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Annual Groundwater Monitoring Report Calendar Year 2022

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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Annual Groundwater Monitoring Report Calendar Year 2022

Groundwater Monitoring Program
Sandia National Laboratories, New Mexico
June 2023

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

Long-Term Stewardship
Sandia National Laboratories, New Mexico
Albuquerque, NM 87185-1103

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Contributing Authors

Copland, John
Jackson, Tim
LaChance, Caitlin
Li, Jun
Mitchell, Michael
Sanchez, Denisha
Skelly, Michael
Tenorio, Zachary

Abstract

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 (DOE's) National Nuclear Security Administration (NNSA) under contract DE-NA0003525. The DOE/NNSA Sandia Field Office administers the contract and oversees contractor operations at SNL/NM.

This *Annual Groundwater Monitoring Report, Calendar Year 2022* summarizes data through December 31, 2022 from groundwater monitoring samples collected from the Chemical Waste Landfill, Mixed Waste Landfill, and Groundwater Monitoring Program locations, as well as the following SNL/NM Areas of Concern (AOCs): Burn Site Groundwater AOC, Technical Area-V Groundwater AOC, and Tijeras Arroyo Groundwater AOC. Reporting the results of environmental monitoring programs is required by The New Mexico Environment Department and DOE Order 231.1B, Admin Change 1, *Environment, Safety, and Health Reporting.*

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Plate

Abbreviations and Acronyms

ABCWUA	Albuquerque Bernalillo County Water Utility Authority
AGMR	annual groundwater monitoring report
amsl	above mean sea level
AOC	Area of Concern
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
CME	Corrective Measures Evaluation
CMS	Corrective Measures Study
COA	City of Albuquerque
COC	constituent of concern
Consent Order	*Compliance Order on Consent*
CSM	Conceptual Site Model
CWL	Chemical Waste Landfill
CY	calendar year
DO	dissolved oxygen
DOE	U.S. Department of Energy
DP	Discharge Permit
DRO	diesel range organics
EB	equipment blank
EDMS	Environmental Data Management System
EHD	Environmental Health Department
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
ERP	Environmental Restoration Program (KAFB)
ET	evapotranspirative
FB	field blank
GEL	GEL Laboratories, LLC
GMP	Groundwater Monitoring Program
GRO	gasoline range organics
GWQB	Ground Water Quality Bureau
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
LTMM	long-term monitoring and maintenance
LTMMP	Long-Term Monitoring and Maintenance Plan
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
NMOSE	New Mexico Office of the State Engineer

Abbreviations and Acronyms *(Concluded)*

NNSA	National Nuclear Security Administration
NOD	Notice of Disapproval
NPN	nitrate plus nitrite
OB	Oversight Bureau
ORP	oxidation-reduction potential
PCCP	Post-Closure Care Permit
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
RCRA Permit	*Resource Conservation and Recovery Act Facility Operating Permit, NM5890110518*
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
TSWP	Treatability Study Work Plan
USGS	U.S. Geological Survey
VA	Veterans Affairs or Veterans Administration (groundwater well nomenclature only)
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
Burn Site Well	Burn Site 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

Annual Groundwater Monitoring Report

Executive Summary

This annual groundwater monitoring report (AGMR) presents the results of the calendar year (CY) 2022 groundwater characterization and groundwater monitoring program performed by Sandia National Laboratories, New Mexico (SNL/NM) personnel for the U.S. Department of Energy (DOE)/National Nuclear Security Administration (NNSA).

This AGMR fulfills certain reporting requirements set forth in the *Resource Conservation and Recovery Act Facility Operating Permit, NM5890110518* (RCRA Permit) (New Mexico Environment Department [NMED] January 2015), 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 various DOE Directives as detailed in Section 1.2.1.

The SNL/NM facility is located on Kirtland Air Force Base (KAFB) in central New Mexico. 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 DOE/NNSA under contract DE-NA0003525.

This AGMR documents the results of the groundwater characterization and monitoring activities at SNL/NM for CY 2022. It has been prepared to meet the environmental reporting requirements for the *Sandia National Laboratories*, *New Mexico Annual Site Environmental Report* (SNL August 2022), providing an annual update of groundwater data to regulators, stakeholders, and outside agencies. In addition, it serves as a valuable tool to inform the public about the groundwater quality at SNL/NM. It includes both water quality sampling results and water level measurements.

Chapter 1.0 provides a general site description of the SNL/NM facility and describes the regulatory criteria and sample collection methods for both site-specific and site-wide groundwater monitoring tasks. The Regional Aquifer supplying the Albuquerque Bernalillo County Water Utility Authority, Veterans Affairs, and KAFB production wells is located within the Albuquerque Basin. The Regional Aquifer is mostly contained within the upper unit and, to some extent, the middle unit of the Santa Fe Group. The edge of the basin on the east side is defined by the Sandia, Manzanita, and Manzano Mountains. KAFB straddles the east side of the basin and is divided approximately in half by basin-bounding faults. On KAFB, the basin margin is primarily defined by the north-south-trending Sandia Fault and the Hubbell Spring Fault. The Tijeras Fault, a strike-slip fault that trends northeast-southwest, intersects the Sandia and Hubbell Spring Faults, forming a system of faults collectively referred to as the Tijeras Fault complex. The faults form a distinct hydrogeological boundary between the Regional Aquifer within the basin (approximately 500 feet below ground surface) and the shallower fractured bedrock aquifer systems within the uplifted areas (generally 45 to 360 feet below ground surface).

The remaining chapters focus on the activities at each of the following monitoring networks maintained at SNL/NM: Groundwater Monitoring Program (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).

The NMED defines a Solid Waste Management Unit (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," and an AOC as "any area that may have had a release of a hazardous waste or hazardous constituents, which is not a solid waste management unit." Monitoring and/or corrective action requirements generally are determined on a SWMU-specific or AOC-specific basis following a site investigation. The Consent Order governs corrective actions for these sites and, accordingly, monitoring is performed at the TAVG AOC, TAG AOC, and BSG AOC.

The MWL is a SWMU that underwent corrective action in accordance with the Consent Order, and in March 2016, the Final Order, State of New Mexico Before the Secretary of the Environment in the Matter of Proposed Permit Modification for Sandia National Laboratories, EPA ID # 5890110518, To Determine Corrective Action Complete with Controls at the Mixed Waste Landfill, No. HWB 15-18(P) (NMED Final Order) (Flynn February 2016) became effective, granting Corrective Action Complete (CAC) with Controls status to the MWL. Groundwater monitoring requirements for the MWL are defined in the Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan (MWL LTMMP) (SNL March 2012).

The CWL is a closed, regulated unit undergoing post-closure care in accordance with 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 (CWL PCCP) (NMED May 2007), which became effective on June 2, 2011. The CWL PCCP Attachment 2, Groundwater Sampling and Analysis Plan, details the groundwater monitoring requirements, procedures, and protocols.

Groundwater Quality Monitoring Activities and Results

During CY 2022, groundwater samples were collected from monitoring wells for six networks. The analytical results for samples from all monitoring wells were compared with maximum contaminant levels (MCLs) established by the U.S. Environmental Protection Agency (EPA). The results for GMP monitoring wells were also compared with NMED maximum allowable concentrations (MACs) promulgated for groundwater by the State of New Mexico Water Quality Control Commission. The activities and results are summarized for each location in the following sections, and the data are presented in the attachments following each chapter.

In this AGMR, groundwater monitoring data are presented for both hazardous and radioactive constituents; however, the monitoring data for radionuclides (gamma spectroscopy, gross alpha/beta activity, isotopic uranium, radon-222, radium-226, radium-228, 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, as specified in Section III.A of the Consent Order (NMED April 2004).

Groundwater Monitoring Program

Chapter 2.0 discusses the annual groundwater monitoring activities conducted during March and May 2022 at wells that are part of the GMP. GMP well locations are scattered throughout and along the perimeter of KAFB in areas that are not specifically affiliated with SWMUs or AOCs.

During CY 2022, groundwater elevations were measured in 166 wells owned by several agencies, 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 one surface water sample was collected from Coyote Springs. Groundwater samples were analyzed for volatile organic compounds (VOCs), total organic halogens, total phenols, nitrate plus nitrite (NPN), total alkalinity, major anions (chloride, bromide, fluoride, and sulfate), Target Analyte List (TAL) metals plus total uranium (at select wells), mercury, total cyanide, radionuclides by gamma spectroscopy, gross alpha/beta activity, radium-226, and radium-228. Additional samples were collected from selected monitoring wells for analysis of high explosive compounds and isotopic uranium. No analytes were detected at concentrations exceeding the associated EPA MCLs or MACs, except for beryllium, fluoride, and mercury. Beryllium was detected above the EPA MCL of 0.004 milligrams per liter (mg/L) in the surface water sample from Coyote Springs at a concentration of 0.00703 mg/L, which is similar to historical concentrations and is considered to be of natural origin. Fluoride was detected above the MAC of 1.6 mg/L in monitoring wells OBS-MW1, SFR-4T, and TRE-1 at concentrations ranging from 1.68 mg/L to 2.75 mg/L. The fluoride results are similar to historical concentrations and are also considered to be of natural origin. Mercury was detected above the EPA MCL of 0.002 mg/L in the filtered PL-4 environmental sample at a concentration of 0.00201 mg/L. However, mercury was not detected above the EPA MCL in the filtered PL-4 environmental duplicate sample or in the total/unfiltered mercury environmental and environmental duplicate samples.

Water levels were measured quarterly in monitoring wells by SNL/NM personnel. The water levels were used to construct 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 portion of KAFB and within the city.

Chemical Waste Landfill

Chapter 3.0 discusses the semiannual groundwater monitoring activities conducted during January and August 2022 at the CWL. The 1.9-acre former disposal site is located in the southeastern corner of Technical Area (TA)-III. The site was used for the disposal 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 May 2007).

During CY 2022, groundwater elevations were measured in and groundwater samples were collected from four monitoring wells (CWL-BW5, CWL-MW9, CWL-MW10, and CWL-MW11). Groundwater samples collected during the January 2022 sampling event were analyzed for trichloroethene (TCE), 1,1,2-trichloro-1,2,2-trifluoroethane, tetrachloroethene (PCE), 1,1-dichloroethene, chloroform, trichlorofluoromethane, nickel, and chromium. Groundwater samples collected during the August 2022 sampling event were analyzed for TCE, nickel, and chromium. No analytes were detected at concentrations exceeding the associated EPA MCLs or CWL-PCCP-defined hazardous concentration limits, and the analytical results are comparable to historical values. Other activities conducted at the CWL during CY 2022 included inspections, cover maintenance, and soil-vapor sampling as required by the CWL PCCP.

Mixed Waste Landfill

Chapter 4.0 discusses the semiannual groundwater monitoring activities conducted in May and October 2022 at the MWL (SWMU 76). The 2.6-acre site is located in the north-central portion of TA-III and was operational from 1959 through 1988. The site 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.

Since January 2014, activities at the MWL have been conducted in accordance with the requirements of the MWL LTMMP (SNL March 2012). On March 13, 2016, the NMED Final Order (Flynn February 2016) became effective, granting CAC with Controls status to the MWL and incorporating the MWL LTMMP into the RCRA Permit (NMED January 2015).

During CY 2022, groundwater elevations were measured in seven wells (MWL-BW2, MWL-MW4, MWL-MW5, MWL-MW6, MWL-MW7, MWL-MW8, and MWL-MW9), and groundwater samples were collected from the four compliance monitoring wells (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) and analyzed for VOCs, metals (cadmium, chromium, nickel, and total uranium), radionuclides by gamma spectroscopy, gross alpha/beta activity, radon-222, and tritium. In addition, samples were collected during the October 2022 sampling event for three perfluoroalkyl and polyfluoroalkyl substances (PFAS), including perfluorohexane sulfonic acid (PFHxS), perfluorooctane sulfonic acid (PFOS), and perfluorooctanoic acid (PFOA), to address the NMED's request in the *Approval of the Mixed Waste Landfill Five-Year Report* (NMED July 2021). No analytes were detected at concentrations exceeding the associated EPA MCLs or MWL LTMMP-defined trigger levels, and the analytical results are comparable to historical values. There were no detections of PFAS in the October 2022 groundwater samples. Other activities conducted at the MWL during CY 2022 included inspections, cover maintenance, soil-vapor sampling, and other monitoring required by the MWL LTMMP.

Technical Area-V Groundwater Area of Concern

Chapter 5.0 discusses the quarterly groundwater monitoring activities conducted during January/February, May/June/July/August, and November 2022 at the TAVG AOC. Note that because of Stage-III fire restrictions implemented at SNL/NM, sampling of monitoring wells AVN-1 and TAV-MW3 originally scheduled for the second quarter of CY 2022 was postponed to July 2022.

The TAVG AOC is located at 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. Environmental activities at this AOC are regulated under the requirements of the Consent Order (NMED April 2004).

During CY 2022, groundwater elevations were measured in and groundwater samples were collected from 18 monitoring wells (AVN-1, LWDS-MW1, LWDS-MW2, and TAV-MW2 through TAV-MW16). Groundwater samples were analyzed for VOCs, NPN, alkalinity, major anions (bromide, chloride, fluoride, and sulfate), filtered metals (arsenic, iron, and manganese), TAL metals plus total uranium, radionuclides by gamma spectroscopy, gross alpha/beta activity, and tritium. No analytes were detected at concentrations exceeding the associated EPA MCLs, except for nitrate and TCE. Nitrate concentrations exceeded the EPA MCL of 10 mg/L in samples from three monitoring wells (AVN-1, LWDS-MW1, and TAV-MW10), with a maximum concentration of 13.5 mg/L in the environmental sample from monitoring well TAV-MW10 collected in August 2022. 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 12.4 μg/L in the environmental sample from monitoring well LWDS-MW1 collected in August 2022. The analytical results of nitrate and TCE in the other monitoring wells were below the EPA MCLs and are consistent with historical trends. Other activities conducted at the TAVG AOC during CY 2022 included the final two quarters of groundwater sampling of wells TAV-INJ1 and TAV-MW6 in the in-situ bioremediation Treatability Study treatment zone.

Tijeras Arroyo Groundwater Area of Concern

Chapter 6.0 discusses the quarterly, semiannual, and annual groundwater monitoring activities conducted during four sampling events (February/March, July/August, August/September, and November/December 2022. Samples were not collected in April, May, or June 2022 because KAFB implemented Stage-III fire restrictions. Sampling resumed in July 2022, and all previously deferred wells were sampled.

Two water-bearing units, the Perched Groundwater System (PGWS) and the Regional Aquifer, underlie the TAG AOC. This AOC is located in the north-central portion of KAFB and includes TA-I, TA-II, and TA-IV. Groundwater in the area may have been impacted since the late 1940s and includes numerous potential SNL/NM and non-SNL/NM wastewater and septic-water sources of nitrate and VOCs. All SNL/NM discharges ceased in 1992. Activities at this AOC are regulated under the requirements of the Consent Order (NMED April 2004).

During CY 2022, groundwater elevations were measured in 27 monitoring wells 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). Groundwater samples were analyzed for VOCs, NPN, alkalinity, anions, TAL metals plus total uranium, radionuclides by gamma spectroscopy, gross alpha/beta activity, and tritium. No analytes were detected at concentrations exceeding the associated EPA MCLs, except for nitrate, TCE, and PCE. Nitrate concentrations exceeded the EPA MCL of 10 mg/L in samples from five monitoring wells screened in the PGWS (TA2-W-19, TA2-W-28, TJA-2, TJA-5, and TJA-7), with a maximum concentration of 22.2 mg/L. The upgradient Merging Zone well TJA-4 had a nitrate concentration of 34.4 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 3.92 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 wells TA2-W-19, TJA-2, and TJA-5 have occasionally exceeded the EPA MCL. Recent nitrate concentrations across the monitoring well network are 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 19.7 and 10.4 μg/L, respectively. The TCE and PCE concentrations in well TA2-W-26 have been relatively consistent since September 2020. No other monitoring wells had VOC concentrations that exceeded EPA MCLs.

Burn Site Groundwater Area of Concern

Chapter 7.0 discusses the semiannual groundwater monitoring activities conducted in April/May and October/November 2022 at the BSG AOC. This AOC is located around the active Lurance Canyon Burn Site facility in the far eastern portion of KAFB. It was used from the 1960s through 1980s for explosives tests and burn tests.

Groundwater investigations were initiated in 1997 at the NMED's request after elevated nitrate levels were discovered in the Burn Site Well (production well inactive since 2003). Activities at this AOC are regulated under the requirements of the Consent Order (NMED April 2004).

During CY 2022, groundwater elevations were measured in 17 wells and groundwater samples were collected from 14 wells (CYN-MW4, CYN-MW7, CYN-MW8, CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12, CYN-MW13, CYN-MW14A, CYN-MW15, CYN-MW16, CYN-MW17, CYN-MW18, and CYN-MW19). Samples were analyzed for VOCs, high explosive compounds, total petroleum hydrocarbons-diesel range organics, total petroleum hydrocarbons-gasoline range organics, NPN, alkalinity, major anions (bromide, chloride, fluoride, and sulfate), TAL metals, radionuclides by gamma spectroscopy, gross alpha/beta activity, isotopic uranium, and tritium. No analytes were detected at concentrations exceeding the associated EPA MCLs, except for nitrate. Nitrate concentrations exceeded the EPA MCL of 10 mg/L in samples from six monitoring wells (CYN-MW9, CYN-MW10, CYN-MW12, CYN-MW13, CYN-MW14A, and CYN-MW15), with a maximum concentration of 38.1 mg/L in the April 2022 environmental sample from monitoring well CYN-MW9. The nitrate concentration trends in these wells have been variable within a narrow range over the past year. No other activities were conducted at the BSG AOC in CY 2022.

Future Groundwater Monitoring Events

The groundwater monitoring events conducted on a site-wide basis as part of the GMP and at the CWL, MWL, TAVG AOC, TAG AOC, and BSG AOC will continue during CY 2023 in accordance with regulatory requirements. The results of these monitoring events will be presented in the CY 2023 AGMR.

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1.0 Introduction

General groundwater monitoring is conducted for the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA) at Sandia National Laboratories, New Mexico (SNL/NM). The purpose of this document is to report to regulators and other stakeholders the results of the consolidated groundwater monitoring activities at SNL/NM for calendar year (CY) 2022.

Separate chapters focus on the investigative activities at each of the following monitoring networks maintained at SNL/NM:

- Groundwater Monitoring Program (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

The SNL/NM facility is located on Kirtland Air Force Base (KAFB), New Mexico. KAFB is a 51,559-acre (80.56 square miles [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 at the foot of the Manzanita Mountains, KAFB has an average elevation of 5,384 feet (ft) above mean sea level (amsl). The range of elevations is 5,162 to 7,986 ft amsl. KAFB and SNL/NM are located adjacent to the City of Albuquerque, which borders KAFB on its north and west boundaries (Figure 1-1).

1.1.1 Climate

The Albuquerque area is characterized by low precipitation and wide temperature extremes that are typical of high-altitude, dry, continental climates. The average annual precipitation measured at the Albuquerque International Sunport (National Oceanic and Atmospheric Administration National Weather Service station) is 8.84 inches (Chapter 2.6.2.1). Most precipitation falls between July and September, mainly in the form of brief, heavy rain. The evaporation potential is high because of 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 initiated 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, before present. Tectonic activity, which began uplifting 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).

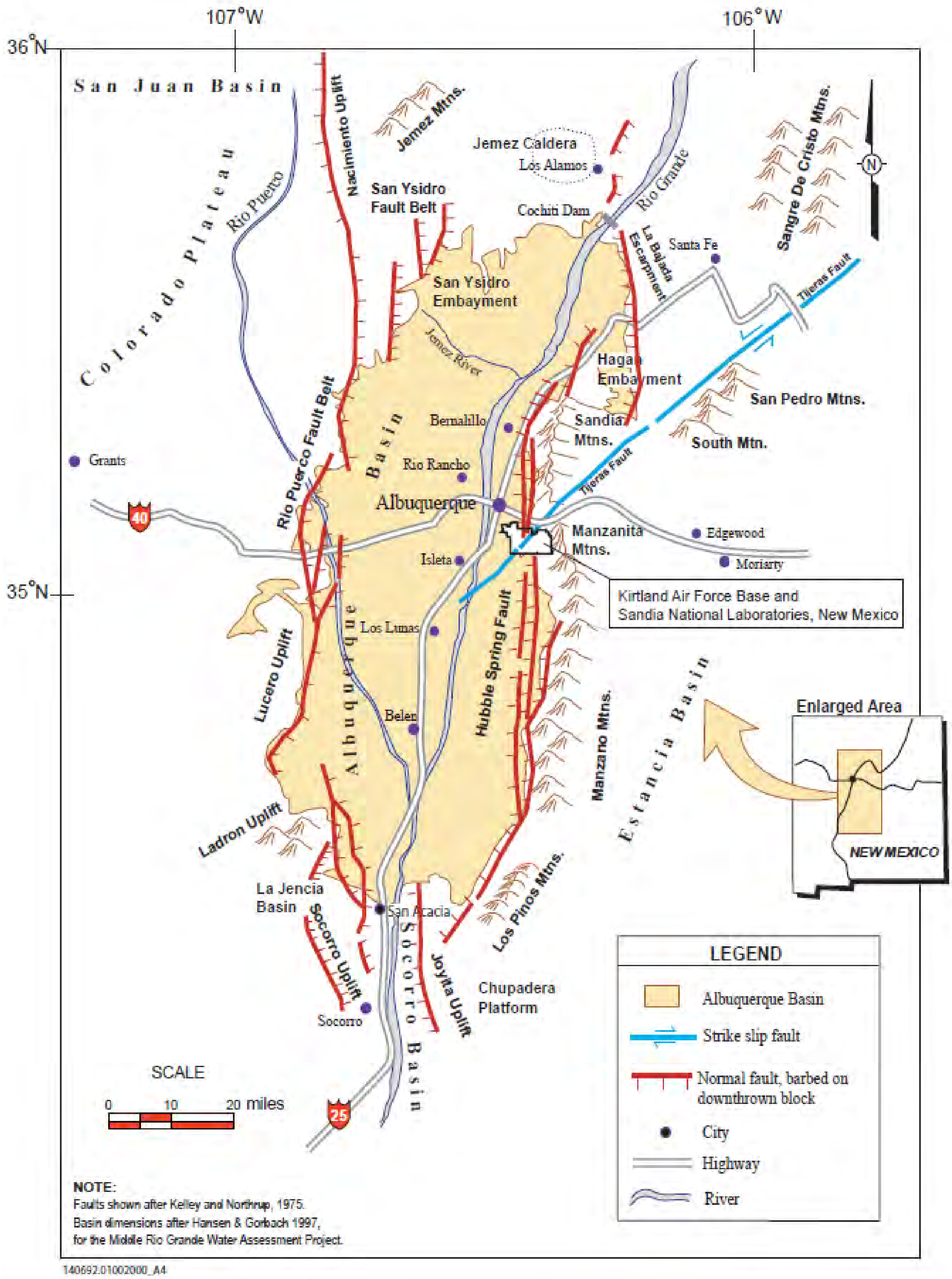

Figure 1-1
Albuquerque Basin, North Central New Mexico

As shown on Figure 1-1, the structural boundaries of the Albuquerque Basin are as follows:

- Colorado Plateau on 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 continued to expand, 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: the Santo Domingo, Calabacillas, and Belen subbasins. 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/sedimentation features contribute greatly to the complex structural setting described below.

Figures 1-2 and 1-3 show four primary faults on the east side of 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 the Hubbell Spring Faults are north-south trending structures that bound the east side of the basin. These two structures are en-echelon normal faults with down to the west displacement.

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). The fault 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 to the east and south of Manzano Base. Manzano Base occupies an uplift of four peaks 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 system of faults, defining the east edge of the Albuquerque basin, is referred to collectively as the Tijeras Fault Complex.

Koning, et al. (August 2019) evaluated the suitability of using managed aquifer recharge in the eastern Albuquerque metropolitan area. Weighted overlay analyses were used to evaluate shallow-base recharge and deep-injection recharge. The best locales for shallow-base recharge and deep-injection recharge were in the central portion of the study area to the northwest of KAFB. Conversely, several areas in the north-central portion of KAFB, including the southeastern corner of the TAG AOC, were deemed unsuitable for shallow-base recharge due to the known extent of groundwater contamination. Deep-injection recharge was also deemed unsuitable due to groundwater contamination and the presence of fault zones that may act as groundwater barriers in the deeper saturated zone.

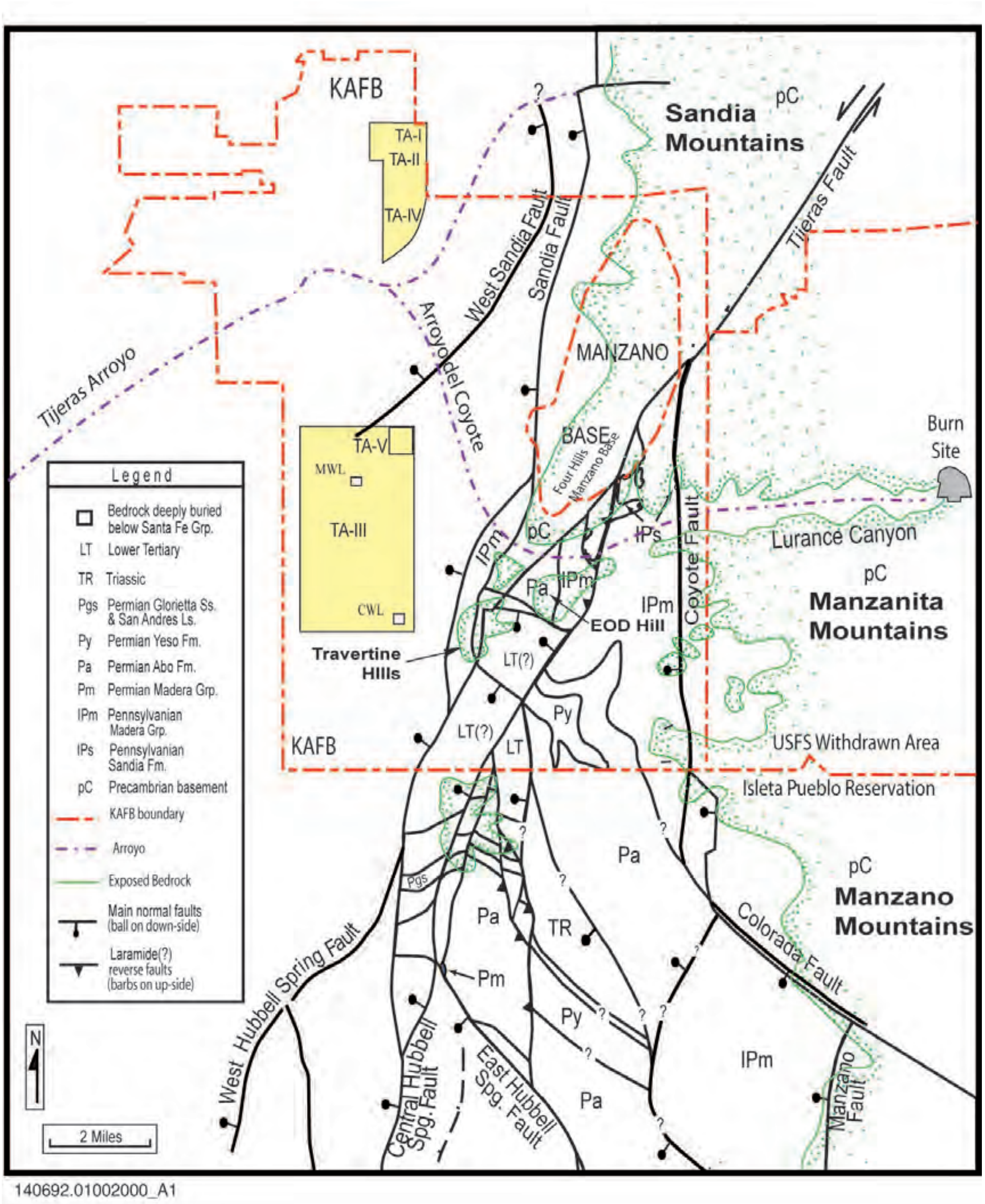

Figure 1-2
Generalized Geology in the Vicinity of Sandia National Laboratories, New Mexico and Kirtland Air Force Base (Van Hart June 2003)

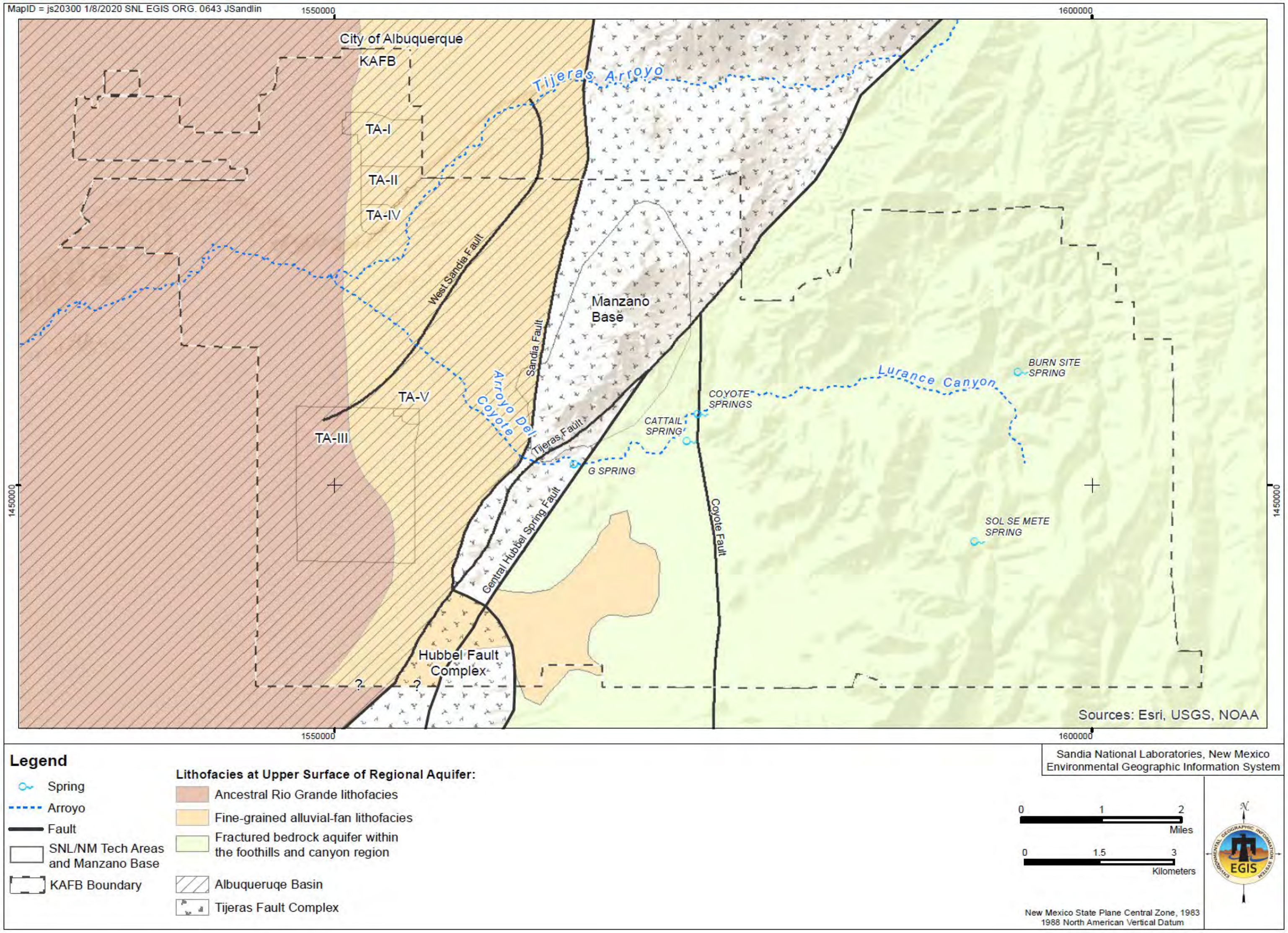

Figure 1-3
Hydrogeologically Distinct Areas Controlled by Faults
(Modified from GRAM and Lettis December 1995 and Van Hart June 2003)

1.1.3 Hydrogeology

Figure 1-3 shows three distinct hydrogeologic areas for the KAFB area: (1) the Albuquerque Basin, (2) the Tijeras Fault Complex, and (3) the foothills and canyons 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 and the fractured bedrock aquifer system. It is important to note that the boundaries shown on Figure 1-3 identify the approximate hydrologic settings. A deep aquifer is present within the Albuquerque Basin where the Regional Aquifer lies at approximately 500 ft below ground surface (bgs). A Perched Groundwater System (PGWS) lies above the Regional Aquifer near TA-I, TA-II, and TA-IV in the TAG AOC. Figure 1-3 does not show the PGWS, but Chapter 6.0 discusses it in detail. The PGWS extends east and southeastward from the former KAFB sewage lagoons to the KAFB Tijeras Arroyo Golf Course. The system crosses TA-I, TA-II, and TA-IV where the gradient averages approximately 0.01 ft per ft (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 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 systems. On the east side of the Tijeras Fault Complex, the depth to groundwater ranges from about 45 to 360 ft bgs. Most non-potable production and monitoring wells east of the faults are completed in fractured bedrock at relatively shallow depths and produce modest yields of groundwater.

Groundwater in the fractured bedrock aquifer system on the east portion of KAFB generally flows west out of the canyons toward the Tijeras Fault Complex (Plate 1). The groundwater gradient for the bedrock aquifer 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 coarser-grained facies of the unconsolidated sediments of the Regional Aquifer.

The historical direction of regional groundwater flow within the Albuquerque basin was westward from the mountains toward the Rio Grande. However, due to groundwater pumping at KAFB, Veterans Affairs, and Albuquerque Bernalillo County Water Utility Authority (ABCWUA) production wells, a depression in the Regional Aquifer has been created, originating at the well fields near the northwest corner of KAFB. The impact of the seasonal variation in water production by both KAFB, Veterans Affairs, and ABCWUA production wells can be observed as minor fluctuations in the groundwater elevations of some SNL/NM and KAFB monitoring wells as far southeast as TA-III.

1.1.4 Surface Water Hydrology

The Rio Grande, located approximately 3 miles west of KAFB, is the major surface hydrologic feature in central New Mexico. The Rio Grande originates in the San Juan Mountains of Colorado and terminates at the Gulf of Mexico, near Brownsville, Texas. The Rio Grande has a total length of 1,760 miles and is the third longest river system in North America. Surface water (with the exception of several springs) within the boundaries of KAFB is found only as ephemeral streams (arroyos) that flow for short periods from runoff after storm events or during the spring melt of mountain snowpack. The primary surface water feature that drains the eastern foothills on KAFB is the Tijeras Arroyo. The Arroyo del Coyote intersects Tijeras Arroyo just south of TA-IV (about 1 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. The Tijeras Arroyo, above the confluence with Arroyo del Coyote, drains about 80 sq mi, while Arroyo del Coyote drains about 39 sq mi (USACE 1979). The total watershed for Tijeras Arroyo, which includes 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 floodplains of both Tijeras Arroyo and Arroyo del Coyote.

Several springs on KAFB are associated with the uplifts in the Tijeras Fault Complex and in the foothills and canyons hydrogeologic areas (Figure 1-3): (1) Coyote Springs, Cattail Springs, and G Spring within Arroyo del Coyote, (2) Burn Site Spring in Lurance Canyon, and (3) Sol se Mete Spring within the Manzanita Mountains. Coyote Springs and Sol se Mete are perennial springs (continuously flowing), while the others are ephemeral springs. Hubbell Spring (a perennial spring) is located just south of KAFB on Isleta Pueblo (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 along the major arroyos. However, the amount of recharge occurring in the foothills and canyons is not well characterized. The estimated recharge for that portion of Tijeras Arroyo on KAFB is approximately 2.2 million cubic ft per year (ft/yr; 50 acre-ft/yr) (SNL February 1998). The best estimate for the groundwater recharge associated with 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 recharge from direct precipitation is negligible due to the high rate of evapotranspiration for most other areas on KAFB, especially on alluvial-fan slopes and other relatively flat areas (SNL February 1998).

1.2 Groundwater Monitoring

Extensive groundwater monitoring is conducted on KAFB by two agencies – the U.S. Department of Defense through KAFB Environmental Restoration Program (ERP) personnel and the DOE through SNL/NM personnel. The KAFB ERP has a large monitoring well network associated with several closed landfills and a former KAFB sewage lagoon system. Additional KAFB wells are sited to monitor and characterize several nitrate plumes and an extensive aviation gasoline/jet fuel plume associated with the KAFB Bulk Fuels Facility. SNL/NM personnel monitor groundwater on KAFB at locations associated with DOE/NNSA-owned facilities and sites permitted by the U.S. Air Force for DOE/NNSA use. Groundwater monitoring is conducted by SNL/NM personnel on a site-wide and site-specific basis. Figure 1-4 illustrates the extensive monitoring well network at KAFB. Plate 1 more accurately portrays the monitoring well network and is presented after Chapter 7.0 of this annual groundwater monitoring report (AGMR), along with Tables 1 and 2, which provide construction details and groundwater elevations for the monitoring, production, and remediation wells operated by SNL/NM and others. Table 1-1 lists the CY 2022 sampling events conducted for groundwater quality monitoring at SNL/NM.

Table 1-2 summarizes the groundwater analytical results for monitoring activities performed at SNL/NM during CY 2022. A note about nomenclature: Historical groundwater analyses have demonstrated that nitrite concentrations are below method detection limits and are considered noncontributory to the results of nitrate plus nitrite (NPN) analyses. Therefore, NPN (as nitrogen) results are used directly to represent nitrate concentrations. Table 1-3 lists detected analytes that exceed the U.S. Environmental Protection Agency (EPA) drinking water regulatory criteria/maximum contaminant level (EPA March 2018) in samples collected by SNL/NM personnel during CY 2022.

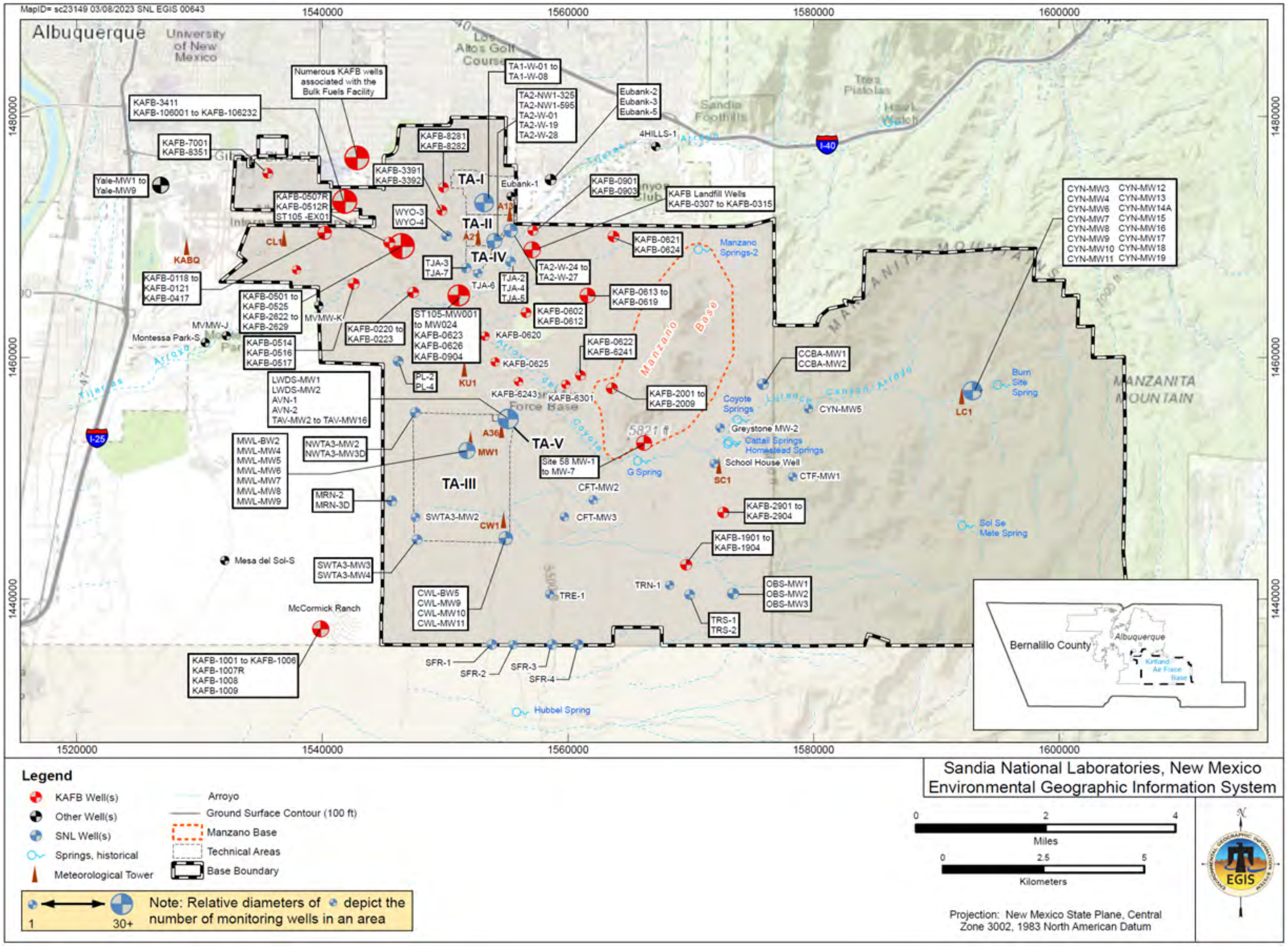

Figure 1-4
Wells and Springs within Sandia National Laboratories, New Mexico and Kirtland Air Force Base

Table 1-1
Sample Collection Dates for Groundwater Quality Monitoring at Sandia National Laboratories, New Mexico for Calendar Year 2022

2022 Sampling Event	GMP	CWL	MWL	TAVG	TAG	BSG
January		✓		✓		
February				✓	✓	
March	✓				✓	
April						✓
May	✓		✓	✓		✓
June				✓		
July				✓	✓	
August		✓		✓	✓	
September					✓	
October			✓			✓
November				✓	✓	✓
December					✓	

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

Table 1-2
Summary of Sandia National Laboratories, New Mexico Groundwater Monitoring Analytical Results for Calendar Year 2022

SNL/NM Groundwater Monitoring	
Number of Active Wells/Springs Monitored	78
Number of Analyses Performed	12,222
Percent of Non-detected Results	85%

Analyte	Number of Detects	Number of Non-Detects	Minimum Detected Value	Maximum Detected Value	Mean Detected Value	EPA MCL
Summary of Field Water Quality Parameters (units as indicated below)						
pH in SU	157	0	5.44	8.18	7.42	NE
Specific Conductivity in µmho/cm	157	0	37.9	4245.3	695.5	NE
Temperature in °C	157	0	10.07	24.30	19.51	NE
Turbidity in NTU	157	0	0.08	439	3.94	NE
Detected Organic Compounds in µg/L						
Acetone	3	139	1.82	2.15	1.99	NE
Chloroform	14	155	0.520	1.11	0.736	80.0[a]
Dichloroethane, 1,1-	13	151	0.360	7.06	3.680	NE
Dichloroethene, 1,1-	10	159	1.01	3.02	2.104	7.0
Dichloroethene, cis-1,2-	44	121	0.350	6.22	1.674	70.0
Naphthalene	1	20	0.380	0.380	0.380	NE
Tetrachloroethene	13	156	0.440	10.4	5.37	5.0
Toluene	15	147	0.340	1.88	0.733	1000
Trichlorobenzene, 1,2,3-	1	151	0.380	0.380	0.380	NE
Trichloroethene	77	98	0.420	19.7	5.52	5.0
Diesel Range Organics	1	35	91.2	91.2	91.2	NE
Detected Inorganic Parameters in mg/L						
Nitrate plus Nitrite, as N	176	1	0.146	38.1	7.888	10.0
Bromide	71	2	0.147	2.94	0.536	NE
Chloride	73	0	9.50	457	54.15	NE
Fluoride	73	0	0.168	2.75	0.924	4.0
Sulfate	73	0	16.1	1940	118	NE
Total Organic Halogens	10	11	0.00370	0.133	0.03240	NE
Total Phenols	1	20	0.00393	0.00393	0.00393	NE
Alkalinity as $CaCO_3$	73	0	60.6	1010	205.9	NE

Refer to Notes on page 1-12.

