1-W-06	MW	5417.10	5417.4	300.0	320.0	5117.4	5097.4	325.6	5.0	PVC	PGWS – SFG sediments	27-Feb-1998	
TA1-W-07	MW	5404.92	5402.8	268.6	288.6	5134.2	5114.2	289.1	5.0	PVC	PGWS – SFG sediments	03-Dec-1998	
TA1-W-08	MW	5434.19	5434.7	302.0	322.0	5132.7	5112.7	327.0	4.5	PVC	PGWS – SFG sediments	10-Oct-2001	

Table 1 (continued)
Inventory of Active and Decommissioned Base-Wide Groundwater Monitoring, Production, and Extraction Wells Located at Sandia National Laboratories, New Mexico[a], Kirtland Air Force Base, and Surrounding Areas

Well ID	Type	Measuring Point[b, c] (ft amsl, NAVD 88)	Ground Surface[c] (ft amsl, NAVD 88)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Top of Screen (ft amsl)	Bottom of Screen (ft amsl)	Casing Total Depth (ft bgs)	Casing, Inner Diameter (inches)	Casing Material	Lithology of Screened Interval	Installation Date	P&A Date, If Applicable
Tijeras Arroyo Groundwater (Continued)													
TA2-NW1-325	MW	5421.94	5420.0	295.0	325.0	5125.0	5095.0	330.3	4.8	PVC	PGWS – SFG sediments	01-Apr-1993	
TA2-NW1-595[g]	MW	5421.26	5420.0	535.0[g]	555.0[g]	4885.0	4865.0	598.0	4.8	PVC	Regional Aquifer – SFG sediments	27-Jul-1993	
TA2-SW1-320	MW	5411.85	5410.1	299.6	319.6	5110.5	5090.5	324.6	3.8	PVC	PGWS – SFG sediments	30-Nov-1992	12-Dec-2014
TA2-W-01	MW	5419.99	5417.4	312.0	332.0	5105.4	5085.4	332.0	4.8	PVC	PGWS – SFG sediments	27-Jun-1994	
TA2-W-19	MW	5351.21	5349.0	265.9	285.9	5083.1	5063.1	285.9	4.8	PVC	PGWS – SFG sediments	29-Nov-1995	
TA2-W-24	MW	5363.66	5361.8	465.0	485.0	4896.8	4876.8	490.6	5.0	PVC	Regional Aquifer – SFG sediments	09-Feb-1998	
TA2-W-25	MW	5374.86	5372.5	492.0	512.0	4880.5	4860.5	517.8	4.8	PVC	Regional Aquifer – SFG sediments	28-Apr-1997	
TA2-W-26	MW	5375.77	5373.8	276.0	296.0	5097.8	5077.8	301.6	5.0	PVC	PGWS – SFG sediments	19-Jan-1998	
TA2-W-27	MW	5362.85	5360.8	275.0	295.0	5085.8	5065.8	300.6	5.0	PVC	PGWS – SFG sediments	09-Feb-1998	
TA2-W-28	MW	5412.41	5410.0	310.5	330.5	5099.5	5079.5	335.45	4.8	PVC	PGWS – SFG sediments	10-Dec-2014	
TJA-1	MW	unk	5351.3	275.0	295.0	5076.3	5056.3	305.0	3.8	PVC	PGWS – SFG sediments	25-Jun-1994	9-Jul-1994
TJA-2	MW	5353.20	5351.3	275.0	295.0	5076.3	5056.3	305.0	3.8	PVC	PGWS – SFG sediments	12-Jul-1994	
TJA-3	MW	5390.56	5387.8	496.0	516.0	4891.8	4871.8	521.7	5.0	PVC	Regional Aquifer – SFG sediments	04-Dec-1998	
TJA-4[h]	MW	5341.16	5338.5	360.0	380.0	4978.5	4958.5	385.7	5.0	PVC	Merging Zone – SFG sediments	01-Dec-1998	
TJA-5	MW	5341.33	5338.5	267.0	287.0	5071.5	5051.5	292.7	5.0	PVC	PGWS – SFG sediments	02-Dec1998	
TJA-6	MW	5343.16	5340.6	454.9	474.9	4885.7	4865.7	480.7	5.0	PVC	Regional Aquifer – SFG sediments	04-Feb-2001	
TJA-7	MW	5391.27	5388.4	290.5	310.5	5097.9	5077.9	316.3	5.0	PVC	PGWS – SFG sediments	12-Mar-2001	
WYO-1	MW	5392.50	5390.4	510.0	560.0	4880.4	4830.4	570.0	4.3	PVC	Regional Aquifer – SFG sediments	28-Aug-1995	Jul-2001
WYO-2	MW	5392.50	5390.4	265.0	285.0	5125.4	5105.4	295.0	2.0	PVC	PGWS – SFG sediments	26-Sep-1995	Jul-2001
WYO-3	MW	5392.09	5390.0	520.0	540.0	4870.0	4850.0	545.0	4.5	PVC	Regional Aquifer – SFG sediments	10-Oct-2001	
WYO-4	MW	5392.57	5390.2	275.0	295.0	5115.2	5095.2	300.0	4.5	PVC	PGWS – SFG sediments	16-Oct-2001	
Technical Area V													
AVN-1	MW	5443.00	5440.2	570.0	590.0	4870.2	4850.2	600.0	5.0	SS	Regional Aquifer – SFG sediments	23-May-1995	07-Feb-2023
AVN-2	MW	5442.39	5440.6	495.0	515.0	4945.6	4925.6	520.0	3.8	PVC	Regional Aquifer – SFG sediments	5-Jun-1995	07-Feb-2023
LWDS-MW1	MW	5423.83	5424.5	495.0	515.0	4929.5	4909.5	520.3	3.9	PVC	Regional Aquifer – SFG sediments	03-May-1993	
LWDS-MW2	MW	5412.41	5411.5	506.0	526.0	4905.5	4885.5	531.0	3.9	PVC/SS	Regional Aquifer – SFG sediments	30-Oct-1992	09-Feb-2023
TAV-INJ1[i]	INJ	5429.70	5430.1	509.0	539.0	4921.1	4891.1	544.0	5.0	Dual PVC	Regional Aquifer – SFG sediments	11-Oct-2017	
TAV-MW1	MW	5437.81	5435.2	489.5	509.5	4945.7	4925.7	509.5	5.0	PVC	Regional Aquifer – SFG sediments	28-Feb-1995	05-Feb-2008
TAV-MW2	MW	5427.33	5424.3	497.0	513.5	4927.3	4910.8	513.5	4.8	PVC	Regional Aquifer – SFG sediments	30-Mar-1995	
TAV-MW3	MW	5464.30	5461.6	532.0	552.0	4929.6	4909.6	557.7	4.8	PVC	Regional Aquifer – SFG sediments	11-Apr-1997	
TAV-MW4	MW	5427.89	5425.4	495.0	515.0	4930.4	4910.4	520.7	4.8	PVC	Regional Aquifer – SFG sediments	18-Apr-1997	
TAV-MW5	MW	5408.71	5406.6	487.0	507.0	4919.6	4899.6	512.7	4.8	PVC	Regional Aquifer – SFG sediments	26-Apr-1997	
TAV-MW6	MW	5431.17	5431.5	507.0	527.0	4924.5	4904.5	532.0	4.8	PVC	Regional Aquifer – SFG sediments	24-Apr-2001	
TAV-MW7	MW	5430.40	5430.9	597.0	617.0	4833.9	4813.9	622.0	4.8	PVC	Regional Aquifer – SFG sediments	06-Apr-2001	
TAV-MW8	MW	5417.00	5417.4	491.0	511.0	4926.4	4906.4	516.0	4.8	PVC	Regional Aquifer – SFG sediments	11-Apr-2001	
TAV-MW9	MW	5416.27	5416.9	582.0	602.0	4834.9	4814.9	607.0	4.8	PVC	Regional Aquifer – SFG sediments	17-Mar-2001	
TAV-MW10	MW	5437.03	5434.7	508.0	528.0	4926.7	4906.7	533.0	4.8	PVC	Regional Aquifer – SFG sediments	06-Feb-2008	

Table 1 (continued)
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Technical Area V (Continued)													
TAV-MW11	MW	5440.12	5440.4	512.0	532.0	4928.4	4908.4	537.0	4.8	PVC	Regional Aquifer – SFG sediments	19-Nov-2010	
TAV-MW12	MW	5435.72	5432.9	507.0	527.0	4925.9	4905.9	532.0	4.8	PVC	Regional Aquifer – SFG sediments	16-Nov-2010	
TAV-MW13	MW	5409.02	5406.0	525.0	545.0	4881.0	4861.0	550.0	4.8	PVC	Regional Aquifer – SFG sediments	12-Nov-2010	
TAV-MW14	MW	5441.52	5438.6	512.0	532.0	4926.6	4906.6	538.0	4.8	PVC	Regional Aquifer – SFG sediments	09-Nov-2010	
TAV-MW15	MW	5437.32	5435.1	516.0	541.0	4919.1	4894.1	546.0	4.8	PVC	Regional Aquifer – SFG sediments	18-Jan-2017	
TAV-MW16	MW	5448.34	5446.1	527.0	552.0	4919.1	4894.1	557.0	4.8	PVC	Regional Aquifer – SFG sediments	12-Jan-2017	
TAV-MW17	MW	5443.92	5441.3	523.0	543.0	4918.3	4898.3	548.0	4.8	PVC	Regional Aquifer – SFG sediments	5-Apr-2023	
Albuquerque Bernalillo County Water Utility Authority, City of Albuquerque, and New Mexico Office of the State Engineer													
4HILLS-1	MW	5554.17	5552.7	24.0	64.0	5528.7	5488.7	69.0	4.0	PVC	Alluvial sands and gravels	1-Dec-1989	
Eubank-1	MW	5460.02	5458.1	550.0	610.0	4908.1	4848.1	615.0	4.0	SS	Regional Aquifer – SFG sediments	16-Jul-1988	
Eubank-2	MW	5474.39	5472.4	552.0	592.0	4920.4	4880.4	597.0	4.0	PVC	Regional Aquifer – SFG sediments	15-Nov-1996	
Eubank-3	MW	5498.73	5496.7	590.0	650.0	4906.7	4846.7	655.0	4.0	PVC	Regional Aquifer – SFG sediments	15-Nov-1996	
Eubank-5	MW	5507.40	5505.4	605.0	665.0	4900.4	4840.4	670.0	4.0	PVC	Regional Aquifer – SFG sediments	15-Nov-1996	
Mesa del Sol-S	MW	5302.67	5302.7	420.0	520.0	4882.7	4782.7	525.0	2.2	PVC	Regional Aquifer – SFG sediments	14-May-1997	
Montessa Park-S	MW	5102.67	5102.7	260.0	320.0	4842.7	4782.7	330.0	2.2	PVC	Regional Aquifer – SFG sediments	10-Sep-1997	
YALE-MW1	MW	5308.45	5309.0?	400.0	464.0	4909.0?	4845.0?	464.0	4.0	PVC	Regional Aquifer – SFG sediments	1997?	
YALE-MW9	MW	5271.06	5272.0?	382.0	422.0	4890.0?	4850.0?	427.0	4.0	PVC	Regional Aquifer – SFG sediments	19-May-1997	
Kirtland Air Force Base/U.S. Air Force[j]													
KAFB-0118	MW	5320.75	5321.2	458.0	488.0	4863.2	4833.2	499.6	5.0	PVC	Regional Aquifer – SFG sediments	unk	
KAFB-0119	MW	5315.82	5315.6	452.3	482.3	4863.3	4833.3	482.0	4.0	PVC	Regional Aquifer – SFG sediments	unk	
KAFB-0120	MW	5292.29	5288.7	429.0	459.0	4859.7	4829.7	461.5	4.0	PVC	Regional Aquifer – SFG sediments	12-Jun-2006	
KAFB-0121	MW	5307.60	5305.0	445.8	475.8	4859.2	4829.2	480.8	4.0	PVC	Regional Aquifer – SFG sediments	24-Nov-2006	
KAFB-0213	MW	5283.29	5280.3	378.0	428.0	4902.3	4852.3	438.0	5.0	PVC	Regional Aquifer – SFG sediments	10-Jan-1984	
KAFB-0219	MW	5263.69	5262.7	396.0	426.0	4866.7	4836.7	428.5	4.0	PVC	Regional Aquifer – SFG sediments	08-Jun-2006	
KAFB-0220	MW	5265.10	5262.5	424.0	454.0	4838.5	4808.5	456.0	4.0	PVC/SS	Regional Aquifer – SFG sediments	15-Jul-2006	
KAFB-0221	MW	5274.36	5271.5	410.5	440.5	4861.0	4831.0	455.0	4.0	PVC	Regional Aquifer – SFG sediments	10-Jul-2006	
KAFB-0222	MW	5247.65	5245.2	366.0	396.0	4879.2	4849.2	401.0	4.0	PVC	Regional Aquifer – SFG sediments	unk	
KAFB-0223	MW	5254.49	5252.1	376.0	406.0	4876.1	4846.1	411.0	4.0	PVC	Regional Aquifer – SFG sediments	unk	
KAFB-0307	MW	5364.53	5362.7	405.0	450.0	4957.7	4912.7	460.0	3.8	PVC	Regional Aquifer – SFG sediments	04-Aug-1991	
KAFB-0308	MW	5381.65	5380.7	463.0	488.0	4917.7	4892.7	498.0	3.8	PVC	Regional Aquifer – SFG sediments	31-Jul-1991	
KAFB-0309	MW	5411.80	5410.7	500.0	525.0	4910.7	4885.7	535.0	4.0	PVC/SS	Regional Aquifer – SFG sediments	6-Jul-1992	
KAFB-0310	MW	5416.48	5413.2	400.0	445.0	5013.2	4968.2	455.0	3.8	PVC	PGWS – SFG sediments	27-Aug-1991	
KAFB-0311	MW	5353.29	5351.7	433.0	458.0	4918.7	4893.7	468.0	3.8	PVC	Regional Aquifer – SFG sediments	24-Jul-1992	