Table 1.2 *(Continued)*
Summary of Sandia National Laboratories, New Mexico Groundwater Monitoring Analytical Results for Calendar Year 2022

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	11	62	0.0239	0.762	0.1818	NE
Antimony	6	67	0.00108	0.00182	0.00134	0.006
Arsenic	72	63	0.00202	0.00724	0.00280	0.010
Barium	73	0	0.00849	0.231	0.06947	2.0
Beryllium	4	69	0.000220	0.00703	0.002580	0.004
Cadmium	2	81	0.000352	0.000395	0.000374	0.005
Calcium	73	0	35.3	312	88.2	NE
Chromium	10	83	0.00307	0.0419	0.00974	0.100
Cobalt	4	69	0.000310	0.00949	0.002850	NE
Copper	22	51	0.000324	0.00377	0.000808	1.3
Iron	17	118	0.0350	0.581	0.1238	NE
Lead	2	71	0.000592	0.000731	0.000661	0.015
Magnesium	73	0	3.80	62.9	20.22	NE
Manganese	30	104	0.00110	1.44	0.0536	NE
Mercury	1	93	0.00201	0.00201	0.00201	0.002
Nickel	18	75	0.000600	0.0232	0.002550	NE
Potassium	73	0	1.23	31.4	3.62	NE
Selenium	56	17	0.00154	0.0286	0.00470	0.050
Sodium	73	0	15.5	974	60.5	NE
Thallium	1	72	0.00132	0.00132	0.00132	0.002
Uranium	59	0	0.00103	0.00933	0.00385	0.030
Vanadium	55	18	0.00362	0.0105	0.00629	NE
Zinc	18	55	0.00400	0.179	0.04100	NE

Refer to Notes on page 1-12.

Table 1.2 *(Concluded)*
Summary of Sandia National Laboratories, New Mexico Groundwater Monitoring Analytical Results for Calendar Year 2022

Analyte	Number of Detects	Number of Non-Detects	Minimum Detected Value	Maximum Detected Value	Mean Detected Value	MCL
Detected Radiochemistry Activities in pCi/L (unless noted otherwise)						
Alpha, gross (corrected)	83	0	-4.722	8.348	2.364	15.0[b]
Beta, gross	74	7	2.050	20.5	5.147	4 mrem/yr
Potassium-40	1	71	64.5	64.5	64.5	NE
Radium-226	12	9	0.446	3.04	1.135	5.0[c]
Radium-228	7	14	0.865	1.43	1.033	5.0[c]
Radon-222	10	0	95.4	470	275.2	4000
Tritium	1	61	158	158	158	4 mrem/yr
Uranium-233/234	24	0	0.40	33.5	12.66	NE
Uranium-235/236	22	2	0.109	0.710	0.231	NE
Uranium-238	24	0	0.104	6.40	2.567	NE

Notes:

[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 [Title 40 Code of Federal Regulations § 141.11{b}], National Primary Drinking Water Standards [EPA March 2018])
mg/L = milligrams per liter
mrem/yr = millirems per year
N = nitrogen
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 during Calendar Year 2022

Analyte	Well (Relevant Chapter)	Exceedance	Date
Beryllium EPA MCL = 0.004 mg/L	Coyote Springs (Ch. 2)	0.00703 mg/L[a]	March 2022
Nitrate plus Nitrite (as Nitrogen) EPA MCL = 10.0 mg/L	AVN-1 (Ch. 5)	10.2 mg/L	July 2022
	CYN-MW9 (Ch. 7)	38.1 mg/L	April 2022
		37.7 mg/L	November 2022
	CYN-MW10 (Ch. 7)	10.2 mg/L	April 2022
		16.8 mg/L	October 2022
	CYN-MW10 (Duplicate) (Ch.7)	16.8 mg/L	October 2022
	CYN-MW12 (Ch. 7)	15.9 mg/L	May 2022
		15.8 mg/L	November 2022
	CYN-MW12 (Duplicate) (Ch.7)	16.0 mg/L	November 2022
	CYN-MW13 (Ch. 7)	29.5 mg/L	May 2022
		27.8 mg/L	November 2022
	CYN-MW14A (Ch. 7)	11.0 mg/L	May 2022
		11.6 mg/L	November 2022
	CYN-MW14A (Duplicate) (Ch. 7)	10.9 mg/L	May 2022
	CYN-MW15 (Ch. 7)	17.6 mg/L	May 2022
		18.2 mg/L	November 2022
	LWDS-MW1 (Ch. 5)	12.2 mg/L	February 2022
		12.2 mg/L	June 2022
		13.1 mg/L	August 2022
		12.1 mg/L	November 2022
	LWDS-MW1 (Duplicate) (Ch. 5)	12.4 mg/L	November 2022
	TA2-W-19 (Ch. 6)	12.3 mg/L	February 2022
		11.2 mg/L	July 2022
		12.7 mg/L	August 2022
		12.1 mg/L	December 2022
	TA2-W-28 (Ch. 6)	17.8 mg/L	February 2022
		15.5 mg/L	July 2022
		18.8 mg/L	August 2022
		14.4 mg/L	December 2022
	TA2-W-28 (Duplicate) (Ch. 6)	15.4 mg/L	July 2022
	TAV-MW10 (Ch. 5)	12.5 mg/L	February 2022
		12.6 mg/L	June 2022
		13.5 mg/L	August 2022
		12.7 mg/L	November 2022
	TAV-MW10 (Duplicate) (Ch. 5)	12.6 mg/L	February 2022
	TJA-2 (Ch. 6)	11.9 mg/L	February 2022
		11.3 mg/L	July 2022
		12.6 mg/L	August 2022
		13.2 mg/L	December 2022
	TJA-2 (Duplicate) (Ch. 6)	12.9 mg/L	December 2022
	TJA-4 (Ch. 6)	32.2 mg/L	March 2022
		29.8 mg/L	July 2022
		32.8 mg/L	August 2022
		34.4 mg/L	December 2022
	TJA-5 (Ch. 6)	16.4 mg/L	August 2022
	TJA-7 (Ch. 6)	22.2 mg/L	March 2022
		21.4 mg/L	July 2022
		21.9 mg/L	August 2022
		21.7 mg/L	December 2022

Refer to Notes on page 1-14.

Table 1-3 *(Concluded)*
Summary of Exceedances for Sandia National Laboratories, New Mexico Groundwater Monitoring Wells and Springs Sampled during Calendar Year 2022

Analyte	Well (Relevant Chapter)	Exceedance	Date
Mercury EPA MCL = 0.002 mg/L	PL-4 (Ch. 2)	0.00201 mg/L	March 2022
Tetrachloroethene EPA MCL = 5.0 µg/L	TA2-W-26 (Ch. 6)	7.44 µg/L	March 2022
		7.18 µg/L	August 2022
		10.4 µg/L	August 2022
		8.10 µg/L	December 2022
	TA2-W-26 (Duplicate) (Ch. 6)	8.05 µg/L	March 2022
		7.43 µg/L	August 2022
		9.37 µg/L	August 2022
		7.48 µg/L	December 2022
Trichloroethene EPA MCL = 5.0 µg/L	LWDS-MW1 (Ch. 5)	10.1 µg/L	February 2022
		11.5 µg/L	June 2022
		12.4 µg/L	August 2022
		7.11 µg/L	November 2022
	LWDS-MW1 (Duplicate) (Ch. 5)	6.04 µg/L	November 2022
	TA2-W-26 (Ch. 6)	15.0 µg/L	March 2022
		16.3 µg/L	August 2022
		19.7 µg/L	August 2022
		17.7 µg/L	December 2022
	TA2-W-26 (Duplicate) (Ch. 6)	16.0 µg/L	March 2022
		16.2 µg/L	August 2022
		18.1 µg/L	August 2022
		15.1 µg/L	December 2022
	TAV-MW4 (Ch. 5)	5.21 µg/L	February 2022
		5.77 µg/L	June 2022
		5.76 µg/L	August 2022
		6.37 µg/L	November 2022
	TAV-MW6 (Ch. 5)	8.36 µg/L	August 2022
		8.97 µg/L	November 2022
	TAV-MW8 (Ch. 5)	5.21 µg/L	February 2022
		5.04 µg/L	June 2022
		5.07 µg/L	August 2022
		5.27 µg/L	November 2022
	TAV-MW8 (Duplicate) (Ch. 5)	5.17 µg/L	August 2022
	TAV-MW10 (Ch. 5)	11.1 µg/L	February 2022
		10.7 µg/L	June 2022
		9.52 µg/L	August 2022
		10.0 µg/L	November 2022
	TAV-MW10 (Duplicate) (Ch. 5)	10.8 µg/L	February 2022
	TAV-MW14 (Ch. 5)	5.04 µg/L	November 2022

Notes:

a = analytical result for filtered water sample (all other analytical results are for unfiltered water samples)
µg/L = micrograms per liter
AVN = Area-V (North) (monitoring well designation only)
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
PL = Power Line
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)

In this AGMR, groundwater monitoring data are presented 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 specified in Section III.A of the Consent Order.

1.2.1 SNL/NM Groundwater Monitoring Requirements

Groundwater monitoring performed by SNL/NM personnel is directed based on three broad sets of requirements: the *Resource Conservation and Recovery Act (RCRA) Facility Operating Permit, NM5890110518* (RCRA Permit) (NMED January 2015), the Consent Order (NMED April 2004), and various DOE Directives.

Potential release sites at SNL/NM are identified, characterized, and remediated (if required) under the RCRA regulations. In 1984, RCRA 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). In the RCRA Permit, a SWMU is defined 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." At SNL/NM, SWMUs are regulated under the RCRA Permit. Monitoring and/or corrective action requirements generally are determined on a SWMU-specific basis following a site investigation.

The Consent Order became effective in 2004 and specified that corrective actions for releases of hazardous waste or hazardous constituents be conducted under the Consent Order rather than under the RCRA Permit, with the exception of new releases from operating units, closure and post-closure at operating units, implementation of controls for any SWMU on the RCRA Permit's Corrective Action Complete (CAC) with Controls list, and any releases of hazardous waste or hazardous constituents that occur after the Consent Order is no longer effective. The Consent Order defines an AOC as "any area that may have had a release of a hazardous waste or hazardous constituents, which is not a solid waste management unit."

The GMP sampling complies with the Consent Order requirement for Facility Investigation Background and Periodic Monitoring Reports. Groundwater monitoring results at all sites are compared with federal and state water quality standards and DOE drinking water guidelines, where established. Some information in this AGMR is also provided in reports required by DOE Order 231.1B, Admin Chg 1, *Environment, Safety, and Health Reporting* (DOE November 2012), including the *Sandia National Laboratories, New Mexico Annual Site Environmental Report* (SNL August 2022).

Closure of the CWL was approved by the NMED and 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* (CWL PCCP) (NMED May 2007) became effective on June 2, 2011 (Kieling June 2011). All groundwater monitoring at the CWL since June 2011 has been performed in accordance with requirements specified in the CWL PCCP. Required monitoring (groundwater and soil-vapor), inspections, and maintenance activities are comprehensively documented in annual Post-Closure Care Reports submitted to the NMED by March 31st of each year.

The MWL is a SWMU that underwent corrective action in accordance with the Consent Order. As of March 13, 2016, the *Final Order, State of New Mexico Before the Secretary of the Environment in the Matter of Proposed Permit Modification for Sandia National Laboratories, EPA ID # 5890110518, To Determine Corrective Action Complete with Controls at the Mixed Waste Landfill, No. HWB 15-18(P)* (Flynn February 2016) became effective, granting CAC with Controls status to the MWL. All controls required for the MWL, including groundwater monitoring, are defined in the *Mixed Waste Landfill*

Long-Term Monitoring and Maintenance Plan (MWL LTMMP) (SNL March 2012) approved by the NMED on January 8, 2014 (Blaine January 2014). The MWL LTMMP defines all long-term monitoring, inspection, maintenance/repair, and reporting requirements that apply to the MWL and is included in the RCRA Permit (Kieling February 2016). Ongoing monitoring, inspection, and maintenance/repair are comprehensively documented in MWL Annual Long-Term Monitoring and Maintenance Reports submitted to the NMED by June 30th of each year.

The three groundwater AOCs at SNL/NM (TAVG, TAG, and BSG) are undergoing corrective action in accordance with the Consent Order. Each AOC complies with requirements set forth in the Consent Order for site characterization and the development of a Corrective Measures Evaluation. The NMED is the regulatory agency responsible for enforcing the requirements of the Consent Order for each AOC (SNL June 2004, July 2004, and December 2004). The Consent Order also includes requirements for placing and installing new groundwater monitoring wells and plugging and abandoning decommissioned monitoring wells at SNL/NM. Applicable well installation and well plugging permits are obtained from the New Mexico Office of the State Engineer.

In addition to groundwater monitoring requirements, the Consent Order has recommendations for public involvement with sites in the corrective action process, such as the BSG, TAG, and TAVG AOCs. Activities to inform the public about the status of these three AOCs in CY 2022 included presentations at DOE/NNSA public meetings held virtually in April and October.

1.3 Field Methods, Analytical Methods, and Quality Control Procedures

The monitoring procedures, as conducted by SNL/NM personnel, are consistent with procedures identified in the EPA's *RCRA Ground-Water Monitoring Technical Enforcement Guidance Document* (EPA 1986a). This section discusses procedures that apply to all groundwater investigations. Chapters 2.0 through 7.0 present the site-specific variances from the procedures.

1.3.1 Field Methods and Measurements

The following sections provide an overview of the sampling and data collection procedures.

1.3.1.1 Groundwater Elevation

In CY 2022, water level measurements were obtained to determine groundwater flow directions, hydraulic gradients, and potentiometric surface elevations. Water levels are periodically measured in SNL/NM monitoring wells according to the instructions and requirements specified in FOP 03-02, *Long-Term Stewardship Program Groundwater Level Data Acquisition and Management* (SNL August 2021). Chapters 2.0 through 7.0 present the water level information used to create the 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 the CY 2022 groundwater samples from all monitoring wells. The minimum purge requirement for the portable piston pump is one saturated screen volume (including annulus). Field water quality parameters measured (Table 1-4) included temperature, specific conductivity (SC), oxidation-reduction potential (ORP), potential of hydrogen (pH), turbidity, and dissolved oxygen (DO). These were recorded for each well during purging and prior to collecting groundwater samples according to SNL/NM FOP 05-01, *Long-Term Stewardship Program Groundwater Monitoring Well Sampling and Field Analytical Measurements* (SNL January 2021a). Groundwater temperature, SC, ORP, pH, and DO were measured using an In-Situ Incorporated Aqua TROLL® 600 Multiparameter Water Quality Sonde. Turbidity was measured with a HACH™ Model 2100P 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 units
pH	= potential of hydrogen (negative logarithm of the hydrogen ion concentration)

The amount of water required to achieve stabilization of field parameters is fairly consistent for a particular monitoring well; however, the ability of the aquifer to produce water can vary greatly from well to well. In accordance with the site-specific mini-sampling and analysis plans (SAPs) (as identified in Chapters 2.0 through 7.0), purging continued until four stable measurements for temperature, SC, pH, and turbidity were obtained. Groundwater stability is considered acceptable (stable) when, for four consecutive readings, temperature is within 1.0 degree Celsius (°C), SC is within 5 percent (%), pH is within 0.1 units, and turbidity is less than 5 nephelometric turbidity units (NTUs) or when, for final turbidity values greater than 5 NTU, the final four measurements are within 10% of each value. Due to severely low hydraulic conductivities, several monitoring wells purge dry prior to removal of the minimum required volume. During the monitoring events, these wells were purged dry, allowed to recover, and then sampled to collect the most representative groundwater sample possible given the low yield of the wells. Associated field measurement logs documenting details of well purging and water quality measurements for each sampling event were submitted to the SNL/NM Customer Funded Records Center.

1.3.1.3 Pump Decontamination

The sampling pump and tubing bundle associated with the portable Bennett™ groundwater sampling system are decontaminated prior to insertion into each monitoring well according to procedures described in SNL/NM FOP 05-03, *Long-Term Stewardship Program Groundwater Monitoring Equipment Decontamination* (SNL January 2021b). Equipment blank (EB) samples are collected to verify the equipment decontamination process.

1.3.1.4 Sample Collection Sampling Procedures

Groundwater samples are collected using the nitrogen gas-powered portable piston pump (Bennett™) in accordance with SNL/NM FOP 05-01, *Long-Term Stewardship Program Groundwater Monitoring Well Sampling and Field Analytical Measurements* (SNL January 2021a). Sample bottles are filled directly from the pump discharge line and water sampling manifold.

1.3.1.5 Sample Handling and Shipment

The SNL/NM Sample Management Office (SMO) processes environmental samples collected by SNL/NM personnel. The SMO staff obtains sample containers, issues sample control and tracking numbers, tracks the chain-of-custody forms, and reviews analytical data packages to determine method, contract, and regulatory project-specific compliance. All groundwater samples are analyzed by off-site laboratories using EPA-specified protocols. Analytical laboratories report associated quality control (QC) data, which are reviewed against quality assurance requirements specified in the *Procedure for Completing the Contract Verification Review* (SNL April 2019) and AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL June 2020).

1.3.1.6 Waste Management

Purge and decontamination wastewater generated by sampling activities was placed in 55-gallon polyethylene drums and stored in the Environmental Resources Field Office waste accumulation area. All waste was managed in accordance with SNL/NM FOP 05-04, *Long-Term Stewardship Program Groundwater Monitoring Waste Management* (SNL January 2021c). All wastewater was discharged to the sanitary sewer in accordance with ABCWUA and project-specific regulatory requirements after waste characterization data were compared to discharge limits and a discharge approval was issued.

1.3.2 Analytical Methods

The groundwater samples are analyzed by off-site laboratories using EPA-specified protocols. Groundwater samples were submitted to GEL Laboratories, LLC for analysis. Samples were analyzed in accordance with applicable EPA and DOE methods (Tables 1-5 and 1-6).

Table 1-5
Chemical Analytical Methods

Analyte	Analytical Method[a]
Alkalinity (total, bicarbonate, 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**

EPA 1986b (and updates). *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd ed., Rev. 1, U.S. Environmental Protection Agency, Washington, D.C.

EPA 1984. *Methods for Chemical Analysis of Water and Wastes,* EPA 600-4-79-020, U.S. Environmental Protection Agency, Washington, D.C.

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

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**

DOE 1997. *EML [Environmental Measurements Laboratory] Procedures Manual,* 28th ed., Vol. 1, Rev. 0, HASL-300, Environmental Measurements Laboratory.

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

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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 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 shows the types of QC samples that accompany groundwater samples in the sampling and analysis process. Upon receipt at SNL/NM, all chemical and radiochemical data are reviewed and qualified in accordance with SNL/NM AOP 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL June 2020). The analytical results that were qualified during the data validation process and other data quality issues are discussed for individual groundwater monitoring programs. Data validation qualifiers are provided with the analytical results in the data tables attached to Chapters 2.0 through 7.0. The data validation report associated with each sampling event is retained per the SNL/NM Records Retention and Disposition Schedule.

1.3.4 Field Quality Control Samples

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

1.3.4.1 Environmental Duplicate Samples

Environmental duplicate samples were analyzed to estimate the overall reproducibility of the sampling and analytical process. An environmental duplicate sample is collected immediately after the original environmental sample to reduce variability caused by time and/or sampling mechanics. The results for environmental duplicate sample analyses (for concentrations above detection limits in both samples only) are used to calculate relative percent difference values. The environmental duplicate results are discussed in Chapters 2.0 through 7.0.

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

QC Sample Type	Description
Field QC	
Duplicate samples	Establish the precision of the sampling process.
Equipment blanks	Determine the effectiveness of the decontamination process of the sampling pump and system to ensure that cross-contamination did not occur between wells.
Field blanks	Assess whether contamination of the VOC samples had resulted from ambient field conditions.
Trip blanks	Determine whether VOC contamination occurred during sample 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 if contaminants were inadvertently introduced during the sample preparation and handling process in the laboratory.
Sample replicate	Used to determine precision for non-organic analyses.
Surrogate spike	Used to demonstrate matrix compatibility with the chosen method of analysis of organic compounds.

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

1.3.4.2 Equipment Blank Samples

The portable Bennett™ sampling pump and tubing bundle were decontaminated prior to insertion into each monitoring well according to procedures described in SNL/NM FOP 05-03, *Long-Term Stewardship Program Groundwater Monitoring Equipment Decontamination* (SNL January 2021b). EB samples are collected periodically to verify the effectiveness of the equipment decontamination process. The EB samples are analyzed for the same constituents as the groundwater samples. The results of the EB analyses are discussed in Chapters 2.0 through 7.0.

1.3.4.3 Field Blank Samples

FB samples are submitted to assess whether any contamination of the samples could have resulted from ambient field conditions. FB samples are 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. The 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 discuss the results of the FB analyses.

1.3.4.4 Trip Blank Samples

TB samples are submitted whenever groundwater samples are collected for VOC and GRO analyses. These samples are used to determine potential contamination during sampling, transport, storage, and analysis and consist of laboratory reagent-grade water with hydrochloric acid preservative contained in 40-milliliter glass vials. These containers are prepared by the analytical laboratory and accompany the empty sample containers supplied by the laboratory. TB samples accompany each groundwater sample shipment and are analyzed for VOCs and/or GRO. Chapters 2.0 through 7.0 discuss the results of the TB analyses.

1.3.5 Laboratory Quality Control Samples

Laboratory and method-required batch QC samples are prepared to determine potential contamination introduced by the laboratory processes. These samples are used to assist with data validation and data defensibility and include laboratory control samples, replicates, matrix spikes, matrix spike duplicates, method blank samples, and surrogate spike samples. Internal laboratory QC samples are analyzed concurrently with all environmental samples. All chemical and radiochemical data are reviewed and qualified in accordance with SNL/NM AOP 00-03 *Data Validation Procedure for Chemical and Radiochemical Data* (SNL June 2020). Laboratory data qualifiers are provided with the analytical results in the tables attached to Chapters 2.0 through 7.0.

Chapter 1.0
Introduction References

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2.0 Groundwater Monitoring Program

2.1 Introduction

This chapter documents the results for the calendar year (CY) 2022 monitoring activities conducted as part of the Sandia National Laboratories, New Mexico (SNL/NM) Groundwater Monitoring Program (GMP). The monitoring activities include the annual collection and analysis of groundwater samples from 16 monitoring wells and 1 surface water sample from a perennial spring. As part of the activities, SNL/NM personnel used groundwater elevation data from 166 monitoring wells owned by several agencies. Groundwater elevation measurements were obtained 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.

The purpose of monitoring the GMP network is to establish background quality and understanding of the general hydrogeologic system beneath SNL/NM. To accomplish this mission, SNL/NM personnel perform the following tasks:

- 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.
- Provide assistance to well owners in the areas of well installation, well inspection and maintenance, and well plugging and abandonment.
- Establish and implement requirements for well registration and well construction data tracking.
- Coordinate with the Surface Water Discharge Program and other SNL/NM organizations to prevent groundwater contamination.
- Provide stakeholders an annual update of SNL/NM groundwater data through this annual groundwater monitoring report (AGMR).
- Support compliance activities at the three groundwater Areas of Concern (AOCs) and background locations.

The groundwater monitoring involves completing the following objectives:

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

The GMP is responsible for tracking information for wells operated by SNL/NM personnel. The GMP Well Registry and Oversight Task was established to ensure that wells operated by SNL/NM personnel are properly constructed and maintained to protect groundwater resources in accordance with guidelines specified by the New Mexico Office of the State Engineer (NMOSE) in *Rules and Regulations Governing Well Driller Licensing; Construction, Repair and Plugging of Wells* (NMOSE August 2005 and NMOSE June 2020). The GMP lead works with SNL/NM personnel to review new monitoring well installation plans, record construction information, track well ownership and maintenance records, perform annual well inspections, and consult with owners when plugging and abandoning or replacing an obsolete monitoring well in accordance with applicable requirements. The goal is to provide full life-cycle management of monitoring wells and deep boreholes.

2.2 Regulatory Criteria

The following actions ensure implementation of a successful GMP that includes relevant elements of the Environmental Management System at SNL/NM:

- Meet applicable federal, state, and U.S. Department of Energy (DOE) requirements.
- Document the history of GMP activities for future site management.
- Document the quality of baseline groundwater conditions.

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) (New Mexico Environment Department [NMED] April 2004) became effective. Among other sampling requirements, the Consent Order includes a requirement to conduct four continuous quarters of sampling and analysis for perchlorate for newly constructed monitoring wells. The protocol establishes a screening level/laboratory method detection limit (MDL) of 4 micrograms per liter (µg/L). If the sampling results indicate the presence of perchlorate either at or greater than 4 µg/L, then DOE/National Nuclear Security Administration (NNSA) and SNL/NM personnel are required to assess the nature and extent of perchlorate contamination and incorporate the results of this assessment into a Corrective Measures Evaluation (CME). Sampling and analysis at the noncompliant well will continue on a quarterly basis until at least four consecutive non-detections are obtained. Section VII.C of the Consent Order clarifies that the CME process will be initiated where there is a documented release to the environment, and where corrective measures are necessary to protect human health and the environment.

The NMED DOE Oversight Bureau (OB) splits a percentage of groundwater samples collected by the SNL/NM GMP. The samples are analyzed by laboratories under contract to the NMED DOE OB. The NMED DOE OB provides independent verification of environmental monitoring results obtained by SNL/NM personnel on behalf of the DOE/NNSA Sandia Field Office. Table 2-1 presents additional requirements associated with groundwater quality regulations.

Although radionuclides (gamma spectroscopy, gross alpha/beta activity, radium-226, radium-228, and isotopic uranium) are being monitored, the information related to radionuclides is provided voluntarily by the 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 specified in Section III.A of the Consent Order.

Table 2-1
Groundwater Quality Regulations

Regulation/Requirements	Standards and Guides	Regulating Agency
National Primary Drinking Water Regulations (40 CFR 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

Activities performed during CY 2022 included sampling at designated monitoring wells and springs (Figure 2-1), sample analysis, groundwater level measurements, and construction of hydrographs and a potentiometric surface map (Plate 1). Historically, the GMP consisted of sampling 12 monitoring wells and in CY 2019 was expanded to 16 monitoring wells (Figure 2-1). Existing monitoring wells CCBA-MW2, CTF-MW1, CYN-MW5, and OBS-MW1 were added to the GMP annual groundwater monitoring sampling event in CY 2019. These four monitoring wells had been installed for investigations associated with specific Solid Waste Management Units (SWMU) as part of Environmental Restoration Operations. The associated SWMUs had previously been granted Corrective Action Complete status. The four monitoring wells were transferred to the GMP in CY 2019 because the location of these wells filled data gaps in the geographic distribution of the GMP monitoring well network by adding more locations in the fractured bedrock aquifer system in the eastern part of Kirtland Air Force Base (KAFB).

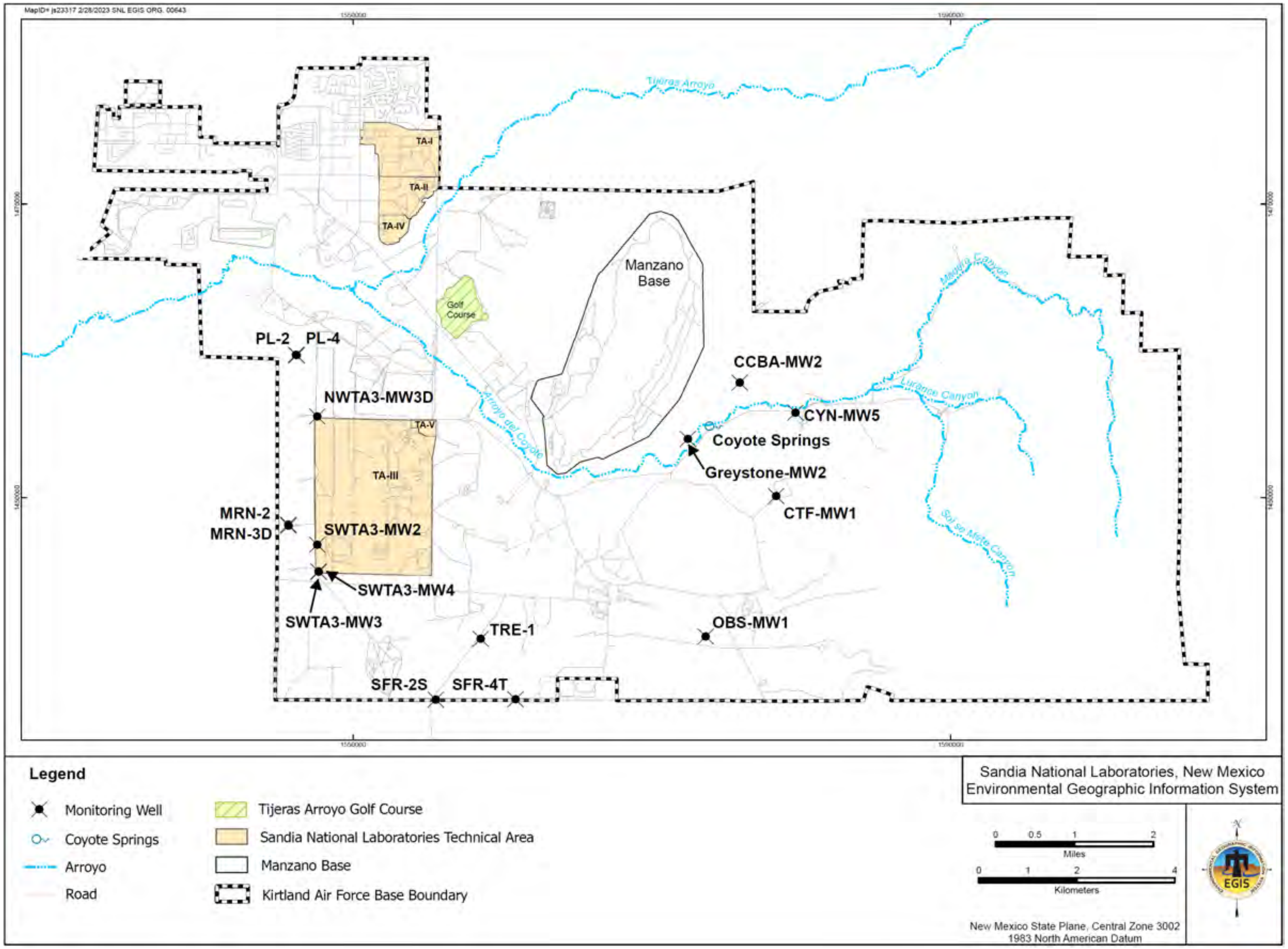

Figure 2-1
Groundwater Monitoring Program Water Quality Monitoring Network

2.3.1 Groundwater Quality Monitoring

Annual sampling of groundwater was conducted during the period from March 8 to May 18, 2022. Samples were collected from 16 monitoring wells and 1 perennial spring. GMP monitoring well locations are distributed throughout and along the perimeter of KAFB in areas that are not necessarily affiliated with SWMUs or AOCs. Groundwater samples were collected from the following 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 using a submersible piston pump. A surface water sample was also collected from Coyote Springs using a portable peristaltic pump.

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 plus total uranium, select wells only
- Mercury
- 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

Samples were filtered at the various sampling locations using in-line filters of 0.45-micron pore size, except those for VOC, HE, and mercury fractions. Mercury is analyzed for both dissolved (filtered) and total (unfiltered) fractions. Analysis for HE compounds was conducted on the groundwater samples collected from monitoring wells SFR-2S, SFR-4T, SWTA3-MW2, SWTA3-MW3, SWTA3-MW4, and TRE-1. 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 at Coyote Springs, CCBA-MW2, CTF-MW1, CYN-MW5, Greystone-MW2, OBS-MW1, SFR-2S, SFR-4T, and TRE-1 (see discussion in Section 2.6.1). Total uranium samples were collected from monitoring wells MRN-2, MRN-3D, NWTA3-MW3D, PL-2, PL-4, SWTA3-MW2, SWTA3-MW3, and SWTA3-MW4. Environmental duplicate samples from monitoring wells MRN-3D, PL-4, SWTA3-MW3, and TRE-1 were submitted for analyses of the same parameters as the environmental samples.

Groundwater elevation monitoring is a means to assess the physical changes of the groundwater system over time. This includes changes in the potentiometric surface, gradients, the quantity of water available, as well as the direction and velocity of groundwater movement. The GMP gathers groundwater information from a large network of wells within and in the vicinity of KAFB. In addition to wells owned by the DOE/NNSA, data are solicited from the KAFB Environmental Restoration Program, City of Albuquerque (COA) Environmental Health Department (EHD), and U.S. Geological Survey (USGS) (Figure 1-4 and

Plate 1). Groundwater elevations in wells were measured quarterly or annually during CY 2022, depending on the owner's requirements and the well characteristics. Plate 1 depicts groundwater elevations at the wells and presents a base-wide potentiometric surface map of the Regional Aquifer and fractured bedrock aquifer system (see discussion in Section 2.6.2.2).

Groundwater pumped from KAFB, Albuquerque Bernalillo County Water Utility Authority (ABCWUA), and Veterans Affairs (VA) production wells represent the primary groundwater withdrawal from the Regional Aquifer. From the potentiometric surface map (Plate 1), groundwater flow directions are identified and horizontal gradients are determined. Precipitation measurements are used as an indirect estimate of potential groundwater recharge. Available precipitation also impacts the demand on groundwater withdrawal. Section 2.6.2 discusses the specific results for annual precipitation, water production, and the impact on the groundwater elevations.

2.3.2 Monitoring Well Installation

No new monitoring wells were installed by the GMP during CY 2022.

2.4 Field Methods and Measurements

Section 1.3 describes in detail the monitoring procedures conducted for GMP groundwater monitoring.

2.5 Analytical Methods

All groundwater samples were analyzed by the off-site laboratory using EPA-specified protocols described in Section 1.3.2.

2.6 Summary of Monitoring Results

Results of the CY 2022 activities are discussed below and are presented in the following attachments. Attachment 2A, Tables 2A-1 through 2A-8, present the analytical results and water quality measurements for the groundwater samples. Attachment 2B, Figures 2B-1 through 2B-10, present the hydrographs that utilize the water level measurements, and Figures 2B-11 through 2B-15 present precipitation and production well data. Attachment 2C, Figures 2C-1 through 2C-4, present the time-trend plots for specific parameters exceeding regulatory standards at monitoring wells OBS-MW1, SFR-4T, and TRE-1, as well as for Coyote Springs. Although dissolved mercury was detected above a regulatory standard in PL-4, this was the initial detection. Therefore, no trend plot was generated to show the one data point.

2.6.1 Analytical Results

Groundwater and surface water samples were submitted to GEL Laboratories LLC (GEL) for both chemical and radiological analysis. Samples submitted to GEL were analyzed in accordance with applicable EPA analytical methods. Groundwater sampling results are compared with EPA maximum contaminant levels (MCLs) for drinking water supplies (EPA March 2018) and NMED maximum allowable concentrations (MACs) for human health standards of groundwater as promulgated by the New Mexico Water Quality Control Commission (NMWQCC December 2018). Analytical reports from GEL, including certificates of analyses, analytical methods, 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 are filed in the SNL/NM Customer Funded Records Center and are archived in the SNL/NM Environmental Data Management System (EDMS) electronic database. Analytical results, laboratory QC qualifiers, and third-party data validation qualifiers are also filed in the SNL/NM Customer Funded Records Center and archived in EDMS.

Table 2A-1 summarizes the detected VOC and HE compound results for groundwater samples collected in CY 2022. No HE compounds were detected above MDLs or above established EPA MCLs or MACs. No VOCs were detected at concentrations above MDLs, except for naphthalene, methylene chloride, chloroform, and trichloroethene. Naphthalene was reported in the PL-2 environmental sample at a concentration of 0.380 μg/L (J-qualified). There is not an established EPA MCL or MAC for naphthalene. Methylene chloride in six samples, chlorobenzene in one sample, chloroform in two samples, and trichloroethene in one sample were qualified as not detected during data validation due to associated trip blank (TB) contamination. Table 2A-2 lists the MDLs for VOC and HE compounds.

Table 2A-3 summarizes NPN results. NPN was detected in all groundwater samples above associated MDLs, and ranged from 0.258 milligrams per liter (mg/L) to 8.00 mg/L. NPN results were below the EPA MCL/MAC of 10 mg/L.

Table 2A-4 summarizes alkalinity, major anions (as bromide, chloride, fluoride, and sulfate), TOX, total phenol, and total cyanide results. No analytes were detected above established EPA MCLs or MACs, except for fluoride. Fluoride was detected above the MAC of 1.6 mg/L in monitoring wells OBS-MW1, SFR-4T, and TRE-1 (environmental and environmental duplicate samples) at concentrations ranging from 1.68 mg/L to 2.75 mg/L. However, results did not exceed the EPA MCL of 4.0 mg/L. Fluoride in groundwater is suspected to be naturally occurring (geogenic). Figures 2C-1 through 2C-3 present the time trend plots for fluoride for monitoring wells OBS-MW1, SFR-4T, and TRE- 1.

Detected concentrations for alkalinity, major anions, TOX, and total phenol were consistent with historical GMP groundwater monitoring data. Total phenol in the SFR-4T environmental sample was qualified as not detected during data validation because total phenol was reported less than the PQL in both the associated environmental sample and associated laboratory method blank sample. Total cyanide was not detected in any samples.

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

Table 2A-6 summarizes TAL metals and total uranium results. No metal parameters, other than beryllium and mercury, 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 from Coyote Springs at a concentration of 0.00703 mg/L. Beryllium in groundwater at Coyote Springs is suspected to be naturally occurring (geogenic). Figure 2C-4 presents the trend plot for beryllium concentrations at Coyote Springs and demonstrates that the CY 2022 beryllium result is consistent with prior years. Mercury was reported above the EPA MCL of 0.002 mg/L in the PL-4 environmental sample at a concentration of 0.00201 mg/L. Mercury was not detected above the MDL in the associated PL-4 environmental duplicate sample. Note that these mercury results are for dissolved/filtered samples in contrast to the total/unfiltered mercury results reported in the paragraph above. Copper (MRN-3D environmental and environmental duplicate samples) and vanadium (TRE-1 environmental and environmental duplicate samples) were qualified as not detected during data validation because these metals were reported in associated environmental samples and associated equipment blank (EB) samples at concentrations below the PQL.

Table 2A-7 summarizes the radiological analyses results. This includes gamma spectroscopy results for short list gamma radiation-emitting radioisotopes (americium-241, cesium-137, cobalt-60, and potassium-40), and analyses for alpha- and beta-emitting radioisotopes (gross alpha/beta activity), isotopic uranium, radium-226, and radium-228. Reported activities were below established EPA MCLs or MACs. The potassium-40 activities reported in the samples from Coyote Springs, MRN-2, MRN-3D (environmental sample only), PL-4, and TRE-1 (environmental sample) were rejected by GEL due to the peak not meeting identification criteria.

Isotopic uranium (uranium-233/234, uranium-235/236, and uranium-238) analyses were conducted on samples from monitoring wells that previously had high gross alpha activity, or are located where 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/MACs for uranium isotopes.

Gross alpha activity is measured as a radiological screening tool in accordance with Title 40 of the Code of Federal Regulations Part 141. Naturally occurring uranium is 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. Radiological results were reviewed by an SNL/NM Health Physicist and were determined to be nonradioactive. The corrected gross alpha activity results were below the EPA MCL of 15 picocuries per liter.

Table 2A-8 summarizes the field water quality measurements collected prior to sampling at each monitoring well. These measurements are used to evaluate water chemistry stability and include turbidity, potential of hydrogen, temperature, specific conductivity, oxidation-reduction potential, and dissolved oxygen.

2.6.2 Groundwater Elevation Measurements

Table 1 at the back of this report lists construction details for monitoring wells located on or near KAFB. During CY 2022, SNL/NM personnel measured groundwater elevations in 105 SNL/NM monitoring wells (Table 2). The groundwater elevations were measured with an electric well sounder (water level meter). Data were also available for 61 additional monitoring wells owned by KAFB, COA EHD, USGS, and NMOSE. The SNL/NM groundwater elevation data are maintained in the corporate EDMS. Table 2-2 provides the total number of wells listed by the respective organization. Table 2 at the back of this report provides the groundwater elevation data for CY 2022 that were used to construct Plate 1.

Table 2-2
Groundwater Elevations Measured in Monitoring Wells by Sandia National Laboratories, New Mexico and Other Organizations during Calendar Year 2022

Total Wells	Measuring Agency	Well Owner	Location
105	SNL/NM GMP	DOE/NNSA	Site-wide monitoring network wells, BSG, CWL, MWL, TAG, and TAVG
53	KAFB	KAFB	ERP Long-term Monitoring Program
5	COA EHD	COA	Eubank Landfill north of KAFB and Yale Avenue Landfill west of KAFB
1	SNL/NM 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

Factors influencing fluctuations in groundwater elevation primarily include potential recharge from precipitation and groundwater withdrawals by production wells.

Annual Precipitation

The climate of the Albuquerque Basin is semi-arid. Long-term average precipitation ranges from 8.84 inches per year (30-year norm based on 1991-2020 data) at Albuquerque International Sunport up to 35 inches per year at the crest of the Sandia Mountains located approximately 15 miles to the northeast. 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. For CY 2022, the wettest months were June, July, August, and October.

Precipitation data relevant to the KAFB hydrogeologic setting are available from five rain gauges. Four on-site and one off-site meteorological towers are 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 annual data prior to 2020 is not available.
- SC1 tower located near the Schoolhouse Well in the foothills of the Manzanita Mountains (Figure 1-4).
- National Weather Service meteorological station "KABQ" at the Albuquerque International Sunport located at the northwest corner of KAFB (Figure 1-4).

Table 2-3 shows annual precipitation during CY 2022 at the five locations; CY 2021 data are also presented for comparison. The differences in precipitation totals from the five locations show the isolated nature of rain showers in the Albuquerque area. The 9.31 inches of precipitation measured at KABQ during CY 2022 is substantially greater than the corresponding period for the previous year (5.50 inches) and is 0.47 inches above the 30-year (1991-2020) norm of 8.84 inches. Figure 2B-11 shows monthly distribution of precipitation during CY 2022 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 from January 2012 to December 2022.

Table 2-3
Precipitation Data for Kirtland Air Force Base, Calendar Years 2021 and 2022

Year	Meteorological Station				
	A21	A36	LC1	SC1	KABQ
CY 2021	6.38	6.81	9.73	8.58	5.50
CY 2022	9.46	9.84	15.79	13.14	9.31

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 foothills of the Manzanita Mountains
SNL/NM = Sandia National Laboratories, New Mexico

Groundwater Withdrawal

The KAFB production wells are screened over a depth from 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 2022, KAFB pumped groundwater primarily from two production wells (KAFB-4 and KAFB-20) for consumptive use (Figure 2B-14).

KAFB supplies the water for SNL/NM and other DOE/NNSA facilities located on KAFB. Figure 2B-13 shows the CY 2022 monthly totals for KAFB production wells. The highest level of production was in July at 110 million gallons (gal); the lowest occurred in December at 33 million gal. The variability in production is in response to seasonal demand as reflected in the cyclic fluctuation of groundwater elevations in monitoring wells and is evident on the hydrographs (discussed in Section 2.6.2.2). Figure 2B-14 shows the CY 2022 monthly production for each KAFB production well. Figure 2B-15 shows the trend of total annual groundwater production at KAFB since 2012. Table 2-4 provides a comparison of water pumped during CY 2022 to the previous year.

Table 2-4
Total Kirtland Air Force Base Groundwater Production, Calendar Years 2021 and 2022

Units	CY 2021	CY 2022
Million gal	794	784
Acre-feet	2,437	2,407

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

2.6.2.2 Groundwater Elevations

Groundwater elevations were used to prepare the potentiometric surface maps and hydrographs.

Base-Wide Potentiometric Surface Map

Groundwater elevation data for monitoring wells installed by SNL/NM personnel, KAFB Environmental Restoration Program, COA EHD, USGS, and NMOSE were used to construct the base-wide CY 2022 potentiometric surface map of the Regional Aquifer and fractured bedrock aquifer system as shown on Plate 1. Water level measurements for April, May, June, August, and October 2022 were used for interpreting the groundwater elevation data and constructing the contours (Table 2). 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 are typically not seasonally affected across KAFB.

The base-wide map (Plate 1) represents the potentiometric surface of the Regional Aquifer and incorporates wells completed at the water table west of the Tijeras Fault Zone and wells completed 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 a fine-grained alluvial-fan lithofacies and the coarser 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 in the water table along the western edge of KAFB is due to cumulative drawdown created by KAFB, VA, and ABCWUA production wells near the northern boundary of KAFB. As a result, water levels across much of KAFB were steadily declining until 2008. Since 2008, hydrographs for Regional Aquifer wells in the northern part of KAFB show an increasing trend in groundwater elevations. Presumably, this is in response to the ABCWUA transitioning to surface water withdrawals 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 is indicative of 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 portion 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).