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Kirtland Air Force Base/U.S. Air Force (Continued)													
KAFB-0312	MW	5432.17	5430.2	503.0	528.0	4927.2	4902.2	533.0	4.5	PVC	Regional Aquifer – SFG sediments	26-Aug-1998	
KAFB-0313	MW	5418.98	5416.9	348.0	368.0	5068.9	5048.9	373.0	4.5	PVC	PGWS – SFG sediments	13-Aug-1998	
KAFB-0314	MW	5455.75	5453.9	428.0	448.0	5025.9	5005.9	453.0	4.5	PVC	Regional Aquifer – SFG sediments	30-Sep-1998	
KAFB-0315	MW	5466.11	5464.1	447.0	472.0	5017.1	4992.1	477.0	4.5	PVC	Regional Aquifer – SFG sediments	08-Sep-2000	
KAFB-0417	MW	5313.07	5310.0	430.0	455.0	4880.0	4855.0	465.0	3.8	PVC	Regional Aquifer – SFG sediments	06-Jun-1992	
KAFB-0504	MW	5357.87	5356.9	470.0	490.0	4886.9	4866.9	500.0	4.0	PVC/SS	Regional Aquifer – SFG sediments	20-Jan-1990	
KAFB-0505	MW	5362.81	5360.8	495.4	520.5	4865.4	4840.3	521.3	4.5	PVC	Regional Aquifer – SFG sediments	22-Jul-1999	
KAFB-0506	MW	5363.47	5361.0	200.0	220.0	5161.0	5141.0	220.0	4.5	PVC	PGWS – SFG sediments	31-Aug-1998	
KAFB-0507R	MW	5358.21	5355.7	492.0	512.0	4863.7	4843.7	520.0	4.0	PVC	Regional Aquifer – SFG sediments	3-Apr-2013	
KAFB-0508	MW	5351.88	5349.7	481.0	506.0	4868.7	4843.7	507.0	3.5	PVC	Regional Aquifer – SFG sediments	02-May-2001	
KAFB-0509	MW	5441.56	5349.9	195.0	220.0	5149.9	5129.9	221.0	3.5	PVC	above PGWS – SFG sediments	10-May-2001	
KAFB-0510	MW	5367.10	5364.7	511.0	536.0	4853.7	4828.7	537.0	3.5	PVC	Regional Aquifer – SFG sediments	17-May-2001	
KAFB-0512R	MW	5302.73	5300.2	430.0	450.0	4870.2	4850.2	455.0	4.0	PVC	Regional Aquifer – SFG sediments	4-Apr-2013	
KAFB-0514	MW	5206.41	5204.7	340.0	365.0	4864.7	4839.7	366.0	3.5	PVC	Regional Aquifer – SFG sediments	17-May-2001	
KAFB-0516	MW	5205.64	5203.4	322.0	357.0	4881.4	4846.4	358.0	4.0	PVC	Regional Aquifer – SFG sediments	29-Jan-2002	
KAFB-0517	MW	5197.10	5194.6	325.0	350.0	4869.6	4844.6	352.0	4.0	PVC	Regional Aquifer – SFG sediments	08-Nov-2002	
KAFB-0518	MW	5177.76	5175.5	305.0	335.0	4870.5	4840.5	337.0	4.0	PVC	Regional Aquifer – SFG sediments	22-Dec-2002	
KAFB-0519	MW	5365.37	5362.7	700.0	725.0	4662.7	4637.7	727.0	5.0	PVC	Regional Aquifer – SFG sediments	12-May-2003	
KAFB-0520	MW	5247.90	5246.2	379.5	404.5	4866.7	4841.7	410.0	4.0	PVC	Regional Aquifer – SFG sediments	15-Jun-2004	
KAFB-0521[k]	MWF	5352.45	5349.7	550.0[k]	655.0[k]	4799.7	4694.7	562.0	5.0	FLUTe™	Regional Aquifer – SFG sediments	7-May-2004	
KAFB-0522	MW	5267.48	5265.7	405.0	430.0	4860.7	4835.7	432.5	4.0	PVC	Regional Aquifer – SFG sediments	23-Jun-2004	
KAFB-0523	MW	5352.62	5350.5	600.0	625.0	4750.5	4725.5	627.0	4.0	PVC	Regional Aquifer – SFG sediments	unk	
KAFB-0524	MW	5345.61	5343.4	484.0	509.0	4859.4	4834.4	511.0	4.0	PVC	Regional Aquifer – SFG sediments	31-Oct-2006	
KAFB-0525	MW	5229.75	5227.9	371.0	396.0	4856.9	4831.9	398.0	4.0	PVC	Regional Aquifer – SFG sediments	19-Nov-2006	
KAFB-0611	MW	5386.09	5383.5	498.0	508.0	4885.5	4875.5	513.0	4.0	PVC	Regional Aquifer – SFG sediments	13-Nov-2002	
KAFB-0612	MW	5385.45	5383.5	290.0	315.0	5093.5	5068.5	317.0	4.0	PVC	PGWS – SFG sediments	21-Nov-2002	
KAFB-0613	MW	5390.78	5391.3	420.0	450.0	4971.3	4941.3	452.0	4.0	PVC	Regional Aquifer – SFG sediments	08-Dec-2002	
KAFB-0614	MW	5390.89	5391.4	360.0	370.0	5031.4	5021.4	372.0	4.0	PVC	PGWS – SFG sediments	12-Dec-2002	
KAFB-0615	MW	5638.43	5636.3	300.0	325.0	5336.3	5311.3	327.0	4.0	PVC	Bedrock (granite)	27-Nov-2002	
KAFB-0616	MW	5481.07	5478.7	472.0	497.0	5006.7	4981.7	499.0	4.0	PVC	Regional Aquifer – SFG sediments	24-Nov-2002	
KAFB-0617	MW	5505.78	5503.3	565.0	590.0	4938.3	4913.3	592.0	4.0	PVC	Regional Aquifer – SFG sediments	18-May-2004	
KAFB-0618	MW	5410.05	5408.2	535.0	560.0	4873.2	4848.2	562.0	4.0	PVC	Regional Aquifer – SFG sediments	15-Jun-2004	
KAFB-0619	MW	5410.78	5409.0	389.0	404.0	5020.0	5005.0	406.0	4.0	PVC	PGWS – SFG sediments	04-Jun-2004	
KAFB-0620	MW	5334.64	5332.0	447.0	472.0	4885.0	4860.0	474.5	4.0	PVC	Regional Aquifer – SFG sediments	18-Jun-2004	
KAFB-0621	MW	5569.89	5568.0	624.0	649.0	4944.0	4919.0	650.0	4.0	PVC	Regional Aquifer – SFG sediments	17-Jun-2004	
KAFB-0622	MW	5488.64	5486.2	529.0	554.0	4957.2	4932.2	555.0	4.0	PVC	Regional Aquifer – SFG sediments	25-Jun-2004	

Table 1 (continued)
Inventory of Active and Decommissioned Base-Wide Groundwater Monitoring, Production, and Extraction Wells Located at Sandia National Laboratories, New Mexico[a], Kirtland Air Force Base, and Surrounding Areas

Well ID	Type	Measuring Point[b, c] (ft amsl, NAVD 88)	Ground Surface[c] (ft amsl, NAVD 88)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Top of Screen (ft amsl)	Bottom of Screen (ft amsl)	Casing Total Depth (ft bgs)	Casing, Inner Diameter (inches)	Casing Material	Lithology of Screened Interval	Installation Date	P&A Date, If Applicable
Kirtland Air Force Base/U.S. Air Force (Continued)													
KAFB-0623	MW	5328.94	5327.0	265.0	290.0	5062.0	5037.0	292.5	4.0	PVC	PGWS – SFG sediments	29-Jun-2004	
KAFB-0624	MW	5673.78	5671.1	765.0	790.0	4906.1	4881.1	792.5	3.8	PVC	Regional Aquifer – SFG sediments	31-Oct-2008	
KAFB-0625	MW	5390.23?	5387.5?	470.0	495.0	4917.5?	4892.5?	497.5	4.0	unk	Regional Aquifer – SFG sediments	unk	
KAFB-0626[k]	MWF	5331.21	5328.8	425.0[k]	629.0[k]	4903.8	4699.8	638.4	5.0	FLUTe™	Regional Aquifer – SFG sediments	20-Aug-2010	
KAFB-0901	MW	5390.07	5389.8	465.0	527.0	4924.8	4862.8	537.0	4.0	PVC	Regional Aquifer – SFG sediments	15-Mar-1990	
KAFB-0902	MW	5229.97	5228.0	337.0	357.0	4891.0	4871.0	367.0	4.0	PVC	Regional Aquifer – SFG sediments	20-Feb-1990	28-Feb-2000
KAFB-0903	MW	5391.63	5389.4	225.0	250.0	5164.4	5139.4	251.0	4.0	PVC	above PGWS – SFG sediments	3-Apr-2002	
KAFB-0904	MW	5291.75	5289.3?	343.0	368.0	4946.3?	4921.3?	368.0	4.0	PVC	Regional Aquifer – SFG sediments	2002	
KAFB-1001	MW	5260.43	5255.7	342.0	367.0	4913.7	4888.7	377.0	4.0	PVC/SS	Regional Aquifer – SFG sediments	19-Apr-1992	
KAFB-1002	MW	5254.75	5252.7	342.0	367.0	4910.7	4885.7	377.0	4.0	PVC/SS	Regional Aquifer – SFG sediments	30-Mar-1992	
KAFB-1003	MW	5258.29	5257.7	345.0	370.0	4912.7	4887.7	380.0	4.0	PVC/SS	Regional Aquifer – SFG sediments	21-May-1992	
KAFB-1004	MW	5258.81	5267.7	348.0	373.0	4919.7	4894.7	383.0	4.0	PVC/SS	Regional Aquifer – SFG sediments	24-Aug-1992	
KAFB-1005	MW	5274.68	5287.7	363.0	388.0	4924.7	4899.7	398.0	4.0	PVC/SS	Regional Aquifer – SFG sediments	26-May-1992	
KAFB-1006	MW	5257.01	5257.0	363.0	383.0	4894.0	4874.0	383.0	4.0	SS	Regional Aquifer – SFG sediments	10-Aug-1996	
KAFB-1007R	MW	5260.62	5258.4	376.5	396.5	4881.9	4861.9	401.5	4.0	PVC	Regional Aquifer – SFG sediments	18-May-2013	
KAFB-1008	MW	5260.77	5258.8	367.6	397.6	4891.2	4861.2	400.0	4.0	PVC	Regional Aquifer – SFG sediments	unk	
KAFB-1009	MW	5272.16	5271.8	392.7	422.7	4879.1	4849.1	427.7	4.0	PVC	Regional Aquifer – SFG sediments	unk	
KAFB-1021	MW	5348.02	5348.0	479.0	504.0	4869.0	4844.0	505.0	4.0	PVC	Regional Aquifer – SFG sediments	17-Mar-2002	
KAFB-1901	MW	5751.58	5748.7	80.5	105.5	5668.2	5643.2	115.5	4.0	PVC/SS	Regional Aquifer – SFG sediments	30-Jun-1992	
KAFB-1902	MW	5754.27	5752.7	80.7	105.7	5672.0	5647.0	115.7	4.0	PVC/SS	Regional Aquifer – SFG sediments	9-Jul-1992	
KAFB-1904	MW	5752.29	5750.0?	84.3	104.3	5665.7?	5645.7?	104.3	4.0	SS	Regional Aquifer – SFG sediments	1992?	
KAFB-2004	MW	5592.08	5592.5?	278.0	308.0	5314.5?	5284.5?	309.0	4.0	PVC	Bedrock (granite)	17-Feb-2002	2008
KAFB-2005	MW	5624.27	5624.6	126.0	156.0	5498.6	5468.6	158.5	4.0	PVC	Bedrock (granite)	10-May-2006	
KAFB-2006	MW	5590.88	5591.0?	303.0	333.0	5288.0?	5258.0?	335.0	4.0	PVC	Bedrock (granite)	10-May-2006	
KAFB-2007	MW	5564.48	5562.1	273.0	303.0	5289.1	5259.1	305.5	4.0	PVC	Bedrock (granite)	13-May-2006	
KAFB-2008	MW	5541.74	5539.5	650.0	680.0	4889.5	4859.5	688.0	5.0	PVC	Regional Aquifer – SFG sediments	15-Oct-2010	
KAFB-2009	MW	5655.63	5653.4	74.0	104.0	5579.4	5549.4	110.0	4.0	PVC	Bedrock (granite)	15-Oct-2010	
KAFB-2622	MW	5358.14	5356.5	195.0	215.0	5161.5	5141.5	217.0	4.0	PVC	PGWS – SFG sediments	02-Dec-2004	
KAFB-2623	MW	5367.48	5365.3	199.8	219.8	5165.5	5145.5	221.8	4.0	PVC	PGWS – SFG sediments	30-Dec-2004	
KAFB-2624	MW	5362.27	5359.6	195.0	215.0	5164.6	5144.6	217.0	4.0	PVC	PGWS – SFG sediments	2013?	
KAFB-2625	MW	5359.26	5357.4	185.0	205.0	5172.4	5152.4	207.0	4.0	PVC	PGWS – SFG sediments	2010?	
KAFB-2626	MW	5357.51	5355.6	185.0	205.0	5170.6	5150.6	208.0	4.0	PVC	PGWS – SFG sediments	22-Feb-2009	
KAFB-2627	MW	5367.47	5365.5	195.0	215.0	5170.5	5150.5	217.5	4.0	PVC	PGWS – SFG sediments	2-Mar-2009	
KAFB-2628	MW	5369.64	5367.4	506.0	530.0	4861.4	4837.4	535.0	5.0	PVC	Regional Aquifer – SFG sediments	2-Aug-2011	
KAFB-2629	MW	5361.53	5359.2	496.0	519.5	4863.2	4839.7	523.5	5.0	PVC	Regional Aquifer – SFG sediments	9-Aug-2011	
KAFB-2630	MW	5361.71	5359.2	205.9	225.7	5153.3	5133.5	227.9	4.0	PVC	above PGWS – SFG sediments	20-Aug-2011	
KAFB-2631	MW	5335.70	5335.5	154.3	174.1	5181.2	5161.4	176.3	4.0	PVC	above PGWS – SFG sediments	16-Aug-2011	