Perched Groundwater System Potentiometric Surface Map

During the installation of monitoring wells for groundwater characterization at TA-II in 1993, 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 wells completed in this 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 using 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 Tijeras Arroyo Groundwater AOC, and the elevation data for wells completed in the PGWS were used to construct the potentiometric surface map that is presented and discussed in Chapter 6.0.

GMP Monitoring Well Hydrographs

This section discusses historical and recent trends in groundwater elevations in the vicinity of SNL/NM, as demonstrated in the hydrographs for 16 GMP monitoring wells (Figures 2B-1 through 2B-10). Historical data from quarterly and annual groundwater elevation measurements through CY 2022 were used for plotting 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/year) 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.
- **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/year from 2014 to 2020; stabilized 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/year from 2014 to 2020; stabilized since 2020.
- **SFR-2S and TRE-1 (Figure 2B-4)**—Slight declining trend of approximately 0.15 to 0.25 ft/year since 2004.

- **SFR-4T (Figure 2B-5)**—Cyclical pattern with artificial yearly fluctuations of 20 to 30 ft since 2001; yearly minimum associated with SNL/NM sampling event and subsequently 3 to 9 months of groundwater level recovery; overall declining trend of peaks of approximately 0.25 ft/year.
- **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 show an increasing trend of approximately 0.6 ft/year since 2014.
- **OBS-MW1 (Figure 2B-7)**—Stable groundwater elevations since 2011.
- **CCBA-MW2 (Figure 2B-8)**—Slight declining trend since 2011 of approximately 0.14 ft/year.
- **CTF-MW1 (Figure 2B-9)**—Slight declining trend over the life of the well of approximately 0.31 ft/year.
- **CYN-MW5 (Figure 2B-10)**—Slight declining trend over the life of the well of approximately 0.14 ft/year.

Base-Wide Map with Hydrographs for Select Monitoring Wells

This section discusses the spatial differences in hydrologic conditions in groundwater monitoring wells completed in the Regional Aquifer and the fractured bedrock aquifer system. Figure 2-2 is a base-wide map showing geographic differences in groundwater elevations over time. Not all SNL/NM monitoring wells/hydrographs are shown on this map, only representative examples are shown based on their geographic distribution. All hydrographs in Figure 2-2 have the same vertical scale (40 ft) and the same horizontal scale (30 years) regardless of the age of the well. The well locations on Figure 2-2 are generalized and the marked locations may represent one or more wells depending on the specific hydrograph. For a base-wide figure 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 individual hydrographs. Readers are referred to the more detailed (and more legible) and updated site-specific hydrographs for the individual groundwater study areas discussed in Sections 2 through 7 of this AGMR.

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 (as shown in in Figure 1-3). Specific information gleaned from the hydrographs includes the following:

- Wells furthest to the east in the fractured bedrock aquifer system (for example, monitoring well 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 wells in the fractured bedrock aquifer system (for example, monitoring well CTF-MW1) exhibit less variability and only slight to moderate declining groundwater elevations.
- Wells in the fine-grained alluvial-fan lithofacies of the Regional Aquifer (for example, CWL series monitoring wells) exhibit slight to moderate declining groundwater elevations.
- Wells in the ARG lithofacies of the Regional Aquifer in the southwestern part of KAFB (for example, SWTA3 series monitoring wells) exhibit moderate declining groundwater elevations until 2010, and subsequent moderately increasing groundwater elevations.
- Wells in the coarser lithofacies of the Regional Aquifer in the northwestern part of KAFB (for example, monitoring well TA1-W-05) exhibit slight declining groundwater elevations until 2010, and then moderate increasing groundwater elevations with a strong overprinting of seasonal fluctuations from nearby production well pumping centers.

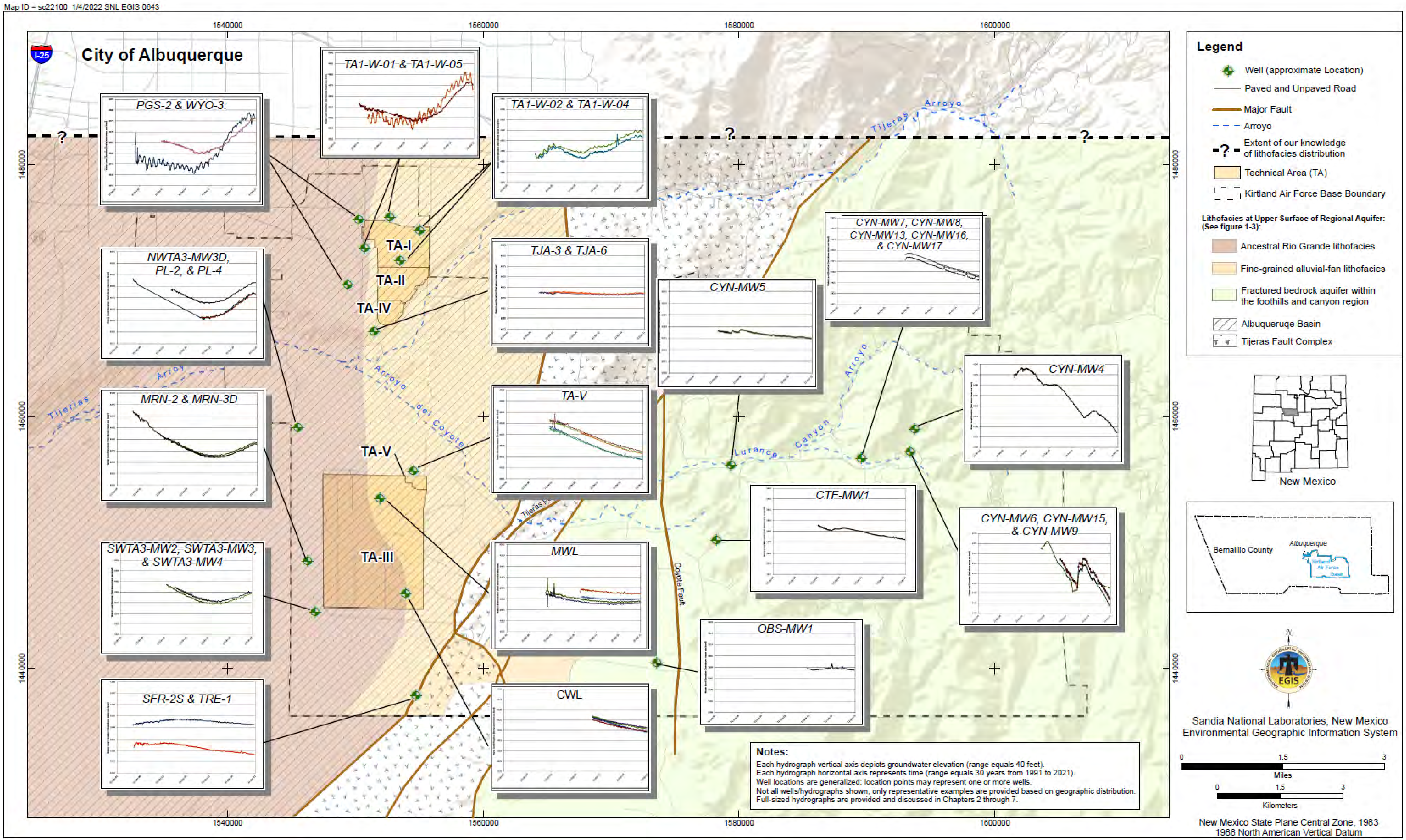

Figure 2-2
Geographic Distribution of Hydrographs for Wells in the Regional Aquifer and Fractured Bedrock Aquifer System at Sandia National Laboratories, New Mexico (base map derived from Figure 1-3)

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2.7 Quality Control Results

Section 1.3.3 presents the purpose of each field and laboratory QC sample type. Field and laboratory QC sample results for the GMP are discussed in the following sections.

2.7.1 Field Quality Control Samples

Field QC samples include environmental duplicate, EB, field blank (FB), and TB samples. Environmental duplicate samples were collected to estimate the overall reproducibility of the sampling and analytical process. Environmental duplicate samples were collected from monitoring wells MRN-3D, PL-4, SWTA3-MW3, and TRE-1 and were analyzed for the same parameters as the environmental sample. Relative percent difference (RPD) calculations of environmental samples and environmental duplicate samples were performed for chemical analytes that were detected in both samples. The environmental duplicate sample results show good agreement (RPD values less than or equal to 35 for inorganic analyses) for calculated parameters, except TOX in TRE-1 samples. The RPD for TOX in TRE-1 was 61 and considered an estimated value because TOX was qualified during data validation as estimated concentrations in both environmental and environmental duplicate samples; the associated matrix spike sample for TOX recovered outside acceptance limits for the environmental duplicate sample.

EB samples were collected prior to well purging and sampling at monitoring wells MRN-3D, PL-4, SWTA3-MW3, and TRE-1 during CY 2022 and submitted for all analyses. EB samples contained detectable alkalinity, bromodichloromethane, bromoform, chloroform, chloride, copper, dibromochloromethane, fluoride, manganese, methylene chloride, sodium, sulfate, TOX, and vanadium. No corrective action was required for alkalinity, bromodichloromethane, bromoform, chloride, dibromochloromethane, fluoride, manganese, methylene chloride, sodium, sulfate, or TOX because these parameters were not detected in associated environmental samples or were detected in environmental samples at concentrations greater than 5 times the EB result. Copper in both environmental and environmental duplicate samples for MRN-3D and TRE-1 were qualified as not detected during data validation because these metals were reported in both environmental and EB samples at a concentration less than the PQL. Chloroform in TRE-1 in both environmental and environmental duplicate samples was qualified as not detected during data validation because this parameter was reported at a concentration greater than the PQL in the associated EB sample and less than the PQL in TRE- 1 environmental and environmental duplicate samples.

Four FB samples were collected during the CY 2022 sampling events for VOC analysis to assess whether contamination of the samples resulted from ambient conditions during sample collection. FB samples were prepared by pouring deionized water into sample containers at the monitoring wells Greystone-MW2, PL-4, SFR-4T, and SWTA3-MW3 sampling points to simulate the transfer of environmental samples from the sampling system to the sample container. Bromodichloromethane, bromoform, chlorobenzene, chloroform, and dibromochloromethane were detected above MDLs in various FB samples. No corrective action was necessary for bromodichloromethane, bromoform, chloroform (previously qualified as ND due to EB contamination), or dibromochloromethane because these compounds were not detected in associated environmental samples. Chlorobenzene in the SFR-4T sample was qualified as not detected during data validation because this compound was reported at concentrations less than the PQL in both the environmental and FB samples.

TB samples were submitted whenever samples were collected for VOC analysis to assess whether contamination of samples had occurred during shipment and storage. A total of 22 TBs were submitted with the CY 2022 samples for analysis of VOCs. Chlorobenzene (two TB samples), methylene chloride (seven TB samples), and trichloroethene (two TB samples) were reported at concentrations less than the PQL. The associated samples with chlorobenzene, methylene chloride, or trichloroethene at concentrations less than the PQL were qualified as not detected during data validation.

2.7.2 Laboratory Quality Control Samples

QC samples are prepared at the laboratory to determine whether contaminant chemicals are inadvertently introduced into laboratory processes and procedures. These include method blanks, 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 activity reported in samples from Coyote Springs, MRN-2, MRN-3D, PL-4, and TRE-1 were rejected by GEL due to the peak not meeting identification criteria.

2.8 Variances and Non-Conformances

No modifications or issues of field activities deviating from requirements in the *LTS Consolidated Groundwater Monitoring Program Mini-Sampling and Analysis Plan (SAP) for FY22 Groundwater Surveillance Task* (SNL February 2022) were identified during CY 2022 sampling activities.

2.9 Summary and Conclusions

The annual groundwater monitoring sampling event was conducted between March 8 and May 18, 2022. Groundwater samples were collected from 16 monitoring wells and surface water was collected from 1 perennial spring. The analytical results for the groundwater samples are similar to the results reported for previous years:

- No VOCs or HE compounds were detected at concentrations above established EPA MCLs or MACs in any CY 2022 samples.
- NPN was detected in samples above associated MDLs and ranged from 0.258 mg/L to 8.00 mg/L. NPN results are below the EPA MCL/MAC of 10 mg/L.
- Fluoride was detected above the MAC of 1.6 mg/L (NMWQCC December 2018) in monitoring wells OBS-MW1, SFR-4T, and TRE-1 samples at concentrations ranging from 1.68 mg/L to 2.75 mg/L. However, results did not exceed the EPA MCL of 4.0 mg/L. Fluoride in groundwater is suspected to be naturally occurring (geogenic).
- No metals, except beryllium, were detected above established EPA MCLs or MACs in any of the groundwater samples. Beryllium was detected above the EPA MCL of 0.004 mg/L in the environmental sample from Coyote Springs at a concentration of 0.00703 mg/L. Beryllium is suspected to be naturally occurring (geogenic) and this analytical result is consistent with prior years.
- Mercury (dissolved/filtered fraction) was reported above the EPA MCL (0.002 mg/L) in the environmental sample from PL-4 at a concentration of 0.00201 mg/L. However, mercury was not detected above the MDL in the associated environmental duplicate sample or the total/unfiltered fraction samples, therefore no additional corrective action was necessary.

Groundwater elevations were obtained during CY 2022 at 105 SNL/NM monitoring wells on a quarterly basis. Groundwater elevations from the SNL/NM monitoring wells and 61 wells owned by other agencies (Table 2) were used to construct a base-wide potentiometric surface map of the Regional Aquifer and the fractured bedrock aquifer system (Plate 1). Overall, the contours display a pattern that reflects the (1) impact of the groundwater withdrawal by production wells located in the northwestern portion of KAFB and adjacent parts of Albuquerque, and (2) basin margin topography to the east. Groundwater elevations at monitoring wells over most of the base are declining in a response to regional drought conditions, whereas wells in the northwestern part of the base show aquifer recovery due to decreased pumping at production wells.

2.10 Summary of Future Activities

Ongoing activities associated with the GMP include the following:

- Continue annual collection of groundwater samples at 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 a surface water sample from Coyote Springs during the first quarter of CY 2023. The analyte list will consist of the same suite analyzed in CY 2022.
- Continue quarterly measurements of groundwater elevations in 106 monitoring wells.
- Report future CMP investigation results in the CY 2023 AGMR.

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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 2022

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 23-Mar-22	Trichloroethene	0.590	0.333	1.00	5.00	5.00	J	1.0U	117237-001	SW846-8260D
CTF-MW1 18-Mar-22	Methylene Chloride	0.740	0.500	5.00	5.00	5.00	J	5.0U	117213-001	SW846-8260D
MRN-3D 17-Mar-22	Methylene Chloride	0.720	0.500	5.00	5.00	5.00	J	5.0U	117208-001	SW846-8260D
MRN-3D (Duplicate) 17-Mar-22	Methylene Chloride	0.720	0.500	5.00	5.00	5.00	J	5.0U	117209-001	SW846-8260D
NWTA3-MW3D 09-Mar-22	Methylene Chloride	1.43	0.500	5.00	5.00	5.00	J	5.0U	117186-001	SW846-8260D
OBS-MW1 16-May-22	Methylene Chloride	0.760	0.500	5.00	5.00	5.00	J	5.0U	117230-001	SW846-8260D
PL-2 11-Mar-22	Naphthalene	0.380	0.333	1.00	NE	30	J	J+	117194-001	SW846-8260D
SFR-2S 21-Mar-22	Methylene Chloride	0.710	0.500	5.00	5.00	5.00	J	5.0U	117216-001	SW846-8260D
SFR-4T 18-May-22	Chlorobenzene	0.950	0.333	1.00	100	NE	J	1.0U	117228-001	SW846-8260D
TRE-1 17-May-22	Chloroform	0.760	0.333	1.00	80.0	100	J	1.0U	117224-001	SW846-8260D
TRE-1 (Duplicate) 17-May-22	Chloroform	0.690	0.333	1.00	80.0	100	J	1.0U	117225-001	SW846-8260D

Refer to Notes on page 2A-45.

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 2022

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	0.0800 – 0.0886	SW846-8330B
4-Isopropyltoluene	0.333	SW846-8260D	1,3-Dinitrobenzene	0.0800 – 0.0886	SW846-8330B
Benzene	0.333	SW846-8260D	2,4,6-Trinitrotoluene	0.0800 – 0.0886	SW846-8330B
Bromobenzene	0.333	SW846-8260D	2,4-Dinitrotoluene	0.0800 – 0.0886	SW846-8330B
Bromochloromethane	0.333	SW846-8260D	2,6-Dinitrotoluene	0.0800 – 0.0886	SW846-8330B
Bromodichloromethane	0.333	SW846-8260D	2-Amino-4,6-dinitrotoluene	0.0800 – 0.0886	SW846-8330B
Bromoform	0.333	SW846-8260D	2-Nitrotoluene	0.0820 – 0.0909	SW846-8330B
Carbon tetrachloride	0.333	SW846-8260D	3-Nitrotoluene	0.0800 – 0.0886	SW846-8330B
Chlorobenzene	0.333	SW846-8260D	4-Amino-2,6-dinitrotoluene	0.0800 – 0.0886	SW846-8330B
Chloroethane	0.333	SW846-8260D	4-Nitrotoluene	0.150 – 0.166	SW846-8330B
Chloroform	0.333	SW846-8260D	HMX	0.0800 – 0.0886	SW846-8330B
Chloromethane	0.333	SW846-8260D	Nitrobenzene	0.0800 – 0.0886	SW846-8330B
Dibromochloromethane	0.333	SW846-8260D	Pentaerythritol tetranitrate	0.100 – 0.111	SW846-8330B
Dibromomethane	0.333	SW846-8260D	RDX	0.0800 – 0.0886	SW846-8330B
Dichlorodifluoromethane	0.355	SW846-8260D	Tetryl	0.0800 – 0.0886	SW846-8330B

Refer to Notes on page 2A-45.

Table 2A-3
Summary of Nitrate Plus Nitrite Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2022

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 24-Mar-22	Nitrate plus nitrite	0.566	0.0170	0.0500	10.0		J	117232-005	EPA 353.2
CCBA-MW2 23-Mar-22	Nitrate plus nitrite	3.53	0.170	0.500	10.0			117237-005	EPA 353.2
CTF-MW1 18-Mar-22	Nitrate plus nitrite	8.00	0.850	2.50	10.0			117213-005	EPA 353.2
CYN-MW5 28-Mar-22	Nitrate plus nitrite	2.28	0.0850	0.250	10.0			117239-005	EPA 353.2
Greystone-MW2 22-Mar-22	Nitrate plus nitrite	4.80	0.425	1.25	10.0			117235-005	EPA 353.2
MRN-2 16-Mar-22	Nitrate plus nitrite	3.94	0.170	0.500	10.0			117204-005	EPA 353.2
MRN-3D 17-Mar-22	Nitrate plus nitrite	3.17	0.0850	0.250	10.0			117208-005	EPA 353.2
MRN-3D (Duplicate) 17-Mar-22	Nitrate plus nitrite	2.87	0.0850	0.250	10.0			117209-005	EPA 353.2
NWTA3-MW3D 09-Mar-22	Nitrate plus nitrite	0.917	0.0170	0.0500	10.0			117186-005	EPA 353.2
OBS-MW1 16-May-22	Nitrate plus nitrite	1.90	0.0850	0.250	10.0			117230-005	EPA 353.2
PL-2 11-Mar-22	Nitrate plus nitrite	3.01	0.0850	0.250	10.0			117194-005	EPA 353.2
PL-4 10-Mar-22	Nitrate plus nitrite	5.29	0.170	0.500	10.0			117191-005	EPA 353.2
PL-4 (Duplicate) 10-Mar-22	Nitrate plus nitrite	5.33	0.170	0.500	10.0			117192-005	EPA 353.2
SFR-2S 21-Mar-22	Nitrate plus nitrite	0.953	0.0170	0.0500	10.0		J	117216-006	EPA 353.2
SFR-4T 18-May-22	Nitrate plus nitrite	0.258	0.0170	0.0500	10.0			117228-006	EPA 353.2
SWTA3-MW2 08-Mar-22	Nitrate plus nitrite	1.08	0.0850	0.250	10.0			117184-006	EPA 353.2

Refer to Notes on page 2A-45.

Table 2A-3 *(Concluded)*
Summary of Nitrate Plus Nitrite Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2022

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 15-Mar-22	Nitrate plus nitrite	0.777	0.0170	0.0500	10.0			117201-006	EPA 353.2
SWTA3-MW3 (Duplicate) 15-Mar-22	Nitrate plus nitrite	0.778	0.0170	0.0500	10.0			117202-006	EPA 353.2
SWTA3-MW4 14-Mar-22	Nitrate plus nitrite	1.11	0.0170	0.0500	10.0			117196-006	EPA 353.2
TRE-1 17-May-22	Nitrate plus nitrite	2.59	0.170	0.500	10.0			117224-006	EPA 353.2
TRE-1 (Duplicate) 17-May-22	Nitrate plus nitrite	2.54	0.170	0.500	10.0			117225-006	EPA 353.2

Refer to Notes on page 2A-45.

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 2022

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	Total Organic Halogens	0.0330	0.00333	0.010	NE	NE	N	J-	117232-002	SW846-9020B
24-Mar-22	Bromide	ND	6.70	20.0	NE	NE	U		117232-007	SW846-9056A
	Chloride	457	6.70	20.0	NE	NE	N	J+	117232-007	SW846-9056A
	Fluoride	1.44	0.033	0.100	4.0	1.60			117232-007	SW846-9056A
	Sulfate	125	13.3	40.0	NE	NE	N	J+	117232-007	SW846-9056A
	Alkalinity as $CaCO_3$	1010	1.45	4.00	NE	NE			117232-004	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U		117232-003	SW846-9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U		117232-006	SW846-9012B
CCCA-MW2	Total Organic Halogens	0.00378	0.00333	0.010	NE	NE	J, N	J-	117237-002	SW846-9020B
23-Mar-22	Bromide	0.555	0.067	0.200	NE	NE			117237-007	SW846-9056A
	Chloride	39.3	0.670	2.00	NE	NE			117237-007	SW846-9056A
	Fluoride	1.51	0.033	0.100	4.0	1.60			117237-007	SW846-9056A
	Sulfate	98.4	1.33	4.00	NE	NE			117237-007	SW846-9056A
	Alkalinity as $CaCO_3$	181	1.45	4.00	NE	NE			117237-004	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U		117237-003	SW846-9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U		117237-006	SW846-9012B
CTF-MW1	Total Organic Halogens	0.0172	0.00333	0.010	NE	NE			117213-002	SW846-9020B
18-Mar-22	Bromide	0.539	0.067	0.200	NE	NE			117213-007	SW846-9056A
	Chloride	38.3	0.335	1.00	NE	NE			117213-007	SW846-9056A
	Fluoride	1.42	0.033	0.100	4.0	1.60			117213-007	SW846-9056A
	Sulfate	82.2	0.665	2.00	NE	NE			117213-007	SW846-9056A
	Alkalinity as $CaCO_3$	199	1.45	4.00	NE	NE			117213-004	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U		117213-003	SW846-9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U		117213-006	SW846-9012B
CYN-MW5	Total Organic Halogens	0.0224	0.00333	0.010	NE	NE	N	J-	117239-002	SW846-9020B
28-Mar-22	Bromide	0.158	0.067	0.200	NE	NE	J		117239-007	SW846-9056A
	Chloride	16.4	0.134	0.400	NE	NE			117239-007	SW846-9056A
	Fluoride	0.346	0.033	0.100	4.0	1.60			117239-007	SW846-9056A
	Sulfate	29.8	0.266	0.800	NE	NE			117239-007	SW846-9056A
	Alkalinity as $CaCO_3$	142	1.45	4.00	NE	NE			117239-004	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U		117239-003	SW846-9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U		117239-006	SW846-9012B

Refer to Notes on page 2A-45.

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 2022

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	Total Organic Halogens	0.00366	0.00333	0.010	NE	NE	J, N	J-	117235-002	SW846-9020B
22-Mar-22	Bromide	0.668	0.067	0.200	NE	NE			117235-007	SW846-9056A
	Chloride	122	1.34	4.00	NE	NE			117235-007	SW846-9056A
	Fluoride	0.921	0.033	0.100	4.0	1.60			117235-007	SW846-9056A
	Sulfate	53.0	2.66	8.00	NE	NE			117235-007	SW846-9056A
	Alkalinity as $CaCO_3$	417	1.45	4.00	NE	NE			117235-004	SM2320B
	Total Phenol	0.00393	0.00167	0.005	NE	NE	J		117235-003	SW846-9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U		117235-006	SW846-9012B
MRN-2	Total Organic Halogens	ND	0.00333	0.010	NE	NE	U		117204-002	SW846-9020B
16-Mar-22	Bromide	0.220	0.067	0.200	NE	NE			117204-007	SW846-9056A
	Chloride	12.8	0.335	1.00	NE	NE			117204-007	SW846-9056A
	Fluoride	0.580	0.033	0.100	4.0	1.60			117204-007	SW846-9056A
	Sulfate	50.6	0.665	2.00	NE	NE			117204-007	SW846-9056A
	Alkalinity as $CaCO_3$	151	1.45	4.00	NE	NE			117204-004	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U	0.005UJ	117204-003	SW846-9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U		117204-006	SW846-9012B
MRN-3D	Total Organic Halogens	0.0172	0.00333	0.010	NE	NE		J+	117208-002	SW846-9020B
17-Mar-22	Bromide	0.206	0.067	0.200	NE	NE			117208-007	SW846-9056A
	Chloride	14.4	0.335	1.00	NE	NE			117208-007	SW846-9056A
	Fluoride	0.444	0.033	0.100	4.0	1.60			117208-007	SW846-9056A
	Sulfate	74.7	0.665	2.00	NE	NE			117208-007	SW846-9056A
	Alkalinity as $CaCO_3$	156	1.45	4.00	NE	NE			117208-004	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U	0.005UJ	117208-003	SW846-9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U		117208-006	SW846-9012B
MRN-3D	Total Organic Halogens	ND	0.00333	0.010	NE	NE	U		117209-002	SW846-9020B
(Duplicate)	Bromide	0.219	0.067	0.200	NE	NE			117209-007	SW846-9056A
17-Mar-22	Chloride	14.5	0.335	1.00	NE	NE			117209-007	SW846-9056A
	Fluoride	0.442	0.033	0.100	4.0	1.60			117209-007	SW846-9056A
	Sulfate	75.2	0.665	2.00	NE	NE			117209-007	SW846-9056A
	Alkalinity as $CaCO_3$	156	1.45	4.00	NE	NE			117209-004	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U	0.005UJ	117209-003	SW846-9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U		117209-006	SW846-9012B

Refer to Notes on page 2A-45.

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 2022

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	Total Organic Halogens	ND	0.00333	0.010	NE	NE	U		117186-002	SW846-9020B
09-Mar-22	Bromide	0.165	0.067	0.200	NE	NE	J		117186-007	SW846-9056A
	Chloride	11.0	0.335	1.00	NE	NE			117186-007	SW846-9056A
	Fluoride	0.720	0.033	0.100	4.0	1.60			117186-007	SW846-9056A
	Sulfate	53.8	0.665	2.00	NE	NE			117186-007	SW846-9056A
	Alkalinity as $CaCO_3$	142	1.45	4.00	NE	NE			117186-004	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U	0.005UJ	117186-003	SW846-9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U		117186-006	SW846-9012B
OBS-MW1	Total Organic Halogens	ND	0.00333	0.010	NE	NE	U		117230-002	SW846-9020B
16-May-22	Bromide	0.414	0.067	0.200	NE	NE			117230-007	SW846-9056A
	Chloride	26.8	0.670	2.00	NE	NE			117230-007	SW846-9056A
	Fluoride	**2.23**	0.033	0.100	4.0	1.60			117230-007	SW846-9056A
	Sulfate	86.3	1.33	4.00	NE	NE			117230-007	SW846-9056A
	Alkalinity as $CaCO_3$	181	1.45	4.00	NE	NE			117230-004	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U		117230-003	SW846-9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U		117230-006	SW846-9012B
PL-2	Total Organic Halogens	ND	0.00333	0.010	NE	NE	U		117194-002	SW846-9020B
11-Mar-22	Bromide	0.238	0.067	0.200	NE	NE			117194-007	SW846-9056A
	Chloride	14.7	0.670	2.00	NE	NE			117194-007	SW846-9056A
	Fluoride	0.451	0.033	0.100	4.0	1.60			117194-007	SW846-9056A
	Sulfate	71.7	1.33	4.00	NE	NE			117194-007	SW846-9056A
	Alkalinity as $CaCO_3$	152	1.45	4.00	NE	NE			117194-004	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U	0.005UJ	117194-003	SW846-9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U		117194-006	SW846-9012B
PL-4	Total Organic Halogens	ND	0.00333	0.010	NE	NE	U		117191-002	SW846-9020B
10-Mar-22	Bromide	0.219	0.067	0.200	NE	NE			117191-007	SW846-9056A
	Chloride	15.5	0.335	1.00	NE	NE			117191-007	SW846-9056A
	Fluoride	0.307	0.033	0.100	4.0	1.60			117191-007	SW846-9056A
	Sulfate	70.8	0.665	2.00	NE	NE			117191-007	SW846-9056A
	Alkalinity as $CaCO_3$	165	1.45	4.00	NE	NE			117191-004	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U	0.005UJ	117191-003	SW846-9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U		117191-006	SW846-9012B

Refer to Notes on page 2A-45.

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 2022

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	0.010	NE	NE	U		117192-002	SW846-9020B
(Duplicate)	Bromide	0.223	0.067	0.200	NE	NE			117192-007	SW846-9056A
10-Mar-22	Chloride	15.6	0.335	1.00	NE	NE			117192-007	SW846-9056A
	Fluoride	0.334	0.033	0.100	4.0	1.60			117192-007	SW846-9056A
	Sulfate	70.8	0.665	2.00	NE	NE			117192-007	SW846-9056A
	Alkalinity as $CaCO_3$	167	1.45	4.00	NE	NE			117192-004	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U	0.005UJ	117192-003	SW846-9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U		117192-006	SW846-9012B
SFR-2S	Total Organic Halogens	0.133	0.00333	0.010	NE	NE		J	117216-003	SW846-9020B
21-Mar-22	Bromide	0.208	0.0670	0.200	NE	NE			117216-008	SW846-9056A
	Chloride	125	1.34	4.00	NE	NE			117216-008	SW846-9056A
	Fluoride	1.58	0.033	0.100	4.0	1.60			117216-008	SW846-9056A
	Sulfate	72.2	2.66	8.00	NE	NE			117216-008	SW846-9056A
	Alkalinity as $CaCO_3$	375	1.45	4.00	NE	NE			117216-005	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U		117216-004	SW846-9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U		117216-007	SW846-9012B
SFR-4T	Total Organic Halogens	0.0523	0.00333	0.010	NE	NE	N	J-	117228-003	SW846-9020B
18-May-22	Bromide	1.63	0.0670	0.200	NE	NE			117228-008	SW846-9056A
	Chloride	207	13.4	40.0	NE	NE		J	117228-008	SW846-9056A
	Fluoride	**2.75**	0.033	0.100	4.0	1.60			117228-008	SW846-9056A
	Sulfate	1940	26.6	80.0	NE	NE		J	117228-008	SW846-9056A
	Alkalinity as $CaCO_3$	107	1.45	4.00	NE	NE			117228-005	SM2320B
	Total Phenol	0.00245	0.00167	0.005	NE	NE	B, J	0.005U	117228-004	SW846-9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U		117228-007	SW846-9012B
SWTA3-MW2	Total Organic Halogens	ND	0.00333	0.010	NE	NE	U		117184-003	SW846-9020B
08-Mar-22	Bromide	0.175	0.067	0.200	NE	NE	J		117184-008	SW846-9056A
	Chloride	17.6	0.335	1.00	NE	NE			117184-008	SW846-9056A
	Fluoride	0.951	0.033	0.100	4.0	1.60			117184-008	SW846-9056A
	Sulfate	54.8	0.665	2.00	NE	NE			117184-008	SW846-9056A
	Alkalinity as $CaCO_3$	172	1.45	4.00	NE	NE			117184-005	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U	0.005UJ	117184-004	SW846-9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U		117184-007	SW846-9012B

Refer to Notes on page 2A-45.

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 2022

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	Total Organic Halogens	ND	0.00333	0.010	NE	NE	U		117201-003	SW846-9020B
15-Mar-22	Bromide	0.183	0.067	0.200	NE	NE	J		117201-008	SW846-9056A
	Chloride	15.2	0.335	1.00	NE	NE			117201-008	SW846-9056A
	Fluoride	1.28	0.033	0.100	4.0	1.60			117201-008	SW846-9056A
	Sulfate	62.6	0.665	2.00	NE	NE			117201-008	SW846-9056A
	Alkalinity as $CaCO_3$	167	1.45	4.00	NE	NE			117201-005	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U	0.005UJ	117201-004	SW846-9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U		117201-007	SW846-9012B
SWTA3-MW3	Total Organic Halogens	ND	0.00333	0.010	NE	NE	U		117202-003	SW846-9020B
(Duplicate)	Bromide	0.192	0.067	0.200	NE	NE	J		117202-008	SW846-9056A
15-Mar-22	Chloride	15.2	0.335	1.00	NE	NE			117202-008	SW846-9056A
	Fluoride	1.26	0.033	0.100	4.0	1.60			117202-008	SW846-9056A
	Sulfate	63.1	0.665	2.00	NE	NE			117202-008	SW846-9056A
	Alkalinity as $CaCO_3$	169	1.45	4.00	NE	NE			117202-005	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U	0.005UJ	117202-004	SW846-9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U		117202-007	SW846-9012B
SWTA3-MW4	Total Organic Halogens	ND	0.00333	0.010	NE	NE	U		117196-003	SW846-9020B
14-Mar-22	Bromide	0.237	0.067	0.200	NE	NE			117196-008	SW846-9056A
	Chloride	17.1	0.670	2.00	NE	NE			117196-008	SW846-9056A
	Fluoride	1.55	0.033	0.100	4.0	1.60			117196-008	SW846-9056A
	Sulfate	51.4	1.33	4.00	NE	NE			117196-008	SW846-9056A
	Alkalinity as $CaCO_3$	180	1.45	4.00	NE	NE			117196-005	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U	0.005UJ	117196-004	SW846-9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U		117196-007	SW846-9012B
TRE-1	Total Organic Halogens	0.0144	0.00333	0.010	NE	NE	N	J	117224-003	SW846-9020B
17-May-22	Bromide	0.797	0.067	0.200	NE	NE			117224-008	SW846-9056A
	Chloride	144	1.34	4.00	NE	NE			117224-008	SW846-9056A
	Fluoride	**1.69**	0.033	0.100	4.0	1.60			117224-008	SW846-9056A
	Sulfate	112	2.66	8.00	NE	NE			117224-008	SW846-9056A
	Alkalinity as $CaCO_3$	498	1.45	4.00	NE	NE			117224-005	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U		117224-004	SW846-9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U		117224-007	SW846-9012B

Refer to Notes on page 2A-45.

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 2022

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 (Duplicate) 17-May-22	Total Organic Halogens	0.0271	0.00333	0.010	NE	NE		J+	117225-003	SW846-9020B
	Bromide	0.811	0.067	0.200	NE	NE			117225-008	SW846-9056A
	Chloride	144	1.34	4.00	NE	NE			117225-008	SW846-9056A
	Fluoride	**1.68**	0.033	0.100	4.0	1.60			117225-008	SW846-9056A
	Sulfate	112	2.66	8.00	NE	NE			117225-008	SW846-9056A
	Alkalinity as $CaCO_3$	490	1.45	4.00	NE	NE			117225-005	SM2320B
	Total Phenol	ND	0.00167	0.005	NE	NE	U		117225-004	SW846-9066
	Total Cyanide	ND	0.00167	0.005	0.200	0.200	U		117225-007	SW846-9012B

Refer to Notes on page 2A-45.

Table 2A-5
Summary of Mercury Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2022

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 24-Mar-22	ND	0.000067	0.0002	0.002	U		117232-009	SW846-7470A
CCBA-MW2 23-Mar-22	ND	0.000067	0.0002	0.002	U		117237-009	SW846-7470A
CTF-MW1 18-Mar-22	ND	0.000067	0.0002	0.002	U		117213-009	SW846-7470A
CYN-MW5 28-Mar-22	ND	0.000067	0.0002	0.002	U		117239-009	SW846-7470A
Greystone-MW2 22-Mar-22	ND	0.000067	0.0002	0.002	U		117235-009	SW846-7470A
MRN-2 16-Mar-22	ND	0.000067	0.0002	0.002	U		117204-009	SW846-7470A
MRN-3D 17-Mar-22	ND	0.000067	0.0002	0.002	U		117208-009	SW846-7470A
MRN-3D (Duplicate) 17-Mar-22	ND	0.000067	0.0002	0.002	U		117209-009	SW846-7470A
NWTA3-MW3D 09-Mar-22	ND	0.000067	0.0002	0.002	U		117186-009	SW846-7470A
OBS-MW1 16-May-22	ND	0.000067	0.0002	0.002	U		117230-009	SW846-7470A
PL-2 11-Mar-22	ND	0.000067	0.0002	0.002	U		117194-009	SW846-7470A
PL-4 10-Mar-22	ND	0.000067	0.0002	0.002	U		117191-009	SW846-7470A
PL-4 (Duplicate) 10-Mar-22	ND	0.000067	0.0002	0.002	U		117192-009	SW846-7470A
SFR-2S 21-Mar-22	ND	0.000067	0.0002	0.002	U		117216-010	SW846-7470A
SFR-4T 18-May-22	ND	0.000067	0.0002	0.002	U		117228-010	SW846-7470A
SWTA3-MW2 08-Mar-22	ND	0.000067	0.0002	0.002	U		117184-010	SW846-7470A
SWTA3-MW3 15-Mar-22	ND	0.000067	0.0002	0.002	U		117201-010	SW846-7470A
SWTA3-MW3 (Duplicate) 15-Mar-22	ND	0.000067	0.0002	0.002	U		117202-010	SW846-7470A

Refer to Notes on page 2A-45.

Table 2A-5 *(Concluded)*
Summary of Mercury Results, Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2022

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 14-Mar-22	ND	0.000067	0.0002	0.002	U		117196-010	SW846-7470A
TRE-1 17-May-22	ND	0.000067	0.0002	0.002	U		117224-010	SW846-7470A
TRE-1 (Duplicate) 17-May-22	ND	0.000067	0.0002	0.002	U		117225-010	SW846-7470A

Refer to Notes on page 2A-45.

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 2022

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	0.204	0.0193	0.050	NE	NE			117232-008	SW846-6020B
24-Mar-22	Antimony	ND	0.001	0.003	0.006	0.006	U		117232-008	SW846-6020B
	Arsenic	0.00724	0.002	0.005	0.010	0.010			117232-008	SW846-6020B
	Barium	0.0413	0.00067	0.004	2.00	2.00			117232-008	SW846-6020B
	Beryllium	**0.00703**	0.0002	0.0005	0.004	0.004			117232-008	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	0.005	U	0.001UJ	117232-008	SW846-6020B
	Calcium	287	0.800	2.00	NE	NE			117232-008	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	0.050	U		117232-008	SW846-6020B
	Cobalt	0.00949	0.0003	0.001	NE	NE			117232-008	SW846-6020B
	Copper	0.000582	0.0003	0.002	1.3	NE	J	J+	117232-008	SW846-6020B
	Iron	0.0986	0.033	0.100	NE	NE	J		117232-008	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	0.015	U		117232-008	SW846-6020B
	Magnesium	62.9	0.050	0.150	NE	NE		J	117232-008	SW846-6020B
	Manganese	1.44	0.005	0.025	NE	NE		J	117232-008	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		117232-008	SW846-7470A
	Nickel	0.0232	0.0006	0.002	NE	NE			117232-008	SW846-6020B
	Potassium	31.4	0.080	0.300	NE	NE			117232-008	SW846-6020B
	Selenium	ND	0.0015	0.005	0.050	0.050	U		117232-008	SW846-6020B
	Silver	ND	0.0003	0.001	NE	0.050	U		117232-008	SW846-6020B
	Sodium	426	0.800	2.50	NE	NE			117232-008	SW846-6020B
	Thallium	0.00132	0.0006	0.002	0.002	0.002	J		117232-008	SW846-6020B
	Vanadium	0.0395	0.0033	0.020	NE	NE		J+	117232-008	SW846-6020B
	Zinc	0.204	0.0193	0.050	NE	NE			117232-008	SW846-6020B

Refer to Notes on page 2A-45.

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 2022

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	0.050	NE	NE	U		117237-008	SW846-6020B
23-Mar-22	Antimony	ND	0.001	0.003	0.006	0.006	U		117237-008	SW846-6020B
	Arsenic	0.00207	0.002	0.005	0.010	0.010	J		117237-008	SW846-6020B
	Barium	0.0454	0.00067	0.004	2.00	2.00			117237-008	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U		117237-008	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	0.005	U		117237-008	SW846-6020B
	Calcium	71.0	0.400	1.00	NE	NE			117237-008	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	0.050	U		117237-008	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	NE	U		117237-008	SW846-6020B
	Copper	ND	0.0003	0.002	1.3	NE	U		117237-008	SW846-6020B
	Iron	ND	0.033	0.100	NE	NE	U		117237-008	SW846-6020B
	Lead	ND	0.0005	0.002	0.15	0.015	U		117237-008	SW846-6020B
	Magnesium	15.1	0.010	0.030	NE	NE			117237-008	SW846-6020B
	Manganese	ND	0.001	0.005	NE	NE	U		117237-008	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		117237-008	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	NE	U		117237-008	SW846-6020B
	Potassium	1.23	0.080	0.300	NE	NE			117237-008	SW846-6020B
	Selenium	0.00329	0.0015	0.005	0.050	0.050	J		117237-008	SW846-6020B
	Silver	ND	0.0003	0.001	NE	0.050	U		117237-008	SW846-6020B
	Sodium	48.2	0.080	0.250	NE	NE			117237-008	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	0.002	U		117237-008	SW846-6020B
	Vanadium	0.0105	0.0033	0.020	NE	NE	J		117237-008	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	NE	U		117237-008	SW846-6020B

Refer to Notes on page 2A-45.