Table 1 (continued)
Inventory of Active and Decommissioned Base-Wide Groundwater Monitoring, Production, and Extraction Wells Located at Sandia National Laboratories, New Mexico[a], Kirtland Air Force Base, and Surrounding Areas

Well ID	Type	Measuring Point[b, c] (ft amsl, NAVD 88)	Ground Surface[c] (ft amsl, NAVD 88)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Top of Screen (ft amsl)	Bottom of Screen (ft amsl)	Casing Total Depth (ft bgs)	Casing, Inner Diameter (inches)	Casing Material	Lithology of Screened Interval	Installation Date	P&A Date, If Applicable
Kirtland Air Force Base/U.S. Air Force (Continued)													
KAFB-2632	MW	5329.08	5328.8	157.4	177.2	5171.4	5151.6	179.4	4.0	PVC	above PGWS – SFG sediments	11-Aug-2011	
KAFB-2901	MW	5839.08	5836.7	121.0	141.0	5715.7	5695.7	146.0	4.0	PVC	Regional Aquifer – SFG sediments	31-May-2015	
KAFB-2902	MW	5832.10	5829.7	160.0	180.0	5669.7	5649.7	185.0	4.0	PVC	Regional Aquifer – SFG sediments	9-May-2015	
KAFB-2903	MW	5819.46	5817.0	165.0	185.0	5652.0	5632.0	190.0	4.0	PVC	Bedrock (Abo Formation) siltstone and shale	11-Jun-2015	
KAFB-2904	MW	5842.72	5840.4	58.0	78.0	5782.4	5762.4	83.0	4.0	PVC	Bedrock (Madera Formation) limestone	14-Jun-2015	
KAFB-3391	MW	5396.60	5394.1	262.3	282.3	5131.8	5111.8	284.3	4.0	PVC	PGWS – SFG sediments	1-Aug-1998	
KAFB-3392	MW	5394.51	5393.4	536.0	561.0	4857.4	4832.4	562.0	4.0	PVC	Regional Aquifer – SFG sediments	08-Oct-1999	
KAFB-3411	MW	5342.81	5340.5	477.0	502.0	4863.5	4838.5	503.0	4.0	PVC	Regional Aquifer – SFG sediments	11-Nov-1999	
KAFB-6241	MW	5466.50	5463.2	528.0	553.0	4935.2	4910.2	555.0	4.0	PVC	Regional Aquifer – SFG sediments	16-Jan-2007	
KAFB-6243	MW	5423.48	5421.0	488.0	513.0	4933.0	4908.0	516.0	4.0	unk	Regional Aquifer – SFG sediments	2009?	
KAFB-6301	MW	5459.64	5457.3	535.0	560.0	4922.3	4897.3	561.0	4.0	PVC	Regional Aquifer – SFG sediments	7-Sep-1999	
KAFB-7001	MW	5322.87	5323.0?	454.0	479.0	4869.0?	4844.0?	480.0	4.0	PVC	Regional Aquifer – SFG sediments	before 2011	
KAFB-8281	MW	5401.03	5401.7	544.0	569.0	4857.7	4832.7	570.0	4.0	PVC	Regional Aquifer – SFG sediments	27-Oct-1999	
KAFB-8282	MW	5402.92	5403.4	262.0	287.0	5141.4	5116.4	288.0	4.0	PVC	PGWS – SFG sediments	1999?	
KAFB-8351	MW	5325.51	5323.3	474.0	499.0	4849.3	4824.3	505.0	4.0	PVC	Regional Aquifer – SFG sediments	23-Nov-1999	
KAFB-ST105-EX01	MW	5353.54	5348.5	505.0	575.0	4843.5	4773.5	575.0	10.0	PVC/SS	Regional Aquifer – SFG sediments	2008?	
Site 58 MW-1	MW	5721.74	5718.4?	46.8	71.8	5671.6?	5646.6?	71.8	2.0	PVC	Colluvium and Bedrock (granite)	2001?	
Site 58 MW-2	MW	5715.94	5715.9	76.7	96.7	5639.2	5619.2	96.7	2.0	PVC	Bedrock (granite)	2001?	
Site 58 MW-3	MW	5717.88	5717.9	52.0	72.0	5665.9	5645.9	72.0	2.0	PVC	Colluvium?	2001?	
Site 58 MW-4	MW	5722.31	5719.8?	55.5	75.5	5664.3?	5644.3?	75.5	2.0	PVC	Bedrock (granite)	2001?	
Site 58 MW-5	MW	5716.83	5716.8	25.0	65.0	5691.8	5651.8	80.0	4.0	PVC	Colluvium?	2001?	
Site 58 MW-6	MW	5720.30	5717.8?	57.0	82.0	5660.8?	5635.8?	87.0	2.0	PVC	Colluvium and Bedrock (granite)?	2001?	
Site 58 MW-7	MW	5717.76	5715.3?	50.0	75.0	5665.3?	5640.3?	80.0	2.0	PVC	Colluvium and Bedrock (granite)?	2001?	
ST105-MW001	MW	5279.34	5276.6	408.0	428.0	4868.6	4848.6	433.4	4.0	PVC	Regional Aquifer – SFG sediments	11-Mar-2103	
ST105-MW002	MW	5180.32	5177.8	308.4	328.4	4869.4	4849.4	333.4	4.0	PVC	Regional Aquifer – SFG sediments	25-Feb-2013	
ST105-MW003	MW	5174.61	5171.9	301.0	321.0	4870.9	4850.9	326.0	4.0	PVC	Regional Aquifer – SFG sediments	28-Feb-2013	
ST105-MW004	MW	5234.61	5232.2	365.0	385.0	4867.2	4847.2	390.4	4.0	PVC	Regional Aquifer – SFG sediments	11-Feb-2013	
ST105-MW005	MW	5287.57	5284.9	273.0	293.0	5011.9	4991.9	298.0	4.0	PVC	Regional Aquifer – SFG sediments	24-May-2103	
ST105-MW006	MW	5313.26	5310.7	228.0	248.0	5082.7	5062.7	253.0	4.0	PVC	PGWS – SFG sediments	25-Feb-2013	
ST105-MW007	MW	5311.18	5308.5	290.0	310.0	5018.5	4998.5	315.0	4.0	PVC	Regional Aquifer – SFG sediments	24-Feb-2013	
ST105-MW008	MW	5358.94	5356.5	456.0	476.0	4900.5	4880.5	481.0	4.0	PVC	Regional Aquifer – SFG sediments	23-Mar-2013	
ST105-MW009	MW	5519.71	5517.5	480.0	500.0	5037.5	5017.5	505.0	4.0	PVC	Regional Aquifer – SFG sediments	16-Nov-2013	
ST105-MW010	MW	5334.70	5332.1	436.5	456.5	4895.6	4875.6	461.5	4.0	PVC	Regional Aquifer – SFG sediments	1-Jun-2013	
ST105-MW011	MW	5422.66	5420.0	456.8	476.8	4963.2	4943.2	482.3	4.0	PVC	Regional Aquifer – SFG sediments	10-Apr-2013	
ST105-MW012	MW	5419.90	5417.1	375.0	395.0	5042.1	5022.1	401.0	4.0	PVC	PGWS – SFG sediments	17-Apr-2013	
ST105-MW013	MW	5447.27	5444.5	433.6	453.6	5010.9	4990.9	458.6	4.0	PVC	Regional Aquifer – SFG sediments	17-Apr-2013	
ST105-MW015	MW	5623.95	5621.2	687.0	707.0	4934.2	4914.2	712.0	4.0	PVC	Regional Aquifer – SFG sediments	8-May-2013	

Table 1 (continued)
Inventory of Active and Decommissioned Base-Wide Groundwater Monitoring, Production, and Extraction Wells Located at Sandia National Laboratories, New Mexico[a], Kirtland Air Force Base, and Surrounding Areas

Well ID	Type	Measuring Point[b, c] (ft amsl, NAVD 88)	Ground Surface[c] (ft amsl, NAVD 88)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Top of Screen (ft amsl)	Bottom of Screen (ft amsl)	Casing Total Depth (ft bgs)	Casing, Inner Diameter (inches)	Casing Material	Lithology of Screened Interval	Installation Date	P&A Date, If Applicable
Kirtland Air Force Base/U.S. Air Force (Continued)													
ST105-MW017	MW	5621.97	5619.6	702.0	722.0	4917.6	4897.6	727.0	4.0	PVC	Regional Aquifer – SFG sediments	15-Jun-2013	
ST105-MW018	MW	5221.68	5218.8	349.2	369.2	4869.6	4849.6	374.6	4.0	PVC	Regional Aquifer – SFG sediments	10-Mar-2013	
ST105-MW019	MW	5217.94	5215.2	345.0	365.0	4870.2	4850.2	370.4	4.0	PVC	Regional Aquifer – SFG sediments	5-Mar-2013	
ST105-MW020	MW	5383.72	5381.0	281.0	301.0	5100.0	5080.0	306.0	4.0	PVC	PGWS – SFG sediments	25-Apr-2013	
ST105-MW021	MW	5390.90	5388.4	290.0	310.0	5098.4	5078.4	315.0	4.0	PVC	PGWS – SFG sediments	6-Apr-2013	
ST105-MW022	MW	5386.66	5383.9	472.0	492.0	4911.9	4891.9	502.3	4.0	PVC	Regional Aquifer – SFG sediments	10-Apr-2013	
ST105-MW023	MW	5275.86	5273.3	406.0	426.0	4867.3	4847.3	431.0	4.0	PVC	Regional Aquifer – SFG sediments	4-Nov-2013	
ST105-MW024	MW	5595.67	5593.3	442.0	462.0	5151.3	5131.3	467.0	4.0	PVC	Bedrock (granite)	21-Nov-2013	
Production, Injection, and Extraction Wells													
ASL-PD	P	6030.00	6030.0	337.0	401.6	5693.0	5628.4	401.6	4.0	PVC	Bedrock (granite)	11-Jan-1990	
Burn Site Well	Px	6374.66	6372.9	231.0	341.0	6141.9	6031.9	341.0	4.0	PVC	Bedrock (schist and granite)	20-Feb-1986	Inactive 2003
Burton 1	P	unk	5317.7	676.0	1292.0	4641.7	4025.7	1312.0	18.0	S	Regional Aquifer – SFG sediments	1-Nov-1985	
Burton 2	P	unk	5286.7	425.0	845.0	4861.7	4441.7	845.0	16.0	S	Regional Aquifer – SFG sediments	1-Jan-1962	
Burton 3	P	unk	5217.7	358.0	994.0	4859.7	4223.7	996.0	16.0	S	Regional Aquifer – SFG sediments	1-Jan-1962	
Burton 4	P	unk	5276.2	636.0	1286.0	4640.2	3990.2	1286.0	20.0	S	Regional Aquifer – SFG sediments	28-Jul-1987	
Burton 5	P	unk	5352.7	550.0	1150.0	4802.7	4202.7	1170.0	unk	S	Regional Aquifer – SFG sediments	19-Aug-1991	
Greystone Well	P	5822.87	5820.8	44.0	54.0	5776.8	5766.8	54.0	4.0	PVC/S	Alluvium	1902?	12-Sep-2002
KAFB-1	P	unk	5386.5	550.0	1199.0	4836.5	4187.5	1199.0	12.0	S	Regional Aquifer – SFG sediments	1-Aug-1949	Dec-2016
KAFB-2	P	5327.06	5327.1	494.0	1000.0	4833.1	4327.1	1000.0	12.0	S	Regional Aquifer – SFG sediments	Jan-1951	Dec-2016
KAFB-3	P	unk	5356.9	452.0	900.0	4904.9	4456.9	900.0	14.0	S	Regional Aquifer – SFG sediments	01-Oct-1949	
KAFB-4	P	unk	5360.2	494.0	1000.0	4866.2	4360.2	1000.0	14.0	S	Regional Aquifer – SFG sediments	01-Dec-1949	
KAFB-5	P	unk	5439.0	504.0	1004.0	4935.0	4435.0	1004.0	14.0	S	Regional Aquifer – SFG sediments	1-Jul-1952	1999
KAFB-6	P	unk	5423.5	504.0	1006.0	4919.5	4421.5	1006.0	14.0	S	Regional Aquifer – SFG sediments	1-Jul-1952	1999
KAFB-7	INJ	unk	5350.4	448.0	976.0	4902.4	4374.4	976.0	16.0	S	Regional Aquifer – SFG sediments	1-Feb-1955	
KAFB-8	P	5372.00	5372.0	440.0	975.0	4932.0	4397.0	1000.0	14.0	S	Regional Aquifer – SFG sediments	1-Feb-1955	1999
KAFB-9	P	5501.19	5501.2	unk	unk	unk	4851.2?	650.0	10.0	S	Regional Aquifer – SFG sediments	1-Oct-1949	1970
KAFB-10	P	5418.65	5418.7	495.0	970.0	4923.7	4448.7	970.0	12.8	S	Regional Aquifer – SFG sediments	27-May-1959	Apr-1996
KAFB-11	P	5470.67	5481.0	670.0	1327.0	4811.0	4154.0	1327.0	16.0	S	Regional Aquifer – SFG sediments	10-Apr-1972	Dec-2016
KAFB-12	P	5322.87	5324.2	446.0	1032.0	4878.2	4292.2	1032.0	16.0	S	Regional Aquifer – SFG sediments	1-Oct-1952	1999
KAFB-13	P	5305.67	5307.0	413.0	953.0	4894.0	4354.0	977.0	14.0	S	Regional Aquifer – SFG sediments	1-Mar-1956	1999
KAFB-14	P	5324.67	5324.2	380.0	1000.0	4944.2	4324.2	1000.0	16.0	S	Regional Aquifer – SFG sediments	01-Jan-1969	
KAFB-15	P	unk	5347.0	697.0	993.0	4650.0	4354.0	1600.0	30.0	S	Regional Aquifer – SFG sediments	1996	
KAFB-16	P	unk	5370.0	697.0	993.0	4673.0	4377.0	1600.0	30.0	S	Regional Aquifer – SFG sediments	1996	
KAFB-17 (Heliport #1)	Px	unk	5301.7	530.0	598.0	4771.7	4703.7	598.0	6.0	SS	Regional Aquifer – SFG sediments	1992	Dec-2016
KAFB-18 (SOR)[i]	Px	5965.70	5965.7	160.0	320.0	5805.7	5645.7	320.0	5.0	PVC	Bedrock (metarhyolite)	19-Aug-1987	
KAFB-19 (HERTF)	P	unk	6229.7	449.0	500.0	5780.7	5729.7	500.0	5.0	S/OH?	Bedrock (granite)	13-Jul-1990	2008
KAFB-20	P	unk	5389.0	710.0	1180.0	4679.0	4209.0	1240.0	20.0	S	Regional Aquifer – SFG sediments	Jan-2008	