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 2022

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	0.050	NE	NE	U		117213-008	SW846-6020B
18-Mar-22	Antimony	ND	0.001	0.003	0.006	0.006	U		117213-008	SW846-6020B
	Arsenic	0.00204	0.002	0.005	0.010	0.010	J		117213-008	SW846-6020B
	Barium	0.0498	0.00067	0.004	2.00	2.00			117213-008	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U		117213-008	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	0.005	U		117213-008	SW846-6020B
	Calcium	89.9	0.800	2.00	NE	NE			117213-008	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	0.050	U		117213-008	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	NE	U		117213-008	SW846-6020B
	Copper	ND	0.0003	0.002	1.3	NE	U		117213-008	SW846-6020B
	Iron	ND	0.033	0.100	NE	NE	U		117213-008	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	0.015	U		117213-008	SW846-6020B
	Magnesium	19.5	0.010	0.030	NE	NE			117213-008	SW846-6020B
	Manganese	ND	0.001	0.005	NE	NE	U		117213-008	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		117213-008	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	NE	U		117213-008	SW846-6020B
	Potassium	1.85	0.080	0.300	NE	NE			117213-008	SW846-6020B
	Selenium	0.00444	0.0015	0.005	0.050	0.050	J		117213-008	SW846-6020B
	Silver	ND	0.0003	0.001	NE	0.050	U		117213-008	SW846-6020B
	Sodium	32.9	0.080	0.250	NE	NE			117213-008	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	0.002	U		117213-008	SW846-6020B
	Vanadium	ND	0.0033	0.020	NE	NE	U		117213-008	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	NE	U		117213-008	SW846-6020B

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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 2022

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	0.050	NE	NE	U		117239-008	SW846-6020B
28-Mar-22	Antimony	ND	0.001	0.003	0.006	0.006	U		117239-008	SW846-6020B
	Arsenic	0.00594	0.002	0.005	0.010	0.010			117239-008	SW846-6020B
	Barium	0.179	0.00067	0.004	2.00	2.00			117239-008	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U		117239-008	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	0.005	U		117239-008	SW846-6020B
	Calcium	53.2	0.400	1.00	NE	NE			117239-008	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	0.050	U		117239-008	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	NE	U		117239-008	SW846-6020B
	Copper	0.000392	0.0003	0.002	1.3	NE	J		117239-008	SW846-6020B
	Iron	ND	0.033	0.100	NE	NE	U		117239-008	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	0.015	U		117239-008	SW846-6020B
	Magnesium	10.5	0.010	0.030	NE	NE		J	117239-008	SW846-6020B
	Manganese	ND	0.001	0.005	NE	NE	U		117239-008	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		117239-008	SW846-7470A
	Nickel	0.00111	0.0006	0.002	NE	NE	J		117239-008	SW846-6020B
	Potassium	2.14	0.080	0.300	NE	NE			117239-008	SW846-6020B
	Selenium	ND	0.0015	0.005	0.050	0.050	U		117239-008	SW846-6020B
	Silver	ND	0.0003	0.001	NE	0.050	U		117239-008	SW846-6020B
	Sodium	15.5	0.080	0.250	NE	NE			117239-008	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	0.002	U		117239-008	SW846-6020B
	Vanadium	ND	0.0033	0.020	NE	NE	U		117239-008	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	NE	U		117239-008	SW846-6020B

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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 2022

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	0.050	NE	NE	U		117235-008	SW846-6020B
22-Mar-22	Antimony	ND	0.001	0.003	0.006	0.006	U		117235-008	SW846-6020B
	Arsenic	0.00391	0.002	0.005	0.010	0.010	J		117235-008	SW846-6020B
	Barium	0.144	0.00067	0.004	2.00	2.00			117235-008	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U		117235-008	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	0.005	U	0.001UJ	117235-008	SW846-6020B
	Calcium	147	0.400	1.00	NE	NE			117235-008	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	0.050	U		117235-008	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	NE	U		117235-008	SW846-6020B
	Copper	0.000464	0.0003	0.002	1.3	NE	J	J+	117235-008	SW846-6020B
	Iron	0.0492	0.033	0.100	NE	NE	J		117235-008	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	0.015	U		117235-008	SW846-6020B
	Magnesium	29.9	0.010	0.030	NE	NE			117235-008	SW846-6020B
	Manganese	ND	0.001	0.005	NE	NE	U		117235-008	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		117235-008	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	NE	U		117235-008	SW846-6020B
	Potassium	5.40	0.080	0.300	NE	NE			117235-008	SW846-6020B
	Selenium	ND	0.0015	0.005	0.050	0.050	U		117235-008	SW846-6020B
	Silver	ND	0.0003	0.001	NE	0.050	U		117235-008	SW846-6020B
	Sodium	98.9	0.400	1.25	NE	NE			117235-008	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	0.002	U		117235-008	SW846-6020B
	Vanadium	ND	0.0033	0.020	NE	NE	U		117235-008	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	NE	U		117235-008	SW846-6020B

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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 2022

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	0.050	NE	NE	U		117204-008	SW846-6020B
16-Mar-22	Antimony	ND	0.001	0.003	0.006	0.006	U		117204-008	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	0.010	U		117204-008	SW846-6020B
	Barium	0.0582	0.00067	0.004	2.00	2.00			117204-008	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U		117204-008	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	0.005	U		117204-008	SW846-6020B
	Calcium	50.9	0.400	1.00	NE	NE			117204-008	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	0.050	U		117204-008	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	NE	U		117204-008	SW846-6020B
	Copper	0.000368	0.0003	0.002	1.3	NE	J		117204-008	SW846-6020B
	Iron	ND	0.033	0.100	NE	NE	U		117204-008	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	0.015	U		117204-008	SW846-6020B
	Magnesium	15.9	0.010	0.030	NE	NE			117204-008	SW846-6020B
	Manganese	ND	0.001	0.005	NE	NE	U		117204-008	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		117204-008	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	NE	U		117204-008	SW846-6020B
	Potassium	3.46	0.080	0.300	NE	NE			117204-008	SW846-6020B
	Selenium	ND	0.0015	0.005	0.050	0.050	U		117204-008	SW846-6020B
	Silver	ND	0.0003	0.001	NE	0.050	U		117204-008	SW846-6020B
	Sodium	24.4	0.080	0.250	NE	NE			117204-008	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	0.002	U		117204-008	SW846-6020B
	Uranium	0.00288	0.000067	0.0002	0.03	0.03			117204-008	SW846-6020B
	Vanadium	0.00763	0.0033	0.020	NE	NE	J		117204-008	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	NE	U		117204-008	SW846-6020B

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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 2022

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	0.050	NE	NE	U		117208-008	SW846-6020B
17-Mar-22	Antimony	ND	0.001	0.003	0.006	0.006	U		117208-008	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	0.010	U		117208-008	SW846-6020B
	Barium	0.111	0.00067	0.004	2.00	2.00			117208-008	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U		117208-008	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	0.005	U		117208-008	SW846-6020B
	Calcium	61.2	0.400	1.00	NE	NE			117208-008	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	0.050	U		117208-008	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	NE	U		117208-008	SW846-6020B
	Copper	0.000304	0.0003	0.002	1.3	NE	J	0.002U	117208-008	SW846-6020B
	Iron	ND	0.033	0.100	NE	NE	U		117208-008	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	0.015	U		117208-008	SW846-6020B
	Magnesium	14.3	0.010	0.030	NE	NE			117208-008	SW846-6020B
	Manganese	ND	0.001	0.005	NE	NE	U		117208-008	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		117208-008	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	NE	U		117208-008	SW846-6020B
	Potassium	4.43	0.080	0.300	NE	NE			117208-008	SW846-6020B
	Selenium	ND	0.0015	0.005	0.050	0.050	U		117208-008	SW846-6020B
	Silver	ND	0.0003	0.001	NE	0.050	U		117208-008	SW846-6020B
	Sodium	29.0	0.080	0.250	NE	NE			117208-008	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	0.002	U		117208-008	SW846-6020B
	Uranium	0.00344	0.000067	0.0002	0.03	0.03			117208-008	SW846-6020B
	Vanadium	0.00676	0.0033	0.020	NE	NE	J		117208-008	SW846-6020B
	Zinc	0.0775	0.0033	0.020	NE	NE			117208-008	SW846-6020B

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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 2022

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	0.050	NE	NE	U		117209-008	SW846-6020B
(Duplicate)	Antimony	ND	0.001	0.003	0.006	0.006	U		117209-008	SW846-6020B
17-Mar-22	Arsenic	ND	0.002	0.005	0.010	0.010	U		117209-008	SW846-6020B
	Barium	0.113	0.00067	0.004	2.00	2.00			117209-008	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U		117209-008	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	0.005	U		117209-008	SW846-6020B
	Calcium	63.1	0.400	1.00	NE	NE			117209-008	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	0.050	U		117209-008	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	NE	U		117209-008	SW846-6020B
	Copper	0.000559	0.0003	0.002	1.3	NE	J	0.002U	117209-008	SW846-6020B
	Iron	ND	0.033	0.100	NE	NE	U		117209-008	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	0.015	U		117209-008	SW846-6020B
	Magnesium	14.6	0.010	0.030	NE	NE			117209-008	SW846-6020B
	Manganese	ND	0.001	0.005	NE	NE	U		117209-008	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		117209-008	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	NE	U		117209-008	SW846-6020B
	Potassium	4.38	0.080	0.300	NE	NE			117209-008	SW846-6020B
	Selenium	ND	0.0015	0.005	0.050	0.050	U		117209-008	SW846-6020B
	Silver	ND	0.0003	0.001	NE	0.050	U		117209-008	SW846-6020B
	Sodium	29.2	0.080	0.250	NE	NE			117209-008	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	0.002	U		117209-008	SW846-6020B
	Uranium	0.00349	0.000067	0.0002	0.03	0.03			117209-008	SW846-6020B
	Vanadium	0.00722	0.0033	0.020	NE	NE	J		117209-008	SW846-6020B
	Zinc	0.0769	0.0033	0.020	NE	NE			117209-008	SW846-6020B

Refer to Notes on page 2A-45.

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 2022

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	0.050	NE	NE	U		117186-008	SW846-6020B
09-Mar-22	Antimony	ND	0.001	0.003	0.006	0.006	U		117186-008	SW846-6020B
	Arsenic	0.00257	0.002	0.005	0.010	0.010	J		117186-008	SW846-6020B
	Barium	0.0976	0.00067	0.004	2.00	2.00			117186-008	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U		117186-008	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	0.005	U		117186-008	SW846-6020B
	Calcium	41.5	0.080	0.200	NE	NE			117186-008	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	0.050	U		117186-008	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	NE	U		117186-008	SW846-6020B
	Copper	ND	0.0003	0.002	1.3	NE	U		117186-008	SW846-6020B
	Iron	ND	0.033	0.100	NE	NE	U		117186-008	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	0.015	U		117186-008	SW846-6020B
	Magnesium	9.06	0.010	0.030	NE	NE			117186-008	SW846-6020B
	Manganese	ND	0.001	0.005	NE	NE	U		117186-008	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		117186-008	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	NE	U		117186-008	SW846-6020B
	Potassium	3.82	0.080	0.300	NE	NE			117186-008	SW846-6020B
	Selenium	ND	0.0015	0.005	0.050	0.050	U		117186-008	SW846-6020B
	Silver	ND	0.0003	0.001	NE	0.050	U		117186-008	SW846-6020B
	Sodium	42.3	0.080	0.250	NE	NE			117186-008	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	0.002	U		117186-008	SW846-6020B
	Uranium	0.00354	0.000067	0.0002	0.03	0.03			117186-008	SW846-6020B
	Vanadium	0.00900	0.0033	0.020	NE	NE	J		117186-008	SW846-6020B
	Zinc	0.0890	0.0033	0.020	NE	NE			117186-008	SW846-6020B

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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 2022

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	0.050	NE	NE	U		117230-008	SW846-6020B
16-May-22	Antimony	ND	0.001	0.003	0.006	0.006	U		117230-008	SW846-6020B
	Arsenic	0.00218	0.002	0.005	0.010	0.010	J		117230-008	SW846-6020B
	Barium	0.0181	0.00067	0.004	2.00	2.00			117230-008	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U		117230-008	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	0.005	U		117230-008	SW846-6020B
	Calcium	90.3	0.800	2.00	NE	NE			117230-008	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	0.050	U		117230-008	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	NE	U		117230-008	SW846-6020B
	Copper	ND	0.0003	0.002	1.3	NE	U		117230-008	SW846-6020B
	Iron	ND	0.033	0.100	NE	NE	U		117230-008	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	0.015	U		117230-008	SW846-6020B
	Magnesium	15.5	0.010	0.030	NE	NE			117230-008	SW846-6020B
	Manganese	ND	0.001	0.005	NE	NE	U		117230-008	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		117230-008	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	NE	U		117230-008	SW846-6020B
	Potassium	1.66	0.080	0.300	NE	NE			117230-008	SW846-6020B
	Selenium	0.00299	0.0015	0.005	0.050	0.050	J		117230-008	SW846-6020B
	Silver	ND	0.0003	0.001	NE	0.050	U		117230-008	SW846-6020B
	Sodium	21.3	0.080	0.250	NE	NE			117230-008	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	0.002	U		117230-008	SW846-6020B
	Vanadium	ND	0.0033	0.020	NE	NE	U		117230-008	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	NE	U		117230-008	SW846-6020B

Refer to Notes on page 2A-45.

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 2022

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	0.050	NE	NE	U		117194-008	SW846-6020B
11-Mar-22	Antimony	0.00112	0.001	0.003	0.006	0.006	J		117194-008	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	0.010	U		117194-008	SW846-6020B
	Barium	0.0759	0.00067	0.004	2.00	2.00			117194-008	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U		117194-008	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	0.005	U		117194-008	SW846-6020B
	Calcium	65.8	0.800	2.00	NE	NE			117194-008	SW846-6020B
	Chromium	0.00335	0.003	0.010	0.100	0.050	J		117194-008	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	NE	U		117194-008	SW846-6020B
	Copper	0.000332	0.0003	0.002	1.3	NE	J		117194-008	SW846-6020B
	Iron	ND	0.033	0.100	NE	NE	U		117194-008	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	0.015	U		117194-008	SW846-6020B
	Magnesium	10.1	0.010	0.030	NE	NE			117194-008	SW846-6020B
	Manganese	ND	0.001	0.005	NE	NE	U		117194-008	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		117194-008	SW846-7470A
	Nickel	0.00280	0.0006	0.002	NE	NE			117194-008	SW846-6020B
	Potassium	3.55	0.080	0.300	NE	NE			117194-008	SW846-6020B
	Selenium	ND	0.0015	0.005	0.050	0.050	U		117194-008	SW846-6020B
	Silver	ND	0.0003	0.001	NE	0.050	U		117194-008	SW846-6020B
	Sodium	30.1	0.080	0.250	NE	NE			117194-008	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	0.002	U		117194-008	SW846-6020B
	Uranium	0.00356	0.000067	0.0002	0.03	0.03			117194-008	SW846-6020B
	Vanadium	0.00645	0.0033	0.020	NE	NE	J		117194-008	SW846-6020B
	Zinc	0.0101	0.0033	0.020	NE	NE	J		117194-008	SW846-6020B

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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 2022

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	0.050	NE	NE	U		117191-008	SW846-6020B
10-Mar-22	Antimony	ND	0.001	0.003	0.006	0.006	U		117191-008	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	0.010	U		117191-008	SW846-6020B
	Barium	0.0821	0.00067	0.004	2.00	2.00			117191-008	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U		117191-008	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	0.005	U		117191-008	SW846-6020B
	Calcium	71.6	0.400	1.00	NE	NE			117191-008	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	0.050	U		117191-008	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	NE	U		117191-008	SW846-6020B
	Copper	ND	0.0003	0.002	1.3	NE	U		117191-008	SW846-6020B
	Iron	ND	0.033	0.100	NE	NE	U		117191-008	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	0.015	U		117191-008	SW846-6020B
	Magnesium	14.0	0.010	0.030	NE	NE			117191-008	SW846-6020B
	Manganese	ND	0.001	0.005	NE	NE	U		117191-008	SW846-6020B
	Mercury	**0.00201**	0.000067	0.0002	0.002	0.002			117191-008	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	NE	U		117191-008	SW846-6020B
	Potassium	5.25	0.080	0.300	NE	NE			117191-008	SW846-6020B
	Selenium	0.00164	0.0015	0.005	0.050	0.050	J		117191-008	SW846-6020B
	Silver	ND	0.0003	0.001	NE	0.050	U		117191-008	SW846-6020B
	Sodium	26.7	0.080	0.250	NE	NE			117191-008	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	0.002	U		117191-008	SW846-6020B
	Uranium	0.00377	0.000067	0.0002	0.03	0.03			117191-008	SW846-6020B
	Vanadium	0.00482	0.0033	0.020	NE	NE	J		117191-008	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	NE	U		117191-008	SW846-6020B

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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 2022

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	0.050	NE	NE	U		117192-008	SW846-6020B
(Duplicate)	Antimony	ND	0.001	0.003	0.006	0.006	U		117192-008	SW846-6020B
10-Mar-22	Arsenic	ND	0.002	0.005	0.010	0.010	U		117192-008	SW846-6020B
	Barium	0.0794	0.00067	0.004	2.00	2.00			117192-008	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U		117192-008	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	0.005	U		117192-008	SW846-6020B
	Calcium	70.5	0.400	1.00	NE	NE			117192-008	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	0.050	U		117192-008	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	NE	U		117192-008	SW846-6020B
	Copper	ND	0.0003	0.002	1.3	NE	U		117192-008	SW846-6020B
	Iron	ND	0.033	0.100	NE	NE	U		117192-008	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	0.015	U		117192-008	SW846-6020B
	Magnesium	13.5	0.010	0.030	NE	NE			117192-008	SW846-6020B
	Manganese	ND	0.001	0.005	NE	NE	U		117192-008	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		117192-008	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	NE	U		117192-008	SW846-6020B
	Potassium	5.27	0.080	0.300	NE	NE			117192-008	SW846-6020B
	Selenium	0.00154	0.0015	0.005	0.050	0.050	J		117192-008	SW846-6020B
	Silver	ND	0.0003	0.001	NE	0.050	U		117192-008	SW846-6020B
	Sodium	26.4	0.080	0.250	NE	NE			117192-008	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	0.002	U		117192-008	SW846-6020B
	Uranium	0.00360	0.000067	0.0002	0.03	0.03			117192-008	SW846-6020B
	Vanadium	0.00555	0.0033	0.020	NE	NE	J		117192-008	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	NE	U		117192-008	SW846-6020B

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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 2022

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	0.050	NE	NE	U		117216-009	SW846-6020B
21-Mar-22	Antimony	ND	0.001	0.003	0.006	0.006	U		117216-009	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	0.010	U		117216-009	SW846-6020B
	Barium	0.0595	0.00067	0.004	2.00	2.00			117216-009	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U		117216-009	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	0.005	U		117216-009	SW846-6020B
	Calcium	127	0.800	2.00	NE	NE			117216-009	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	0.050	U		117216-009	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	NE	U		117216-009	SW846-6020B
	Copper	0.000438	0.0003	0.002	1.3	NE	J	J+	117216-009	SW846-6020B
	Iron	ND	0.033	0.100	NE	NE	U		117216-009	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	0.015	U		117216-009	SW846-6020B
	Magnesium	37.5	0.010	0.030	NE	NE			117216-009	SW846-6020B
	Manganese	ND	0.001	0.005	NE	NE	U		117216-009	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		117216-009	SW846-7470A
	Nickel	0.00184	0.0006	0.002	NE	NE	J		117216-009	SW846-6020B
	Potassium	7.76	0.800	2.50	NE	NE			117216-009	SW846-6020B
	Selenium	0.00157	0.0015	0.005	0.050	0.050	J		117216-009	SW846-6020B
	Silver	ND	0.0003	0.001	NE	0.050	U		117216-009	SW846-6020B
	Sodium	85.1	0.800	2.50	NE	NE			117216-009	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	0.002	U		117216-009	SW846-6020B
	Vanadium	0.00494	0.0033	0.020	NE	NE	J		117216-009	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	NE	U		117216-009	SW846-6020B

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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 2022

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	0.050	NE	NE	U		117228-009	SW846-6020B
18-May-22	Antimony	0.00129	0.001	0.003	0.006	0.006	J		117228-009	SW846-6020B
	Arsenic	0.00278	0.002	0.005	0.010	0.010	J		117228-009	SW846-6020B
	Barium	0.00849	0.00067	0.004	2.00	2.00			117228-009	SW846-6020B
	Beryllium	ND	0.001	0.0025	0.004	0.004	U		117228-009	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	0.005	U		117228-009	SW846-6020B
	Calcium	64.9	0.400	1.00	NE	NE			117228-009	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	0.050	U		117228-009	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	NE	U		117228-009	SW846-6020B
	Copper	0.000337	0.0003	0.002	1.3	NE	J		117228-009	SW846-6020B
	Iron	ND	0.033	0.100	NE	NE	N, U	0.100UJ	117228-009	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	0.015	U		117228-009	SW846-6020B
	Magnesium	3.80	0.010	0.030	NE	NE			117228-009	SW846-6020B
	Manganese	0.0038	0.001	0.005	NE	NE	J		117228-009	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		117228-009	SW846-7470A
	Nickel	0.00106	0.0006	0.002	NE	NE	J		117228-009	SW846-6020B
	Potassium	2.34	0.080	0.300	NE	NE			117228-009	SW846-6020B
	Selenium	ND	0.0015	0.005	0.050	0.050	U		117228-009	SW846-6020B
	Silver	ND	0.0003	0.001	NE	0.050	U		117228-009	SW846-6020B
	Sodium	974	8.00	25.0	NE	NE			117228-009	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	0.002	U		117228-009	SW846-6020B
	Vanadium	ND	0.0033	0.020	NE	NE	U		117228-009	SW846-6020B
	Zinc	0.179	0.0033	0.020	NE	NE		J	117228-009	SW846-6020B

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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 2022

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	0.050	NE	NE	U		117184-009	SW846-6020B
08-Mar-22	Antimony	ND	0.001	0.003	0.006	0.006	U		117184-009	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	0.010	U		117184-009	SW846-6020B
	Barium	0.0783	0.00067	0.004	2.00	2.00			117184-009	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U		117184-009	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	0.005	U		117184-009	SW846-6020B
	Calcium	46.6	0.080	0.200	NE	NE			117184-009	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	0.050	U		117184-009	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	NE	U		117184-009	SW846-6020B
	Copper	0.000886	0.0003	0.002	1.3	NE	J		117184-009	SW846-6020B
	Iron	ND	0.033	0.100	NE	NE	U		117184-009	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	0.015	U		117184-009	SW846-6020B
	Magnesium	14.9	0.010	0.030	NE	NE			117184-009	SW846-6020B
	Manganese	ND	0.001	0.005	NE	NE	U		117184-009	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		117184-009	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	NE	U		117184-009	SW846-6020B
	Potassium	4.34	0.080	0.300	NE	NE			117184-009	SW846-6020B
	Selenium	ND	0.0015	0.005	0.050	0.050	U		117184-009	SW846-6020B
	Silver	ND	0.0003	0.001	NE	0.050	U		117184-009	SW846-6020B
	Sodium	43.1	0.080	0.250	NE	NE			117184-009	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	0.002	U		117184-009	SW846-6020B
	Uranium	0.00329	0.000067	0.0002	0.03	0.03			117184-009	SW846-6020B
	Vanadium	0.00674	0.0033	0.020	NE	NE	J		117184-009	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	NE	U		117184-009	SW846-6020B

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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 2022

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	0.050	NE	NE	U		117201-009	SW846-6020B
15-Mar-22	Antimony	ND	0.001	0.003	0.006	0.006	U		117201-009	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	0.010	U		117201-009	SW846-6020B
	Barium	0.0597	0.00067	0.004	2.00	2.00			117201-009	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U		117201-009	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	0.005	U		117201-009	SW846-6020B
	Calcium	38.8	0.080	0.200	NE	NE			117201-009	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	0.050	U		117201-009	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	NE	U		117201-009	SW846-6020B
	Copper	ND	0.0003	0.002	1.3	NE	U		117201-009	SW846-6020B
	Iron	ND	0.033	0.100	NE	NE	U		117201-009	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	0.015	U		117201-009	SW846-6020B
	Magnesium	11.2	0.010	0.030	NE	NE			117201-009	SW846-6020B
	Manganese	ND	0.001	0.005	NE	NE	U		117201-009	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		117201-009	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	NE	U		117201-009	SW846-6020B
	Potassium	4.48	0.080	0.300	NE	NE			117201-009	SW846-6020B
	Selenium	ND	0.0015	0.005	0.050	0.050	U		117201-009	SW846-6020B
	Silver	ND	0.0003	0.001	NE	0.050	U		117201-009	SW846-6020B
	Sodium	49.5	0.080	0.250	NE	NE			117201-009	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	0.002	U		117201-009	SW846-6020B
	Uranium	0.00239	0.000067	0.0002	0.03	0.03			117201-009	SW846-6020B
	Vanadium	0.00877	0.0033	0.020	NE	NE	J		117201-009	SW846-6020B
	Zinc	0.104	0.0033	0.020	NE	NE			117201-009	SW846-6020B

Refer to Notes on page 2A-45.

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 2022

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	0.050	NE	NE	U		117202-009	SW846-6020B
(Duplicate)	Antimony	ND	0.001	0.003	0.006	0.006	U		117202-009	SW846-6020B
15-Mar-22	Arsenic	ND	0.002	0.005	0.010	0.010	U		117202-009	SW846-6020B
	Barium	0.0583	0.00067	0.004	2.00	2.00			117202-009	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U		117202-009	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	0.005	U		117202-009	SW846-6020B
	Calcium	37.5	0.080	0.200	NE	NE			117202-009	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	0.050	U		117202-009	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	NE	U		117202-009	SW846-6020B
	Copper	ND	0.0003	0.002	1.3	NE	U		117202-009	SW846-6020B
	Iron	ND	0.033	0.100	NE	NE	U		117202-009	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	0.015	U		117202-009	SW846-6020B
	Magnesium	10.9	0.010	0.030	NE	NE			117202-009	SW846-6020B
	Manganese	ND	0.001	0.005	NE	NE	U		117202-009	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		117202-009	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	NE	U		117202-009	SW846-6020B
	Potassium	4.63	0.080	0.300	NE	NE			117202-009	SW846-6020B
	Selenium	ND	0.0015	0.005	0.050	0.050	U		117202-009	SW846-6020B
	Silver	ND	0.0003	0.001	NE	0.050	U		117202-009	SW846-6020B
	Sodium	49.0	0.080	0.250	NE	NE			117202-009	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	0.002	U		117202-009	SW846-6020B
	Uranium	0.00232	0.000067	0.0002	0.03	0.03			117202-009	SW846-6020B
	Vanadium	0.00829	0.0033	0.020	NE	NE	J		117202-009	SW846-6020B
	Zinc	0.0968	0.0033	0.020	NE	NE			117202-009	SW846-6020B

Refer to Notes on page 2A-45.

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 2022

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	0.050	NE	NE	U		117196-009	SW846-6020B
14-Mar-22	Antimony	ND	0.001	0.003	0.006	0.006	U		117196-009	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	0.010	U		117196-009	SW846-6020B
	Barium	0.0518	0.00067	0.004	2.00	2.00			117196-009	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	0.004	U		117196-009	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	0.005	U		117196-009	SW846-6020B
	Calcium	35.3	0.080	0.200	NE	NE			117196-009	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	0.050	U		117196-009	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	NE	U		117196-009	SW846-6020B
	Copper	ND	0.0003	0.002	1.3	NE	U		117196-009	SW846-6020B
	Iron	ND	0.033	0.100	NE	NE	U		117196-009	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	0.015	U		117196-009	SW846-6020B
	Magnesium	10.4	0.010	0.030	NE	NE			117196-009	SW846-6020B
	Manganese	ND	0.001	0.005	NE	NE	U		117196-009	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		117196-009	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	NE	U		117196-009	SW846-6020B
	Potassium	4.25	0.080	0.300	NE	NE			117196-009	SW846-6020B
	Selenium	ND	0.0015	0.005	0.050	0.050	U		117196-009	SW846-6020B
	Silver	ND	0.0003	0.001	NE	0.050	U		117196-009	SW846-6020B
	Sodium	62.4	0.800	2.50	NE	NE			117196-009	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	0.002	U		117196-009	SW846-6020B
	Uranium	0.00223	0.000067	0.0002	0.03	0.03			117196-009	SW846-6020B
	Vanadium	0.00918	0.0033	0.020	NE	NE	J		117196-009	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	NE	U		117196-009	SW846-6020B

Refer to Notes on page 2A-45.

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 2022

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	0.050	NE	NE	U		117224-009	SW846-6020B
17-May-22	Antimony	ND	0.001	0.003	0.006	0.006	U		117224-009	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	0.010	U		117224-009	SW846-6020B
	Barium	0.0448	0.00067	0.004	2.00	2.00			117224-009	SW846-6020B
	Beryllium	0.000221	0.0002	0.0005	0.004	0.004	J		117224-009	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	0.005	U		117224-009	SW846-6020B
	Calcium	168	1.60	4.00	NE	NE			117224-009	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	0.050	U		117224-009	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	NE	U		117224-009	SW846-6020B
	Copper	ND	0.0003	0.002	1.3	NE	U		117224-009	SW846-6020B
	Iron	0.0357	0.033	0.100	NE	NE	J		117224-009	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	0.015	U		117224-009	SW846-6020B
	Magnesium	34.2	0.010	0.030	NE	NE			117224-009	SW846-6020B
	Manganese	ND	0.001	0.005	NE	NE	U		117224-009	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		117224-009	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	NE	U		117224-009	SW846-6020B
	Potassium	6.72	0.080	0.300	NE	NE			117224-009	SW846-6020B
	Selenium	0.00240	0.0015	0.005	0.050	0.050	J		117224-009	SW846-6020B
	Silver	ND	0.0003	0.001	NE	0.050	U		117224-009	SW846-6020B
	Sodium	109	1.60	5.00	NE	NE			117224-009	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	0.002	U		117224-009	SW846-6020B
	Vanadium	0.00436	0.0033	0.020	NE	NE	B, J	0.02U	117224-009	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	NE	U		117224-009	SW846-6020B

Refer to Notes on page 2A-45.

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 2022

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	0.050	NE	NE	U		117225-009	SW846-6020B
(Duplicate)	Antimony	ND	0.001	0.003	0.006	0.006	U		117225-009	SW846-6020B
17-May-22	Arsenic	0.00224	0.002	0.005	0.010	0.010	J		117225-009	SW846-6020B
	Barium	0.0452	0.00067	0.004	2.00	2.00			117225-009	SW846-6020B
	Beryllium	0.000220	0.0002	0.0005	0.004	0.004	J		117225-009	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	0.005	U		117225-009	SW846-6020B
	Calcium	158	1.60	4.00	NE	NE			117225-009	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	0.050	U		117225-009	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	NE	U		117225-009	SW846-6020B
	Copper	ND	0.0003	0.002	1.3	NE	U		117225-009	SW846-6020B
	Iron	0.0406	0.033	0.100	NE	NE	J		117225-009	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	0.015	U		117225-009	SW846-6020B
	Magnesium	34.3	0.010	0.030	NE	NE			117225-009	SW846-6020B
	Manganese	ND	0.001	0.005	NE	NE	U		117225-009	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	0.002	U		117225-009	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	NE	U		117225-009	SW846-6020B
	Potassium	6.72	0.080	0.300	NE	NE			117225-009	SW846-6020B
	Selenium	0.00239	0.0015	0.005	0.050	0.050	J		117225-009	SW846-6020B
	Silver	ND	0.0003	0.001	NE	0.050	U		117225-009	SW846-6020B
	Sodium	101	1.60	5.00	NE	NE			117225-009	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	0.002	U		117225-009	SW846-6020B
	Vanadium	0.00472	0.0033	0.020	NE	NE	B, J	0.02U	117225-009	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	NE	U		117225-009	SW846-6020B

Refer to Notes on page 2A-45.

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 2022

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	Americium-241	-3.99 ± 6.93	9.75	4.75	NE	NE	U	BD	117232-010	EPA 901.1
24-Mar-22	Cesium-137	0.728 ± 1.94	3.46	1.65	NE	NE	U	BD	117232-010	EPA 901.1
	Cobalt-60	0.446 ± 1.90	3.52	1.64	NE	NE	U	BD	117232-010	EPA 901.1
	Potassium-40	37.7 ± 66.3	30.7	14.2	NE	NE	X	R	117232-010	EPA 901.1
	Gross Alpha	-3.81	NA	NA	15 pCi/L	NE	NA	None	117232-011	EPA 900.0
	Gross Beta	20.5 ± 6.66	10.4	5.06	4 mrem/yr	NE		J	117232-011	EPA 900.0
	Uranium-233/234	10.4 ± 1.05	0.0576	0.0247	NE	NE			117232-014	HASL-300
	Uranium-235/236	0.199 ± 0.0588	0.0374	0.0136	NE	NE			117232-014	HASL-300
	Uranium-238	2.33 ± 0.276	0.0487	0.0202	NE	NE			117232-014	HASL-300
	Radium-226	0.922 ± 0.439	0.425	0.155	5 pCi/L	5 pCi/L		J	117232-012	EPA 903.1M
	Radium-228	0.865 ± 0.482	0.621	0.276	5 pCi/L	5 pCi/L		J	117232-013	EPA 904.0
CCBA-MW2	Americium-241	0.267 ± 8.25	12.8	6.26	NE	NE	U	BD	117237-010	EPA 901.1
23-Mar-22	Cesium-137	1.50 ± 3.41	3.78	1.81	NE	NE	U	BD	117237-010	EPA 901.1
	Cobalt-60	-0.621 ± 2.43	4.16	1.96	NE	NE	U	BD	117237-010	EPA 901.1
	Potassium-40	-29.0 ± 36.9	41.7	19.6	NE	NE	U	BD	117237-010	EPA 901.1
	Gross Alpha	0.78	NA	NA	15 pCi/L	NE	NA	None	117237-011	EPA 900.0
	Gross Beta	2.92 ± 0.989	1.56	0.760	4 mrem/yr	NE		J	117237-011	EPA 900.0
	Uranium-233/234	6.73 ± 0.827	0.103	0.0442	NE	NE		J+	117237-014	HASL-300
	Uranium-235/236	0.148 ± 0.0718	0.0670	0.0243	NE	NE		J+	117237-014	HASL-300
	Uranium-238	1.38 ± 0.229	0.0873	0.0362	NE	NE		J+	117237-014	HASL-300
	Radium-226	3.04 ± 0.794	0.256	0.0777	5 pCi/L	5 pCi/L			117237-012	EPA 903.1M
	Radium-228	0.968 ± 0.581	0.805	0.368	5 pCi/L	5 pCi/L		J	117237-013	EPA 904.0
CTF-MW1	Americium-241	-0.431 ± 9.02	15.2	7.36	NE	NE	U	BD	117213-010	EPA 901.1
18-Mar-22	Cesium-137	0.657 ± 1.78	3.11	1.47	NE	NE	U	BD	117213-010	EPA 901.1
	Cobalt-60	-5.73 ± 6.20	3.48	1.60	NE	NE	U	BD	117213-010	EPA 901.1
	Potassium-40	16.5 ± 41.2	31.7	14.5	NE	NE	U	BD	117213-010	EPA 901.1
	Gross Alpha	5.06	NA	NA	15 pCi/L	NE	NA	None	117213-011	EPA 900.0
	Gross Beta	4.30 ± 0.808	1.03	0.494	4 mrem/yr	NE			117213-011	EPA 900.0
	Uranium-233/234	25.0 ± 2.45	0.0596	0.0255	NE	NE			117213-014	HASL-300
	Uranium-235/236	0.432 ± 0.0922	0.0386	0.0140	NE	NE			117213-014	HASL-300
	Uranium-238	3.71 ± 0.413	0.0504	0.0209	NE	NE			117213-014	HASL-300
	Radium-226	0.480 ± 0.300	0.283	0.0860	5 pCi/L	5 pCi/L		J	117213-012	EPA 903.1M
	Radium-228	0.213 ± 0.332	0.567	0.251	5 pCi/L	5 pCi/L	U	BD	117213-013	EPA 904.0

Refer to Notes on page 2A-45.

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 2022

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]
CYN-MW5	Americium-241	1.03 ± 15.2	23.6	11.5	NE	NE	U	BD	117239-010	EPA 901.1
28-Mar-22	Cesium-137	-1.45 ± 3.39	3.82	1.81	NE	NE	U	BD	117239-010	EPA 901.1
	Cobalt-60	0.00953 ± 2.08	3.88	1.78	NE	NE	U	BD	117239-010	EPA 901.1
	Potassium-40	-20.3 ± 43.3	55.0	25.8	NE	NE	U	BD	117239-010	EPA 901.1
	Gross Alpha	1.93	NA	NA	15 pCi/L	NE	NA	None	117239-011	EPA 900.0
	Gross Beta	2.66 ± 0.695	1.06	0.516	4 mrem/yr	NE		J	117239-011	EPA 900.0
	Uranium-233/234	0.931 ± 0.147	0.0663	0.0284	NE	NE			117239-014	HASL-300
	Uranium-235/236	0.0130 ± 0.0225	0.0430	0.0156	NE	NE	U	BD	117239-014	HASL-300
	Uranium-238	0.217 ± 0.0613	0.0560	0.0233	NE	NE			117239-014	HASL-300
	Radium-226	1.65 ± 0.519	0.214	0.0650	5 pCi/L	5 pCi/L			117239-012	EPA 903.1M
	Radium-228	0.212 ± 0.553	0.969	0.446	5 pCi/L	5 pCi/L	U	BD	117239-013	EPA 904.0
Greystone-MW2	Americium-241	10.1 ± 14.1	22.1	10.8	NE	NE	U	BD	117235-010	EPA 901.1
22-Mar-22	Cesium-137	-0.0512 ± 2.47	3.85	1.84	NE	NE	U	BD	117235-010	EPA 901.1
	Cobalt-60	-0.131 ± 2.38	4.31	2.02	NE	NE	U	BD	117235-010	EPA 901.1
	Potassium-40	-40.5 ± 44.9	52.7	25.0	NE	NE	U	BD	117235-010	EPA 901.1
	Gross Alpha	0.74	NA	NA	15 pCi/L	NE	NA	None	117235-011	EPA 900.0
	Gross Beta	5.80 ± 2.01	3.15	1.53	4 mrem/yr	NE		J	117235-011	EPA 900.0
	Uranium-233/234	9.01 ± 0.924	0.0590	0.0253	NE	NE			117235-014	HASL-300
	Uranium-235/236	0.116 ± 0.0454	0.0382	0.0139	NE	NE			117235-014	HASL-300
	Uranium-238	2.13 ± 0.260	0.0499	0.0207	NE	NE			117235-014	HASL-300
	Radium-226	0.890 ± 0.415	0.371	0.127	5 pCi/L	5 pCi/L		J	117235-012	EPA 903.1M
	Radium-228	0.249 ± 0.375	0.638	0.283	5 pCi/L	5 pCi/L	U	BD	117235-013	EPA 904.0
MRN-2	Americium-241	-7.15 ± 15.4	24.5	11.8	NE	NE	U	BD	117204-010	EPA 901.1
16-Mar-22	Cesium-137	-0.999 ± 2.17	3.11	1.46	NE	NE	U	BD	117204-010	EPA 901.1
	Cobalt-60	0.289 ± 1.85	3.39	1.55	NE	NE	U	BD	117204-010	EPA 901.1
	Potassium-40	64.3 ± 54.8	29.6	13.3	NE	NE	X	R	117204-010	EPA 901.1
	Gross Alpha	3.39	NA	NA	15 pCi/L	NE	NA	None	117204-011	EPA 900.0
	Gross Beta	3.94 ± 1.00	1.55	0.754	4 mrem/yr	NE		J	117204-011	EPA 900.0
	Radium-226	0.146 ± 0.270	0.489	0.190	5 pCi/L	5 pCi/L	U	BD	117204-012	EPA 903.1M
	Radium-228	0.481 ± 0.510	0.821	0.362	5 pCi/L	5 pCi/L	U	BD	117204-013	EPA 904.0

Refer to Notes on page 2A-45.

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 2022

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]
MRN-3D	Americium-241	-2.24 ± 13.7	24.6	11.9	NE	NE	U	BD	117208-010	EPA 901.1
17-Mar-22	Cesium-137	1.56 ± 5.74	3.29	1.54	NE	NE	U	BD	117208-010	EPA 901.1
	Cobalt-60	2.28 ± 2.60	4.77	2.21	NE	NE	U	BD	117208-010	EPA 901.1
	Potassium-40	70.6 ± 64.4	36.4	16.5	NE	NE	X	R	117208-010	EPA 901.1
	Gross Alpha	3.83	NA	NA	15 pCi/L	NE	NA	None	117208-011	EPA 900.0
	Gross Beta	3.72 ± 0.790	1.12	0.540	4 mrem/yr	NE			117208-011	EPA 900.0
	Radium-226	0.0367 ± 0.278	0.561	0.226	5 pCi/L	5 pCi/L	U	BD	117208-012	EPA 903.1M
	Radium-228	-0.249 ± 0.365	0.763	0.337	5 pCi/L	5 pCi/L	U	BD	117208-013	EPA 904.0
MRN-3D	Americium-241	1.04 ± 7.97	14.0	6.75	NE	NE	U	BD	117209-010	EPA 901.1
(Duplicate)	Cesium-137	-0.639 ± 2.96	3.33	1.57	NE	NE	U	BD	117209-010	EPA 901.1
17-Mar-22	Cobalt-60	1.90 ± 1.93	3.58	1.64	NE	NE	U	BD	117209-010	EPA 901.1
	Potassium-40	5.42 ± 57.2	35.4	16.2	NE	NE	U	BD	117209-010	EPA 901.1
	Gross Alpha	2.82	NA	NA	15 pCi/L	NE	NA	None	117209-011	EPA 900.0
	Gross Beta	4.19 ± 0.889	1.29	0.624	4 mrem/yr	NE			117209-011	EPA 900.0
	Radium-226	0.260 ± 0.290	0.469	0.186	5 pCi/L	5 pCi/L	U	BD	117209-012	EPA 903.1M
	Radium-228	0.234 ± 0.437	0.758	0.340	5 pCi/L	5 pCi/L	U	BD	117209-013	EPA 904.0
NWTA3-MW3D	Americium-241	11.6 ± 15.8	24.0	11.6	NE	NE	U	BD	117186-010	EPA 901.1
09-Mar-22	Cesium-137	2.63 ± 3.03	3.98	1.88	NE	NE	U	BD	117186-010	EPA 901.1
	Cobalt-60	0.640 ± 2.44	4.08	1.88	NE	NE	U	BD	117186-010	EPA 901.1
	Potassium-40	-6.31 ± 42.8	56.7	26.7	NE	NE	U	BD	117186-010	EPA 901.1
	Gross Alpha	1.75	NA	NA	15 pCi/L	NE	NA	None	117186-011	EPA 900.0
	Gross Beta	4.30 ± 0.621	0.822	0.400	4 mrem/yr	NE			117186-011	EPA 900.0
	Radium-226	0.147 ± 0.205	0.351	0.121	5 pCi/L	5 pCi/L	U	BD	117186-012	EPA 903.1M
	Radium-228	-0.0637 ± 0.395	0.769	0.339	5 pCi/L	5 pCi/L	U	BD	117186-013	EPA 904.0
OBS-MW1	Americium-241	-4.96 ± 16.3	27.9	13.6	NE	NE	U	BD	117230-010	EPA 901.1
16-May-22	Cesium-137	0.976 ± 2.04	3.41	1.63	NE	NE	U	BD	117230-010	EPA 901.1
	Cobalt-60	-0.871 ± 3.65	3.83	1.79	NE	NE	U	BD	117230-010	EPA 901.1
	Potassium-40	4.74 ± 56.2	34.4	16.0	NE	NE	U	BD	117230-010	EPA 901.1
	Gross Alpha	3.76	NA	NA	15 pCi/L	NE	NA	None	117230-011	EPA 900.0
	Gross Beta	4.20 ± 1.19	1.87	0.917	4 mrem/yr	NE		J	117230-011	EPA 900.0
	Uranium-233/234	16.8 ± 1.60	0.0555	0.0241	NE	NE			117230-014	HASL-300
	Uranium-235/236	0.247 ± 0.0616	0.0454	0.0182	NE	NE			117230-014	HASL-300
	Uranium-238	3.19 ± 0.344	0.0455	0.0192	NE	NE			117230-014	HASL-300
	Radium-226	2.06 ± 0.693	0.420	0.144	5 pCi/L	5 pCi/L			117230-012	EPA 903.1M
	Radium-228	1.04 ± 0.497	0.577	0.256	5 pCi/L	5 pCi/L		J	117230-013	EPA 904.0

Refer to Notes on page 2A-45.