Table 1 (continued)
Inventory of Active and Decommissioned Base-Wide Groundwater Monitoring, Production, and Extraction Wells Located at Sandia National Laboratories, New Mexico[a], Kirtland Air Force Base, and Surrounding Areas

Well ID	Type	Measuring Point[b, c] (ft amsl, NAVD 88)	Ground Surface[c] (ft amsl, NAVD 88)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Top of Screen (ft amsl)	Bottom of Screen (ft amsl)	Casing Total Depth (ft bgs)	Casing, Inner Diameter (inches)	Casing Material	Lithology of Screened Interval	Installation Date	P&A Date, If Applicable
KAFB-PG-1598 [m]	Ext	5369.90	5368.4	290.0	440.0	5078.4	4928.4	455.0	12.0	SS	PGWS – SFG sediments	14-Oct-1998	
KAFB-0602	Ext	5365.47	5364.2	437.0	457.0	4927.2	4907.2	467.0	4.0	PVC/SS	PGWS – SFG sediments	20-Mar-1990	
KAFB-0608	Ext	5361.17	5359.9	307.0	327.0	5052.9	5032.9	338.0	4.0	PVC/SS	PGWS – SFG sediments	28-Mar-1990	
KAFB-0609	Ext	5365.87	5364.7	316.0	336.0	5048.7	5028.7	345.0	4.0	PVC/SS	PGWS – SFG sediments	31-Mar-1990	22-Jun-2014
KAFB-0610	Ext	5359.47	5357.3	333.0	353.0	5024.3	5004.3	363.0	4.0	PVC/SS	PGWS – SFG sediments	04-Apr-1990	
Production, Injection, and Extraction Wells (Continued)													
KAFB-106228	Ext	5319.62	5322.9	440.0	540.0	4882.9	4782.9	545.0	8.0	SS	Regional Aquifer – SFG sediments	2-June-2015	
KAFB-106233	Ext	5312.20	5315.5	430.0	532.1	4885.5	4783.4	537.1	8.0	SS	Regional Aquifer – SFG sediments	30-Sep-2015	
KAFB-106234	Ext	5323.07	5326.3	439.7	539.7	4886.6	4786.6	544.7	8.0	SS	Regional Aquifer – SFG sediments	9-Oct-2015	
KAFB-106239	Ext	5330.09	5333.4	470.0	570.0	4863.4	4763.4	575.0	8.0	SS	Regional Aquifer – SFG sediments	3-May-2017	
KAFB-106IN2	Inj	5370.84	5367.0	605.0	905.0	4762.0	4462.0	910.0	12.8	S	Regional Aquifer – SFG sediments	19-Oct-2020	
Lake Christian West[n]	Px	5716.61	5715.7	60.0	72.0	5655.7	5643.7	72.0	6.0	S	Sandstone	1982?	2004?
Lomas 1	P	unk	5597.7	700.0	1300.0	4897.7	4297.7	1341.0	16.0	S	Regional Aquifer – SFG sediments	1962	
Lomas 2	P	unk	5582.7	743.0	1539.0	4835.0	4039.0	1590.0	16.0	S	Regional Aquifer – SFG sediments	1973	
Lomas 5	P	unk	5496.7	823.0	1651.0	4876.0	3848.0	1670.0	18.0	S	Regional Aquifer – SFG sediments	3-Nov-1978	
Lomas 6	P	unk	5532.0	876.0	1688.0	4657.0	3845.0	1704.0	18.0	S	Regional Aquifer – SFG sediments	1978	
Love 2	P	unk	5444.0	740.0	1536.0	4704.0	3908.0	1548.0	16.0	S	Regional Aquifer – SFG sediments	1958	
Love 5	P	5392.67	5392.7	660.0	1248.0	4732.7	4144.7	1248.0	16.0	S	Regional Aquifer – SFG sediments	19-Jun-1958	
Miles 1	P	unk	5148.7	404.5	1153.5	4744.2	3995.2	1165.5	16.0	S	Regional Aquifer – SFG sediments	6-Jun-1974	
Ridgecrest 1	P	unk	5444.7	636.0	1260.0	4808.7	4184.7	1260.0	16.0	S	Regional Aquifer – SFG sediments	13-Jan-1964	
Ridgecrest 2	P	unk	5418.7	730.0	1500.0	4688.7	3918.7	1543.0	16.0	S	Regional Aquifer – SFG sediments	1-Jan-1977	
Ridgecrest 3	P	unk	5387.7	621.0	1436.0	4766.7	3951.7	1449.0	16.0	S	Regional Aquifer – SFG sediments	01-May-1974	
Ridgecrest 4	P	unk	5346.7	573.0	1413.0	4773.7	3933.7	1450.0	unk	S	Regional Aquifer – SFG sediments	01-Mar-1974	
Ridgecrest 5	P	unk	5356.7	650.0	1,450.0	4706.7	3906.7	1450.0	20.0	S	Regional Aquifer – SFG sediments	8-Dec-1990	
RG-01091	Px	unk	5602.0?	650.0	1180.0	4952.0?	4422.0?	1200.0	18.0	S	Fractured limestone, metamorphics, igneous	1-Sep-1957	
RG-39652	P	unk	7070.0?	163.0	263.0	6907.0?	6807.0?	263.0	3.0	PVC	Bedrock (limestone)	6-Mar-2013	
RG-40129	P	unk	7265.0?	240.0	340.0	7025.0?	6925.0?	340.0	5.0	unk	Bedrock (limestone)	18-Jul-1983	
RG-44737	P	unk	6021.0?	unk	unk	unk	unk	100.0?	5.0?	unk	Bedrock (metamorphics?)	1986?	Aug-1991
RG-58935-3	P	unk	6260.0?	160.0	480.0	6100.0?	5780.0?	480.0	4.0	PVC	Bedrock (metamorphics)	2017?	
RG-61206	P	unk	6320.0?	100.0	500.0	6220.0?	5820.0?	500.0	4.0	PVC	Bedrock (metamorphics)	18-Dec-1994	
RG-61207	P	unk	6370.0?	100.0	480.0	6270.0?	5890.0?	500.0	4.0	PVC	Bedrock (metamorphics)	17-Dec-1994	
RG-76274	P	unk	6280.0?	180.0	540.0	6100.0?	5740.0?	540.0	4.5	PVC	Bedrock (granite and metamorphics?)	3-Sep-2001	
School House Well	P	5796.33	5799.0	83.0	103.0	5716.0	5696.0	103.0	6.0	S/OH	Bedrock (Sandia Formation) sandstone?	1930s?	inactive
TSA-1	P	6063.68	6060.2	190.0	210.0	5870.2	5850.2	300.0	6.0	S	Bedrock (metamorphics)	10-Nov-1987	Aug-2001
VA-1	P	unk	5344.0	unk	unk	unk	unk	unk	unk	unk	Regional Aquifer – SFG sediments	1940?	1997?
VA-2	P	unk	5346.2?	590.0	990.0	4756.2?	4356.2?	1010.0	13.4	SS	Regional Aquifer – SFG sediments	18-Apr-1997	
Yale 1	P	unk	5161.7	336.0	960.0	4825.7	4201.7	960.0	16.0	S	Regional Aquifer – SFG sediments	30-Nov-1963	
Yale 2	P	unk	5138.7	357.0	1185.0	4781.7	3953.7	1185.0	16.0	S	Regional Aquifer – SFG sediments	1-Jan-1972	

Table 1 (concluded)
Inventory of Active and Decommissioned Base-Wide Groundwater Monitoring, Production, and Extraction Wells Located at Sandia National Laboratories, New Mexico[a], Kirtland Air Force Base, and Surrounding Areas

Well ID	Type	Measuring Point[b, c] (ft amsl, NAVD 88)	Ground Surface[c] (ft amsl, NAVD 88)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Top of Screen (ft amsl)	Bottom of Screen (ft amsl)	Casing Total Depth (ft bgs)	Casing, Inner Diameter (inches)	Casing Material	Lithology of Screened Interval	Installation Date	P&A Date, If Applicable
Production, Injection, and Extraction Wells (Continued)													
Yates Well	P	6104.67	6102.7	unk	unk	unk	unk	unk	unk	S	Bedrock (granite)	1929	1942?

Notes:

[a] The status of all SNL/NM-installed groundwater wells is maintained in this table. However, not all of the decommissioned (P&A) groundwater wells for KAFB are listed.

[b] Measuring point is the elevation for the top of well casing, typically the top of PVC casing, that is used for measuring and calculating groundwater elevations.

[c] Elevations are relative to the NAVD 88, New Mexico State Plane Coordinate System, Central Zone. Elevation data from other government agencies that were based on the National Geodetic Vertical Datum of 1929 were converted (re-projected) by +2.671 ft.

[d] MWL-MW4 well casing was installed at 6 degrees from vertical. Casing depths were measured during well installation and are not corrected for true vertical (perpendicular to the ground surface) distance of the slant hole. The well has two screens: 488.4 to 508.4 ft bgs and 528.4 to 548.4 ft bgs. A packer is set between the screens.

[e] The casings for SFR-1D and SFR-1S were installed in a single borehole.

[f] PGS-2 has three screens: 535 to 565 ft bgs, 585 to 595 ft bgs, and 625 to 645 ft bgs. Groundwater samples were collected from the upper screen.

[g] TA2-NW1-595 has two screens: 535 to 555 ft bgs, and 585 to 595 ft bgs. Groundwater samples were collected from the upper screen.

[h] TJA-4 is screened in the Merging Zone. The Merging Zone refers to layers of saturation near Tijeras Arroyo, typically between the PGWS and the Regional Aquifer.

[i] TAV-INJ1 is a nested well with two PVC casings installed in a single borehole. The 5-inch diameter monitoring screen extends from 509 to 539 ft bgs. The 1.5-inch diameter injection screen extends from 519 to 539 ft bgs. The primary sandpack (2-millimeter SilLibeads®) extends from 504 to 544.5 ft bgs. Injections were conducted from November 2018 through April 2019. TAV-INJ1 was formally reclassified as a monitoring well by the New Mexico Environment Department on 12 October 2021.

[j] Many of the Bulk Fuels Facility (BFF) monitoring wells, such as KAFB-1062, are not shown in order to reduce clutter on the AGMR figures and Plate 1. The BFF plume does not impact groundwater quality at SNL/NM.

[k] KAFB-0521 and KAFB-0626 were constructed with a FLUTe™ monitoring system with multiple sampling ports. Groundwater elevations cannot be measured. Sample tubing (0.25-inch diameter) for the ports was installed in 5-inch diameter PVC casings. KAFB-0521 has ports set at 550 to 555, 600 to 605, and 650 to 655 ft bgs. KAFB-0626 has ports set at 425, 471, 515, and 629 ft bgs.

[l] Production well KAFB-18 (non-potable) is also known as the Optical Range Well or the Starfire Optical Range Well.

[m] The production-non-potable well (water supply well) KAFB-PG-1598 is also known as the Golf Course Main Pond Well. Some KAFB documents also use the identifier RG-1598-S-4 or RG-1589-S-4. Pumped water is used for irrigating the KAFB Tijeras Arroyo Golf Course.

[n] Lake Christian West is also known as well KAFB-1903. The well was used for non-potable purposes, including the filling of a USAF high-explosives testing pond located approximately 1,600 ft to the east of the well.