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 2022

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-2	Americium-241	0.0133 ± 4.36	7.16	3.42	NE	NE	U	BD	117194-010	EPA 901.1
11-Mar-22	Cesium-137	0.598 ± 3.64	6.53	3.02	NE	NE	U	BD	117194-010	EPA 901.1
	Cobalt-60	-0.0158 ± 3.69	6.90	3.07	NE	NE	U	BD	117194-010	EPA 901.1
	Potassium-40	13.4 ± 55.0	92.8	42.5	NE	NE	U	BD	117194-010	EPA 901.1
	Gross Alpha	4.50	NA	NA	15 pCi/L	NE	NA	None	117194-011	EPA 900.0
	Gross Beta	5.09 ± 0.922	1.33	0.644	4 mrem/yr	NE			117194-011	EPA 900.0
	Radium-226	0.218 ± 0.269	0.448	0.169	5 pCi/L	5 pCi/L	U	BD	117194-012	EPA 903.1M
	Radium-228	0.728 ± 0.509	0.738	0.332	5 pCi/L	5 pCi/L	U	BD	117194-013	EPA 904.0
PL-4	Americium-241	1.32 ± 9.10	14.9	7.22	NE	NE	U	BD	117191-010	EPA 901.1
10-Mar-22	Cesium-137	0.377 ± 1.99	3.51	1.67	NE	NE	U	BD	117191-010	EPA 901.1
	Cobalt-60	0.999 ± 1.84	3.39	1.56	NE	NE	U	BD	117191-010	EPA 901.1
	Potassium-40	-9.04 ± 35.0	48.5	22.9	NE	NE	U	BD	117191-010	EPA 901.1
	Gross Alpha	0.39	NA	NA	15 pCi/L	NE	NA	None	117191-011	EPA 900.0
	Gross Beta	6.40 ± 0.843	1.17	0.572	4 mrem/yr	NE			117191-011	EPA 900.0
	Radium-226	0.180 ± 0.236	0.398	0.145	5 pCi/L	5 pCi/L	U	BD	117191-012	EPA 903.1M
	Radium-228	0.880 ± 0.558	0.776	0.348	5 pCi/L	5 pCi/L		J	117191-013	EPA 904.0
PL-4	Americium-241	-1.90 ± 5.26	9.40	4.47	NE	NE	U	BD	117192-010	EPA 901.1
(Duplicate)	Cesium-137	2.03 ± 2.41	4.47	2.07	NE	NE	U	BD	117192-010	EPA 901.1
10-Mar-22	Cobalt-60	1.99 ± 2.48	4.81	2.15	NE	NE	U	BD	117192-010	EPA 901.1
	Potassium-40	46.4 ± 51.6	40.7	17.8	NE	NE	X	R	117192-010	EPA 901.1
	Gross Alpha	3.30	NA	NA	15 pCi/L	NE	NA	None	117192-011	EPA 900.0
	Gross Beta	5.44 ± 0.826	1.18	0.576	4 mrem/yr	NE			117192-011	EPA 900.0
	Radium-226	0.446 ± 0.319	0.411	0.150	5 pCi/L	5 pCi/L		J	117192-012	EPA 903.1M
	Radium-228	0.396 ± 0.453	0.739	0.328	5 pCi/L	5 pCi/L	U	BD	117192-013	EPA 904.0
SFR-2S	Americium-241	4.31 ± 6.29	7.15	3.49	NE	NE	U	BD	117216-011	EPA 901.1
21-Mar-22	Cesium-137	-1.53 ± 5.67	6.64	3.19	NE	NE	U	BD	117216-011	EPA 901.1
	Cobalt-60	-0.704 ± 3.13	4.81	2.20	NE	NE	U	BD	117216-011	EPA 901.1
	Potassium-40	19.9 ± 83.0	49.5	22.7	NE	NE	U	BD	117216-011	EPA 901.1
	Gross Alpha	0.82	NA	NA	15 pCi/L	NE	NA	None	117216-012	EPA 900.0
	Gross Beta	12.0 ± 2.05	2.79	1.35	4 mrem/yr	NE			117216-012	EPA 900.0
	Uranium-233/234	18.8 ± 1.83	0.0578	0.0247	NE	NE			117216-015	HASL-300
	Uranium-235/236	0.385 ± 0.0837	0.0375	0.0136	NE	NE			117216-015	HASL-300
	Uranium-238	5.19 ± 0.548	0.0488	0.0203	NE	NE			117216-015	HASL-300
	Radium-226	0.185 ± 0.264	0.455	0.172	5 pCi/L	5 pCi/L	U	BD	117216-013	EPA 903.1M
	Radium-228	0.392 ± 0.522	0.872	0.400	5 pCi/L	5 pCi/L	U	BD	117216-014	EPA 904.0

Refer to Notes on page 2A-45.

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 2022

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 18-May-22	Americium-241	2.62 ± 13.6	21.3	10.3	NE	NE	U	BD	117228-011	EPA 901.1
	Cesium-137	0.236 ± 2.09	3.55	1.67	NE	NE	U	BD	117228-011	EPA 901.1
	Cobalt-60	-0.883 ± 2.48	3.78	1.73	NE	NE	U	BD	117228-011	EPA 901.1
	Potassium-40	27.4 ± 62.0	36.6	16.7	NE	NE	U	BD	117228-011	EPA 901.1
	Gross Alpha	-3.09	NA	NA	15 pCi/L	NE	NA	None	117228-012	EPA 900.0
	Gross Beta	4.96 ± 5.87	9.87	4.75	4 mrem/yr	NE	U	BD	117228-012	EPA 900.0
	Uranium-233/234	0.398 ± 0.0769	0.0554	0.0241	NE	NE			117228-015	HASL-300
	Uranium-235/236	0.00328 ± 0.0144	0.0453	0.0182	NE	NE	U	BD	117228-015	HASL-300
	Uranium-238	0.104 ± 0.0362	0.0455	0.0191	NE	NE		J	117228-015	HASL-300
	Radium-226	0.663 ± 0.427	0.524	0.191	5 pCi/L	5 pCi/L		J	117228-013	EPA 903.1M
	Radium-228	1.10 ± 0.498	0.640	0.307	5 pCi/L	5 pCi/L		J	117228-014	EPA 904.0
SWTA3-MW2 08-Mar-22	Americium-241	2.27 ± 8.23	13.4	6.47	NE	NE	U	BD	117184-011	EPA 901.1
	Cesium-137	-1.13 ± 1.91	2.70	1.27	NE	NE	U	BD	117184-011	EPA 901.1
	Cobalt-60	4.99 ± 3.56	5.00	1.53	NE	NE	U	BD	117184-011	EPA 901.1
	Potassium-40	25.1 ± 51.8	31.4	14.4	NE	NE	U	BD	117184-011	EPA 901.1
	Gross Alpha	3.75	NA	NA	15 pCi/L	NE	NA	None	117184-012	EPA 900.0
	Gross Beta	5.42 ± 0.815	1.10	0.535	4 mrem/yr	NE			117184-012	EPA 900.0
	Radium-226	-0.119 ± 0.281	0.643	0.262	5 pCi/L	5 pCi/L	U	BD	117184-013	EPA 903.1M
	Radium-228	-0.202 ± 0.363	0.735	0.327	5 pCi/L	5 pCi/L	U	BD	117184-014	EPA 904.0
SWTA3-MW3 15-Mar-22	Americium-241	-3.74 ± 9.92	15.7	7.58	NE	NE	U	BD	117201-011	EPA 901.1
	Cesium-137	-0.691 ± 1.99	3.37	1.60	NE	NE	U	BD	117201-011	EPA 901.1
	Cobalt-60	-0.983 ± 1.94	3.04	1.39	NE	NE	U	BD	117201-011	EPA 901.1
	Potassium-40	-23.8 ± 35.5	44.4	20.9	NE	NE	U	BD	117201-011	EPA 901.1
	Gross Alpha	2.54	NA	NA	15 pCi/L	NE	NA	None	117201-012	EPA 900.0
	Gross Beta	4.60 ± 0.998	1.47	0.716	4 mrem/yr	NE			117201-012	EPA 900.0
	Radium-226	0.365 ± 0.325	0.489	0.190	5 pCi/L	5 pCi/L	U	BD	117201-013	EPA 903.1M
	Radium-228	1.43 ± 0.660	0.669	0.282	5 pCi/L	5 pCi/L		J	117201-014	EPA 904.0
SWTA3-MW3 (Duplicate) 15-Mar-22	Americium-241	2.69 ± 6.01	10.1	4.92	NE	NE	U	BD	117202-011	EPA 901.1
	Cesium-137	-0.156 ± 1.78	3.02	1.43	NE	NE	U	BD	117202-011	EPA 901.1
	Cobalt-60	0.591 ± 1.76	3.23	1.49	NE	NE	U	BD	117202-011	EPA 901.1
	Potassium-40	-4.54 ± 30.9	45.5	21.5	NE	NE	U	BD	117202-011	EPA 901.1
	Gross Alpha	2.47	NA	NA	15 pCi/L	NE	NA	None	117202-012	EPA 900.0
	Gross Beta	6.02 ± 1.11	1.65	0.803	4 mrem/yr	NE			117202-012	EPA 900.0
	Radium-226	0.574 ± 0.338	0.293	0.0890	5 pCi/L	5 pCi/L		J	117202-013	EPA 903.1M
	Radium-228	0.0979 ± 0.415	0.758	0.337	5 pCi/L	5 pCi/L	U	BD	117202-014	EPA 904.0

Refer to Notes on page 2A-45.

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 2022

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	Americium-241	1.88 ± 8.24	14.1	6.78	NE	NE	U	BD	117196-011	EPA 901.1
14-Mar-22	Cesium-137	0.0670 ± 1.77	3.06	1.44	NE	NE	U	BD	117196-011	EPA 901.1
	Cobalt-60	-0.344 ± 1.90	3.31	1.52	NE	NE	U	BD	117196-011	EPA 901.1
	Potassium-40	-30.6 ± 38.6	47.9	22.6	NE	NE	U	BD	117196-011	EPA 901.1
	Gross Alpha	2.70	NA	NA	15 pCi/L	NE	NA	None	117196-012	EPA 900.0
	Gross Beta	6.22 ± 1.18	1.76	0.862	4 mrem/yr	NE			117196-012	EPA 900.0
	Radium-226	0.491 ± 0.304	0.313	0.108	5 pCi/L	5 pCi/L		J	117196-013	EPA 903.1M
	Radium-228	0.221 ± 0.424	0.740	0.328	5 pCi/L	5 pCi/L	U	BD	117196-014	EPA 904.0
TRE-1	Americium-241	2.30 ± 15.7	24.1	11.7	NE	NE	U	BD	117224-011	EPA 901.1
17-May-22	Cesium-137	-1.55 ± 5.02	6.26	3.02	NE	NE	U	BD	117224-011	EPA 901.1
	Cobalt-60	2.31 ± 2.64	4.80	2.23	NE	NE	U	BD	117224-011	EPA 901.1
	Potassium-40	49.4 ± 65.4	35.3	15.9	NE	NE	X	R	117224-011	EPA 901.1
	Gross Alpha	3.10	NA	NA	15 pCi/L	NE	NA	None	117224-012	EPA 900.0
	Gross Beta	6.57 ± 2.02	3.05	1.48	4mrem/yr	NE		J	117224-012	EPA 900.0
	Uranium-233/234	22.7 ± 2.16	0.0590	0.0257	NE	NE			117224-015	HASL-300
	Uranium-235/236	0.399 ± 0.0849	0.0483	0.0194	NE	NE			117224-015	HASL-300
	Uranium-238	5.80 ± 0.594	0.0485	0.0204	NE	NE			117224-015	HASL-300
	Radium-226	1.23 ± 0.557	0.552	0.219	5 pCi/L	5 pCi/L		J	117224-013	EPA 903.1M
	Radium-228	0.950 ± 0.502	0.642	0.289	5 pCi/L	5 pCi/L		NJ+	117224-014	EPA 904.0
TRE-1	Americium-241	2.71 ± 17.5	26.9	13.1	NE	NE	U	BD	117225-011	EPA 901.1
(Duplicate)	Cesium-137	-0.421 ± 2.01	3.55	1.68	NE	NE	U	BD	117225-011	EPA 901.1
17-May-22	Cobalt-60	-0.498 ± 2.12	3.83	1.76	NE	NE	U	BD	117225-011	EPA 901.1
	Potassium-40	-34.1 ± 46.1	57.9	27.4	NE	NE	U	BD	117225-011	EPA 901.1
	Gross Alpha	1.99	NA	NA	15 pCi/L	NE	NA	None	117225-012	EPA 900.0
	Gross Beta	14.0 ± 2.24	3.09	1.50	4 mrem/yr	NE			117225-012	EPA 900.0
	Uranium-233/234	23.8 ± 2.35	0.0655	0.0285	NE	NE			117225-015	HASL-300
	Uranium-235/236	0.710 ± 0.124	0.0535	0.0215	NE	NE			117225-015	HASL-300
	Uranium-238	6.40 ± 0.675	0.0537	0.0226	NE	NE			117225-015	HASL-300
	Radium-226	1.18 ± 0.529	0.360	0.110	5 pCi/L	5 pCi/L			117225-013	EPA 903.1M
	Radium-228	0.135 ± 0.273	0.483	0.210	5 pCi/L	5 pCi/L	U	BD	117225-014	EPA 904.0

Refer to Notes on page 2A-45.

Table 2A-8
Summary of Field Water Quality Measurements[h], Long-Term Stewardship Groundwater Monitoring Program, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	24-Mar-22	12.51	2434.8	151.2	6.07	0.52	27.26	2.65
CCBA-MW2	23-Mar-22	13.79	505.80	191.1	7.53	0.19	62.76	5.64
CTF-MW1	18-Mar-22	17.25	716.91	136.7	7.39	0.23	71.11	6.33
CYN-MW5	28-Mar-22	16.60	323.39	188.5	6.14	0.67	42.46	3.81
Greystone-MW2	22-Mar-22	14.62	959.61	160.1	7.07	0.46	66.80	6.26
MRN-2	16-Mar-22	18.63	402.45	114.3	7.72	0.24	70.46	6.12
MRN-3D	17-Mar-22	18.37	444.38	171.2	7.55	1.87	37.42	3.25
NWTA3-MW3D	09-Mar-22	18.80	372.35	168.4	7.69	1.01	40.45	3.51
OBS-MW1	16-May-22	18.21	531.78	173.5	7.46	0.61	38.32	3.13
PL-2	11-Mar-22	16.45	422.06	167.1	7.70	0.49	63.85	5.86
PL-4	10-Mar-22	16.67	449.85	177.3	7.44	0.51	68.74	6.17
SFR-2S	21-Mar-22	15.33	992.13	158.5	6.96	2.29	75.38	6.95
SFR-4T	18-May-22	19.54	4245.3	94.2	7.93	1.64	6.65	0.49
SWTA3-MW2	08-Mar-22	18.46	431.55	166.5	7.64	0.85	45.06	3.94
SWTA3-MW3	15-Mar-22	19.66	451.17	157.7	7.68	6.51	46.36	3.85
SWTA3-MW4	14-Mar-22	18.94	450.67	93.6	7.71	0.36	49.88	4.27
TRE-1	17-May-22	19.97	1342.5	173.6	6.75	0.13	80.54	6.32

Refer to Notes on page 2A-45.

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
MW	= Monitoring Well
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 method detection limit)

[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 20.6.2.3103A NMAC, Human Health Standards, 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.
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.

[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

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.

DOE, 1997, *EML [Environmental Measurements Laboratory] Procedures Manual,* 27th ed., Vol. 1, Rev. 1992, HASL-300.

EPA, 1986, (and updates), *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* SW-846, 3rd ed., Rev.1, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1984, *Methods for Chemical Analysis of Water and Wastes*" EPA 600-4-79-020, U.S. Environmental Protection Agency, Cincinnati, Ohio.

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

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

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

[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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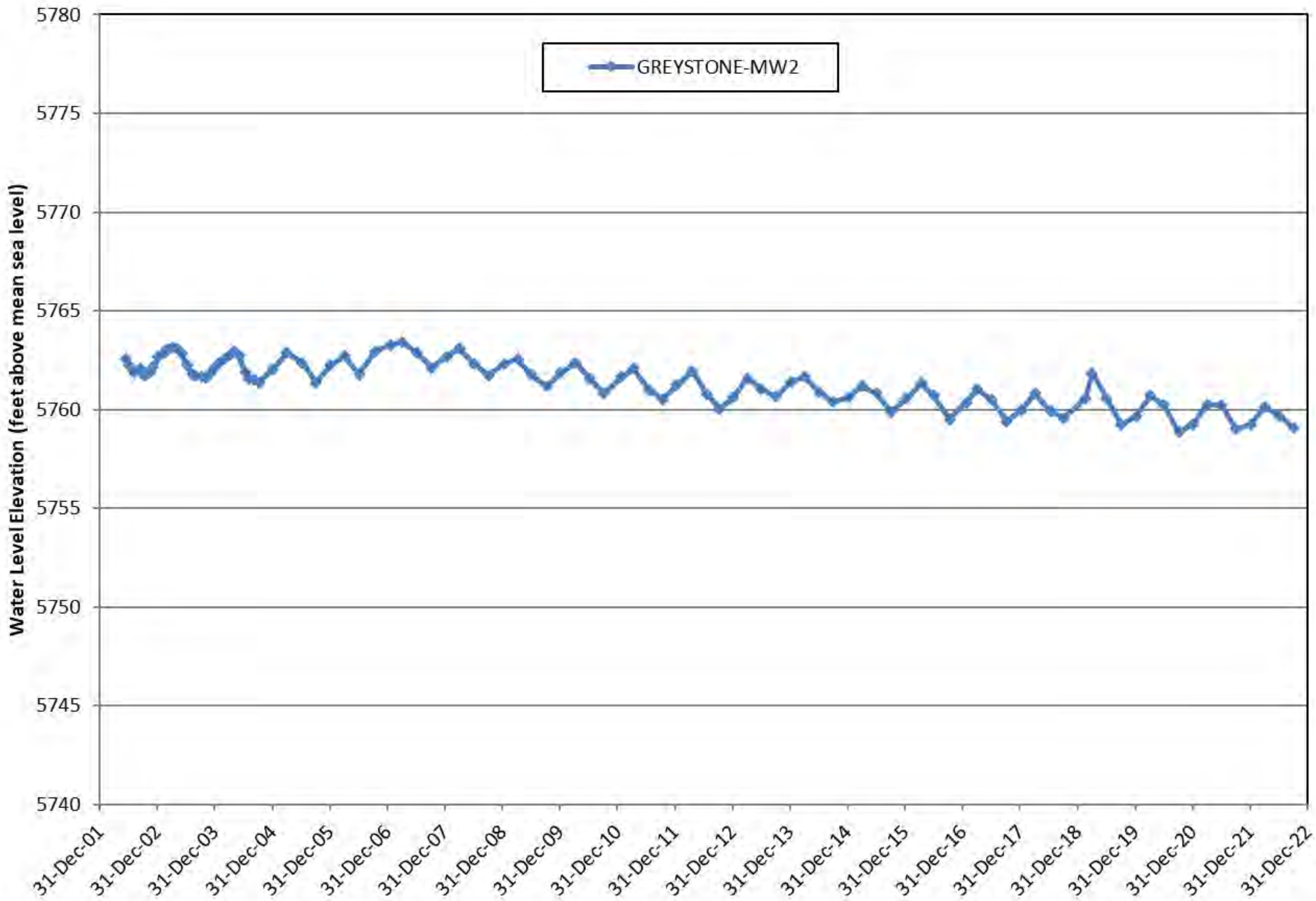

Figure 2B-1
Groundwater Monitoring Program Study Wells (1 of 10)

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

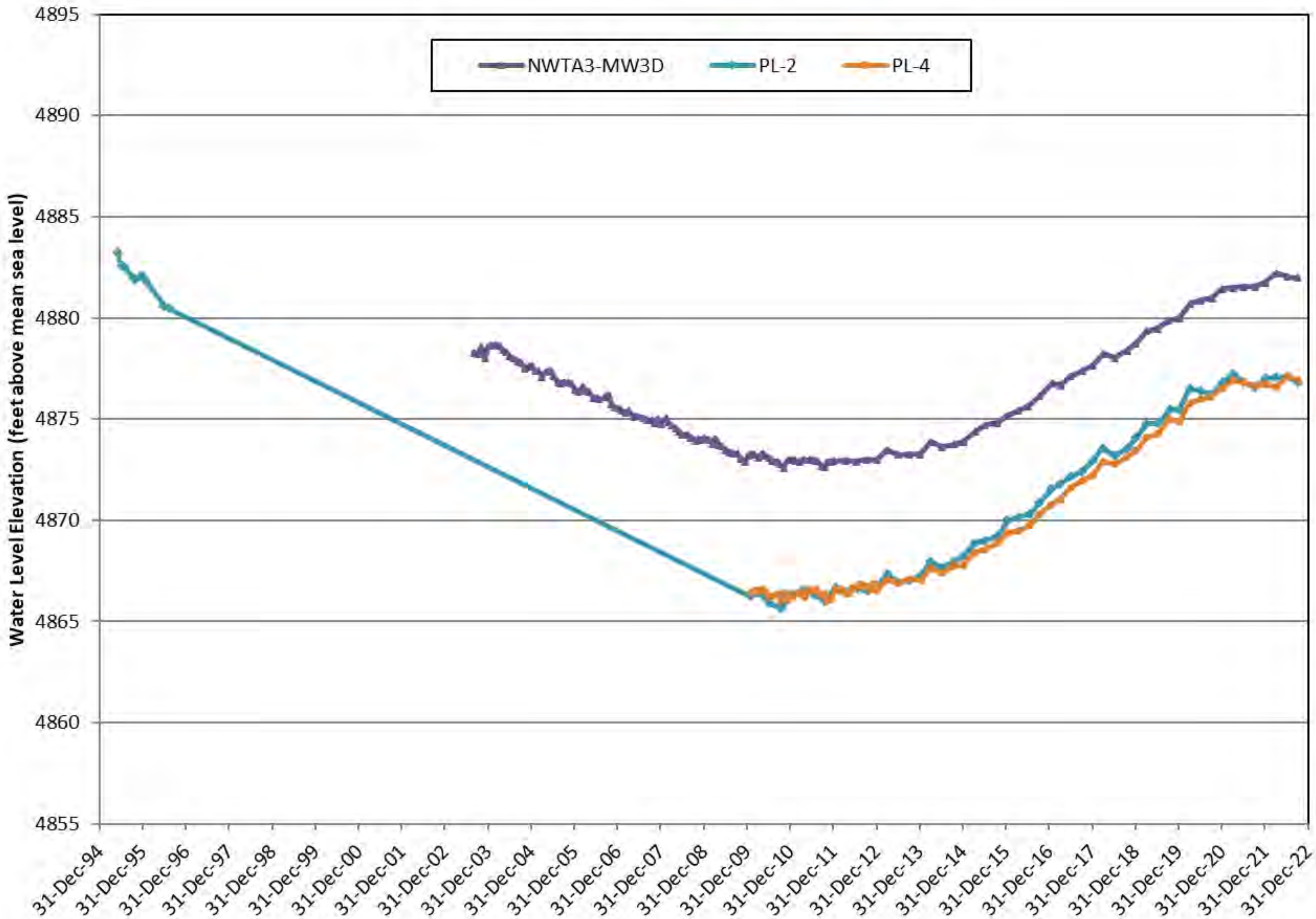

Figure 2B-3
Groundwater Monitoring Program Study Wells (3 of 10)

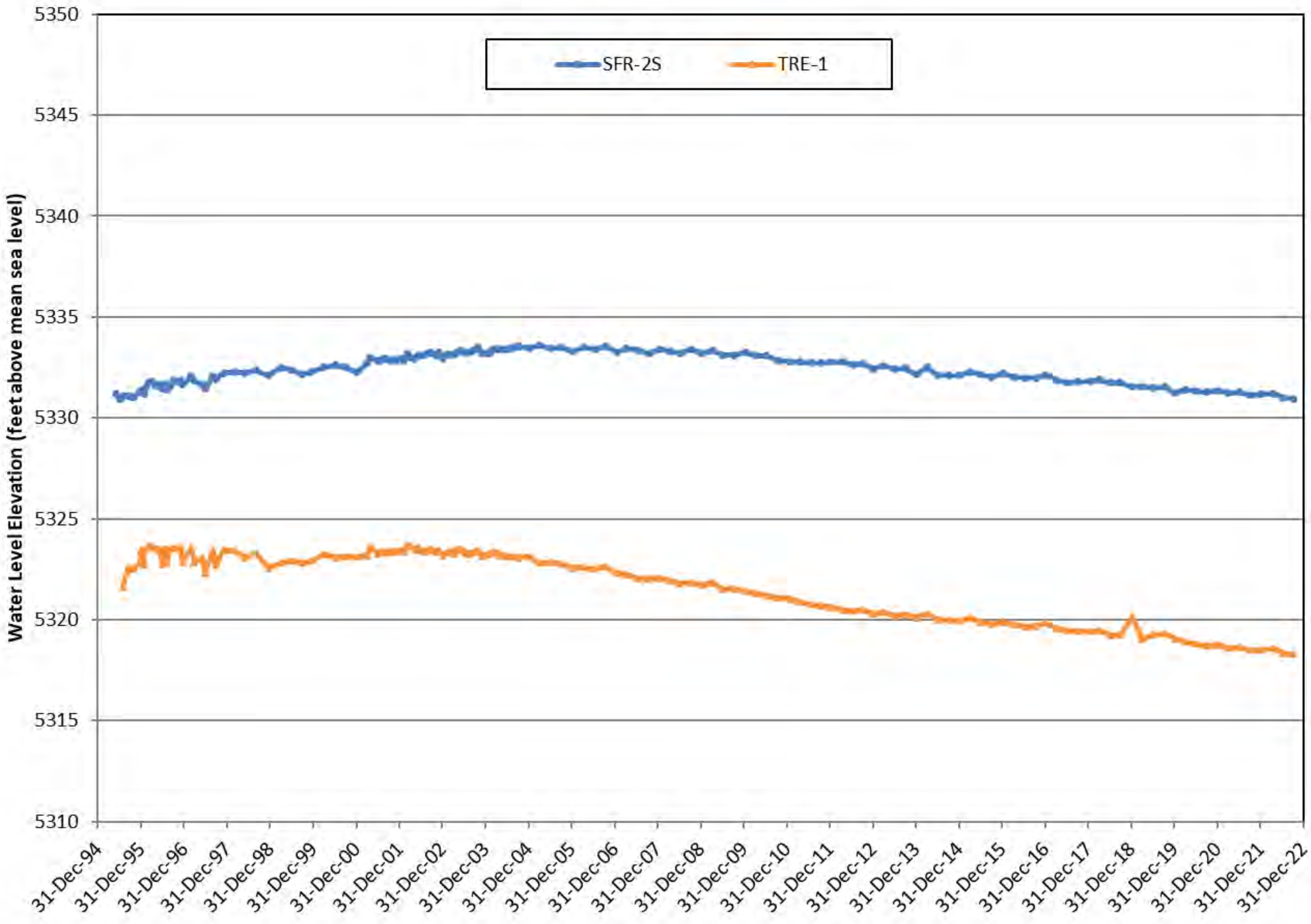

Figure 2B-4
Groundwater Monitoring Program Study Wells (4 of 10)

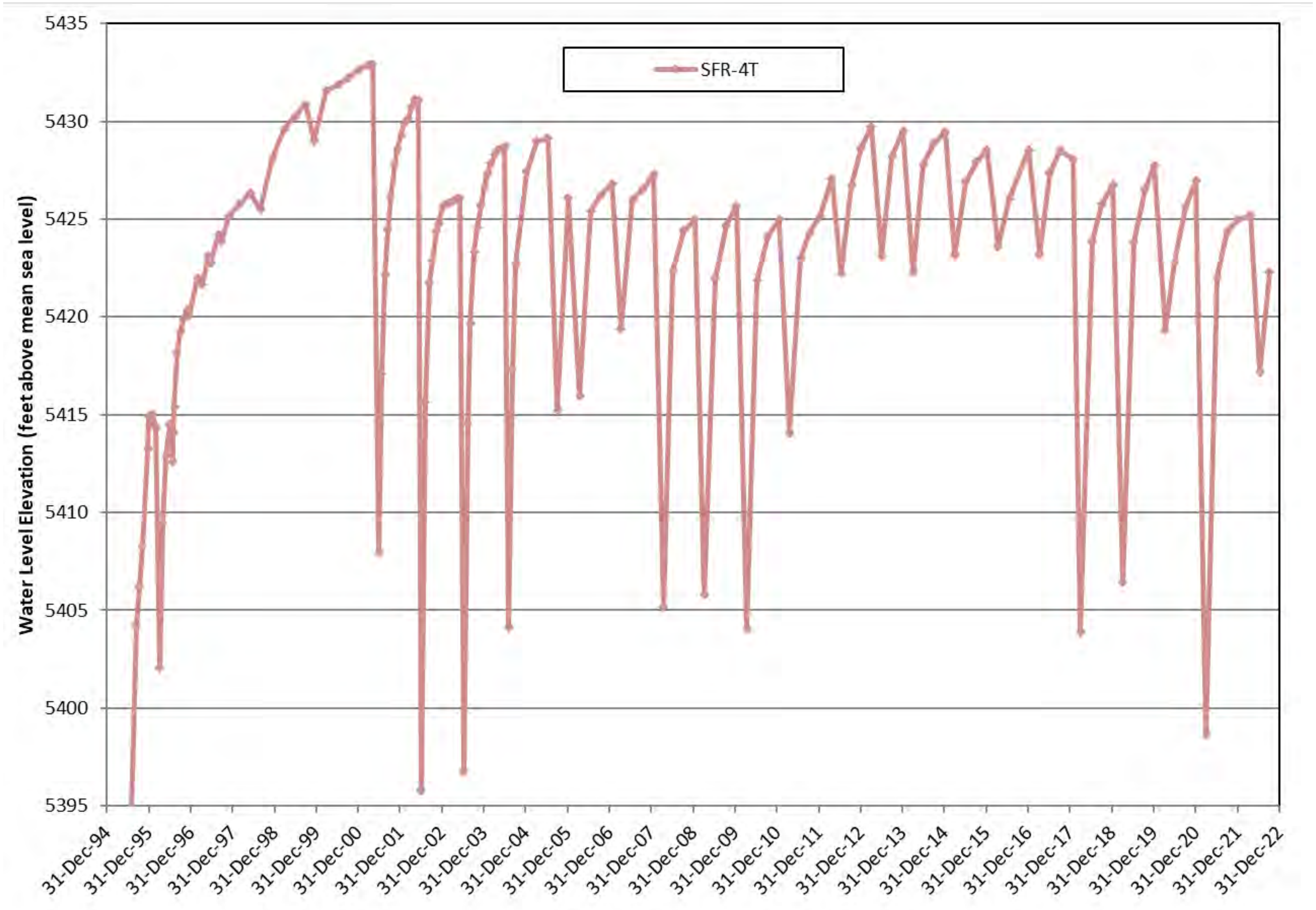

Figure 2B-5
Groundwater Monitoring Program Study Wells (5 of 10)

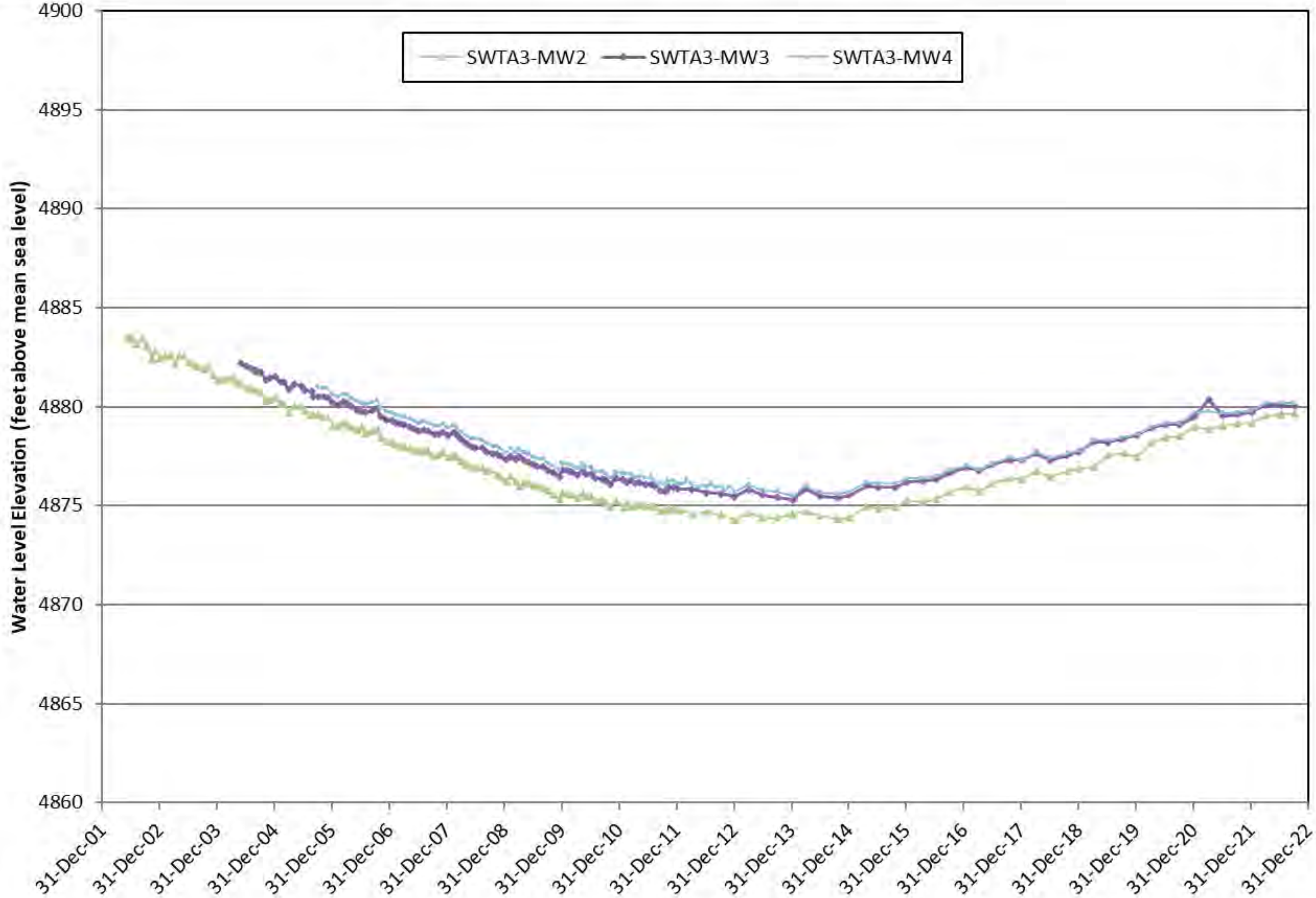

Figure 2B-6
Groundwater Monitoring Program Study Wells (6 of 10)

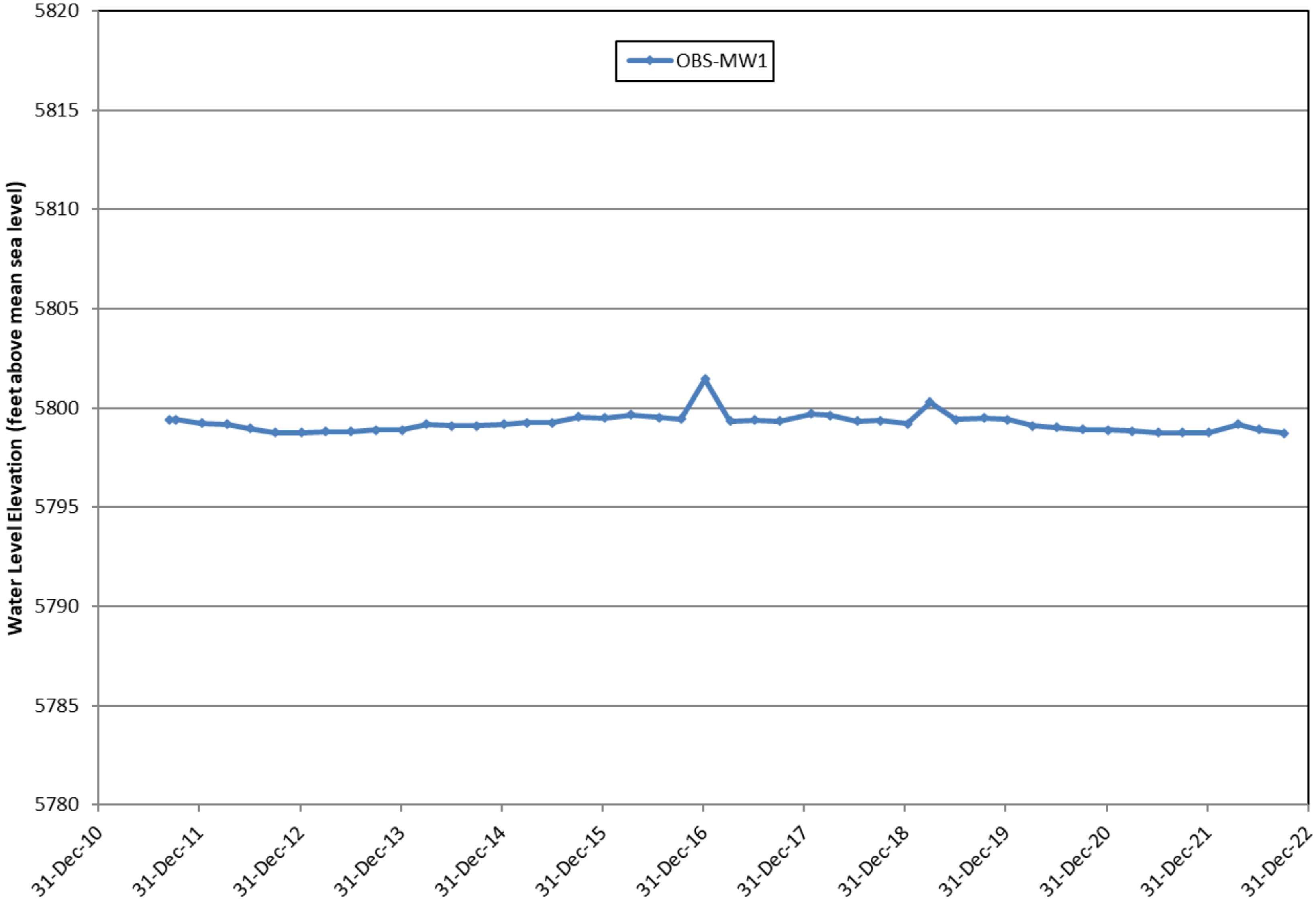

Figure 2B-7
Groundwater Monitoring Program Study Wells (7 of 10)

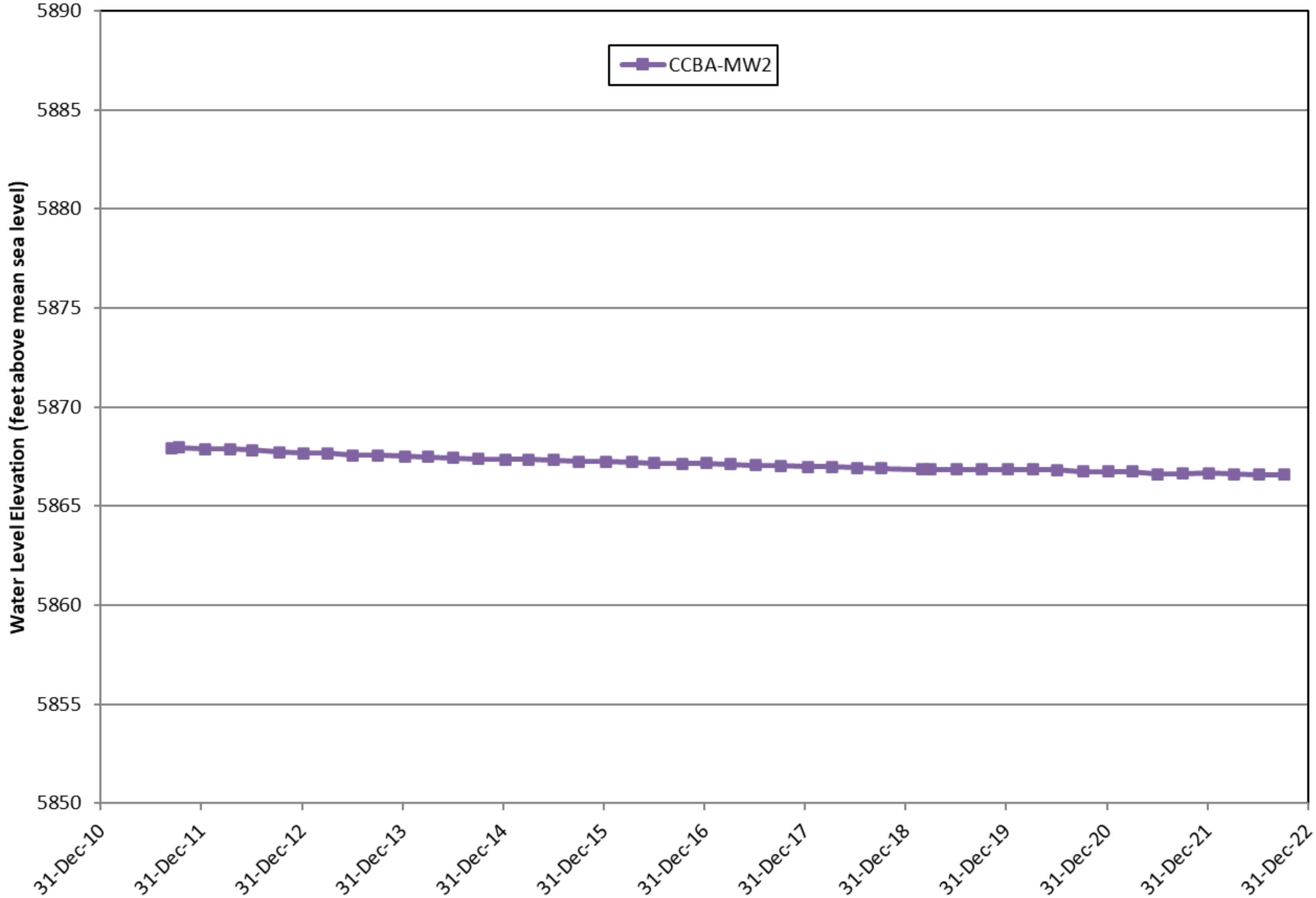

Figure 2B-8
Groundwater Monitoring Program Study Wells (8 of 10)

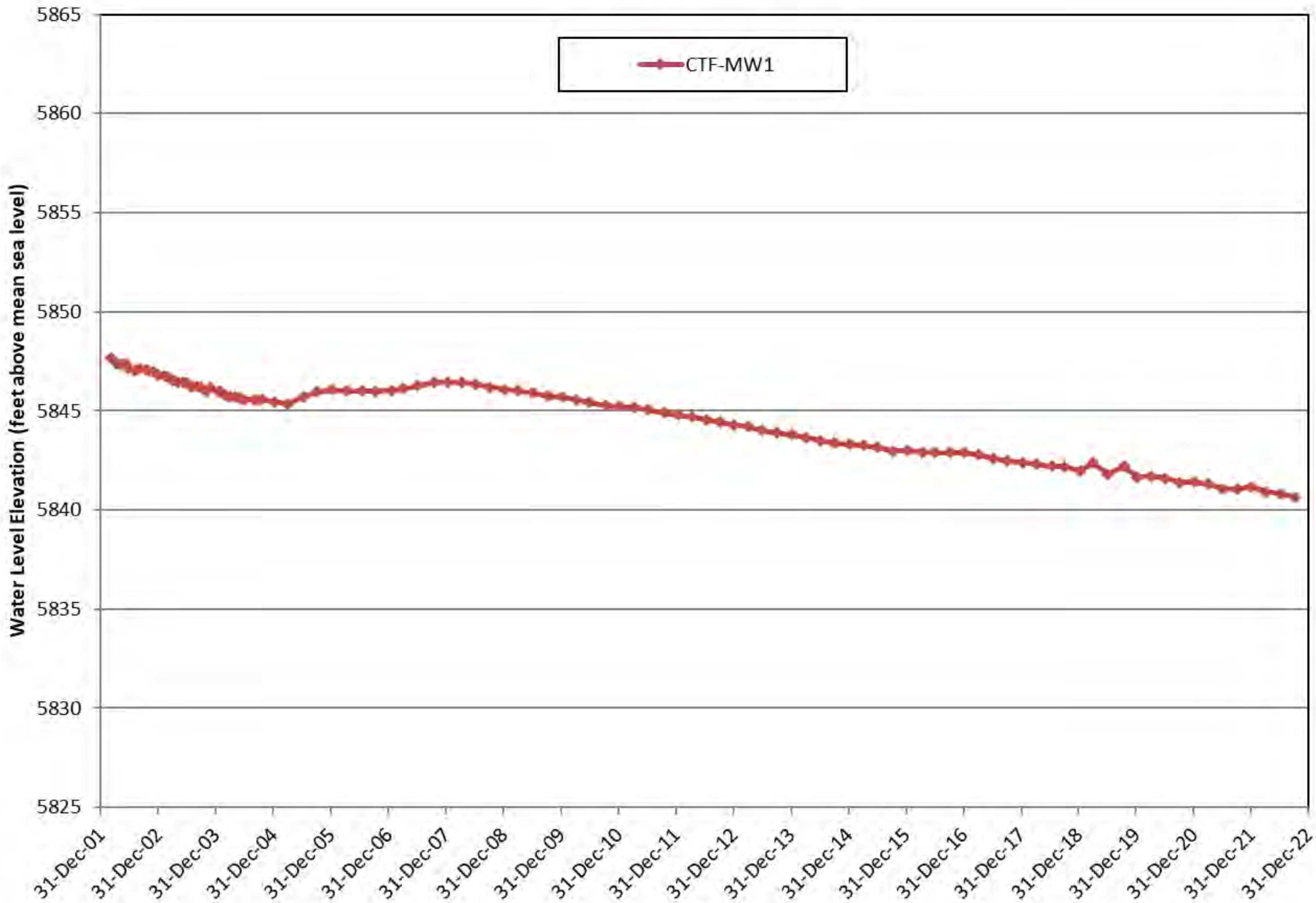

Figure 2B-9
Groundwater Monitoring Program Study Wells (9 of 10)