AGMR = annual groundwater monitoring report
amsl = above mean sea level
ASL-PD = Albuquerque Seismological Laboratory Production
AVN = Area-V (North)
bgs = below ground surface
BW = Background Well
CCBA = Coyote Canyon Blast Area
CTF = Coyote Test Field
CWL = Chemical Waste Landfill
CYN = Canyons (Lurance Canyon area)
D = deep
Dual PVC = Two PVC casings in one borehole.
EX = Well proposed for extraction purposes but used for monitoring purposes only. This applies to the well number for KAFB-ST105-EX01.
Ext = Extraction well used for remediating groundwater at the KAFB Bulk Fuels Facility and the KAFB Tijeras Arroyo Golf Course.
ft = feet or foot
FLUTe™ = Flexible Liner Underground Technologies, LLC
HERTF = High Energy Research Test Facility
ID = identifier
INJ = Injection
KAFB = Kirtland Air Force Base
L = lower screen (term used at the CWL)
LMF = Large Melt Facility
LWDS = Liquid Waste Disposal System
MRN = Magazine Road North
MW = Monitoring Well
MWF = Monitoring Well FLUTe™
MWL = Mixed Waste Landfill
NAVD 88 = North American Vertical Datum of 1988
NWTA3 = Northwest Technical Area-III
OBS = Old Burn Site (in Coyote Test Area)
P = Production well (water supply well) used for potable purposes.
P&A = plugged and abandoned (decommissioned)
Px = Production well (water supply well) used for non-potable purposes, such as irrigating the golf course.
PGS = Parade Ground South
PGWS = Perched Groundwater System
PL = Power Line Road (northwest of Technical Area-III). The better-known Power Line Road (also known as Pole Line Road) is near the Tijeras Arroyo Golf Course.
PVC = polyvinyl chloride
PVC/S = Composition of blank well casing is PVC and composition of well screen is steel (carbon steel).
PVC/SS = Composition of blank well casing is PVC and composition of well screen is stainless steel.
R = Replacement well (term used by KAFB)
RG = Rio Grande
S = shallow
S = steel (carbon steel)
S/OH = Open hole completion (no well screen) with blank casing above.
S/SS = Composition of blank well casing is carbon steel and composition of well screen is stainless steel.
SFG = Santa Fe Group
SFR = South Fence Road
SNL/NM = Sandia National Laboratories, New Mexico
SOR = Starfire Optical Range
SS = stainless steel
ST105 = Series of KAFB/USAF wells for nitrate abatement study.
STW = Solar Tower West
SWTA3 = Southwest Technical Area-III
TA1-W = Technical Area-I (Well)
TA2-NW = Technical Area-II (Northwest)
TA2-SW = Technical Area-II (Southwest)
TA2-W = Technical Area-II (Well)
TAV = Technical Area-V (monitoring well designation)
TJA = Tijeras Arroyo
TRE = Thunder Road East
TRN = Target Road North
TRS = Target Road South
TSA = Transportation Safeguards Academy
U = upper screen (term used at CWL)
unk = Unknown information, not available.
USAF = U.S. Air Force
VA = Veterans Administration (previously Veterans Affairs)
WYO = Wyoming Boulevard
YALE = Yale Landfill area
? = Accuracy of information or interpretation is questionable.
12AUP = Environmental Restoration Site 12A underflow piezometer

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Table 2
Base-Wide Groundwater Elevations for Active Monitoring Wells Located at Sandia National Laboratories, New Mexico and the Kirtland Air Force Base Vicinity for Calendar Year 2023

Well ID	Measuring Point[a, b, c] (ft amsl, NAVD 88)	Date Measured (2023)[d]	Depth to Water (ft btoc, 2023)	Groundwater Elevation (ft amsl, 2023)	Groundwater Elevation, rounded (ft amsl, 2023)	Screened Unit	Comment, as needed	Groundwater Elevation (ft amsl, 2022 or earlier)	Data Source	Well Owner
DOE/NNSA Owned Wells										
Burn Site Well	6374.66	9-Oct-2023	132.61	6242.05	6242	Bedrock (schist and granite)		6243.85	SNL/NM	DOE/NNSA
CCBA-MW1	5902.34	2-Oct-2023	48.22	5854.12	5854	Alluvium and bedrock (granite)		5854.20	SNL/NM	DOE/NNSA
CCBA-MW2	5939.28	2-Oct-2023	72.87	5866.41	5866	Bedrock (granite)		5866.57	SNL/NM	DOE/NNSA
CTF-MW1	6082.63	2-Oct-2023	242.24	5840.39	5840	Bedrock (granite)		5840.65	SNL/NM	DOE/NNSA
CTF-MW2	5578.60	6-Oct-2023	44.21	5534.39	5534	Bedrock (granite)		5534.55	SNL/NM	DOE/NNSA
CTF-MW3	5522.82	6-Oct-2023	311.92	5210.90	5211	Bedrock (granite)		5211.19	SNL/NM	DOE/NNSA
CWL-BW5	5434.79	2-Oct-2023	516.24	4918.55	4919	Regional Aquifer – SFG sediments		4918.85	SNL/NM	DOE/NNSA
CWL-MW9	5426.12	2-Oct-2023	507.10	4919.02	4919	Regional Aquifer – SFG sediments		4919.18	SNL/NM	DOE/NNSA
CWL-MW10	5424.58	2-Oct-2023	504.21	4920.37	4920	Regional Aquifer – SFG sediments		4920.58	SNL/NM	DOE/NNSA
CWL-MW11	5423.24	2-Oct-2023	502.34	4920.90	4921	Regional Aquifer – SFG sediments		4921.26	SNL/NM	DOE/NNSA
CYN-MW3	6313.26	9-Oct-2023	dry	dry	dry	Bedrock (metamorphics)		dry	SNL/NM	DOE/NNSA
CYN-MW4	6455.48	9-Oct-2023	244.12	6211.36	6211	Bedrock (quartzite)		6214.35	SNL/NM	DOE/NNSA
CYN-MW5	5984.23	9-Oct-2023	109.61	5874.62	5875	Bedrock (quartzite)		5874.79	SNL/NM	DOE/NNSA
CYN-MW6	6343.37	9-Oct-2023	161.79	6181.58	6182	Bedrock (metamorphics)		6181.81	SNL/NM	DOE/NNSA
CYN-MW7	6216.35	9-Oct-2023	309.39	5906.96	5907	Bedrock (granitic gneiss)		5907.59	SNL/NM	DOE/NNSA
CYN-MW8	6230.11	9-Oct-2023	324.17	5905.94	5906	Bedrock (granitic gneiss)		5905.59	SNL/NM	DOE/NNSA
CYN-MW9	6360.67	9-Oct-2023	191.14	6169.53	6170	Bedrock (metamorphics)		6172.75	SNL/NM	DOE/NNSA
CYN-MW10	6345.45	9-Oct-2023	149.83	6195.62	6196	Bedrock (metamorphics)		6197.42	SNL/NM	DOE/NNSA
CYN-MW11	6374.41	9-Oct-2023	132.28	6242.13	6242	Bedrock (metamorphics)		6243.96	SNL/NM	DOE/NNSA
CYN-MW12	6345.16	9-Oct-2023	234.59	6110.57	6111	Bedrock (metamorphics)		6114.72	SNL/NM	DOE/NNSA
CYN-MW13	6237.79	9-Oct-2023	331.35	5906.44	5906	Bedrock (granitic gneiss)		5907.09	SNL/NM	DOE/NNSA
CYN-MW14A	6315.85	9-Oct-2023	203.43	6112.42	6112	Bedrock (metamorphics)	NC - deeper fracture	6116.62	SNL/NM	DOE/NNSA
CYN-MW15	6344.44	9-Oct-2023	180.83	6163.61	6164	Bedrock (metamorphics)		6169.18	SNL/NM	DOE/NNSA
CYN-MW16	6249.60	9-Oct-2023	343.27	5906.33	5906	Bedrock (granitic gneiss)		5906.97	SNL/NM	DOE/NNSA
CYN-MW17	6268.95	9-Oct-2023	362.55	5906.40	5906	Bedrock (granitic gneiss)		5907.07	SNL/NM	DOE/NNSA
CYN-MW18	6304.02	9-Oct-2023	255.01	6049.01	6049	Bedrock (metamorphics)		6051.11	SNL/NM	DOE/NNSA
CYN-MW19	6410.43	9-Oct-2023	46.17	6364.26	6364	Bedrock (metamorphics)		6363.77	SNL/NM	DOE/NNSA
Greystone-MW2	5814.20	2-Oct-2023	55.59	5758.61	5759	Alluvium in arroyo, recent	NC - alluvium	5759.06	SNL/NM	DOE/NNSA
LWDS-MW1	5423.83	4-Oct-2023	507.29	4916.54	4917	Regional Aquifer – SFG sediments		4916.92	SNL/NM	DOE/NNSA
MRN-2	5308.18	2-Oct-2023	429.11	4879.07	4879	Regional Aquifer – SFG sediments		4878.37	SNL/NM	DOE/NNSA
MRN-3D	5309.34	2-Oct-2023	429.64	4879.70	4880	Regional Aquifer – SFG sediments		4878.97	SNL/NM	DOE/NNSA
MWL-BW2	5391.02	2-Oct-2023	482.82	4908.20	4908	Regional Aquifer – SFG sediments		4908.38	SNL/NM	DOE/NNSA
MWL-MW4	5391.70	2-Oct-2023	505.02	4892.14	4892	Regional Aquifer – SFG sediments	corrected for slant	4892.14	SNL/NM	DOE/NNSA
MWL-MW5	5382.56	2-Oct-2023	493.24	4889.32	4889	Regional Aquifer – SFG sediments		4889.10	SNL/NM	DOE/NNSA
MWL-MW6	5375.31	2-Oct-2023	486.69	4888.62	4889	Regional Aquifer – SFG sediments		4888.37	SNL/NM	DOE/NNSA
MWL-MW7	5383.30	2-Oct-2023	490.66	4892.64	4893	Regional Aquifer – SFG sediments		4892.56	SNL/NM	DOE/NNSA
MWL-MW8	5384.67	2-Oct-2023	492.18	4892.49	4892	Regional Aquifer – SFG sediments		4892.36	SNL/NM	DOE/NNSA
MWL-MW9	5381.91	2-Oct-2023	491.66	4890.25	4890	Regional Aquifer – SFG sediments		4890.03	SNL/NM	DOE/NNSA
NWTA3-MW2	5337.49	3-Oct-2023	458.92	4878.57	4879	Regional Aquifer – SFG sediments		4877.80	SNL/NM	DOE/NNSA
NWTA3-MW3D	5340.80	3-Oct-2023	457.94	4882.86	4883	Regional Aquifer – SFG sediments		4881.97	SNL/NM	DOE/NNSA
OBS-MW1	5871.42	2-Oct-2023	72.69	5798.73	5799	Bedrock (granite)		5798.73	SNL/NM	DOE/NNSA
OBS-MW2	5863.16	2-Oct-2023	171.75	5691.41	5691	Bedrock (granite)		5691.12	SNL/NM	DOE/NNSA
OBS-MW3	5865.50	2-Oct-2023	70.51	5794.99	5795	Bedrock (granite)		5795.13	SNL/NM	DOE/NNSA

Table 2 (continued)
Base-Wide Groundwater Elevations for Active Monitoring Wells Located at Sandia National Laboratories, New Mexico and the Kirtland Air Force Base Vicinity for Calendar Year 2023

Well ID	Measuring Point[a, b, c] (ft amsl, NAVD 88)	Date Measured (2023)[d]	Depth to Water (ft btoc, 2023)	Groundwater Elevation (ft amsl, 2023)	Groundwater Elevation, rounded (ft amsl, 2023)	Screened Unit	Comment, as needed	Groundwater Elevation (ft amsl, 2022 or earlier)	Data Source	Well Owner
PGS-2	5408.29	4-Oct-2023	533.24	4875.05	4875	Regional Aquifer – SFG sediments		4873.16	SNL/NM	DOE/NNSA
PL-2	5336.01	2-Oct-2023	457.94	4878.07	4878	Regional Aquifer – SFG sediments		4876.81	SNL/NM	DOE/NNSA
PL-4	5334.98	2-Oct-2023	456.99	4877.99	4878	Regional Aquifer – SFG sediments		4876.94	SNL/NM	DOE/NNSA
SFR-1D	5399.13	2-Oct-2023	140.49	5258.64	5259	Regional Aquifer – SFG sediments	NC - deeper fracture	5258.70	SNL/NM	DOE/NNSA
SFR-1S	5399.16	2-Oct-2023	90.59	5308.57	5309	Regional Aquifer – SFG sediments		5308.24	SNL/NM	DOE/NNSA
SFR-2S	5432.77	2-Oct-2023	101.92	5330.85	5331	Regional Aquifer – SFG sediments		5330.95	SNL/NM	DOE/NNSA
SFR-3D	5497.94	2-Oct-2023	163.36	5334.58	5335	Regional Aquifer – SFG sediments		5334.67	SNL/NM	DOE/NNSA
SFR-3P	5499.63	2-Oct-2023	163.63	5336.00	5336	Regional Aquifer – SFG sediments		5336.08	SNL/NM	DOE/NNSA
SFR-3S	5498.24	2-Oct-2023	162.60	5335.64	5336	Regional Aquifer – SFG sediments		5335.76	SNL/NM	DOE/NNSA
SFR-3T	5498.66	2-Oct-2023	68.05	5430.61	5431	Bedrock (sandstone)	NC – deeper fracture	5430.35	SNL/NM	DOE/NNSA
SFR-4P	5573.33	2-Oct-2023	151.91	5421.42	5421	Bedrock (sandstone)		5420.58	SNL/NM	DOE/NNSA
SFR-4T	5573.95	2-Oct-2023	151.31	5422.64	5423	Bedrock (sandstone)		5422.32	SNL/NM	DOE/NNSA
SWTA3-MW2	5325.60	3-Oct-2023	445.43	4880.17	4880	Regional Aquifer – SFG sediments		4879.66	SNL/NM	DOE/NNSA
SWTA3-MW3	5323.94	3-Oct-2023	443.37	4880.57	4881	Regional Aquifer – SFG sediments		4880.02	SNL/NM	DOE/NNSA
SWTA3-MW4	5324.81	3-Oct-2023	444.14	4880.67	4881	Regional Aquifer – SFG sediments		4880.18	SNL/NM	DOE/NNSA
TA1-W-01	5403.82	4-Oct-2023	527.70	4876.12	4876	Regional Aquifer – SFG sediments		4875.45	SNL/NM	DOE/NNSA
TA1-W-02	5416.62	4-Oct-2023	516.71	4899.91	4900	Regional Aquifer – SFG sediments		4898.98	SNL/NM	DOE/NNSA
TA1-W-03	5457.03	4-Oct-2023	dry	dry	dry	PGWS - SFG sediments	value (dry) not plotted	dry	SNL/NM	DOE/NNSA
TA1-W-04	5460.98	4-Oct-2023	563.51	4897.47	4897	Regional Aquifer – SFG sediments		4896.28	SNL/NM	DOE/NNSA
TA1-W-05	5433.84	6-Oct-2023	560.03	4873.81	4874	Regional Aquifer – SFG sediments		4873.03	SNL/NM	DOE/NNSA
TA1-W-06	5417.10	4-Oct-2023	310.82	5106.28	5106	PGWS - SFG sediments	value not plotted	5106.48	SNL/NM	DOE/NNSA
TA1-W-07	5404.92	4-Oct-2023	287.05	5117.87	5118	PGWS - SFG sediments	value not plotted	5117.82	SNL/NM	DOE/NNSA
TA1-W-08	5434.19	6-Oct-2023	312.71	5121.48	5121	PGWS - SFG sediments	value not plotted	5121.38	SNL/NM	DOE/NNSA
TA2-NW1-325	5421.94	4-Oct-2023	321.99	5099.95	5100	PGWS - SFG sediments	value not plotted	5099.10	SNL/NM	DOE/NNSA
TA2-NW1-595	5421.26	4-Oct-2023	515.91	4905.35	4905	Regional Aquifer – SFG sediments		4904.41	SNL/NM	DOE/NNSA
TA2-W-01	5419.99	4-Oct-2023	332.55	5087.44	5087	PGWS - SFG sediments	value not plotted	5087.60	SNL/NM	DOE/NNSA
TA2-W-19	5351.21	4-Oct-2023	276.05	5075.16	5075	PGWS - SFG sediments	value not plotted	5075.33	SNL/NM	DOE/NNSA
TA2-W-24	5363.66	4-Oct-2023	438.49	4925.17	4925	Regional Aquifer – SFG sediments		4924.67	SNL/NM	DOE/NNSA
TA2-W-25	5374.86	4-Oct-2023	462.20	4912.66	4913	Regional Aquifer – SFG sediments		4912.03	SNL/NM	DOE/NNSA
TA2-W-26	5375.77	4-Oct-2023	291.19	5084.58	5085	PGWS - SFG sediments	value not plotted	5084.83	SNL/NM	DOE/NNSA
TA2-W-27	5362.85	4-Oct-2023	284.20	5078.65	5079	PGWS - SFG sediments	value not plotted	5078.81	SNL/NM	DOE/NNSA
TA2-W-28	5412.41	4-Oct-2023	322.97	5089.44	5089	PGWS - SFG sediments	value not plotted	5089.51	SNL/NM	DOE/NNSA
TAV-MW2	5427.33	2-Oct-2023	511.52	4915.81	4916	Regional Aquifer – SFG sediments		4916.14	SNL/NM	DOE/NNSA
TAV-MW3	5464.30	3-Oct-2023	549.71	4914.59	4915	Regional Aquifer – SFG sediments		4915.14	SNL/NM	DOE/NNSA
TAV-MW4	5427.89	3-Oct-2023	511.59	4916.30	4916	Regional Aquifer – SFG sediments		4916.72	SNL/NM	DOE/NNSA
TAV-MW5	5408.71	3-Oct-2023	496.10	4912.61	4913	Regional Aquifer – SFG sediments		4913.13	SNL/NM	DOE/NNSA
TAV-MW6	5431.17	4-Oct-2023	515.01	4916.16	4916	Regional Aquifer – SFG sediments		4916.54	SNL/NM	DOE/NNSA
TAV-MW7	5430.40	4-Oct-2023	516.99	4913.41	4913	Regional Aquifer – SFG sediments		4913.66	SNL/NM	DOE/NNSA
TAV-MW8	5417.00	4-Oct-2023	500.27	4916.73	4917	Regional Aquifer – SFG sediments		4917.09	SNL/NM	DOE/NNSA
TAV-MW9	5416.27	4-Oct-2023	503.00	4913.27	4913	Regional Aquifer – SFG sediments		4913.58	SNL/NM	DOE/NNSA
TAV-MW10	5437.03	4-Oct-2023	521.33	4915.70	4916	Regional Aquifer – SFG sediments		4916.12	SNL/NM	DOE/NNSA
TAV-MW11	5440.12	4-Oct-2023	523.99	4916.13	4916	Regional Aquifer – SFG sediments		4916.45	SNL/NM	DOE/NNSA
TAV-MW12	5435.72	4-Oct-2023	520.74	4914.98	4915	Regional Aquifer – SFG sediments		4915.33	SNL/NM	DOE/NNSA
TAV-MW13	5409.02	3-Oct-2023	499.13	4909.89	4910	Regional Aquifer – SFG sediments		4910.11	SNL/NM	DOE/NNSA

Table 2 (continued)
Base-Wide Groundwater Elevations for Active Monitoring Wells Located at Sandia National Laboratories, New Mexico and the Kirtland Air Force Base Vicinity for Calendar Year 2023

Well ID	Measuring Point[a, b, c] (ft amsl, NAVD 88)	Date Measured (2023)[d]	Depth to Water (ft btoc, 2023)	Groundwater Elevation (ft amsl, 2023)	Groundwater Elevation, rounded (ft amsl, 2023)	Screened Unit	Comment, as needed	Groundwater Elevation (ft amsl, 2022 or earlier)	Data Source	Well Owner
TAV-MW14	5441.52	4-Oct-2023	527.72	4913.80	4914	Regional Aquifer – SFG sediments		4914.08	SNL/NM	DOE/NNSA
TAV-MW15	5437.32	2-Oct-2023	522.44	4914.88	4915	Regional Aquifer – SFG sediments		4915.18	SNL/NM	DOE/NNSA
TAV-MW16	5448.34	3-Oct-2023	533.98	4914.36	4914	Regional Aquifer – SFG sediments		4914.77	SNL/NM	DOE/NNSA
TAV-MW17	5443.92	3-Oct-2023	529.17	4914.75	4915	Regional Aquifer – SFG sediments		not installed	SNL/NM	DOE/NNSA
TJA-2	5353.20	4-Oct-2023	280.67	5072.53	5073	PGWS - SFG sediments	value not plotted	5072.39	SNL/NM	DOE/NNSA
TJA-3	5390.56	4-Oct-2023	498.45	4892.11	4892	Regional Aquifer – SFG sediments		4891.85	SNL/NM	DOE/NNSA
TJA-4	5341.16	4-Oct-2023	299.97	5041.19	5041	Merging Zone – SFG sediments	NC - Merging Zone	5041.02	SNL/NM	DOE/NNSA
TJA-5	5341.33	4-Oct-2023	271.58	5069.75	5070	PGWS - SFG sediments	value not plotted	5069.56	SNL/NM	DOE/NNSA
TJA-6	5343.16	4-Oct-2023	450.64	4892.52	4893	Regional Aquifer – SFG sediments		4892.28	SNL/NM	DOE/NNSA
TJA-7	5391.27	4-Oct-2023	305.69	5085.58	5086	PGWS - SFG sediments	value not plotted	5085.53	SNL/NM	DOE/NNSA
TRE-1	5497.25	2-Oct-2023	179.01	5318.24	5318	Regional Aquifer – SFG sediments		5318.30	SNL/NM	DOE/NNSA
TRE-2	5497.20	nm	nm	nm	nm	Regional Aquifer – SFG sediments		nm	SNL/NM	DOE/NNSA
TRN-1	5735.62	2-Oct-2023	93.30	5642.32	5642	Bedrock (sandstone)		5642.33	SNL/NM	DOE/NNSA
TRS-1D	5779.80	2-Oct-2023	128.17	5651.63	5652	Bedrock (limestone)		5650.89	SNL/NM	DOE/NNSA
TRS-1S	5780.07	2-Oct-2023	135.99	5644.08	5644	Bedrock (limestone)		5644.21	SNL/NM	DOE/NNSA
TRS-2	5780.76	2-Oct-2023	136.57	5644.19	5644	Bedrock (limestone)		5644.33	SNL/NM	DOE/NNSA
WYO-3	5392.09	4-Oct-2023	515.67	4876.42	4876	Regional Aquifer – SFG sediments		4875.15	SNL/NM	DOE/NNSA
WYO-4	5392.57	4-Oct-2023	dry	dry	dry	PGWS - SFG sediments	value (dry) not plotted	5095.24	SNL/NM	DOE/NNSA
Wells Owned by Other Entities										
Eubank-1	5460.02	4-Oct-2023	543.06	4916.96	4917	Regional Aquifer – SFG sediments		4916.54	SNL/NM	COA EHD
Eubank-2	5474.39	26-Oct-2023	570.63	4903.76	4904	Regional Aquifer – SFG sediments		4903.06	COA EHD	COA EHD
Eubank-3	5498.73	26-Oct-2023	599.64	4899.09	4899	Regional Aquifer – SFG sediments		4898.15	COA EHD	COA EHD
Eubank-5	5507.40	26-Oct-2023	608.69	4898.71	4899	Regional Aquifer – SFG sediments		4897.79	COA EHD	COA EHD
KAFB-0118	5320.75	1-Mar-2023	442.43	4878.32	4878	Regional Aquifer – SFG sediments		4877.98	KAFB	KAFB
KAFB-0119	5315.82	1-Mar-2023	438.05	4877.77	4878	Regional Aquifer – SFG sediments		4877.50	KAFB	KAFB
KAFB-0120	5292.29	1-Mar-2023	411.03	4881.26	4881	Regional Aquifer – SFG sediments		4881.16	KAFB	KAFB
KAFB-0121	5307.60	1-Mar-2023	429.81	4877.79	4878	Regional Aquifer – SFG sediments		4877.52	KAFB	KAFB
KAFB-0213	5283.29	1-Mar-2023	405.48	4877.81	4878	Regional Aquifer – SFG sediments		4877.43	KAFB	KAFB
KAFB-0219	5263.69	1-Mar-2023	387.05	4876.64	4877	Regional Aquifer – SFG sediments		4876.35	KAFB	KAFB
KAFB-0220	5265.10	1-Mar-2023	388.38	4876.72	4877	Regional Aquifer – SFG sediments		4876.33	KAFB	KAFB
KAFB-0221	5274.36	1-Mar-2023	397.58	4876.78	4877	Regional Aquifer – SFG sediments		4876.30	KAFB	KAFB
KAFB-0222	5247.65	1-Mar-2023	368.17	4879.48	4879	Regional Aquifer – SFG sediments		4879.30	KAFB	KAFB
KAFB-0223	5254.49	1-Mar-2023	374.86	4879.63	4880	Regional Aquifer – SFG sediments		4879.11	KAFB	KAFB
KAFB-0307	5364.53	1-Mar-2023	410.89	4953.64	4954	Regional Aquifer – SFG sediments		4952.46	KAFB	KAFB
KAFB-0308	5381.65	1-Mar-2023	442.37	4939.28	4939	Regional Aquifer – SFG sediments		4938.94	KAFB	KAFB
KAFB-0309	5411.80	1-Mar-2023	471.45	4940.35	4940	Regional Aquifer – SFG sediments		4939.87	KAFB	KAFB
KAFB-0310	5416.48	1-Mar-2023	355.59	5060.89	5061	PGWS - SFG sediments	value not plotted	5061.15	KAFB	KAFB
KAFB-0311	5353.29	1-Mar-2023	416.23	4937.06	4937	Regional Aquifer – SFG sediments		4937.05	KAFB	KAFB
KAFB-0312	5432.17	1-Mar-2023	416.72	5015.45	5015	Regional Aquifer – SFG sediments		5015.54	KAFB	KAFB
KAFB-0313	5418.98	1-Mar-2023	350.98	5068.00	5068	PGWS - SFG sediments	value not plotted	5067.48	KAFB	KAFB
KAFB-0314	5455.75	1-Mar-2023	418.28	5037.47	5037	Regional Aquifer – SFG sediments		5037.65	KAFB	KAFB
KAFB-0315	5466.11	1-Mar-2023	437.81	5028.30	5028	Regional Aquifer – SFG sediments		5028.23	KAFB	KAFB
KAFB-0417	5313.07	7-Feb-2023	438.33	4874.74	4875	Regional Aquifer – SFG sediments		4874.21	KAFB	KAFB
KAFB-0504	5357.87	nm	nm	nm	nm	Regional Aquifer – SFG sediments		nm	KAFB	KAFB

Table 2 (continued)
Base-Wide Groundwater Elevations for Active Monitoring Wells Located at Sandia National Laboratories, New Mexico and the Kirtland Air Force Base Vicinity for Calendar Year 2023