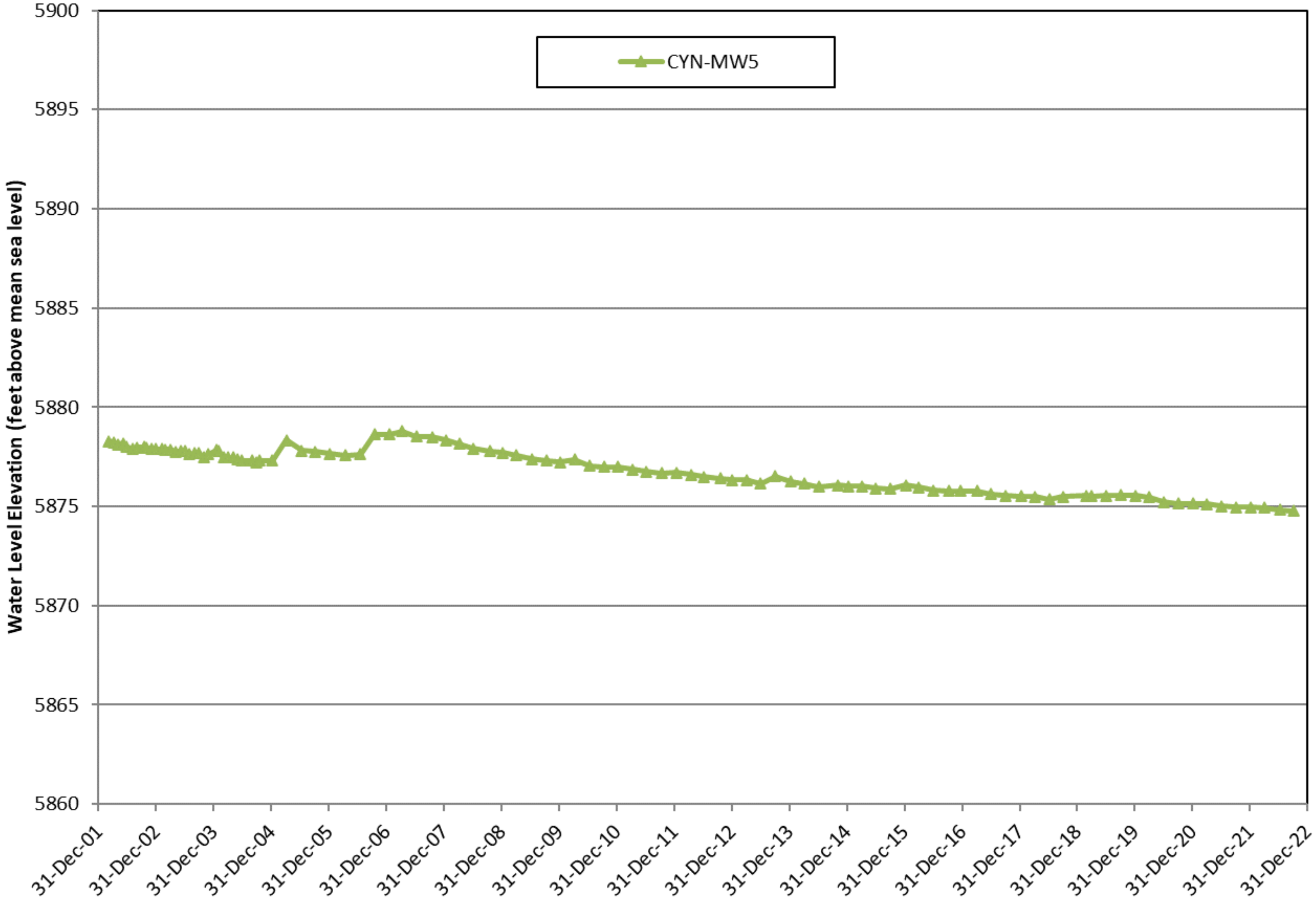

Figure 2B-10
Groundwater Monitoring Program Study Wells (10 of 10)

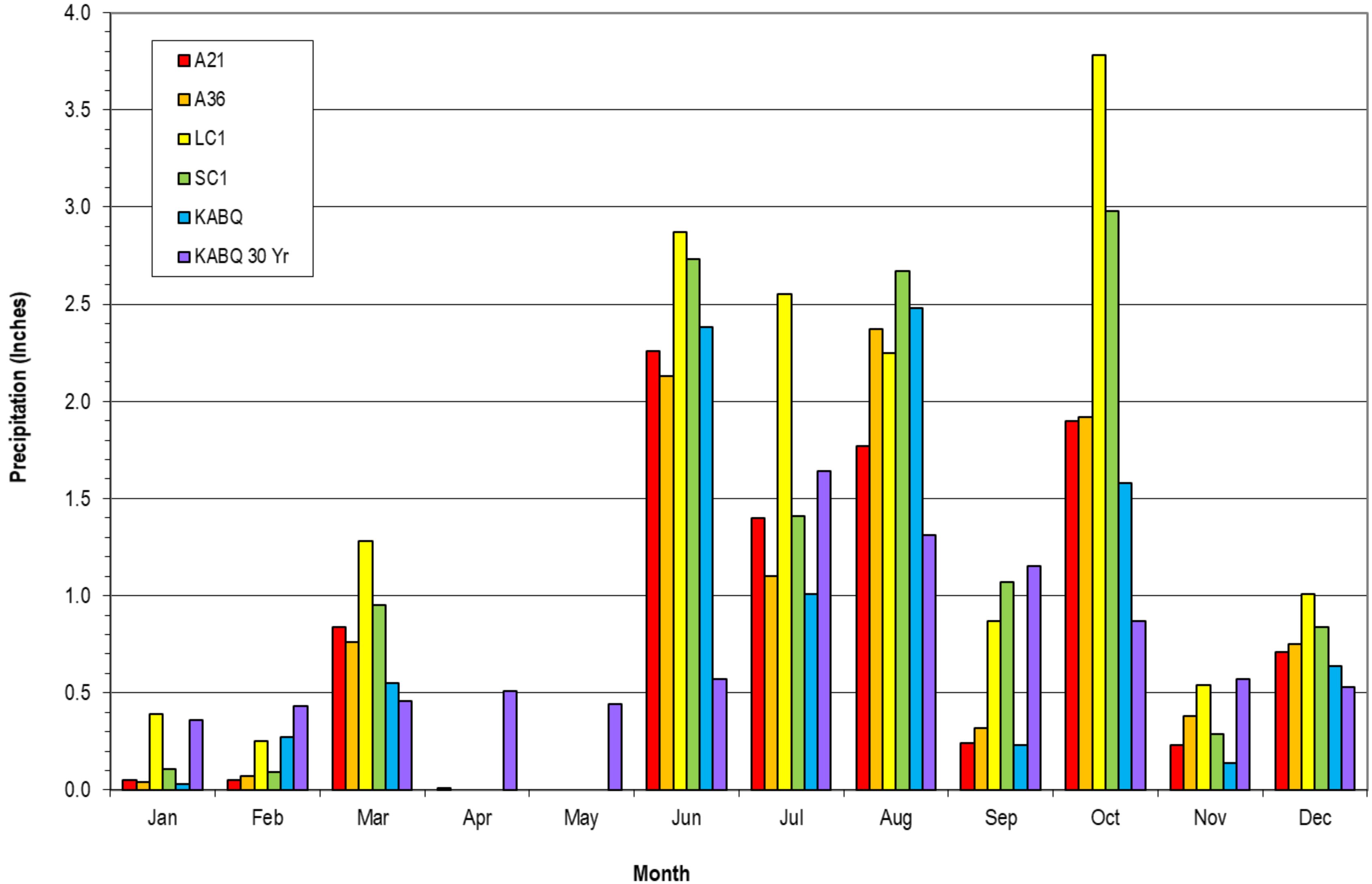

Figure 2B-11
Precipitation Data for Sandia National Laboratories, New Mexico, Calendar Year 2022

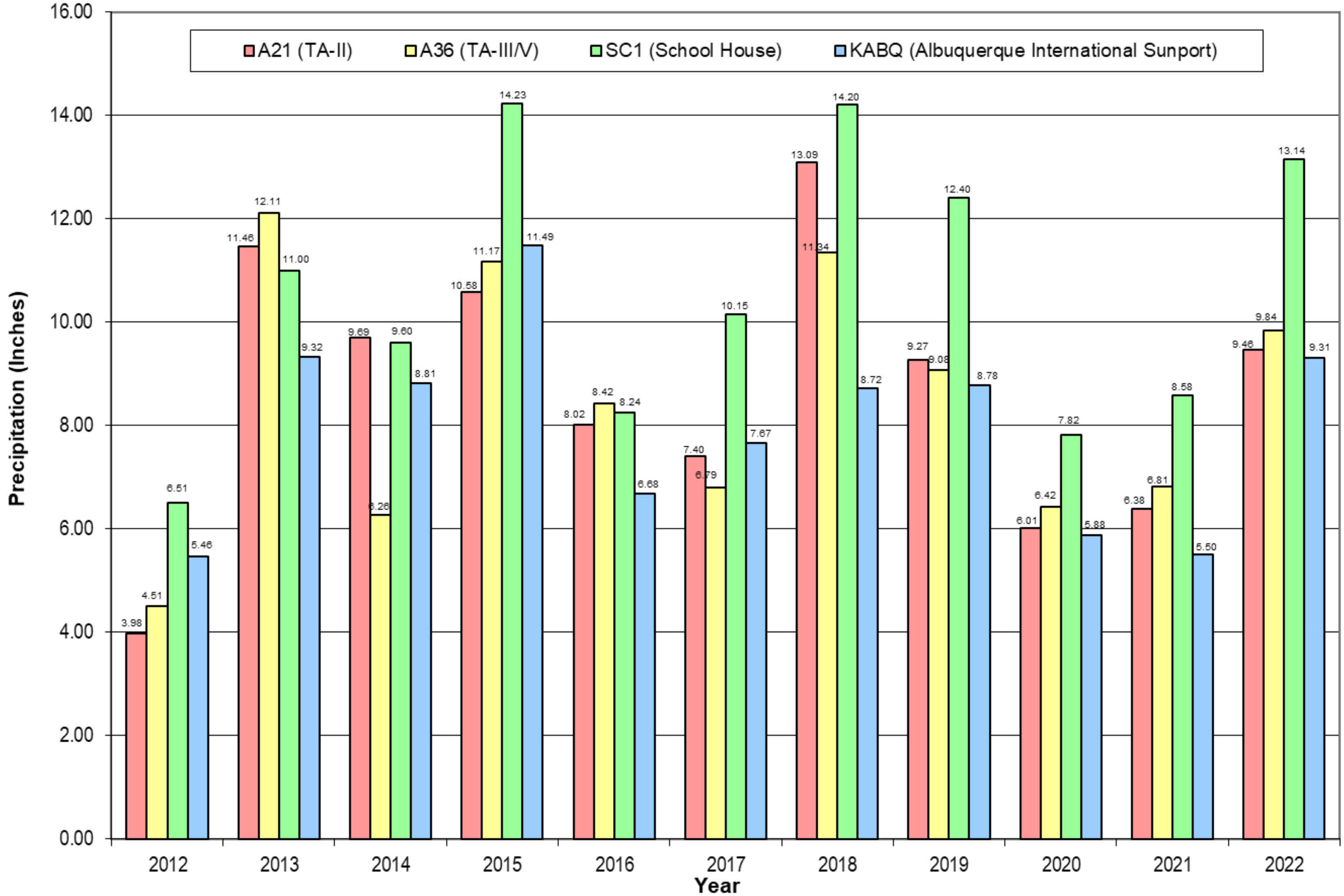

Figure 2B-12
Annual Precipitation Data for Sandia National Laboratories, New Mexico, January 2012 to December 2022

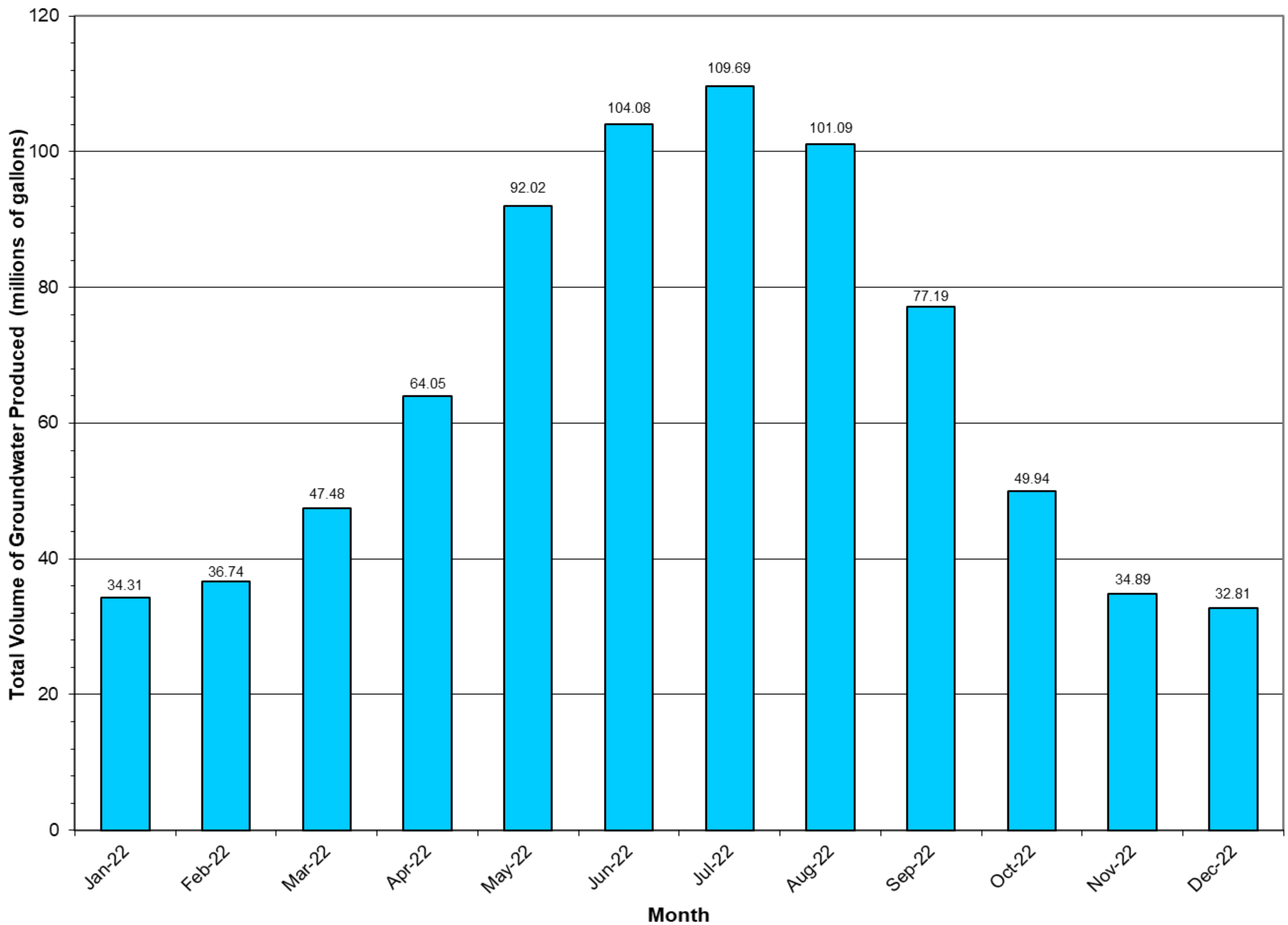

Figure 2B-13
Monthly Groundwater Pumped by Kirtland Air Force Base Production Wells, Calendar Year 2022

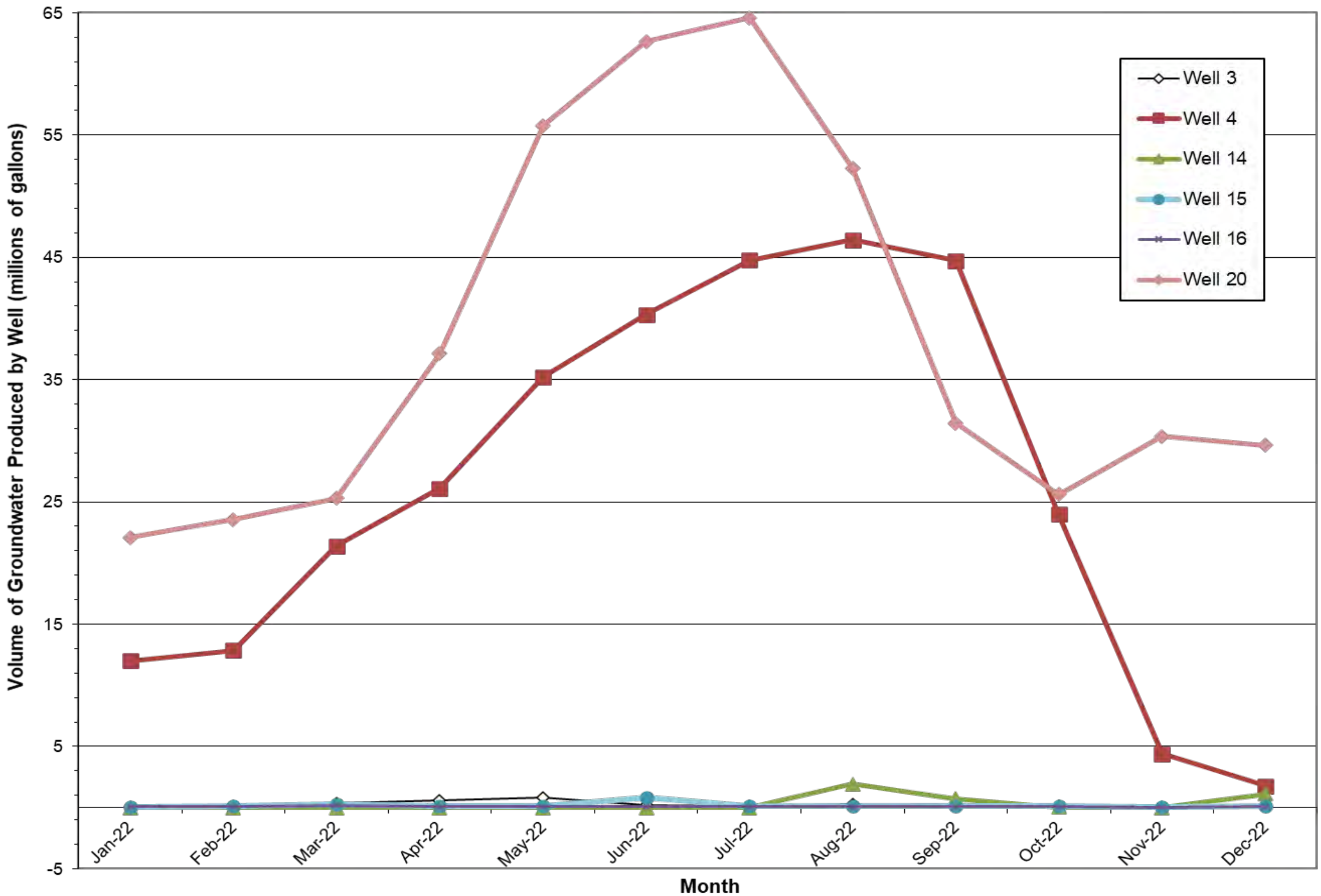

Figure 2B-14
Groundwater Pumped by Kirtland Air Force Base Production Wells, Calendar Year 2022

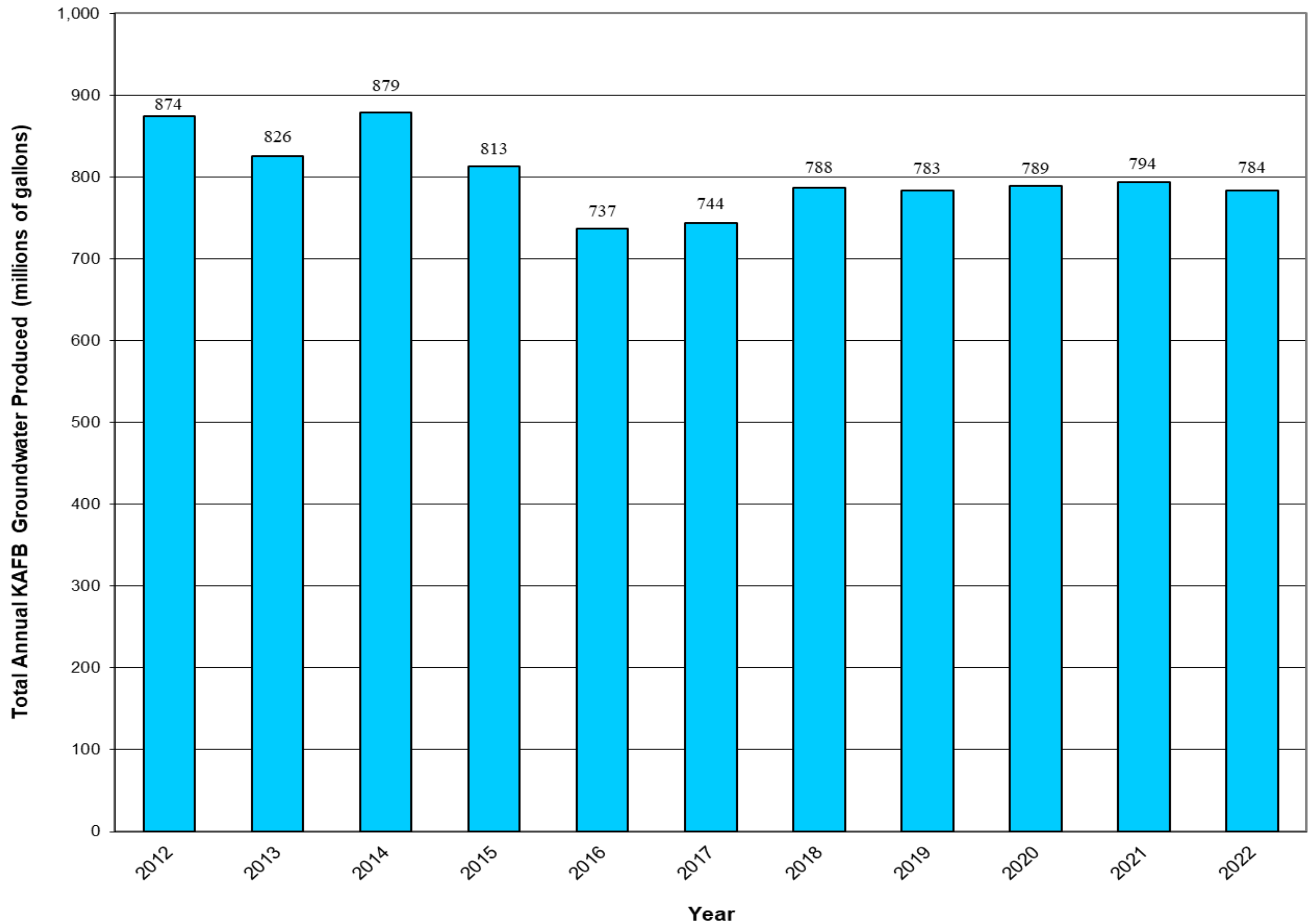

Figure 2B-15
Annual Groundwater Pumped by Kirtland Air Force Base Production Wells, 2011 to 2022

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Attachment 2C
Groundwater Monitoring Program Plots

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Attachment 2C Plots

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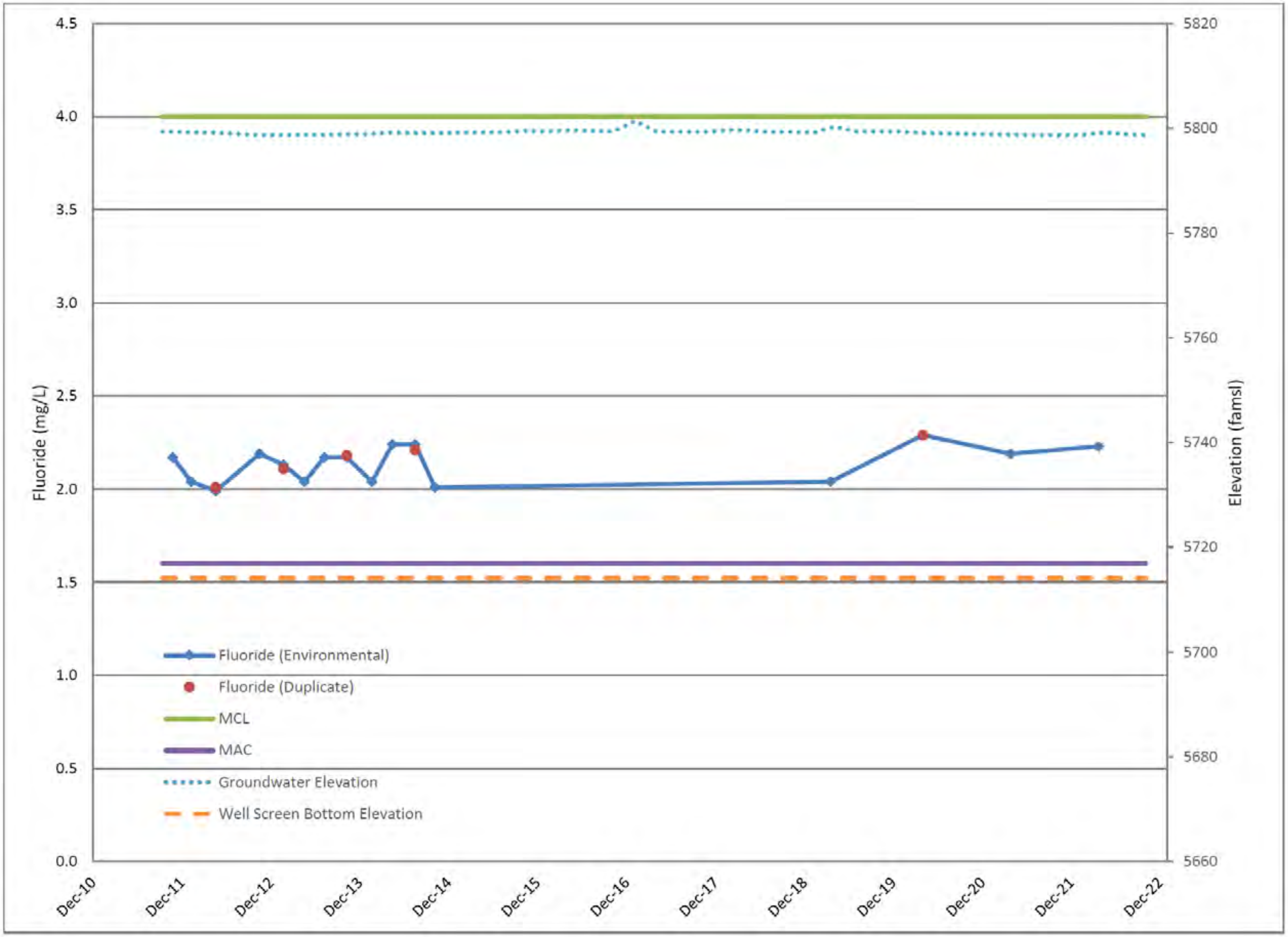

Figure 2C-1
Fluoride Concentrations, OBS-MW1

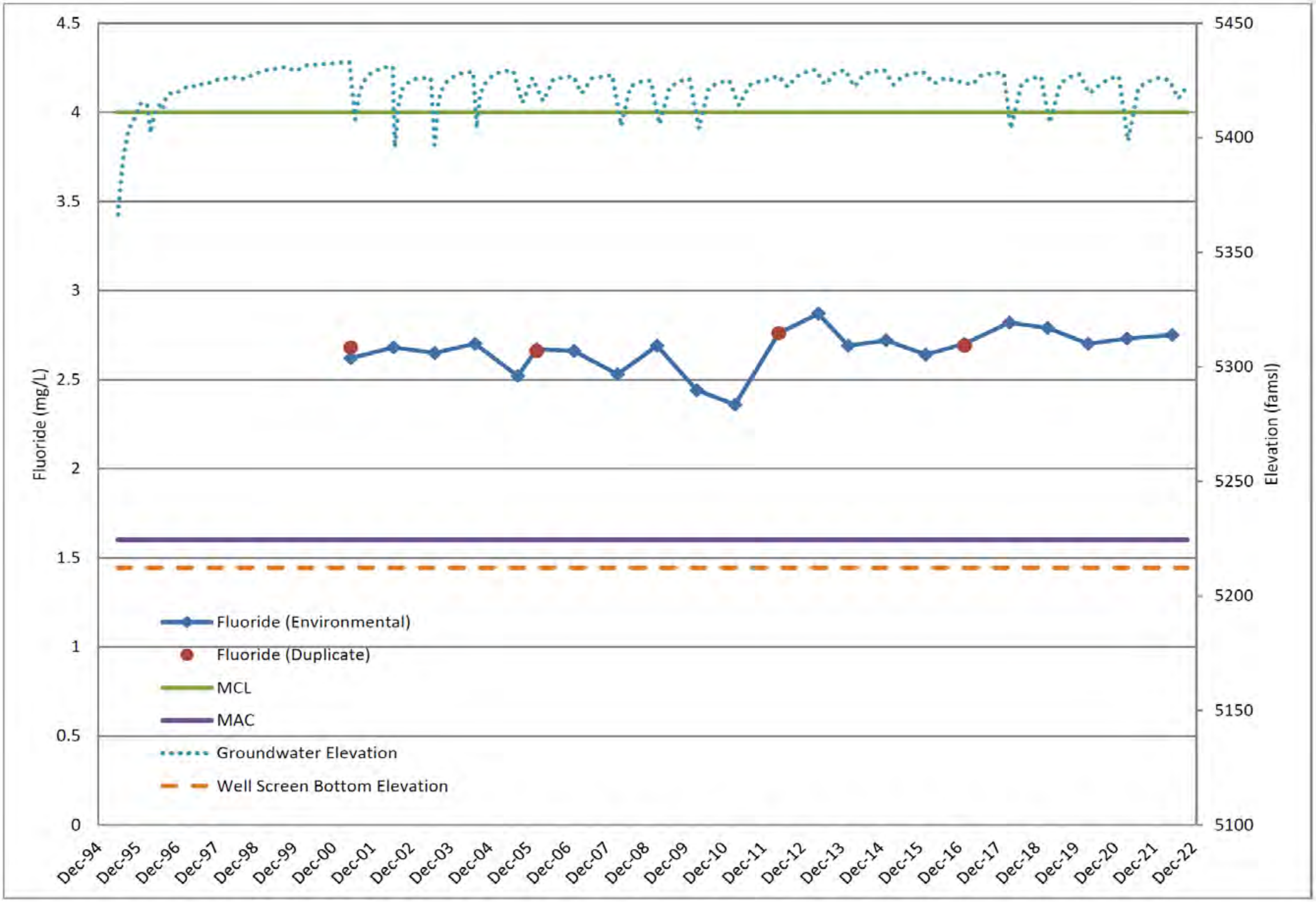

Figure 2C-2
Fluoride Concentrations, SFR-4T

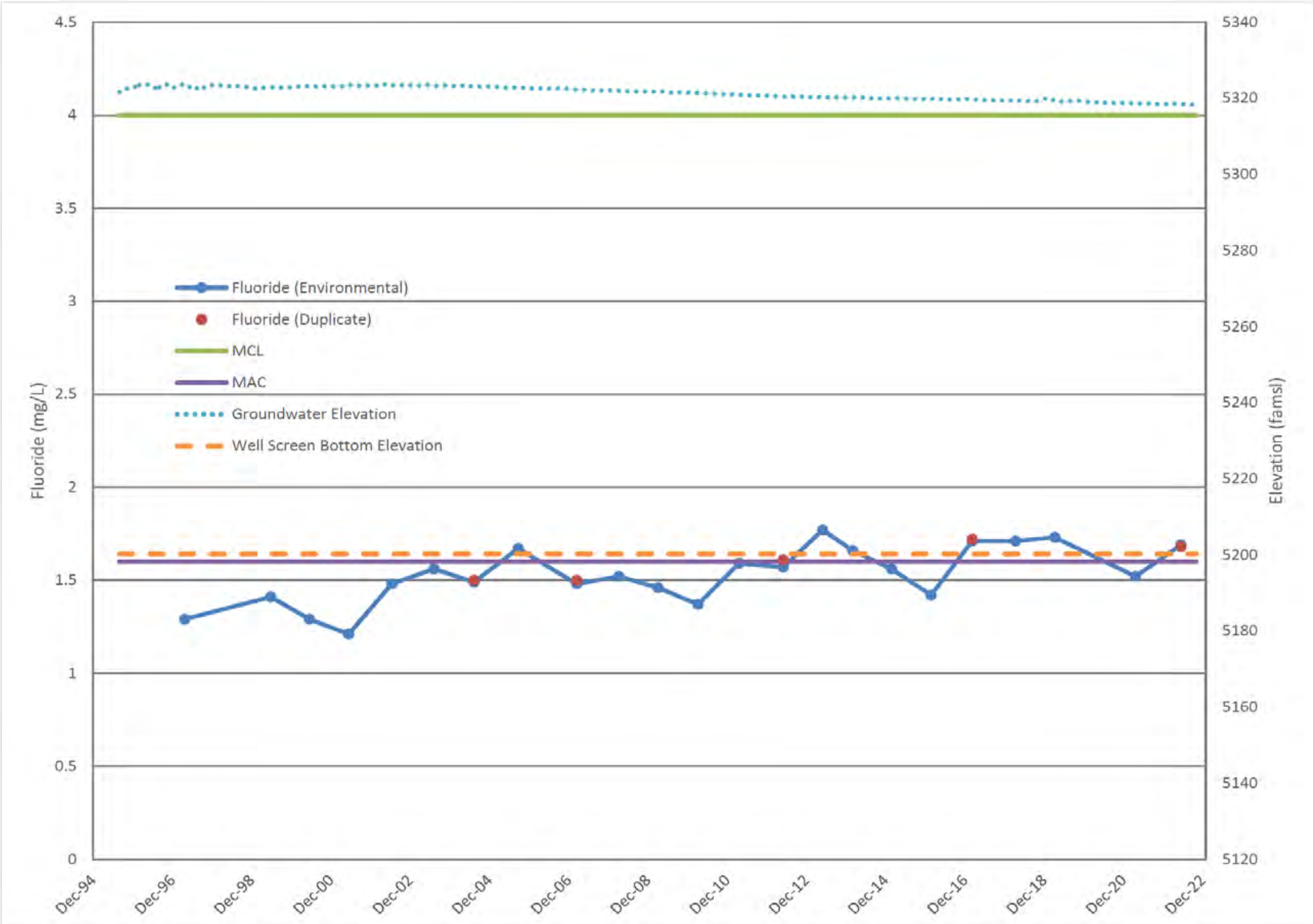

Figure 2C-3
Fluoride Concentrations, TRE-1

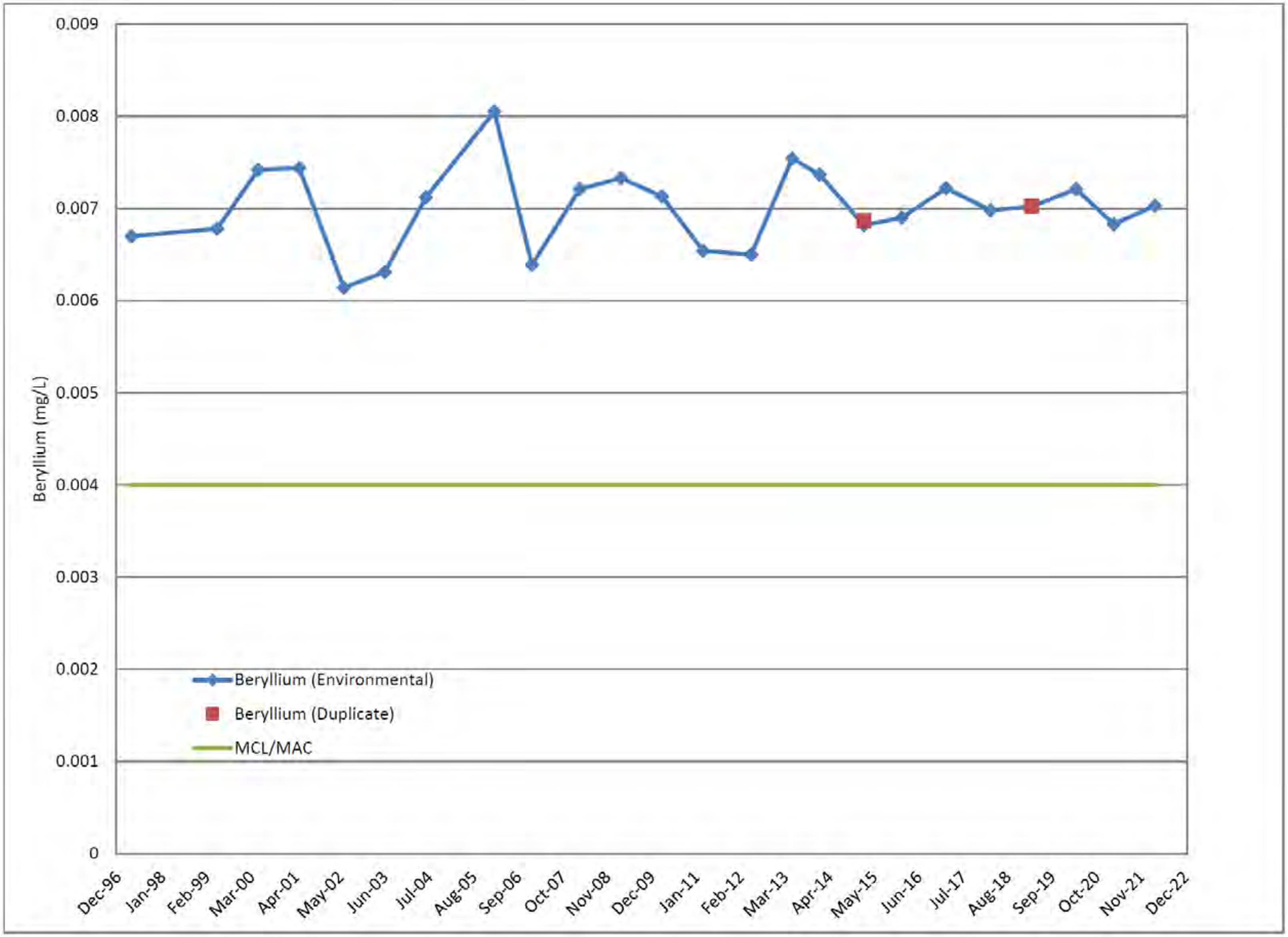

Figure 2C-4
Beryllium Concentrations, Coyote Springs

Chapter 2.0
Groundwater Monitoring Program References

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40 CFR 141	Code of Federal Regulations, Title 40 - Protection of the Environment, Part 141 - National Primary Drinking Water Regulations.
EPA March 2018	U.S. Environmental Protection Agency (EPA), March 2018. *2018 Edition of the Drinking Water Standards and Health Advisories Tables*, EPA 822-F-18-0001, Office of Water, U.S. Environmental Protection Agency, Washington, D.C.
NMED April 2004	New Mexico Environment Department (NMED), April 2004. *Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act 74-4-10: Sandia National Laboratories Consent Order*, New Mexico Environment Department, Santa Fe, New Mexico, April 29, 2004.
NMOSE August 2005	New Mexico Office of the State Engineer (NMOSE), August 2005. *Rules and Regulations Governing Well Driller Licensing; Construction, Repair and Plugging of Wells*, Office of the State Engineer, Santa Fe, New Mexico, August 31, 2005.
NMOSE June 2020	New Mexico Office of the State Engineer (NMOSE), June 2020. *Well Plugging Handbook*, Office of the State Engineer, Santa Fe, New Mexico.
NMWQCC December 2018	New Mexico Water Quality Control Commission (NMWQCC), December 2018. Environmental Protection, Water Quality, Ground and Surface Water Protection Regulations, Section 20.6.2 of the New Mexico Administrative Code, Santa Fe, New Mexico, December 21, 2018.
SNL February 2021	Sandia National Laboratories, New Mexico (SNL/NM), February 2021. *LTS Consolidated Groundwater Monitoring Program Mini-Sampling and Analysis Plan (SAP) for FY21 Groundwater Surveillance Task*, Sandia National Laboratories, Albuquerque, New Mexico.

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3.0 Chemical Waste Landfill

3.1 Introduction

The Chemical Waste Landfill (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 until 1981, the CWL was used for the disposal 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 above ground, 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,* hereafter referred to as the Final Closure Plan (SNL December 1992). The SNL/NM Environmental Restoration Project implemented two voluntary corrective measures (VCMs); the Vapor Extraction and the Landfill Excavation VCMs. 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 end-state conditions met 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 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 (Wagner April 2004) while NMED comments on the May 2003 *Chemical Waste Landfill Corrective Measures Study Report* (CWL CMS Report) (SNL December 2004) were being resolved. In September 2004, the NMED approved this request (Kieling 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 (Kieling May 2007) for three documents: the CWL CMS Report, the *Post-Closure Care Permit* (CWL PCCP) (NMED May 2007), and the *Chemical Waste Landfill Final Closure Plan – Chapter 12 Revision* (*CWL Final Closure Plan – Chapter 12 Revision*) (SNL February 2006). In 2009, the NMED issued the final CWL PCCP (NMED October 2009a), approved the CWL CMS Report, and approved the *CWL Final Closure Plan – Chapter 12 Revision* (NMED October 2009b).

In 2010, 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 groundwater monitoring network for the CWL in accordance with the approved *CWL Final Closure Plan – Chapter 12 Revision*. The *Chemical Waste Landfill Final Resource Conservation and Recovery Act Closure Report* (SNL September 2010) documenting closure in accordance with all Final Closure Plan requirements was submitted to the NMED after completion of well installation and decommissioning activities.

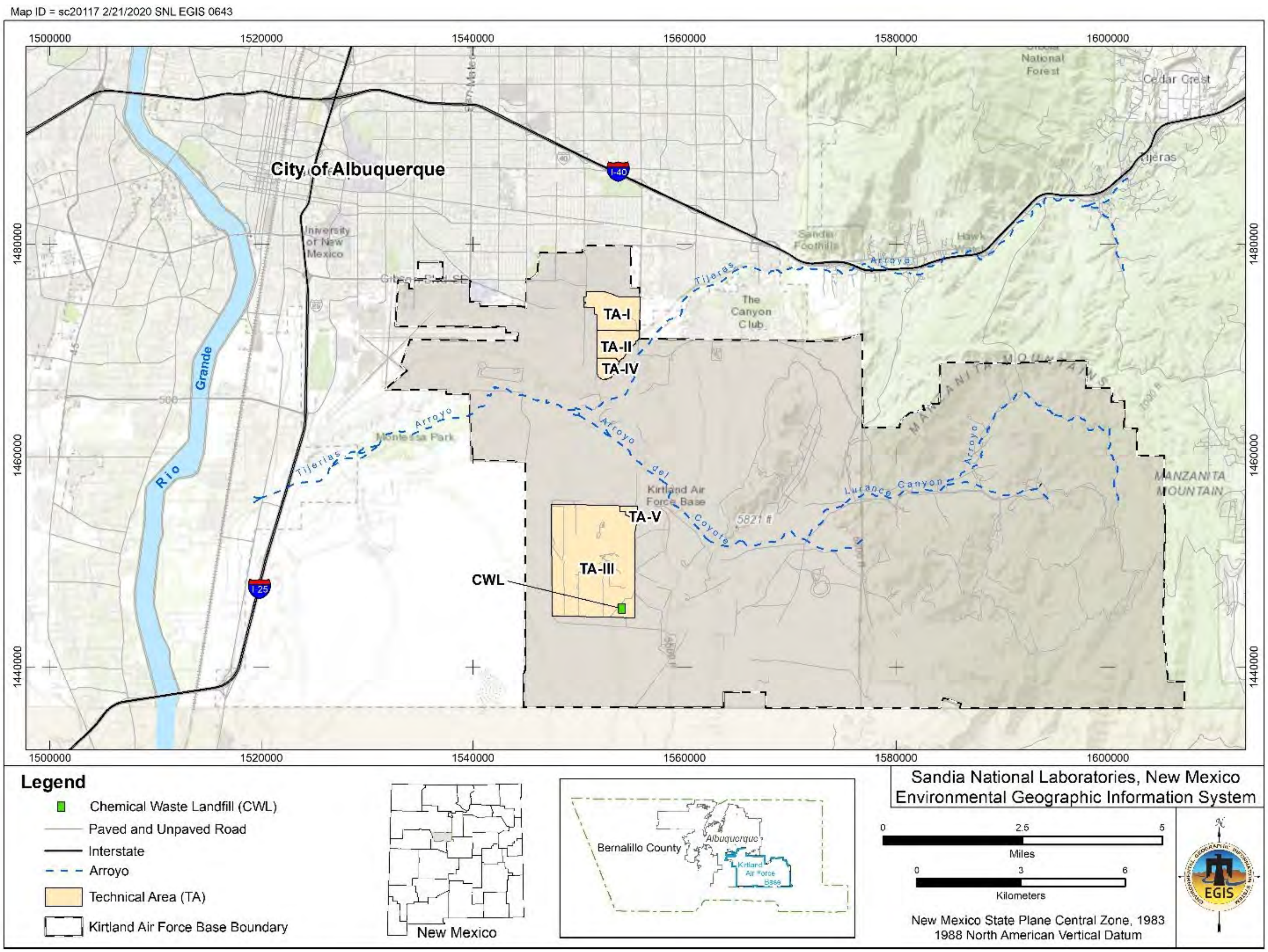

Figure 3-1
Location of the Chemical Waste Landfill with Respect to Kirtland Air Force Base and the City of Albuquerque

Upon NMED approval of CWL closure (Kieling June 2011), the CWL PCCP became the enforceable regulatory document. All groundwater monitoring activities at the CWL since June 2011 are performed in accordance with 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. During calendar year (CY) 2022, the *Chemical Waste Landfill Annual Post-Closure Care Report*, *Calendar Year 2021* (SNL March 2022) was submitted to the NMED and approved (Cobrain April 2022). The *Chemical Waste Landfill Annual Post-Closure Care Report, Calendar Year 2022* will be submitted to the NMED in March 2023.