Well ID	Measuring Point[a, b, c] (ft amsl, NAVD 88)	Date Measured (2023)[d]	Depth to Water (ft btoc, 2023)	Groundwater Elevation (ft amsl, 2023)	Groundwater Elevation, rounded (ft amsl, 2023)	Screened Unit	Comment, as needed	Groundwater Elevation (ft amsl, 2022 or earlier)	Data Source	Well Owner
KAFB-0505	5362.81	29-Dec-2023	486.90	4875.91	4876	Regional Aquifer – SFG sediments		4875.27	KAFB	KAFB
KAFB-0506	5363.47	7-Feb-2023	211.99	5151.48	5151	PGWS - SFG sediments	value not plotted	5152.44	KAFB	KAFB
KAFB-0507R	5358.21	nm	nm	nm	nm	Regional Aquifer – SFG sediments		4873.51	KAFB	KAFB
KAFB-0508	5351.88	7-Feb-2023	476.35	4875.53	4876	Regional Aquifer – SFG sediments		4874.44	KAFB	KAFB
KAFB-0509	5441.56	nm	nm	nm	nm	above PGWS – SFG sediments		nm	KAFB	KAFB
KAFB-0510	5367.10	7-Feb-2023	493.08	4874.02	4874	Regional Aquifer – SFG sediments		4873.43	KAFB	KAFB
KAFB-0512R	5302.73	nm	nm	nm	nm	Regional Aquifer – SFG sediments		4874.29	KAFB	KAFB
KAFB-0514	5206.41	nm	nm	nm	nm	Regional Aquifer – SFG sediments		4873.76	KAFB	KAFB
KAFB-0516	5205.64	nm	nm	nm	nm	Regional Aquifer – SFG sediments		4874.21	KAFB	KAFB
KAFB-0517	5197.10	7-Feb-2023	319.65	4877.45	4877	Regional Aquifer – SFG sediments		4877.41	KAFB	KAFB
KAFB-0518	5177.76	13-Jun-2022	299.76	4878.00	4878	Regional Aquifer – SFG sediments		4878.00	KAFB	KAFB
KAFB-0519	5365.37	nm	nm	nm	nm	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
KAFB-0520	5247.90	6-Oct-2021	374.03	4873.87	4874	Regional Aquifer – SFG sediments		4873.87	KAFB	KAFB
KAFB-0521	5352.45	nm	nm	nm	nm	Regional Aquifer – SFG sediments	FLUTe well	nm	KAFB	KAFB
KAFB-0522	5267.48	29-Dec-2023	392.96	4874.52	4875	Regional Aquifer – SFG sediments		4873.92	KAFB	KAFB
KAFB-0523	5352.62	nm	nm	nm	nm	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
KAFB-0524	5345.61	13-Jun-2022	468.89	4876.72	4877	Regional Aquifer – SFG sediments		4876.72	KAFB	KAFB
KAFB-0525	5229.75	nm	nm	nm	nm	Regional Aquifer – SFG sediments		4875.19	KAFB	KAFB
KAFB-0611	5386.09	8-Aug-2022	463.60	4922.49	4922	Regional Aquifer – SFG sediments		4922.49	KAFB	KAFB
KAFB-0612	5385.45	26-Oct-2018	288.51	5096.94	5097	PGWS - SFG sediments	value not plotted	5096.94	KAFB	KAFB
KAFB-0613	5390.78	19-Oct-2020	353.08	5037.70	5038	Regional Aquifer – SFG sediments		5037.70	KAFB	KAFB
KAFB-0614	5390.89	7-Feb-2023	331.23	5059.66	5060	PGWS - SFG sediments	value not plotted	5059.29	KAFB	KAFB
KAFB-0615	5638.43	nm	nm	nm	nm	Bedrock (granite)		nm	KAFB	KAFB
KAFB-0616	5481.07	nm	nm	nm	nm	Regional Aquifer – SFG sediments		5035.22	KAFB	KAFB
KAFB-0617	5505.78	nm	nm	nm	nm	Regional Aquifer – SFG sediments	nearby fault	4949.23	KAFB	KAFB
KAFB-0618	5410.05	13-Jun-2022	484.23	4925.82	4926	Regional Aquifer – SFG sediments		4925.82	KAFB	KAFB
KAFB-0619	5410.78	7-Feb-2023	384.32	5026.46	5026	PGWS - SFG sediments	value not plotted	5026.48	KAFB	KAFB
KAFB-0620	5334.64	nm	nm	nm	nm	Regional Aquifer – SFG sediments		4892.49	KAFB	KAFB
KAFB-0621	5569.89	nm	nm	nm	nm	Regional Aquifer – SFG sediments	nearby fault	4945.52	KAFB	KAFB
KAFB-0622	5488.64	nm	nm	nm	nm	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
KAFB-0623	5328.94	nm	nm	nm	nm	PGWS - SFG sediments	value (nm) not plotted	nm	KAFB	KAFB
KAFB-0624	5673.78	14-Jun-2022	767.58	4906.20	4906	Regional Aquifer – SFG sediments	NC - nearby fault	4906.20	KAFB	KAFB
KAFB-0625	5390.23?	nm	nm	nm	nm	Regional Aquifer – SFG sediments		4915.48	KAFB	KAFB
KAFB-0626	5331.21	nm	nm	nm	nm	Regional Aquifer – SFG sediments	FLUTe™ well	nm	KAFB	KAFB
KAFB-0901	5390.07	nm	nm	nm	nm	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
KAFB-0903	5391.63	nm	nm	nm	nm	above PGWS – SFG sediments	semiconfined?	nm	KAFB	KAFB
KAFB-0904	5291.75	nm	nm	nm	nm	Regional Aquifer – SFG sediments	semiconfined?	4940.24	KAFB	KAFB
KAFB-1001	5260.43	nm	nm	nm	nm	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
KAFB-1002	5254.75	nm	nm	nm	nm	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
KAFB-1003	5258.29	nm	nm	nm	nm	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
KAFB-1004	5258.81	nm	nm	nm	nm	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
KAFB-1005	5274.68	nm	nm	nm	nm	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
KAFB-1006	5257.01	5-Nov-2020	381.22	4875.79	4876	Regional Aquifer – SFG sediments		4875.79	KAFB	KAFB
KAFB-1007R	5260.62	29-Jun-2022	381.20	4879.42	4879	Regional Aquifer – SFG sediments		4879.42	KAFB	KAFB

Table 2 (continued)
Base-Wide Groundwater Elevations for Active Monitoring Wells Located at Sandia National Laboratories, New Mexico and the Kirtland Air Force Base Vicinity for Calendar Year 2023

Well ID	Measuring Point[a, b, c] (ft amsl, NAVD 88)	Date Measured (2023)[d]	Depth to Water (ft btoc, 2023)	Groundwater Elevation (ft amsl, 2023)	Groundwater Elevation, rounded (ft amsl, 2023)	Screened Unit	Comment, as needed	Groundwater Elevation (ft amsl, 2022 or earlier)	Data Source	Well Owner
KAFB-1008	5260.77	5-Nov-2020	379.51	4881.26	4881	Regional Aquifer – SFG sediments		4881.26	KAFB	KAFB
KAFB-1009	5272.16	5-Nov-2020	390.72	4881.44	4881	Regional Aquifer – SFG sediments		4881.44	KAFB	KAFB
KAFB-1021	5348.02	nm	nm	nm	nm	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
KAFB-1901	5751.58	nm	nm	nm	nm	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
KAFB-1902	5754.27	nm	nm	nm	nm	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
KAFB-1904	5752.29	nm	nm	nm	nm	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
KAFB-2005	5624.27	nm	nm	nm	nm	Bedrock (granite)		nm	KAFB	KAFB
KAFB-2006	5590.88	nm	nm	nm	nm	Bedrock (granite)		nm	KAFB	KAFB
KAFB-2007	5564.48	nm	nm	nm	nm	Bedrock (granite)		nm	KAFB	KAFB
KAFB-2008	5541.74	8-Aug-2022	600.09	4941.65	4942	Regional Aquifer – SFG sediments		4941.65	KAFB	KAFB
KAFB-2009	5655.63	nm	nm	nm	nm	Bedrock (granite)		nm	KAFB	KAFB
KAFB-2622	5358.14	6-Feb-2023	dry	dry	dry	PGWS - SFG sediments	value (dry) not plotted	dry	KAFB	KAFB
KAFB-2623	5367.48	nm	nm	nm	nm	PGWS - SFG sediments	value (nm) not plotted	nm	KAFB	KAFB
KAFB-2624	5362.27	6-Feb-2023	dry	dry	dry	PGWS - SFG sediments	value (dry) not plotted	nm	KAFB	KAFB
KAFB-2625	5359.26	7-Feb-2023	200.00	5159.26	5159	PGWS - SFG sediments	value not plotted	5159.82	KAFB	KAFB
KAFB-2626	5357.51	6-Feb-2023	dry	dry	dry	PGWS - SFG sediments	value (dry) not plotted`	nm	KAFB	KAFB
KAFB-2627	5367.47	nm	nm	nm	nm	PGWS - SFG sediments	value (nm) not plotted	nm	KAFB	KAFB
KAFB-2628	5369.64	6-Feb-2023	492.16	4877.48	4877	Regional Aquifer – SFG sediments		4876.15	KAFB	KAFB
KAFB-2629	5361.53	6-Feb-2023	485.30	4876.23	4876	Regional Aquifer – SFG sediments		4871.62	KAFB	KAFB
KAFB-2630	5361.71	6-Feb-2023	212.71	5149.00	5149	above PGWS – SFG sediments	value not plotted	5149.49	KAFB	KAFB
KAFB-2631	5335.70	6-Feb-2023	dry	dry	dry	above PGWS – SFG sediments	value (dry) not plotted	nm	KAFB	KAFB
KAFB-2632	5329.08	6-Feb-2023	172.82	5156.26	5156	above PGWS – SFG sediments	value not plotted	5156.60	KAFB	KAFB
KAFB-2901	5839.08	nm	nm	nm	nm	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
KAFB-2902	5832.10	nm	nm	nm	nm	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
KAFB-2903	5819.46	nm	nm	nm	nm	Bedrock (Abo Formation) siltstone/shale		nm	KAFB	KAFB
KAFB-2904	5842.72	nm	nm	nm	nm	Bedrock (Madera Formation) limestone		nm	KAFB	KAFB
KAFB-3391	5396.60	nm	nm	nm	nm	PGWS - SFG sediments	value (nm) not plotted	nm	KAFB	KAFB
KAFB-3392	5394.51	nm	nm	nm	nm	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
KAFB-3411	5342.81	nm	nm	nm	nm	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
KAFB-6241	5466.50	nm	nm	nm	nm	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
KAFB-6243	5423.48	8-Aug-2022	503.51	4919.97	4920	Regional Aquifer – SFG sediments		4919.97	KAFB	KAFB
KAFB-6301	5459.64	nm	nm	nm	nm	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
KAFB-7001	5322.87	28-Dec-2023	441.38	4881.49	4881	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
KAFB-8281	5401.03	nm	nm	nm	nm	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
KAFB-8282	5402.92	nm	nm	nm	nm	PGWS - SFG sediments	value (nm) not plotted	nm	KAFB	KAFB
KAFB-8351	5325.51	29-Dec-2023	444.03	4881.48	4881	Regional Aquifer – SFG sediments		4881.49	KAFB	KAFB
KAFB-ST105-EX01	5353.54	nm	nm	nm	nm	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
Mesa del Sol-S	5302.67	15-Nov-2023	419.82	4882.85	4883	Regional Aquifer – SFG sediments		4882.98	USGS	NMOSE
Montessa Park-S	5102.67	15-Nov-2023	211.13	4891.54	4892	Regional Aquifer – SFG sediments		4891.42	USGS	ABCWUA
Site 58 MW-1	5721.74	10-May-2023	65.34	5656.40	5656	Colluvium and Bedrock (granite)	value not plotted	nm	KAFB	KAFB
Site 58 MW-2	5715.94	10-May-2023	65.80	5650.14	5650	Bedrock (granite)	value not plotted	nm	KAFB	KAFB
Site 58 MW-3	5717.88	10-May-2023	63.69	5654.19	5654	Colluvium?	value not plotted	nm	KAFB	KAFB
Site 58 MW-4	5722.31	10-May-2023	65.95	5656.36	5656	Bedrock (granite)	value not plotted	nm	KAFB	KAFB
Site 58 MW-5	5716.83	10-May-2023	62.95	5653.88	5654	Colluvium?	value not plotted	nm	KAFB	KAFB

Table 2 (continued)
Base-Wide Groundwater Elevations for Active Monitoring Wells Located at Sandia National Laboratories, New Mexico and the Kirtland Air Force Base Vicinity for Calendar Year 2023

Well ID	Measuring Point[a, b, c] (ft amsl, NAVD 88)	Date Measured (2023)[d]	Depth to Water (ft btoc, 2023)	Groundwater Elevation (ft amsl, 2023)	Groundwater Elevation, rounded (ft amsl, 2023)	Screened Unit	Comment, as needed	Groundwater Elevation (ft amsl, 2022 or earlier)	Data Source	Well Owner
Site 58 MW-6	5720.30	10-May-2023	65.97	5654.33	5654	Colluvium and Bedrock (granite)?	value not plotted	nm	KAFB	KAFB
Site 58 MW-7	5717.76	10-May-2023	64.35	5653.41	5653	Colluvium and Bedrock (granite)?	value not plotted	nm	KAFB	KAFB
ST105-MW001	5279.34	6-Oct-2021	403.19	4876.15	4876	Regional Aquifer – SFG sediments		4876.15	KAFB	KAFB
ST105-MW002	5180.32	6-Oct-2021	303.60	4876.72	4877	Regional Aquifer – SFG sediments		4876.72	KAFB	KAFB
ST105-MW003	5174.61	6-Oct-2021	297.91	4876.70	4877	Regional Aquifer – SFG sediments		4876.70	KAFB	KAFB
ST105-MW004	5234.61	nm	nm	nm	nm	Regional Aquifer – SFG sediments		4875.96	KAFB	KAFB
ST105-MW005	5287.57	nm	nm	nm	nm	Regional Aquifer – SFG sediments	semiconfined?	nm	KAFB	KAFB
ST105-MW006	5313.26	6-Feb-2023	236.09	5077.17	5077	PGWS - SFG sediments	value not plotted	5077.01	KAFB	KAFB
ST105-MW007	5311.18	nm	nm	nm	nm	Regional Aquifer – SFG sediments	semiconfined?	nm	KAFB	KAFB
ST105-MW008	5358.94	8-Aug-2022	478.10	4880.84	4881	Regional Aquifer – SFG sediments		4880.84	KAFB	KAFB
ST105-MW009	5519.71	13-Jun-2022	486.31	5033.40	5033	Regional Aquifer – SFG sediments		5033.40	KAFB	KAFB
ST105-MW010	5334.70	nm	nm	nm	nm	Regional Aquifer – SFG sediments		4889.04	KAFB	KAFB
ST105-MW011	5422.66	8-Aug-2022	483.98	4938.68	4939	Regional Aquifer – SFG sediments		4938.68	KAFB	KAFB
ST105-MW012	5419.90	nm	nm	nm	nm	PGWS - SFG sediments	value (nm) not plotted	nm	KAFB	KAFB
ST105-MW013	5447.27	8-Aug-2022	436.82	5010.45	5010	Regional Aquifer – SFG sediments		5010.45	KAFB	KAFB
ST105-MW015	5623.95	8-Aug-2022	688.51	4935.44	4935	Regional Aquifer – SFG sediments	NC - nearby fault	4935.44	KAFB	KAFB
ST105-MW017	5621.97	13-Jun-2022	704.65	4917.32	4917	Regional Aquifer – SFG sediments	NC - nearby fault	4917.32	KAFB	KAFB
ST105-MW018	5221.68	13-Jun-2022	345.28	4876.40	4876	Regional Aquifer – SFG sediments		4876.40	KAFB	KAFB
ST105-MW019	5217.94	nm	nm	nm	nm	Regional Aquifer – SFG sediments		4875.29	KAFB	KAFB
ST105-MW020	5383.72	7-Feb-2023	300.53	5083.19	5083	PGWS - SFG sediments	value not plotted	5083.67	KAFB	KAFB
ST105-MW021	5390.90	6-Oct-2021	330.62	5060.28	5060	PGWS - SFG sediments	value not plotted	5060.28	KAFB	KAFB
ST105-MW022	5386.66	13-Jun-2022	470.41	4916.25	4916	Regional Aquifer – SFG sediments		4916.25	KAFB	KAFB
ST105-MW023	5275.86	nm	nm	nm	nm	Regional Aquifer – SFG sediments		4874.69	KAFB	KAFB
ST105-MW024	5595.67	nm	nm	nm	nm	Bedrock (granite)		5249.48	KAFB	KAFB
YALE-MW1	5308.45	26-Oct-2023	414.95	4893.50	4894	Regional Aquifer – SFG sediments		4893.02	COA EHD	COA EHD
YALE-MW9	5271.06	26-Oct-2023	370.05	4901.01	4901	Regional Aquifer – SFG sediments		4900.41	COA EHD	COA EHD
4-HILLS-1	5554.17	nm	nm	nm	nm	Alluvial sands and gravels		nm	COA EHD	COA EHD