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 2022* will present a comprehensive statistical evaluation of CWL CY 2022 groundwater monitoring results.

3.1.1 Monitoring History

Groundwater monitoring began in 1985 at the CWL (IT December 1985) as required by Section 20.4.1.600 of the New Mexico Administrative Code, incorporating Title 40, Code of Federal Regulations, Part 265, Subpart F. Monitoring under the Final Closure Plan was conducted until June 2, 2011; since then, groundwater monitoring has been performed in accordance with the CWL PCCP.

3.1.2 Monitoring Network

The CWL compliance groundwater monitoring network includes 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 2022 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 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

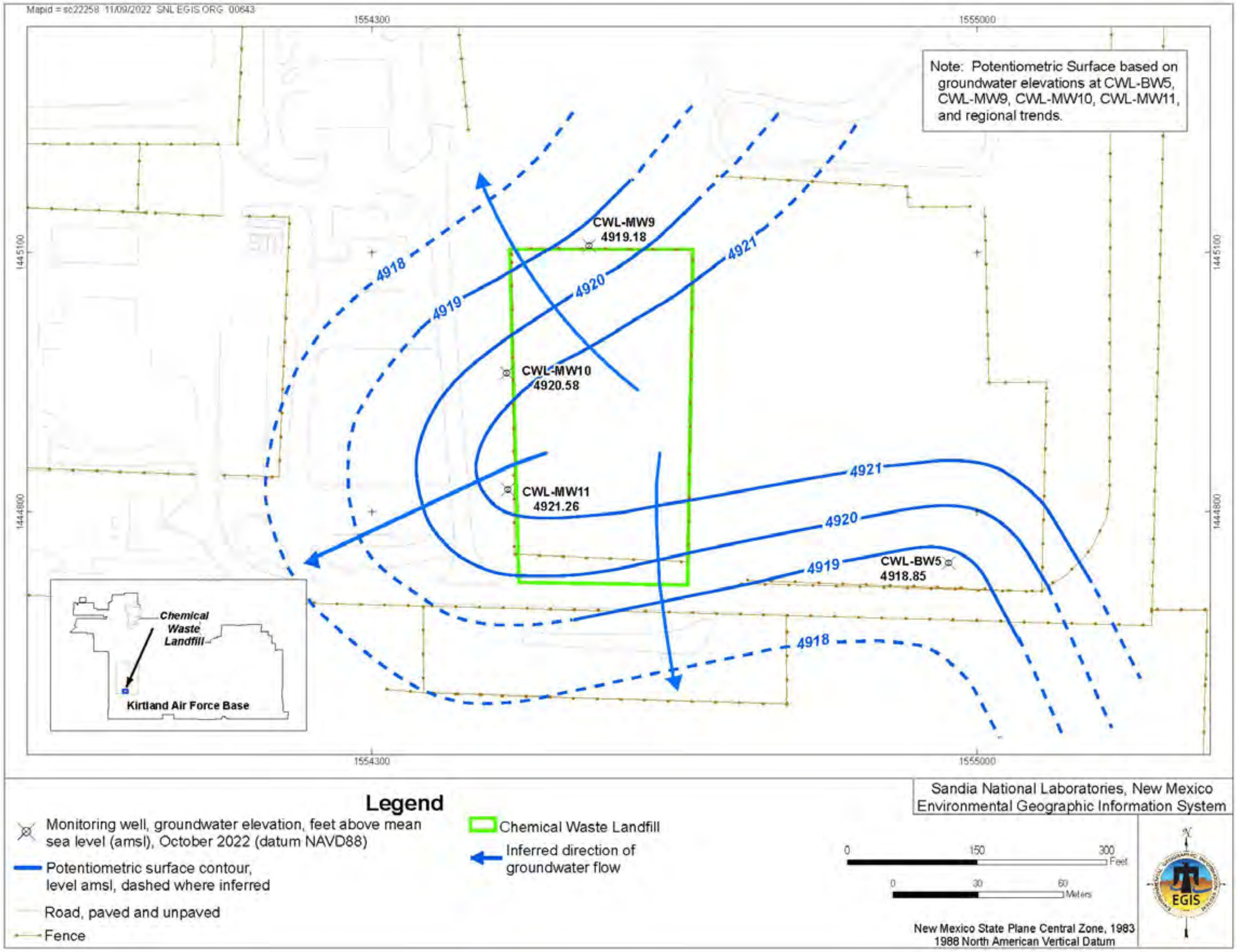

Figure 3-2
Localized Potentiometric Surface of the Regional Aquifer at the Chemical Waste Landfill, October 2022

3.1.3 Conceptual Site Model

The constituents of concern in 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. Groundwater flows generally westward, away from the Manzanita Mountains and toward the Rio Grande. Several production wells operated by Kirtland Air Force Base (KAFB) and the Albuquerque Bernalillo County Water Utility Authority (ABCWUA) 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 portions of KAFB. As a result, water levels at the CWL have been steadily declining since monitoring began in 1985.

In Attachment 3A, Figure 3A-1 (hydrographs) shows the rate of groundwater elevation decline from 2009 to 2022 at the existing CWL monitoring wells. Since groundwater monitoring began at the CWL in 1985, the average rate of water table decline has been somewhat variable, but typically in the range of 0.4 to 0.8 ft per year. The groundwater elevation decline between October 2021 and October 2022 at the four monitoring wells ranged from 0.20 to 0.42 ft (CWL-MW11 and CWL-BW5, respectively). This amount of decline was consistent with the decline between October 2020 to October 2021, which ranged from 0.25 (CWL-MW11) to 0.38 ft (CWL-BW5). Overall, the rate of decline has decreased, which is likely due to decreased pumping of 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 2022.

Table 3-2 presents the data used to construct the CY 2022 potentiometric surface map shown in Figure 3-2 for the CWL groundwater monitoring network.

Table 3-2
Groundwater Elevations Measured in October 2022 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	3-Oct-2022	515.94	4,918.85
CWL-MW9	5,426.12	3-Oct-2022	506.94	4,919.18
CWL-MW10	5,424.58	3-Oct-2022	504.00	4,920.58
CWL-MW11	5,423.24	3-Oct-2022	501.98	4,921.26

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 shown on Plate 1, 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 did not change significantly from previous years and was approximately 0.013 ft per ft. Groundwater velocities in the alluvial-fan sediments were calculated using the current potentiometric surface gradient, the hydraulic conductivity range (i.e., high and low values) from slug tests conducted in 2012 on the four groundwater monitoring wells, and a porosity of 29 percent as determined from the laboratory analyses of CWL sediment samples (SNL October 1995). The CY 2022 calculated velocities ranged from approximately 1.8×10^{-4} to 2.8×10^{-3} ft per day. This is equivalent to approximately 0.07 to 1.02 ft per year. 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 KAFB and ABCWUA production wells are on the order of hundreds to thousands of years (SNL February 2001).

3.2 Regulatory Criteria

The CWL is a remediated, closed, regulated unit undergoing post-closure care in accordance with the CWL PCCP that became effective on June 2, 2011. Groundwater monitoring requirements, procedures, and protocols are detailed in the 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 activities were conducted in January and August 2022 at the CWL in accordance with Attachment 2 of the CWL PCCP. In January 2022, groundwater samples were analyzed for TCE, chromium, nickel, and the enhanced list of VOCs. The enhanced list of VOCs includes 1,1-dichloroethene; 1,1,2-trichloro-1,2,2-trifluoroethane; chloroform; tetrachloroethene; and trichlorofluoromethane. In August 2022, groundwater samples were analyzed for TCE, chromium, and nickel.

Table 3-3 lists the analytical parameters and CWL monitoring wells sampled. Attachment 3B contains the analytical results (Tables 3B-1 and 3B-2). In January and August 2022, groundwater sampling activities were conducted in accordance with the CWL PCCP and procedures outlined in the *Chemical Waste Landfill Groundwater Monitoring, Mini-Sampling and Analysis Plan for Fiscal Year 2022, 2nd Quarter Sampling* (SNL December 2021) and the *Chemical Waste Landfill Groundwater Monitoring, Mini-Sampling and Analysis Plan for Fiscal Year 2022, 4th Quarter Sampling* (SNL June 2022).

The CWL groundwater samples were submitted for analysis to GEL Laboratories, LLC in Charleston, South Carolina. All groundwater sampling results are compared with EPA MCLs for drinking water (EPA March 2018).

Table 3-3
Analytical Parameters for the Chemical Waste Landfill Monitoring Wells, Calendar Year 2022

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-MW9 (Duplicate) CWL-MW10 CWL-MW11
Metals: Chromium Nickel		
VOCs: TCE	August	CWL-BW5 CWL-BW5 (Duplicate) CWL-MW9 CWL-MW10 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 Section 1.3.3. Field QC samples included environmental duplicate, equipment blank (EB), field blank (FB), and trip blank (TB) samples. Laboratory QC samples included method blank, laboratory control, matrix spike and matrix spike duplicate, surrogate spike, and replicate samples.

3.4 Field Methods and Measurements

Groundwater sampling and depth-to-groundwater measurements were conducted in accordance with the CWL PCCP and procedures specified in the CWL groundwater monitoring mini-SAPs, which are consistent with the methods described in Section 1.3. Water quality parameters measured in the field during the purging process included temperature, specific conductivity (SC), oxidation-reduction potential (ORP), potential of hydrogen (pH), and dissolved oxygen (DO) using an In-Situ Incorporated Aqua TROLL® 600 Multiparameter Water Quality Sonde. Turbidity measurements were made with a HACH™ Model 2100Q turbidity meter. Attachment 3B, Table 3B-3 presents field water quality parameters and Attachment 3A, Figure 3A-1 (hydrograph) presents groundwater elevation measurements at the CWL monitoring wells.

As specified in CWL PCCP Attachment 2, Section 2.12, 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 located along the discharge line. In addition, during the purging process at wells prone to purging dry, the flow rate is continually adjusted to achieve as low a flow rate as possible without causing the pump to be damaged or fail due to overheating. This represents a “best faith effort” to purge the wells at the slowest rate possible given equipment limitations.

The minimum purging volume requirement was satisfied at three of the four monitoring wells (CWL-BW5, CWL-MW9, and CWL-MW11). Monitoring well CWL-MW10 purged dry prior to removal of the minimum volume. This well was purged to dryness during both the January and August 2022 monitoring events, allowed to recover, and then sampled to collect the most representative groundwater sample possible given the low yield of this well. During January 2022, approximately 13 gallons (gal) were purged from CWL-MW10 prior to the well going dry (purge volume requirement was approximately 21 gal). The average flow rate for the entire purging event was 0.171 gal per minute (gpm), and the estimated flow rate during the final three gal was 0.143 gpm (equivalent to 0.647 and 0.541 liters per minute, respectively). During August 2022, approximately 13 gal were purged from CWL-MW10 prior to the well going dry (purge volume requirement was approximately 20 gal). The average flow rate for the entire purging event was 0.210 gpm, and the estimated flow rate during the final three gal was 0.250 gpm (equivalent to 0.795 and 0.946 liters per minute, respectively).

3.5 Analytical Methods

All groundwater samples were analyzed by the off-site laboratory using EPA-specified protocols described in Section 1.3.2.

3.6 Summary of Analytical Results

The analytical results and water quality parameters are presented in Attachment 3B, Tables 3B-1 through 3B-3. Data qualifiers assigned by the analytical laboratory and the data validation process (SNL June 2020) are presented with the associated results in Tables 3B-1 and 3B-2.

For the purposes of this report, the CY 2022 analytical results were compared with EPA MCLs where applicable. No detected constituents exceeded the respective EPA MCLs or the CWL PCCP-defined hazardous concentration limits. The analytical results are discussed in detail in the following sections.

3.6.1 Volatile Organic Compounds

Table 3B-1 summarizes the CY 2022 analytical results for TCE and the enhanced list of VOCs (January) and TCE (August). TCE was detected above the laboratory method detection limit (MDL) in the January 2022 environmental sample from monitoring well CWL-MW10 at a concentration of 0.630 µg/L and in the August 2022 environmental sample at a concentration of 0.670 µg/L. These TCE results are below the practical quantitation limit of 1.0 µg/L (i.e., J-qualified estimated values) and the EPA MCL of 5.0 µg/L. No other VOCs were detected above the MDL in the January 2022 samples. Since implementation of the CWL PCCP in June 2011, TCE is the only VOC detected and it has only been detected in samples from CWL-MW10. Concentrations in CWL-MW10 samples have shown a declining trend since January 2013 indicating the two VCMs completed from 1996 through 2002 were effective.

3.6.2 Metals

Table 3B-2 summarizes the CY 2022 analytical results for chromium and nickel. Chromium was not detected above the MDL in the CY 2022 samples. Nickel was detected at an estimated concentration in the January 2022 CWL-BW5 and CWL-MW11 environmental samples, and in the August 2022 CWL-MW10 environmental sample. Nickel was reported above the MDL in the August 2022 CWL-BW5 environmental and environmental duplicate samples, but these detections were qualified as non-detections during data validation due to a similar nickel concentration reported in the associated EB sample.

3.6.3 Water Quality Parameters

Table 3B-3 lists the water quality parameters measured immediately prior to sample collection at each well. These field parameters consist of temperature, SC, ORP, pH, turbidity, and DO.

3.7 Quality Control Results

Section 1.3.3 presents the purpose of each field and laboratory QC sample type. Field and laboratory QC sample results for the CWL are discussed in the following sections.

3.7.1 Field Quality Control Samples

The QC samples collected in the field included environmental duplicate, EB, FB, and TB samples. Analytical results for each QC sample type are discussed in the following sections.

3.7.1.1 Environmental Duplicate Samples

One environmental duplicate sample was collected from monitoring well CWL-MW9 in January 2022 and one environmental duplicate sample was collected from monitoring well CWL-BW5 in August 2022. No constituents were detected in the January and August 2022 environmental-duplicate sample pairs.

3.7.1.2 Equipment Blank Samples

One EB sample was collected in January 2022 and analyzed for TCE, chromium, nickel, and the enhanced list of VOCs. Chloroform was detected above MDL in the EB sample; no corrective action was necessary since chloroform was not detected in the associated environmental samples. One EB sample was collected in August 2022 and analyzed for TCE, chromium, and nickel. Nickel was the only constituent detected in the August 2022 EB sample. As mentioned in Section 3.6.2, the nickel detections in the CWL-BW5 environmental and environmental duplicate samples were qualified as non-detections due to the EB sample results. Due to a shipping delay the sample was received by the laboratory outside the temperature range, so the TCE result was qualified as unusable during data validation. There was no impact as TCE was not detected in the associated CWL-BW5 environmental and environmental duplicate samples. However, a second EB sample was collected prior to sampling CWL-MW11 and analyzed for all constituents. No constituents were detected in this second EB sample.

3.7.1.3 Field Blank Samples

Three FB samples were collected in January 2022 and analyzed for TCE and the enhanced list of VOCs. Chloroform was detected above the MDL in the three FB samples; no corrective action was necessary since chloroform was not reported in the associated environmental samples. Three FB samples were collected in August 2022 and analyzed for TCE only. There were no TCE detections above the MDL in the August 2022 FB samples.

3.7.1.4 Trip Blank Samples

Six TB samples were submitted with the January 2022 samples and analyzed for TCE and the enhanced list of VOCs and seven TB samples were submitted with the August 2022 samples and analyzed for TCE. No VOCs were detected in the January and August 2022 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. Issues noted with the CY 2022 analytical results are discussed below.

The January 2022 CWL-MW9 metals results for the environmental and environmental duplicate sample pair were reanalyzed by the laboratory because the original sample results did not agree with historical results and the environmental-duplicate sample pair results did not agree with each other. The reanalysis produced results that were consistent with historical results and did not confirm the original results. In addition, the reanalysis environmental and environmental duplicate sample results were in agreement (i.e., both non-detect results). Based on professional judgment, the original sample results were qualified as “unusable” during data validation and the reanalysis results were included in this report.

3.8 Variances and Non-Conformances

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 non-conformances are defined in Attachment 2, Section 2.22, of the CWL PCCP for groundwater monitoring. There were no variances or non-conformances during the CY 2022 sampling activities.

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

3.9 Summary and Conclusions

During CY 2022, groundwater samples were collected from the four CWL monitoring wells (CWL-BW5, CWL-MW9, CWL-MW10, and CWL-MW11) in January and August in accordance with the CWL PCCP. January 2022 samples were analyzed for TCE, chromium, nickel, and the enhanced list of VOCs. August 2022 samples were analyzed for TCE, nickel, and chromium. Based on field and laboratory QC sample and data validation results, the CY 2022 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 CWL PCCP hazardous constituent concentration limits defined in Attachment 1, Table 1-2 of the CWL PCCP.

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 NMED approved closure (Kieling June 2011). An application for renewal of the CWL PCCP was submitted to the NMED in November 2020 (Harrell 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 New Mexico Administrative Code, incorporating Title 40, Code of Federal Regulations, Part 264.117(a)(2).

In accordance with the CWL PCCP, 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 in future annual groundwater monitoring reports.

Attachment 3A
Chemical Waste Landfill Hydrographs

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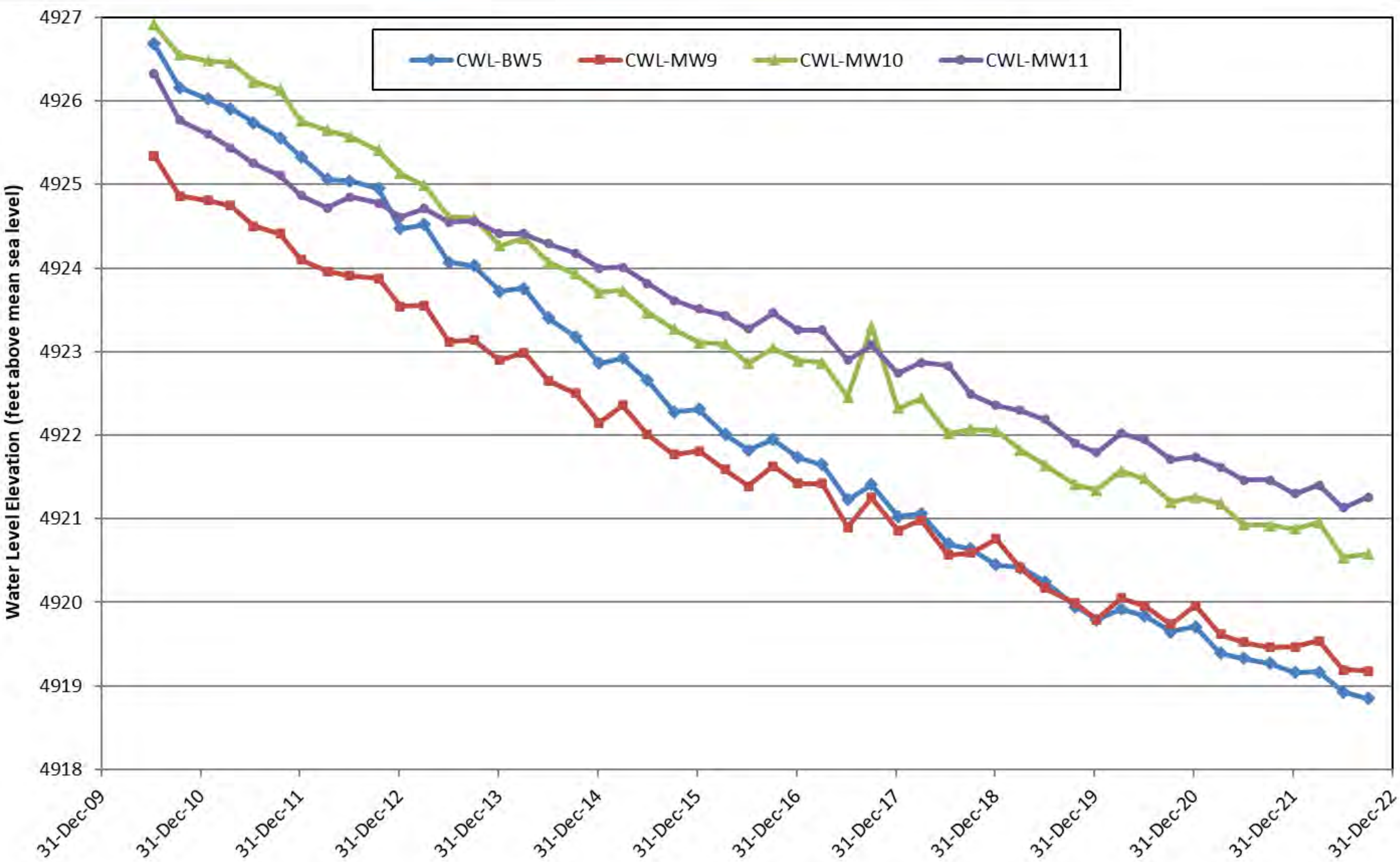

Figure 3A-1
Chemical Waste Landfill Groundwater Monitoring Wells

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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 2022

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		116560-001	SW846-8260D
12-Jan-22	Chloroform	ND	0.333	1.00	80.0	U		116560-001	SW846-8260D
	Tetrachloroethene	ND	0.333	1.00	5.00	U		116560-001	SW846-8260D
	Trichloroethene	ND	0.333	1.00	5.00	U		116560-001	SW846-8260D
	Trichlorofluoromethane	ND	0.333	1.00	NE	U		116560-001	SW846-8260D
	1,1,2-Trichloro-1,2,2-trifluoroethane	ND	2.98	5.00	NE	U		116560-001	SW846-8260D
CWL-MW9	1,1-Dichloroethene	ND	0.333	1.00	7.00	U		116567-001	SW846-8260D
13-Jan-22	Chloroform	ND	0.333	1.00	80.0	U		116567-001	SW846-8260D
	Tetrachloroethene	ND	0.333	1.00	5.00	U		116567-001	SW846-8260D
	Trichloroethene	ND	0.333	1.00	5.00	U		116567-001	SW846-8260D
	Trichlorofluoromethane	ND	0.333	1.00	NE	U		116567-001	SW846-8260D
	1,1,2-Trichloro-1,2,2-trifluoroethane	ND	2.98	5.00	NE	U		116567-001	SW846-8260D
CWL-MW9	1,1-Dichloroethene	ND	0.333	1.00	7.00	U		116568-001	SW846-8260D
(Duplicate)	Chloroform	ND	0.333	1.00	80.0	U		116568-001	SW846-8260D
13-Jan-22	Tetrachloroethene	ND	0.333	1.00	5.00	U		116568-001	SW846-8260D
	Trichloroethene	ND	0.333	1.00	5.00	U		116568-001	SW846-8260D
	Trichlorofluoromethane	ND	0.333	1.00	NE	U		116568-001	SW846-8260D
	1,1,2-Trichloro-1,2,2-trifluoroethane	ND	2.98	5.00	NE	U		116568-001	SW846-8260D
CWL-MW10	1,1-Dichloroethene	ND	0.333	1.00	7.00	U		116581-001	SW846-8260D
19-Jan-22	Chloroform	ND	0.333	1.00	80.0	U		116581-001	SW846-8260D
	Tetrachloroethene	ND	0.333	1.00	5.00	U		116581-001	SW846-8260D
	Trichloroethene	0.630	0.333	1.00	5.00	J		116581-001	SW846-8260D
	Trichlorofluoromethane	ND	0.333	1.00	NE	U		116581-001	SW846-8260D
	1,1,2-Trichloro-1,2,2-trifluoroethane	ND	2.98	5.00	NE	U		116581-001	SW846-8260D
CWL-MW11	1,1-Dichloroethene	ND	0.333	1.00	7.00	U		116573-001	SW846-8260D
14-Jan-22	Chloroform	ND	0.333	1.00	80.0	U		116573-001	SW846-8260D
	Tetrachloroethene	ND	0.333	1.00	5.00	U		116573-001	SW846-8260D
	Trichloroethene	ND	0.333	1.00	5.00	U		116573-001	SW846-8260D
	Trichlorofluoromethane	ND	0.333	1.00	NE	U		116573-001	SW846-8260D
	1,1,2-Trichloro-1,2,2-trifluoroethane	ND	2.98	5.00	NE	U		116573-001	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 2022

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 2-Aug-22	Trichloroethene	ND	0.333	1.00	5.00	U		118324-001	SW846-8260D
CWL-BW5 (Duplicate) 2-Aug-22	Trichloroethene	ND	0.333	1.00	5.00	U		118325-001	SW846-8260D
CWL-MW9 3-Aug-22	Trichloroethene	ND	0.333	1.00	5.00	U		118329-001	SW846-8260D
CWL-MW10 8-Aug-22	Trichloroethene	0.670	0.333	1.00	5.00	J		118340-001	SW846-8260D
CWL-MW11 9-Aug-22	Trichloroethene	ND	0.333	1.00	5.00	U		118336-001	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 2022

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	0.003	0.010	0.100	U		116560-002	SW846-6020B
12-Jan-22	Nickel	0.000602	0.0006	0.002	NE	J		116560-002	SW846-6020B
CWL-MW9	Chromium	ND	0.003	0.010	0.100	U		116567-R02[h]	SW846-6020B
13-Jan-22	Nickel	ND	0.0006	0.002	NE	U		116567-R02[h]	SW846-6020B
CWL-MW9 (Duplicate)	Chromium	ND	0.003	0.010	0.100	U		116568-R02[h]	SW846-6020B
13-Jan-22	Nickel	ND	0.0006	0.002	NE	U		116568-R02[h]	SW846-6020B
CWL-MW10	Chromium	ND	0.003	0.010	0.100	U		116581-002	SW846-6020B
19-Jan-22	Nickel	ND	0.0006	0.002	NE	U		116581-002	SW846-6020B
CWL-MW11	Chromium	ND	0.003	0.010	0.100	U		116573-002	SW846-6020B
14-Jan-22	Nickel	0.000783	0.0006	0.002	NE	J		116573-002	SW846-6020B
CWL-BW5	Chromium	ND	0.003	0.010	0.100	U		118324-002	SW846-6020B
2-Aug-22	Nickel	0.00107	0.0006	0.002	NE	J	0.002U, B2	118324-002	SW846-6020B
CWL-BW5 (Duplicate)	Chromium	ND	0.003	0.010	0.100	U		118325-002	SW846-6020B
2-Aug-22	Nickel	0.00113	0.0006	0.002	NE	J	0.002U, B2	118325-002	SW846-6020B
CWL-MW9	Chromium	ND	0.003	0.010	0.100	U		118329-002	SW846-6020B
3-Aug-22	Nickel	ND	0.0006	0.002	NE	U		118329-002	SW846-6020B
CWL-MW10	Chromium	ND	0.003	0.010	0.100	U		118340-002	SW846-6020B
8-Aug-22	Nickel	0.000748	0.0006	0.002	NE	J		118340-002	SW846-6020B
CWL-MW11	Chromium	ND	0.003	0.010	0.100	U		118336-002	SW846-6020B
9-Aug-22	Nickel	ND	0.0006	0.002	NE	U		118336-002	SW846-6020B

Refer to Notes on page 3B-9.

Table 3B-3
Summary of Field Water Quality Measurements[i], Chemical Waste Landfill Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

Well ID	Sample Date	Temperature (°C)	Specific Conductivity (µmho/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
CWL-BW5	12-Jan-22	16.36	1025.6	129.7	6.98	1.25	78.05	7.74
CWL-MW9	13-Jan-22	19.02	970.47	120.5	7.07	0.41	63.13	5.25
CWL-MW10	19-Jan-22	18.87	964.56	-14.8	7.05	2.10	22.57	1.87
CWL-MW11	14-Jan-22	20.99	1069.5	13.8	7.05	2.68	78.13	6.19
CWL-BW5	2-Aug-22	21.68	1127.3	195.9	7.10	0.60	79.78	6.15
CWL-MW9	3-Aug-22	22.39	1034.2	187.2	7.13	0.10	55.12	4.19
CWL-MW10	8-Aug-22	21.68	1016.3	-34.7	7.20	0.97	17.38	1.34
CWL-MW11	9-Aug-22	24.17	1090.6	25.8	7.03	0.67	62.13	4.60

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 method detection limit)

[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
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.
U = The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit.
B2 = Equipment blank contamination at concentration greater than the MDL.

[g]Analytical Method Reference
EPA, 1986, (and updates), *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd ed., Update 3, SW-846, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.

[h]Relog Sample Results
The January 2022 CWL-MW9 metals results for the environmental and environmental duplicate sample pair were reanalyzed by the laboratory (Section 3.7.2); the reanalysis results are presented in Table 3B-2.

[i]Field Water Quality Measurements
Field measurements collected 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

The Mixed Waste Landfill (MWL) is a 2.6-acre Solid Waste Management Unit (SWMU) 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 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 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 RFI*, the *Mixed Waste Landfill Corrective Measures Study Final Report* (SNL May 2003) was 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 November 2005; Bearzi December 2008). The *Mixed Waste Landfill Corrective Measures Implementation Report* documenting cover construction was submitted to the NMED (SNL January 2010) and approved (Bearzi 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 March 2012) was submitted to the NMED and approved (Blaine January 2014). All MWL LTMMP monitoring, maintenance, and reporting requirements were implemented upon NMED approval, including the installation of three multi-port soil-vapor monitoring wells (SNL January 2014) required to complete the LTMMP monitoring systems. After the Installation of Three FLUTe™ Soil-Vapor Monitoring Wells (MWL-SV03, MWL-SV04, and MWL-SV05) at the Mixed Waste Landfill (SNL September 2014) was approved by the NMED (Kieling September 2014), the U.S. Department of Energy (DOE) and SNL/NM personnel requested a Certification of Completion for the Mixed Waste Landfill (Beausoleil September 2014) that was granted by the NMED (Cobrain October 2014).

In October 2014, DOE and SNL/NM personnel submitted to NMED a *Request for Class 3 Permit Modification to Module IV of Hazardous Waste Permit* (Beausoleil October 2014) for Corrective Action Complete with Controls at the Mixed Waste Landfill. The associated regulatory process included two public comment periods, a public meeting held by DOE and SNL/NM personnel in November 2014, and a four-day public hearing held by NMED in July 2015. On March 13, 2016, the second MWL NMED Final Order (NMED February 2016) became effective (Kieling February 2016), granting Corrective Action Complete with Controls status to the MWL and incorporating the MWL LTMMP into the *Resource Conservation and Recovery Act Facility Operating Permit* (RCRA Permit) (NMED January 2015). All controls required for the MWL, including groundwater monitoring, are defined in the MWL LTMMP and are comprehensively documented in Mixed Waste Landfill Annual Long-Term Monitoring and Maintenance Reports (MWL LTMM Reports) submitted to the NMED in June of each year. In calendar year (CY) 2022, the ninth *MWL Annual LTMM Report* (SNL June 2022) was submitted to the NMED and approved (Shean August 2022).

MWL groundwater monitoring results are directly compared to trigger levels and subject to the trigger evaluation process defined in Table 5.2.4-1 and Figure 5.1-1 of the MWL LTMMP, respectively.

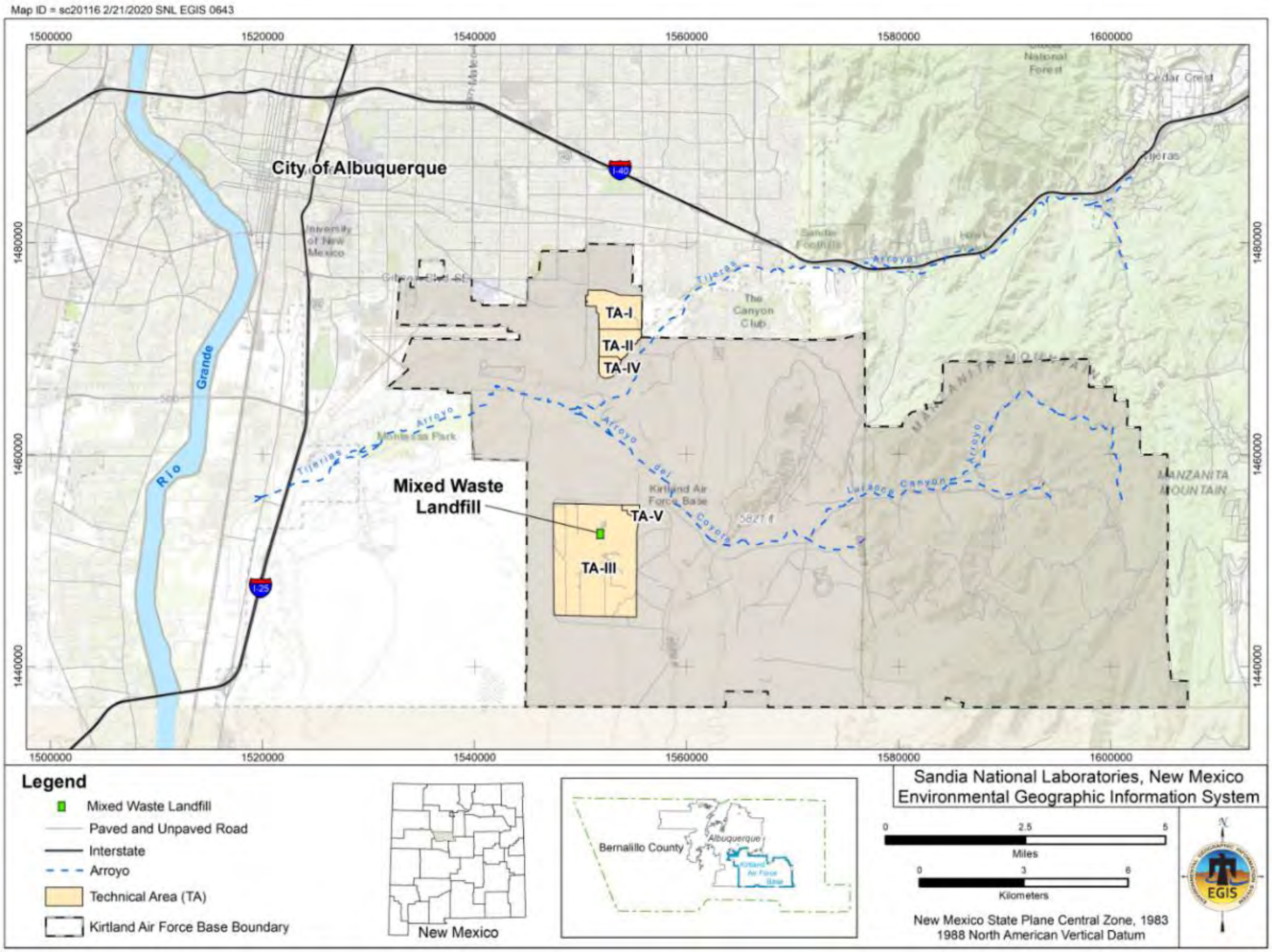

Figure 4-1
Location of the Mixed Waste Landfill with Respect to Kirtland Air Force Base and the City of Albuquerque

The evaluation of MWL CY 2022 groundwater monitoring results will be presented in the *MWL Annual LTMM Report, April 2021 – March 2022*, which will be submitted to the NMED in June 2023.

4.1.1 Monitoring History

Groundwater monitoring has been conducted at the MWL since 1990. The original MWL groundwater monitoring network was modified in 2008 due to the declining water table and corrosion of stainless-steel well screens. Four original monitoring wells were plugged and abandoned (MWL-BW1, MWL-MW1, MWL-MW2, and MWL-MW3), and four monitoring wells were installed (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9). The 2008 wells were constructed with Schedule 80 polyvinyl chloride screens set across the water table of the Regional Aquifer and represent the NMED-approved groundwater monitoring network under the MWL LTMMP. 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. Wells MWL-MW5 and MWL-MW6 were also part of the original monitoring well network; they are located to the west of the site and their screen intervals are below the top of the Regional Aquifer.

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-two years of analytical data indicate that groundwater has not been impacted by the MWL.

4.1.2 Monitoring Network

The current groundwater monitoring network at the MWL consists of seven wells listed in Table 4-1 and shown on Figure 4-2. In accordance with the MWL LTMMP, four of these wells comprise 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 groundwater monitoring 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.

Table 4-1
Mixed Waste Landfill Monitoring Well Network and Calendar Year 2022 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 March 2012). Semiannual groundwater monitoring of compliance wells was conducted in May and November 2021.
[c]Upper screen of monitoring well MWL-MW4 is monitored and is across the uppermost portion of Regional Aquifer.

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

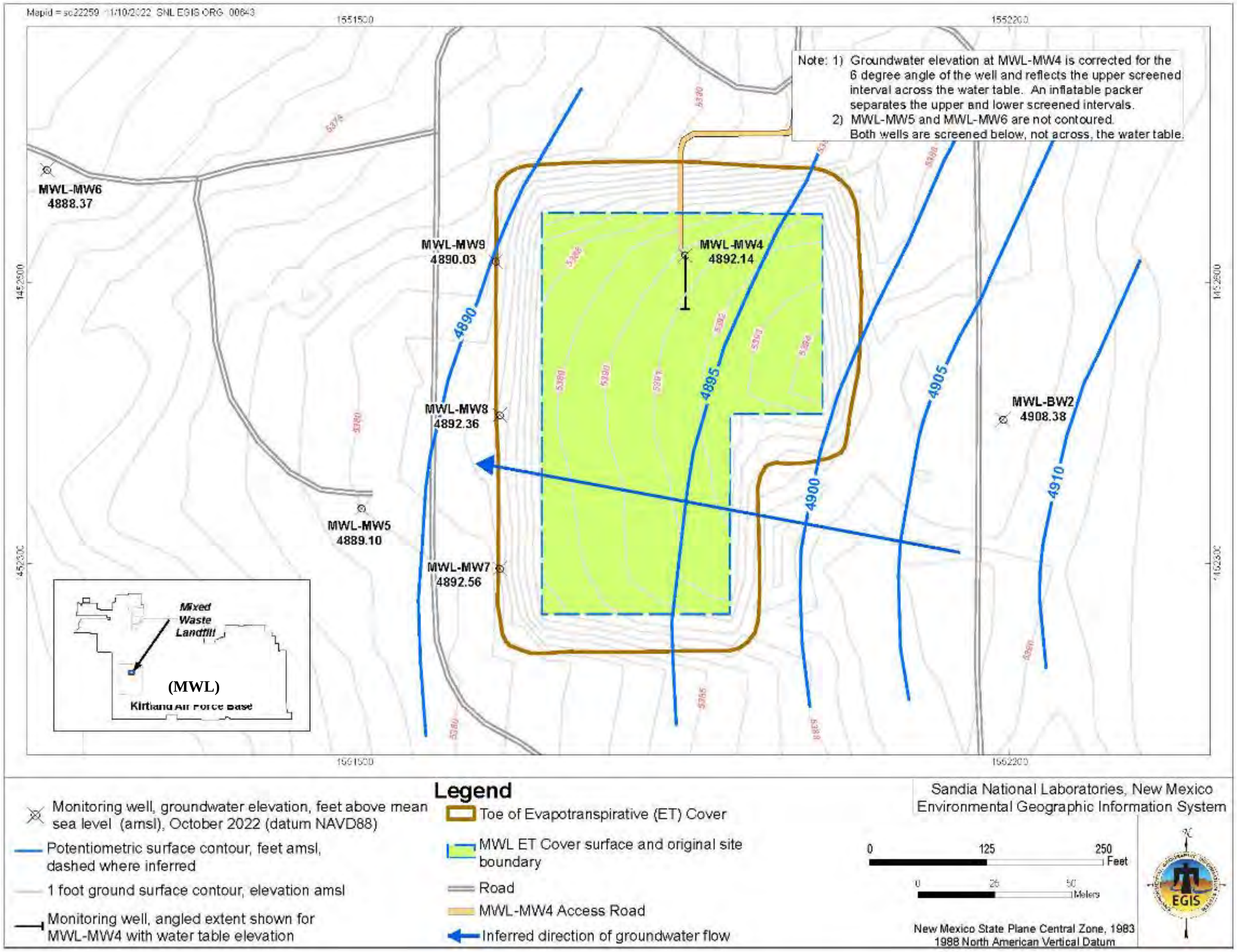

Figure 4-2
Localized Potentiometric Surface of the Regional Aquifer at the Mixed Waste Landfill, October 2022

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 June 2010).

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.

In Attachment 4A, Figures 4A-1 and 4A-2 (hydrographs) show the rate of groundwater elevation change at the existing MWL monitoring wells. Over the past 12 years 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. Well MWL-BW2 on the east side of the MWL shows the highest rate of decline, which has been consistent since 2008. From October 2021 to October 2022, the groundwater elevation declined in all MWL compliance wells, ranging from -0.26 ft at MWL-BW2 to -0.04 ft at MWL-MW9. Changes were smaller at the other three monitoring wells with different well completions; MWL-MW4 and MWL-MW5 showed a slight decline (-0.05 ft and -0.03 ft, respectively) and MWL-MW6 showed no change. In contrast to more significant decreases observed in the past, these subtle changes are likely due to decreased pumping of Albuquerque Bernalillo County Water Utility Authority 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 2022.

Table 4-2 presents the data used to construct the October 2022 potentiometric surface map shown in Figure 4-2 for the MWL groundwater monitoring network. The groundwater elevation used for monitoring well MWL-MW4 is measured within the upper screen interval.

Table 4-2
Groundwater Elevations Measured in October 2022 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	3-Oct-2022	482.64	4908.38
MWL-MW4[a]	5391.70	3-Oct-2022	502.31	4892.14[b]
MWL-MW5[c]	5382.56	3-Oct-2022	493.46	4889.10
MWL-MW6[c]	5375.31	3-Oct-2022	486.94	4888.37
MWL-MW7	5383.30	3-Oct-2022	490.74	4892.56
MWL-MW8	5384.67	3-Oct-2022	492.31	4892.36
MWL-MW9	5381.91	3-Oct-2022	491.88	4890.03

Notes:
[a]Upper screen of monitoring well MWL-MW4 is monitored and represents 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, towards 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 the potentiometric surface contours beneath Technical Area-III generally trend north to south with the inferred groundwater flow direction being generally westward. Several production wells operated by Kirtland Air Force Base (KAFB) and the Albuquerque Bernalillo County Water Utility Authority 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. However, more recently the rate of decline has slowed and in all 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 2022 ranges from approximately 0.03 to 0.08 ft per 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 2022 groundwater velocity ranged from 0.02 to 0.06 ft per day; the average is 0.04 ft per day. These very low values and the general position of the groundwater elevation contours 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* (Consent Order) (NMED April 2004), NMED Final Order on remedy selection (NMED May 2005), and New Mexico Administrative Code, Title 20, Chapter 4, Part 1, Section 500 (20.4.1.500 NMAC) incorporating Title 40 of the Code of Federal Regulations (CFR), Part 264.101 (40 CFR 264.101). 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 became effective). All controls applicable to the MWL, including groundwater monitoring, are documented in the MWL LTMMP incorporated through reference in Attachment M of the RCRA Permit.

Although radionuclides are being monitored and screened at the MWL, the information related to radionuclides is provided voluntarily by the DOE/National Nuclear Security Administration 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 specified in Section III.A of the Consent Order.

4.3 Scope of Activities

Semiannual groundwater sampling was conducted in May and October 2022 at the MWL. Groundwater samples were collected from four 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, samples were collected during the October 2022 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 MWL October 2022 groundwater monitoring event to address the NMED request (NMED July 2021) to evaluate 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 the MWL monitoring wells sampled. The CY 2022 sampling was conducted in accordance with MWL LTMMP requirements and procedures outlined in the *Mixed Waste Landfill Groundwater Monitoring, Mini-Sampling and Analysis Plan for Fiscal Year 2022, 3rd*

Quarter Sampling (SNL April 2022) and the *Mixed Waste Landfill Groundwater Monitoring, Mini-Sampling and Analysis Plan for Fiscal Year 2023, 1st Quarter Sampling* (SNL September 2022).