Table 2 (concluded)
Base-Wide Groundwater Elevations for Active Monitoring Wells Located at Sandia National Laboratories, New Mexico and the Kirtland Air Force Base Vicinity for Calendar Year 2023

Notes:

[a] Measuring point is the elevation for the top of casing, typically the top of PVC casing, that is used for measuring and calculating groundwater elevations.
[b] Elevations are relative to the NAVD 88, New Mexico State Plane Coordinate System, Central Zone. Elevation data from other government agencies that were based on the National Geodetic Vertical Datum 1929 were converted (re-projected) by +2.671 ft.
[c] Well construction details are listed in Table 1.
[d] Water level from the most recent year is used when a water level was not measured during the current year.
Green shading denotes monitoring wells that are screened in the Perched Groundwater System. Blue shading denotes the well is screened in the Merging Zone. Wells screened in the Regional Aquifer are not shaded.

ABCWUA	= Albuquerque Bernalillo County Water Utility Authority
amsl	= above mean sea level
btoc	= below top of casing (below the measuring point)
BW	= Background Well
CCBA	= Coyote Canyon Blast Area
COA EHD	= City of Albuquerque Environmental Health Department
corrected	= MWL-MW4 depth to groundwater was corrected for the inclined well casing (6 degrees).
CTF	= Coyote Test Field
CWL	= Chemical Waste Landfill
CYN	= Canyons (in Lurance Canyon area)
D	= deeper well completion
DOE/NNSA	= U.S. Department of Energy/National Nuclear Security Administration
dry	= Water was not present in the well screen.
EX	= Well proposed for extraction purposes but used for monitoring purposes only.
FLUTe	= Flexible Liner Underground Technologies, LLC. There is no access for water level.
ft	= foot (feet)
ID	= identifier
KAFB	= Kirtland Air Force Base
LWDS	= Liquid Waste Disposal System
MRN	= Magazine Road North
MW	= Monitoring Well
MWL	= Mixed Waste Landfill
NAVD88	= North American Vertical Datum of 1988
NC	= Not contoured (see explanations below) this year or historically
NC – alluvium	= Well is screened in alluvium along the arroyo channel.
NC – deeper fracture	= Well is screened in a deeper bedrock fracture.
NC – Merging Zone	= Well is screened in the Merging Zone that hydraulically connects the PGWS and the Regional Aquifer.
NC – nearby fault	= A buried (unmapped) fault appears to have a localized effect on groundwater.
nm	= not measured
NMOSE	= New Mexico Office of the State Engineer
NWTA3	= Northwest Technical Area-III
OBS	= Old Burn Site (in Coyote Test Field)
PGS	= Parade Ground South
PGWS	= Perched Groundwater System
PL	= Power Line Road (northwest of Technical Area-III)
PVC	= polyvinyl chloride
R	= Replacement well (term used by KAFB)
S	= Shallow (shallower bedrock well completion) at SFR and TRS wells.
SFG	= Santa Fe Group
SFR	= South Fence Road
SNL/NM	= Sandia National Laboratories, New Mexico
ST105	= Series of KAFB/USAF monitoring wells for nitrate abatement study.
SWTA3	= Southwest Technical Area-III
TA1-W	= Technical Area-I well
TA2-NW	= Technical Area-II Northwest well
TA2-W	= Technical Area-II well
TAV	= Technical Area-V (monitoring well designation)
TJA	= Tijeras Arroyo (monitoring well designation)
TRE	= Thunder Road East
TRN	= Target Road North
TRS	= Target Road South
USAF	= U.S. Air Force
USGS	= U.S. Geological Survey
W	= Well
WYO	= Wyoming Boulevard well
YALE	= Yale Landfill well
?	= Accuracy of information or interpretation is questionable.

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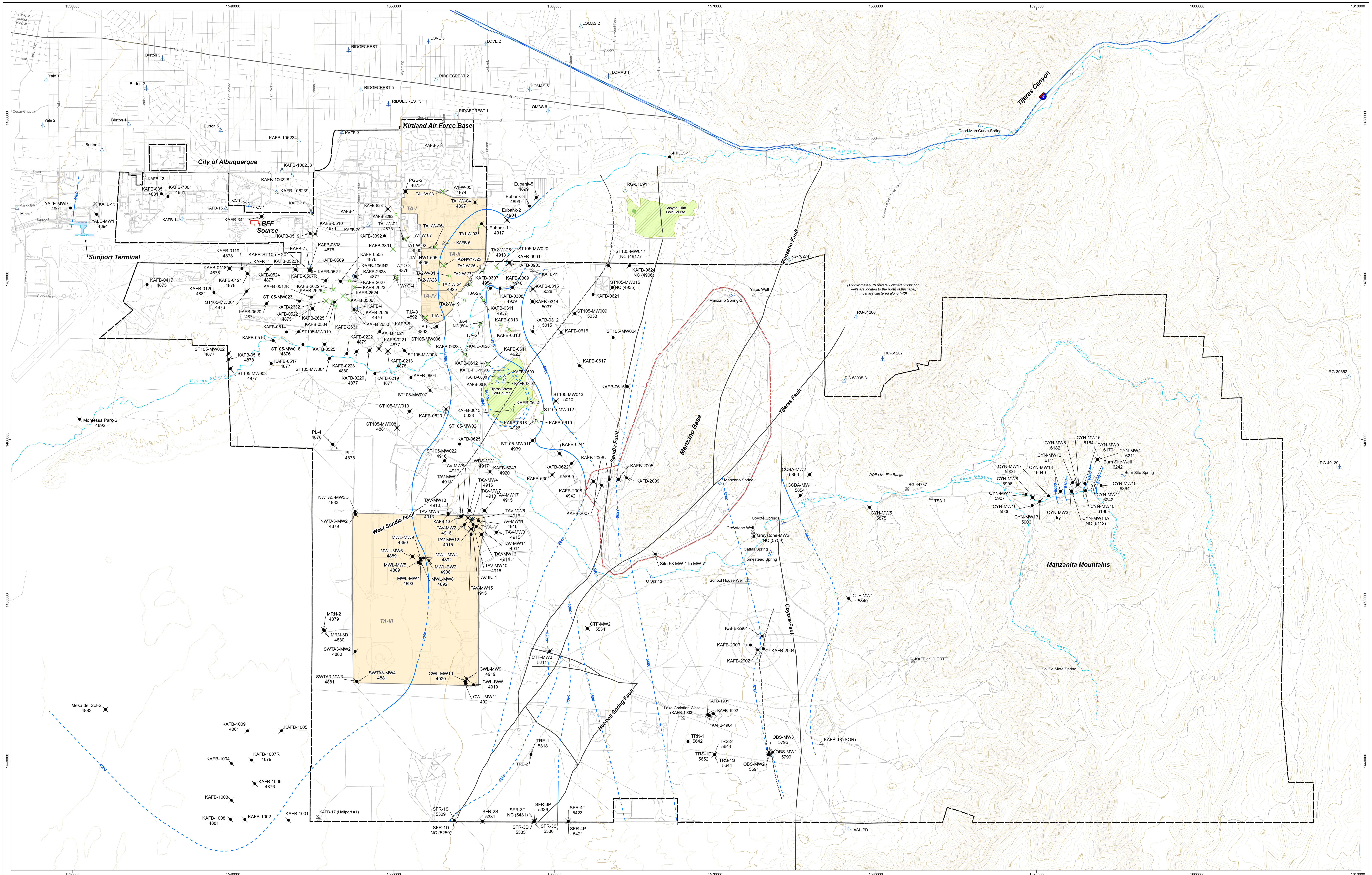
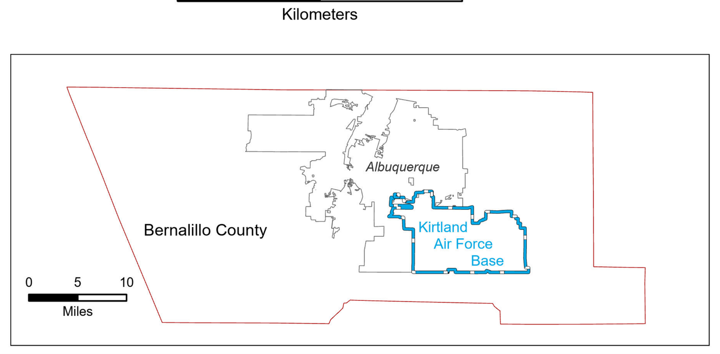


Feet: 0 | 2,000 | 4,000

Meters: 0 | 750 | 1,500

Miles: 0 | 0.5 | 1

Kilometers: 0 | 0.75 | 1.5



Legend

- Monitoring Well, Regional Aquifer / Fractured Bedrock System
- Monitoring Well, Perched Groundwater System
- Production Well, potable
- Production Well, non-potable
- Production Well, plugged and abandoned
- Extraction Well
- Extraction Well, plugged and abandoned
- Injection Well
- Spring, current or historical flow
- NC Not Contoured
- Potentiometric surface contour (feet above mean sea level [feet amsl])
- dashed where uncertain
- Fault, exposed and concealed
- Fault, fully concealed
- Surface drainage, arroyo
- Ground surface contour (40 ft interval)
- Road, paved and unpaved
- Bulk Fuels Facility (BFF) KAFB
- Golf Course
- Golf Course Main Pond
- SNL/NM Technical Area (TA) boundary
- Manzano Base boundary
- Kirtland Air Force Base (KAFB) boundary

NOTES:

1. Groundwater elevations for the Regional Aquifer and the Fractured Bedrock System are shown for monitoring wells located near Sandia National Laboratories, New Mexico (SNL/NM) facilities. The wells with no available recent groundwater elevation have no value plotted.
2. Monitoring wells with anomalous groundwater elevations in the Regional Aquifer or Fractured Bedrock System are shown with an NC (not contoured) label next to the value. Table 2 states the rationale.
3. Groundwater elevations are rounded to the nearest foot. Water levels were measured at Department of Energy/National Nuclear Security Administration (DOE/NNSA) owned wells between 2 October and 9 October, 2023. Groundwater elevations and measurement dates are listed in Table 2 for DOE/NNSA owned wells and wells owned by other government entities.
4. Groundwater elevations from production, injection, and extraction wells are not used.
5. Groundwater elevations for monitoring wells screened in the Perched Groundwater System are not plotted. A potentiometric surface figure for the Perched Groundwater System is presented in Chapter 6.
6. Potentiometric surface contours for the Regional Aquifer are primarily shown using two intervals: below 5000 ft amsl the contour intervals are 40 and 60 feet; above 5000 ft amsl the contour interval is 100 feet.
7. Most of the monitoring wells located near the KAFB Bulk Fuels Facility and at KAFB Site 58 are not plotted.
8. Decommissioned (plugged and abandoned) monitoring wells are not shown.
9. Faults are derived from multiple sources. The major faults (Coyote, Hubbell Spring, Manzano, Sandia, and Tijeras) were identified from GRAM and Lettis (December 1995). The West Sandia Fault is described in Van Hart (June 2003). Numerous faults located in the mountainous terrain east of the Coyote Fault and the Tijeras Fault are not shown. The dashed faults located near wells KAFB-2007 and OBS-MW1 are inferred from historical groundwater elevations.
10. West of the Sandia Fault, the Regional Aquifer is present within the unconsolidated Santa Fe Group sediments. Groundwater within and east of the Tijeras Fault Zone (bounded by the Sandia and Tijeras Faults) is primarily present in the Paleozoic and Precambrian bedrock.
11. The West Sandia Fault does not affect the alluvial-fan sediments at the water table.
12. Coordinates for some KAFB production wells were more accurately plotted using ortho-rectified aerial photography (Copland July 2018).

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

Plate 1
Potentiometric Surface for the Regional Aquifer and the Fractured Bedrock System at Sandia National Laboratories, New Mexico and Kirtland Air Force Base for Calendar Year 2023

Transverse Mercator Projection
New Mexico State Plane Coordinate System, Central Zone
1983 North American Horizontal Datum
1988 North American Vertical Datum

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Data Packages
(Provided in Separate Files)

1. Long-Term Stewardship Groundwater Monitoring Program Data Packages, Calendar Year 2023
2. Chemical Waste Landfill Data Packages, Calendar Year 2023
3. Mixed Waste Landfill Data Packages, Calendar Year 2023
4. Technical Area-V Groundwater Area of Concern Data Packages, Calendar Year 2023
5. Tijeras Arroyo Groundwater Area of Concern Data Packages, Calendar Year 2023
6. Burn Site Groundwater Area of Concern Data Packages, Calendar Year 2023