Table 4-3
Analytical Parameters for the Mixed Waste Landfill Monitoring Wells, Calendar Year 2022

<table>
<tr><th rowspan="2">Analytical Parameters</th><th colspan="2">Semiannual Event</th></tr>
<tr><th>May</th><th>October</th></tr>
<tr><td>VOCs</td><td rowspan="3">MWL-BW2
MWL-BW2 (Duplicate)
MWL-MW7
MWL-MW8
MWL-MW9</td><td rowspan="3">MWL-BW2
MWL-MW7
MWL-MW7 (Duplicate)
MWL-MW8
MWL-MW9</td></tr>
<tr><td>Metals:
Cadmium, Chromium, Nickel, and Total Uranium</td></tr>
<tr><td>Radionuclides:
Gamma Spectroscopy (short list[a])
Gross Alpha/Beta Activity
Radon-222, and Tritium</td></tr>
<tr><td>Perfluoroalkyl & Polyfluoroalkyl Substances (PFAS):
perfluorohexane sulfonic acid (PFHxS)
perfluorooctane sulfonic acid (PFOS)
perfluorooctanoic acid (PFOA)</td><td>Not Analyzed</td><td>MWL-BW2
MWL-MW7
MWL-MW7 (Duplicate)
MWL-MW8
MWL-MW9</td></tr>
</table>

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

The MWL groundwater samples were submitted for analysis to GEL Laboratories, LLC in Charleston, South Carolina. All groundwater sampling results are compared with U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) for drinking water (EPA March 2018).

Field and laboratory quality control (QC) samples are discussed in Section 1.3.3. Field QC samples included environmental duplicate, equipment blank (EB), field blank (FB), and trip blank (TB) samples. Laboratory QC analyses included method blank, laboratory control sample, matrix spike, matrix spike duplicate, surrogate spike, and replicate analyses.

4.4 Field Methods and Measurements

Groundwater sampling and depth-to-groundwater measurements were conducted in accordance with the MWL LTMMP and procedures specified in the MWL groundwater monitoring mini-SAPs, which are consistent with the methods described in Section 1.3. Water quality parameters measured in the field during the purging process include temperature, specific conductivity (SC), oxidation-reduction potential (ORP), potential of hydrogen (pH), and dissolved oxygen (DO) using an In-Situ Incorporated Aqua TROLL® 600 Multiparameter Water Quality Sonde. Turbidity was measured with a Hach™ Model 2100Q turbidity meter. Attachment 4A, Figures 4A-1 and 4A-2 (hydrographs) present groundwater elevation measurements at the MWL monitoring wells.

As specified in the MWL LTMMP, Appendix F, Section 3.4, 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 located 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 causing the pump to be damaged or fail due to overheating. The purging volume requirement was achieved for all monitoring wells during CY 2022 sampling activities; no wells purged dry.

4.5 Analytical Methods

All groundwater samples were analyzed by the off-site laboratory using EPA-specified protocols as described in Section 1.3.2.

4.6 Summary of Analytical Results

Attachment 4B, Table 4B-1 presents the laboratory method detection limits (MDLs) for VOCs and PFAS and Table 4B-2 presents the October 2022 VOCs results. Tables 4B-3 and 4B-4 present the analytical results for metals and radiological constituents, respectively. Field water quality measurements are presented in Table 4B-5. Data qualifiers assigned by the analytical laboratory and the data validation process (SNL June 2020) are presented with the associated results in Tables 4B-2 through 4B-4.

For the purposes of this report, the CY 2022 analytical results were compared with established EPA MCLs where applicable. No detected constituents exceeded the respective EPA MCLs. In addition, no results exceeded respective MWL trigger levels defined in Table 5.2.4-1 of the MWL LTMMP. The analytical results are discussed in detail in the following sections.

4.6.1 Volatile Organic Compounds and Perfluoroalkyl and Polyfluoroalkyl Substances

Table 4B-1 summarizes the laboratory MDLs for VOCs and the three PFAS included in the October 2022 analyses. There were no detections of VOCs in the May 2022 samples. Groundwater samples were not collected for PFAS in May 2022. There were no detections of PFHxS, PFOS, and PFOA in the October 2022 groundwater samples.

Table 4B-2 summarizes the VOCs detected in the May and October 2022 groundwater samples. For the May 2022 results, methylene chloride was reported at very low concentrations below the practical quantitation limit in the MWL-BW2 environmental duplicate sample and the MWL-MW7 environmental sample. These results were qualified during data validation as non-detections due to associated trip blank results. For the October 2022 results, acetone and methylene chloride were reported in the sample from MWL-BW2 and acetone was reported in the MWL-MW7 environmental duplicate sample at very low concentrations below the practical quantitation limit. These results were qualified as not detected during data validation due to associated TB and FB sample results, respectively. Toluene was reported in all October 2022 groundwater samples at low concentrations. The toluene result for MWL-MW8 was qualified as not detected during data validation due to a similar result in the associated TB sample. The toluene results for the other environmental and environmental duplicate samples were all very low detections between the MDL and practical quantitation limit and 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 October 2010) that was approved by the NMED (Bearzi January 2011). The extensive data and information presented in the report indicated the MWL and other SNL/NM sites were not the source of the toluene detected in groundwater samples, which were like those reported in the October 2022 samples. Since groundwater monitoring began under the MWL LTMMP in 2014 there have been no detections of toluene in MWL groundwater samples until the October 2022 data set.

4.6.2 Metals

Table 4B-3 summarizes the CY 2022 analytical results for cadmium, chromium, nickel, and total uranium. Chromium, nickel, and 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 summarizes the CY 2022 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 is measured in accordance with 40 CFR Part 141 and used as a radiological screening tool. Naturally occurring uranium is measured independently (i.e., total uranium concentration determined by metals analysis described above) and the gross alpha activity measurements are corrected by subtracting the total uranium activity from the uncorrected gross alpha activity results. MWL radiological results are further reviewed by an SNL/NM Health Physicist to screen results for radiological anomalies that could indicate potential contamination. Corrected gross alpha activity results are below the EPA MCL of 15 picocuries per liter. Gross beta results are used as a radiological screening tool; results do 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 2022 samples were determined as nonradioactive.

4.6.4 Water Quality Parameters

Table 4B-5 presents the field water quality parameters measured immediately before sampling at each well. These field parameters consist of temperature, SC, ORP, pH, turbidity, and DO.

4.7 Quality Control Results

Section 1.3.3 presents the purpose of each field and laboratory QC sample type. Field and laboratory QC sample results for MWL wells are discussed in the following sections.

4.7.1 Field Quality Control Samples

The QC samples collected in the field included environmental duplicate, EB, FB, and TB samples. Analytical results are discussed for each QC sample type in the following sections.

4.7.1.1 Environmental Duplicate Samples

Environmental duplicate samples were collected from monitoring wells MWL-BW2 (May 2022) and MWL-MW7 (October 2022) 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 (RPD) was calculated for constituents that were detected above the MDL in both samples.

CY 2022 sample pair (environmental sample and environmental duplicate sample) results show good correlation, with calculated RPD values ranging from 1 to 3. Calculated RPD values are 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 Appendix F of the MWL LTMMP.

4.7.1.2 Equipment Blank Samples

One EB sample (also referred to as a rinsate blank) associated with monitoring well MWL-BW2 was collected in May 2022 and analyzed for all constituents. Four EB samples associated with each compliance monitoring well were collected in October 2022 and analyzed for all constituents, including the three PFAS. The compounds 2-butanone, acetone, bromodichloromethane, bromoform, chloroform, dibromochloromethane, and methylene chloride were detected above MDLs in the May 2022 EB sample. Methylene chloride in the EB sample was qualified as not detected during data validation since it was reported in the associated TB sample at a similar concentration. No corrective action was required for the other compounds as they were not detected in the associated environmental samples. Due to a shipping delay, the EB VOC sample was received by the laboratory outside the analytical method temperature criteria. All related EB VOC results that were detections above the MDLs were qualified as estimated values with a negative bias and all non-detections (i.e., less than the associated MDLs) were qualified as not usable during data validation. No corrective action was required as there were no VOCs reported above MDLs in the associated environmental samples (i.e., MWL-BW2 environmental-duplicate sample pair). Also due to the shipping delay, the May 2022 EB radon-222 sample was analyzed outside the analytical method holding time. A second EB sample was collected for radon-222 only on May 17, 2022 prior to sampling MWL-MW9. Radon-222 was reported below the minimum detectable activity in both EB samples.

In the October 2022 EB samples, 1,2-dichloroethane, acetone, bromodichloromethane, 2-butanone, chloroform, dibromochloromethane, methylene chloride, nickel, and gross beta were detected above MDLs or minimum detectable activity for gross beta. No corrective action was necessary for 1,2-dichloroethane, acetone, bromodichloromethane, 2-butanone, chloroform, dibromochloromethane, methylene chloride, and gross beta since these constituents were not detected in associated environmental samples or were detected at a concentration greater than five times the EB concentration or activity. One exception was the MWL-MW8 gross beta result that was a detection greater than the minimum detectable activity but less than five times the EB activity; it was qualified during data validation as an estimated value with a suspected positive bias. Nickel results for the MWL-MW7 environmental-duplicate sample pair were qualified as not detected during data validation since nickel was reported in both environmental-duplicate sample pair and the EB sample at concentrations less than the practical quantitation limit.

4.7.1.3 Field Blank Samples

Five FB samples were collected and submitted for VOC analysis during the May 2022 sampling event. Acetone, bromodichloromethane, bromoform, chloroform, and dibromochloromethane were detected in the FB samples. No corrective action was necessary since these compounds were not detected in the associated environmental samples. Methylene chloride was reported in one FB sample but was qualified as not detected during data validation since it was reported at a similar concentration in the associated TB sample.

A total of five FB samples were collected and submitted for VOC and PFAS analysis during the October 2022 sampling event. Four additional reagent FB samples (i.e., using water supplied by the laboratory versus the deionized water supplied by a local vendor) were also collected at each well location and analyzed for the three PFAS only (PFHxS, PFOS, and PFOA). The compounds detected in FB samples that were not qualified as non-detections during data validation due to associated TB results included 1,2-dichloroethane, acetone, bromodichloromethane, chloroform, dibromochloromethane, and PFOS. No corrective action was necessary for 1,2-dichloroethane, bromodichloromethane, chloroform, dibromochloromethane, and PFOS since these compounds were not detected in the associated environmental samples. Acetone in the MWL-MW7 environmental duplicate sample was qualified as not detected during data validation since acetone was reported at similar concentrations in the environmental duplicate and FB samples. The one PFOS detection was in the FB sample associated with MWL-MW9 (i.e., not the reagent FB sample).

4.7.1.4 *Trip Blank Samples*

Fifteen TB samples (six in May, nine in October) were submitted with the CY 2022 environmental samples for analysis of VOCs. Methylene chloride was reported below the laboratory practical quantitation limit in the May 2022 TB samples associated with the MWL-BW2 and MWL-MW7 environmental samples, and the associated field QC samples (i.e., two FB and one EB sample). In the environmental and field QC samples with reported detections, methylene chloride was qualified as not detected during data validation since the reported concentrations were similar to the TB sample concentrations.

For the October 2022 TB samples, acetone was reported in the TB samples associated with MWL-BW2 and three EB samples. Methylene chloride was reported below the practical quantitation limit in TB samples associated with MWL-BW2, MWL-MW8, two EB samples, and two FB samples. Toluene was reported in the TB samples associated with MWL-MW8 and two FB samples. Acetone, methylene chloride, and toluene were qualified as not detected in these environmental and field QC samples during data validation since reported concentrations were either below the practical quantitation limit or less than two times the TB concentrations.

4.7.2 Laboratory Quality Control Samples

Internal laboratory QC samples were analyzed concurrently with the CY 2022 groundwater samples and included method blank samples, laboratory control samples, matrix spike and matrix spike duplicate samples, surrogate spike samples, and replicates samples. All laboratory QC sample results met analytical method and laboratory procedure requirements.

4.8 Variances and Non-Conformances

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 non-conformances are defined in Appendix F, Section 6, of the MWL LTMMP for groundwater monitoring. There were no variances or non-conformances during the CY 2022 sampling activities.

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

4.9 Summary and Conclusions

During CY 2022, groundwater samples were collected from the MWL compliance monitoring wells (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) in May and October in accordance with the MWL LTMMP. 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, samples were collected during the October 2022 sampling event for three PFAS, including PFHxS, PFOS, and PFOA, to address the NMED request (NMED July 2021). Based on the field and laboratory QC sample and data validation results, the CY 2022 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 MWL trigger levels defined in Table 5.2.4-1 of the MWL LTMMP. There were no detections of PFAS in the October 2022 groundwater samples.

4.10 Summary of Future Activities

All monitoring, inspection, and maintenance requirements will continue to be performed and documented as required by the MWL LTMMP. The three PFAS will be included in the next CY 2023 groundwater monitoring event. Groundwater monitoring of the four compliance monitoring wells will continue on a semiannual basis and results will be documented in both comprehensive MWL annual LTMM reports (submitted to NMED in June of each year) and in future annual groundwater monitoring reports.

Attachment 4A
Mixed Waste Landfill Hydrographs

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Attachment 4A Hydrographs

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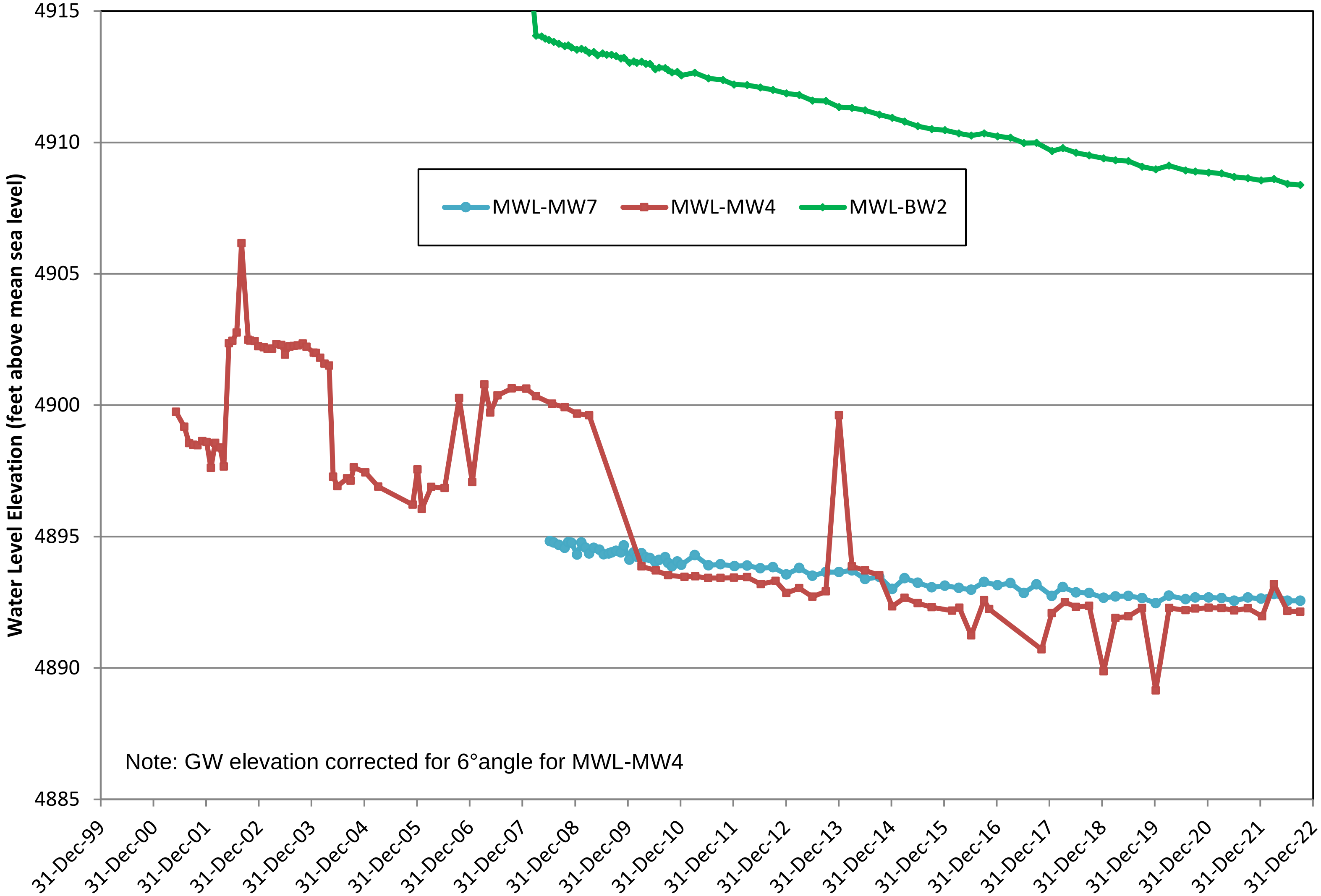

Figure 4A-1
Mixed Waste Landfill Groundwater Monitoring Wells (1 of 2)

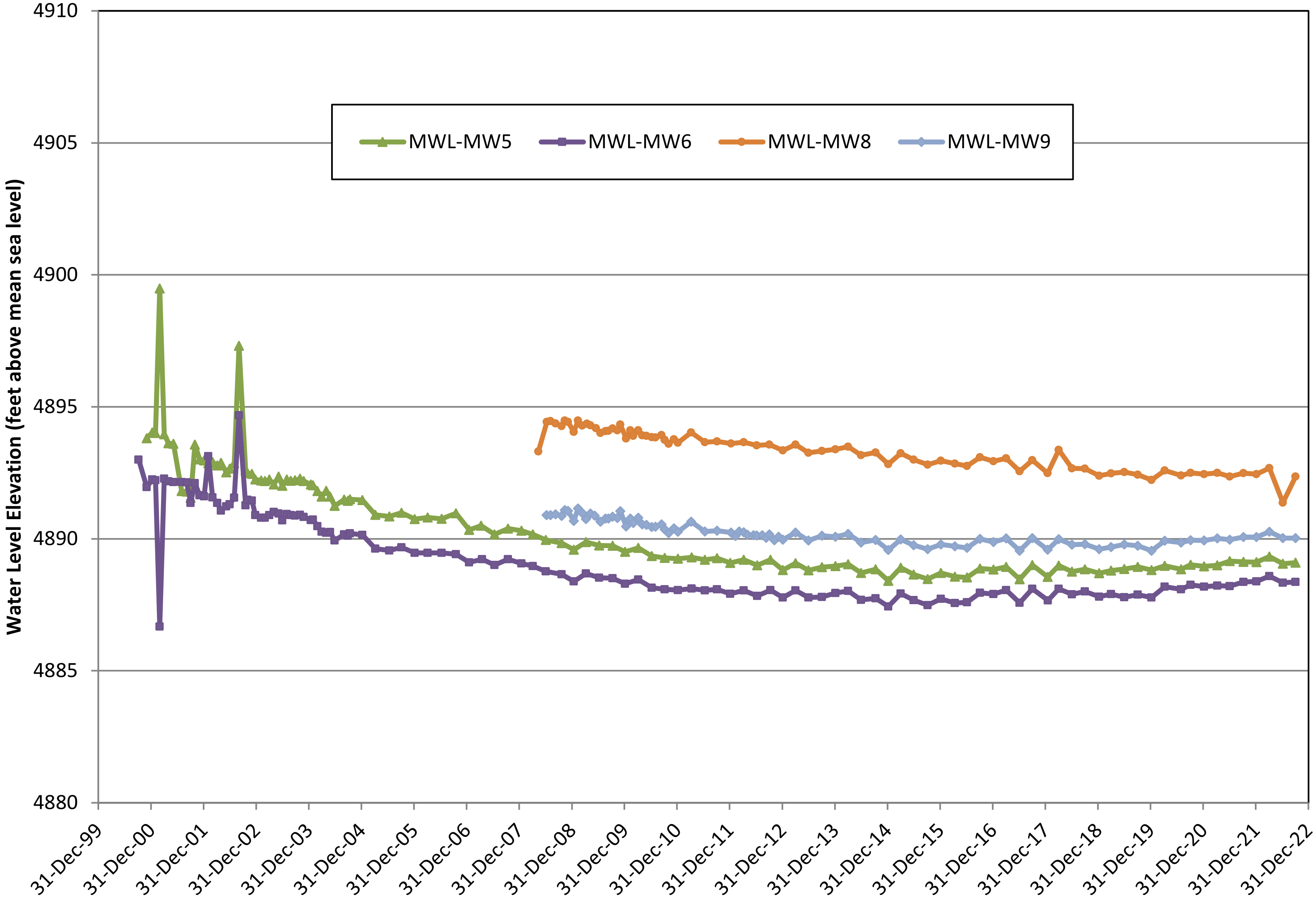

Figure 4A-2
Mixed Waste Landfill Groundwater Monitoring Wells (2 of 2)

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 (Method[g] SW846-8260D) and Perfluoroalkyl and Polyfluoroalkyl Substances (Method[g] 537.1), Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

Analyte	MDL[b]
Volatile Organic Compounds (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 (ng/L)	
Perfluorohexane sulfonic acid (PFHxS)	0.619 - 0.661
Perfluorooctane sulfonic acid (PFOS)	0.713 - 0.761
Perfluorooctanoic acid (PFOA)	0.619 - 0.661

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 2022

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 (Duplicate) 12-May-22	Methylene chloride	0.560	0.500	5.00	5	J	5.0U	117659-001	SW846-8260D
MWL-MW7 16-May-22	Methylene chloride	0.730	0.500	5.00	5	J	5.0U	117662-001	SW846-8260D
MWL-BW2 20-Oct-22	Acetone	2.09	1.74	5.00	NE	J	5.0U	118933-001	SW846-8260D
	Methylene chloride	0.860	0.500	5.00	5	J	5.0UJ	118933-001	SW846-8260D
	Toluene	0.880	0.333	1.00	1000	J		118933-001	SW846-8260D
MWL-MW7 24-Oct-22	Toluene	0.880	0.333	1.00	1000	J		118941-001	SW846-8260D
MWL-MW7 (Duplicate) 24-Oct-22	Acetone	2.11	1.74	5.00	NE	J	5.0U	118942-001	SW846-8260D
	Toluene	0.870	0.333	1.00	1000	J		118942-001	SW846-8260D
MWL-MW8 26-Oct-22	Toluene	7.93	0.333	1.00	1000		7.93U	118956-001	SW846-8260D
MWL-MW9 25-Oct-22	Toluene	0.840	0.333	1.00	1000	J		118948-001	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 2022

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 12-May-22	Cadmium	ND	0.0003	0.001	0.005	U		117658-002	SW846-6020B
	Chromium	ND	0.003	0.010	0.10	U		117658-002	SW846-6020B
	Nickel	0.000736	0.0006	0.002	NE	J		117658-002	SW846-6020B
	Uranium	0.00726	0.000067	0.0002	0.030			117658-002	SW846-6020B
MWL-BW2 (Duplicate) 12-May-22	Cadmium	ND	0.0003	0.001	0.005	U		117659-002	SW846-6020B
	Chromium	ND	0.003	0.010	0.10	U		117659-002	SW846-6020B
	Nickel	0.000720	0.0006	0.002	NE	J		117659-002	SW846-6020B
	Uranium	0.00713	0.000067	0.0002	0.030			117659-002	SW846-6020B
MWL-MW7 16-May-22	Cadmium	ND	0.0003	0.001	0.005	U		117662-002	SW846-6020B
	Chromium	ND	0.003	0.010	0.10	U		117662-002	SW846-6020B
	Nickel	ND	0.0006	0.002	NE	U		117662-002	SW846-6020B
	Uranium	0.00738	0.000067	0.0002	0.030			117662-002	SW846-6020B
MWL-MW8 18-May-22	Cadmium	ND	0.0003	0.001	0.005	U		117667-002	SW846-6020B
	Chromium	ND	0.003	0.010	0.10	U		117667-002	SW846-6020B
	Nickel	ND	0.0006	0.002	NE	U		117667-002	SW846-6020B
	Uranium	0.00752	0.000067	0.0002	0.030			117667-002	SW846-6020B
MWL-MW9 17-May-22	Cadmium	ND	0.0003	0.001	0.005	U		117670-002	SW846-6020B
	Chromium	ND	0.003	0.010	0.10	U		117670-002	SW846-6020B
	Nickel	ND	0.0006	0.002	NE	U		117670-002	SW846-6020B
	Uranium	0.00933	0.000067	0.0002	0.030			117670-002	SW846-6020B
MWL-BW2 20-Oct-22	Cadmium	ND	0.0003	0.001	0.005	U		118933-003	SW846-6020B
	Chromium	ND	0.003	0.010	0.10	U		118933-003	SW846-6020B
	Nickel	0.000787	0.0006	0.002	NE	J		118933-003	SW846-6020B
	Uranium	0.00687	0.000067	0.0002	0.030			118933-003	SW846-6020B
MWL-MW7 24-Oct-22	Cadmium	ND	0.0003	0.001	0.005	U		118941-003	SW846-6020B
	Chromium	0.00319	0.003	0.010	0.10	J		118941-003	SW846-6020B
	Nickel	0.00186	0.0006	0.002	NE	J	0.002U	118941-003	SW846-6020B
	Uranium	0.00721	0.000067	0.0002	0.030			118941-003	SW846-6020B
MWL-MW7 (Duplicate) 24-Oct-22	Cadmium	ND	0.0003	0.001	0.005	U		118942-003	SW846-6020B
	Chromium	0.00311	0.003	0.010	0.10	J		118942-003	SW846-6020B
	Nickel	0.00192	0.0006	0.002	NE	J	0.002U	118942-003	SW846-6020B
	Uranium	0.00711	0.000067	0.0002	0.030			118942-003	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 2022

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-MW8 26-Oct-22	Cadmium	ND	0.0003	0.001	0.005	U		118956-003	SW846-6020B
	Chromium	ND	0.003	0.010	0.10	U		118956-003	SW846-6020B
	Nickel	ND	0.0006	0.002	NE	U		118956-003	SW846-6020B
	Uranium	0.00754	0.000067	0.0002	0.030			118956-003	SW846-6020B
MWL-MW9 25-Oct-22	Cadmium	ND	0.0003	0.001	0.005	U		118948-003	SW846-6020B
	Chromium	ND	0.003	0.010	0.10	U		118948-003	SW846-6020B
	Nickel	ND	0.0006	0.002	NE	U		118948-003	SW846-6020B
	Uranium	0.00932	0.000067	0.0002	0.030			118948-003	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 2022

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	-4.66 ± 7.38	11.1	5.36	NE	U	BD	117658-003	EPA 901.1
12-May-22	Cesium-137	0.779 ± 1.74	2.80	1.32	NE	U	BD	117658-003	EPA 901.1
	Cobalt-60	-0.287 ± 1.67	3.03	1.39	NE	U	BD	117658-003	EPA 901.1
	Potassium-40	64.5 ± 54.6	26.0	11.7	NE		J	117658-003	EPA 901.1
	Gross Alpha	6.74	NA	NA	15 pCi/L	NA	None	117658-004	EPA 900.0
	Gross Beta	7.73 ± 0.997	1.32	0.638	4 mrem/yr			117658-004	EPA 900.0
	Tritium	13.0 ± 75.8	138	62.4	4 mrem/yr	U	BD	117658-005	EPA 906.0M
	Radon-222	470 ± 128	90.3	42.4	4000 pCi/L	H	J	117658-006	SM7500 Rn B
MWL-BW2 (Duplicate)	Americium-241	8.64 ± 15.3	25.3	12.2	NE	U	BD	117659-003	EPA 901.1
12-May-22	Cesium-137	1.13 ± 3.13	2.95	1.39	NE	U	BD	117659-003	EPA 901.1
	Cobalt-60	-0.813 ± 2.09	3.53	1.62	NE	U	BD	117659-003	EPA 901.1
	Potassium-40	6.99 ± 46.2	36.2	16.6	NE	U	BD	117659-003	EPA 901.1
	Gross Alpha	7.12	NA	NA	15 pCi/L	NA	None	117659-004	EPA 900.0
	Gross Beta	9.14 ± 1.17	1.52	0.739	4 mrem/yr			117659-004	EPA 900.0
	Tritium	-3.77 ± 74.5	139	62.9	4 mrem/yr	U	BD	117659-005	EPA 906.0M
	Radon-222	438 ± 122	90.5	42.4	4000 pCi/L	H	J	117659-006	SM7500 Rn B
MWL-MW7	Americium-241	1.68 ± 9.51	15.6	7.55	NE	U	BD	117662-003	EPA 901.1
16-May-22	Cesium-137	-5.87 ± 4.80	3.26	1.55	NE	U	BD	117662-003	EPA 901.1
	Cobalt-60	0.0379 ± 1.73	3.22	1.48	NE	U	BD	117662-003	EPA 901.1
	Potassium-40	-18.3 ± 34.2	42.2	19.8	NE	U	BD	117662-003	EPA 901.1
	Gross Alpha	5.66	NA	NA	15 pCi/L	NA	None	117662-004	EPA 900.0
	Gross Beta	6.99 ± 1.07	1.44	0.700	4 mrem/yr			117662-004	EPA 900.0
	Tritium	69.9 ± 82.7	137	62.4	4 mrem/yr	U	BD	117662-005	EPA 906.0M
	Radon-222	95.4 ± 61.1	92.1	43.5	4000 pCi/L		J	117662-006	SM7500 Rn B
MWL-MW8	Americium-241	1.68 ± 10.2	17.0	8.16	NE	U	BD	117667-003	EPA 901.1
18-May-22	Cesium-137	0.537 ± 2.13	3.74	1.76	NE	U	BD	117667-003	EPA 901.1
	Cobalt-60	0.676 ± 2.10	3.91	1.79	NE	U	BD	117667-003	EPA 901.1
	Potassium-40	-1.97 ± 52.9	50.4	23.5	NE	U	BD	117667-003	EPA 901.1
	Gross Alpha	4.43	NA	NA	15 pCi/L	NA	None	117667-004	EPA 900.0
	Gross Beta	5.40 ± 0.811	1.01	0.483	4 mrem/yr			117667-004	EPA 900.0
	Tritium	24.3 ± 78.3	140	63.4	4 mrem/yr	U	BD	117667-005	EPA 906.0M
	Radon-222	158 ± 56.7	64.4	30.4	4000 pCi/L		J	117667-006	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 2022

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	-2.41 ± 18.3	30.0	14.4	NE	U	BD	117670-003	EPA 901.1
17-May-22	Cesium-137	0.403 ± 2.14	3.83	1.80	NE	U	BD	117670-003	EPA 901.1
	Cobalt-60	-0.320 ± 2.19	4.00	1.82	NE	U	BD	117670-003	EPA 901.1
	Potassium-40	31.1 ± 72.8	35.1	15.7	NE	U	BD	117670-003	EPA 901.1
	Gross Alpha	4.35	NA	NA	15 pCi/L	NA	None	117670-004	EPA 900.0
	Gross Beta	6.28 ± 0.979	1.33	0.644	4 mrem/yr			117670-004	EPA 900.0
	Tritium	68.8 ± 85.0	142	64.5	4 mrem/yr	U	BD	117670-005	EPA 906.0M
	Radon-222	421 ± 112	77.5	36.6	4000 pCi/L			117670-006	SM7500 Rn B
MWL-BW2	Americium-241	-1.17 ± 15.2	23.2	11.3	NE	U	BD	118933-004	EPA 901.1
20-Oct-22	Cesium-137	1.75 ± 3.69	3.27	1.55	NE	U	BD	118933-004	EPA 901.1
	Cobalt-60	-1.84 ± 2.53	3.44	1.59	NE	U	BD	118933-004	EPA 901.1
	Potassium-40	8.80 ± 47.8	32.2	14.8	NE	U	BD	118933-004	EPA 901.1
	Gross Alpha	6.60	NA	NA	15 pCi/L	NA	None	118933-005	EPA 900.0
	Gross Beta	9.05 ± 1.17	1.42	0.692	4 mrem/yr			118933-005	EPA 900.0
	Tritium	52.1 ± 90.8	157	71.3	4 mrem/yr	U	BD	118933-006	EPA 906.0M
	Radon-222	345 ± 100	84.1	39.6	4000 pCi/L			118933-007	SM7500 Rn B
MWL-MW7	Americium-241	0.571 ± 7.64	13.3	6.45	NE	U	BD	118941-004	EPA 901.1
24-Oct-22	Cesium-137	0.327 ± 1.47	2.59	1.23	NE	U	BD	118941-004	EPA 901.1
	Cobalt-60	-1.19 ± 1.63	2.63	1.21	NE	U	BD	118941-004	EPA 901.1
	Potassium-40	6.80 ± 45.0	26.9	12.4	NE	U	BD	118941-004	EPA 901.1
	Gross Alpha	2.95	NA	NA	15 pCi/L	NA	None	118941-005	EPA 900.0
	Gross Beta	6.98 ± 0.909	1.17	0.563	4 mrem/yr			118941-005	EPA 900.0
	Tritium	16.4 ± 87.8	159	72.2	4 mrem/yr	U	BD	118941-006	EPA 906.0M
	Radon-222	142 ± 57.4	70.6	33.2	4000 pCi/L		J	118941-007	SM7500 Rn B
MWL-MW7 (Duplicate)	Americium-241	-0.263 ± 5.29	9.19	4.45	NE	U	BD	118942-004	EPA 901.1
24-Oct-22	Cesium-137	-0.444 ± 1.59	2.57	1.22	NE	U	BD	118942-004	EPA 901.1
	Cobalt-60	0.617 ± 1.47	2.75	1.27	NE	U	BD	118942-004	EPA 901.1
	Potassium-40	17.3 ± 37.5	26.3	12.1	NE	U	BD	118942-004	EPA 901.1
	Gross Alpha	3.81	NA	NA	15 pCi/L	NA	None	118942-005	EPA 900.0
	Gross Beta	5.39 ± 0.805	0.988	0.473	4 mrem/yr			118942-005	EPA 900.0
	Tritium	55.9 ± 92.2	158	72.1	4 mrem/yr	U	BD	118942-006	EPA 906.0M
	Radon-222	109 ± 52.2	70.8	33.3	4000 pCi/L		J	118942-007	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 2022

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-MW8	Americium-241	-1.51 ± 9.47	14.1	6.78	NE	U	BD	118956-004	EPA 901.1
26-Oct-22	Cesium-137	0.385 ± 3.06	2.93	1.39	NE	U	BD	118956-004	EPA 901.1
	Cobalt-60	0.843 ± 1.68	3.10	1.43	NE	U	BD	118956-004	EPA 901.1
	Potassium-40	23.9 ± 39.3	28.5	13.0	NE	U	BD	118956-004	EPA 901.1
	Gross Alpha	4.50	NA	NA	15 pCi/L	NA	None	118956-005	EPA 900.0
	Gross Beta	5.79 ± 0.872	1.19	0.574	4 mrem/yr		NJ+	118956-005	EPA 900.0
	Tritium	63.1 ± 94.0	160	72.9	4 mrem/yr	U	BD	118956-006	EPA 906.0M
	Radon-222	153 ± 57.2	66.3	31.2	4000 pCi/L		J	118956-007	SM7500 Rn B
MWL-MW9	Americium-241	-0.0705 ± 12.9	20.2	9.80	NE	U	BD	118948-004	EPA 901.1
25-Oct-22	Cesium-137	0.308 ± 1.71	2.98	1.41	NE	U	BD	118948-004	EPA 901.1
	Cobalt-60	1.04 ± 1.61	3.03	1.39	NE	U	BD	118948-004	EPA 901.1
	Potassium-40	-25.6 ± 35.5	47.0	22.3	NE	U	BD	118948-004	EPA 901.1
	Gross Alpha	4.06	NA	NA	15 pCi/L	NA	None	118948-005	EPA 900.0
	Gross Beta	5.64 ± 0.948	1.24	0.596	4 mrem/yr			118948-005	EPA 900.0
	Tritium	59.4 ± 93.0	159	72.4	4 mrem/yr	U	BD	118948-006	EPA 906.0M
	Radon-222	421 ± 107	59.1	27.8	4000 pCi/L			118948-007	SM7500 Rn B

Refer to Notes on page 4B-13.

Table 4B-5
Summary of Field Water Quality Measurements[h], Mixed Waste Landfill Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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)
MWL-BW2	12-May-22	21.41	703.61	153.1	7.37	2.27	26.24	2.16
MWL-MW7	16-May-22	22.96	614.43	176.9	7.54	0.28	75.07	6.06
MWL-MW8	18-May-22	23.14	605.81	169.1	7.49	0.34	40.91	3.11
MWL-MW9	17-May-22	23.85	628.31	143.3	7.45	0.71	14.95	1.17
MWL-BW2	20-Oct-22	21.94	694.20	95.2	7.34	1.55	36.75	2.70
MWL-MW7	24-Oct-22	16.72	463.99	108.6	7.52	0.70	73.02	6.10
MWL-MW8	26-Oct-22	18.05	483.09	124.6	7.49	0.32	35.31	2.81
MWL-MW9	25-Oct-22	16.95	470.64	96.1	7.45	0.54	10.53	0.87

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
No.	= number
pCi/L	= picocuries per liter

[a]Result or Activity

Result applies to Tables 4B-1 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 MCL.
ND	= not detected (at method detection limit)

[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.

H	= Analytical holding time was exceeded.
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 method detection limit.

[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.
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 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, *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.

EPA, 1986, (and updates), *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd ed. Rev.1, U.S. Environmental Protection Agency, Washington, D.C.

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

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)

Chapter 4.0
Mixed Waste Landfill References

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5.0 Technical Area-V Groundwater Area of Concern

5.1 Introduction

Trichloroethene (TCE) and nitrate have been identified as constituents of concern (COCs) in groundwater at the Technical Area (TA)-V Groundwater (TAVG) Area of Concern (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 at 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 1993, the maximum concentrations detected in groundwater at the TAVG AOC have been 26 μg/L of TCE and 19 mg/L of nitrate (as nitrogen).

U.S. Department of Energy/National Nuclear Security Administration (DOE/NNSA) and Sandia National Laboratories, New Mexico (SNL/NM) personnel conducted a phased Treatability Study to evaluate the effectiveness of in-situ bioremediation (ISB) as a potential technology to treat groundwater contamination at the TAVG AOC. The technical approach was to gravity-inject substrate solution containing essential food, nutrients, and biodegradation bacteria to groundwater via injection well(s). DOE/NNSA and SNL/NM personnel started Phase I of the Treatability Study in November 2017 and completed it in May 2021. Operation and results of the Phase I Treatability Study were summarized 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) that was submitted to the New Mexico Environment Department (NMED) Hazardous Waste Bureau (HWB) in April 2022 (SNL/NM March 2022 and DOE April 2022a). Based on the findings of the Phase I Treatability Study, DOE/NNSA and SNL/NM personnel recommended not to proceed 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 HWB June 2022).

5.1.1 Location

TA-V is located in the west-central portion of Kirtland Air Force Base (KAFB), south of the City of Albuquerque (Figure 5-1 and Plate 1). TA-V occupies approximately 35 acres at 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 components and has hosted multiple generations of research reactors, the Gamma Irradiation Facility, the Low-Dose-Rate Irradiation Facility, and the Hot Cell Facilities. 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.

Since 1992, SNL/NM Environmental Restoration (ER) Operations personnel have conducted numerous investigations in the TAVG AOC. Table 5A-1 in Attachment 5A provides the historical timeline for the TAVG AOC investigations. Many of these investigations (soil and soil vapor) were site-specific and were conducted for supporting various Solid Waste Management Unit (SWMU) assessments. The majority of the SWMU investigations involved shallow soil contamination. Where required, contaminated soil was excavated and removed. The NMED HWB has granted Corrective Action Complete status to all 21 SWMUs in the TAVG AOC (SNL September 2015). Only the groundwater issue remains.

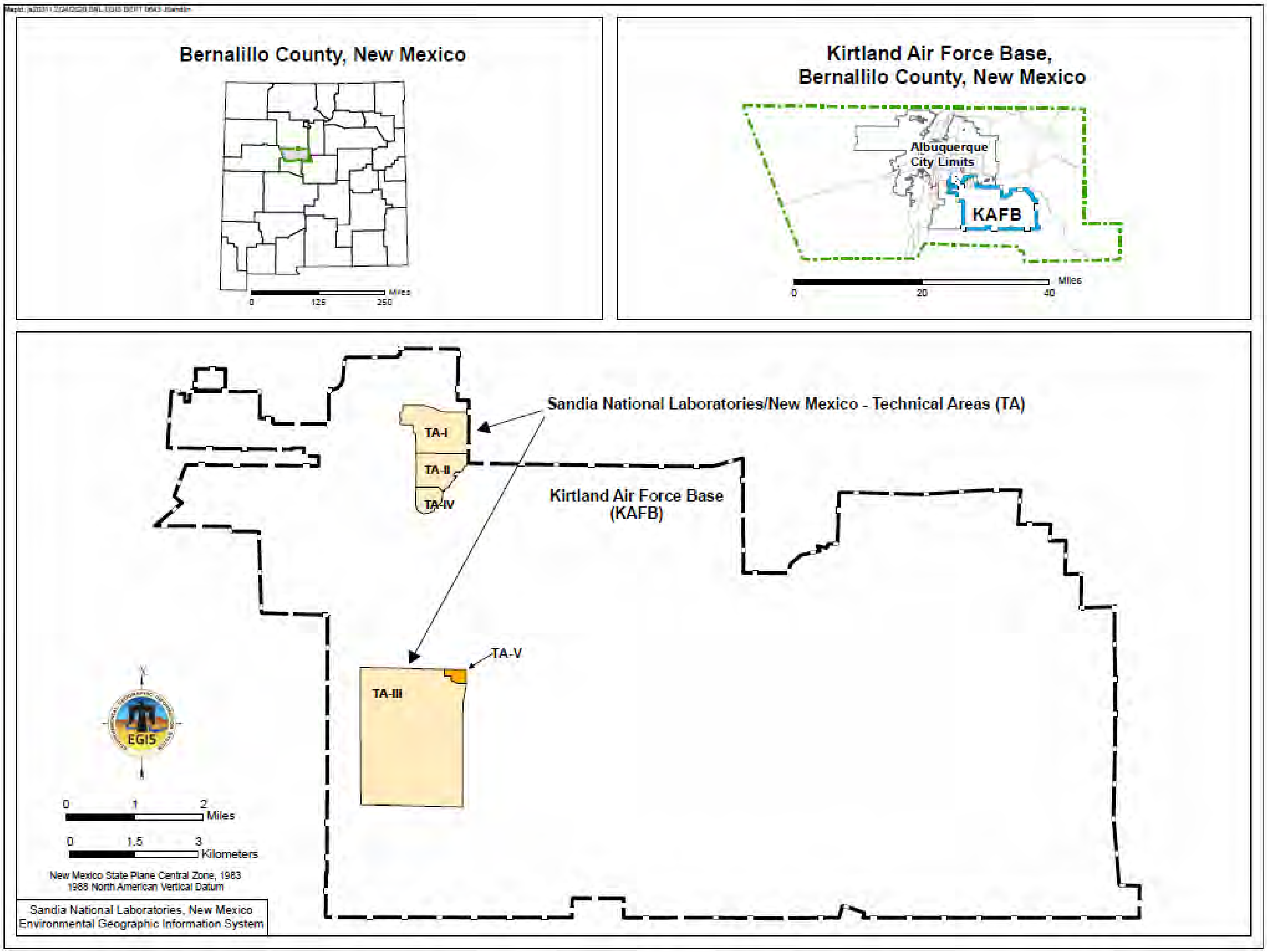


Figure 5-1
Location of Sandia National Laboratories, New Mexico and Technical Area-V

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 and was first detected above the EPA MCL of 5 µg/L in the same well in September 1995. Since then, low concentrations of TCE have been consistently detected at several monitoring wells. Nitrate was first detected above the EPA MCL of 10 mg/L in monitoring well LWDS-MW1 in December 1995. Since 1992, 20 groundwater monitoring wells have been installed through the end of calendar year (CY) 2022 and 2 of the 20 have gone dry (Table 5-1). Groundwater monitoring results for the TAVG AOC monitoring network continue to be summarized in the annual groundwater monitoring reports (AGMRs).

Historical groundwater analyses have demonstrated that nitrite concentrations are below laboratory method detection limits (MDLs) and are therefore considered as non-contributory to the analytical results of nitrate plus nitrite (NPN) as nitrogen analyses. Therefore, NPN (as nitrogen) results are used to directly represent nitrate concentrations in this report.

Three soil-vapor monitoring 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. 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 June 2014) and are summarized in Section 5.1.6.5.

5.1.4 Current Monitoring Network

Table 5-1 provides a list of monitoring and injection wells in the TAVG AOC installed to date. Figure 5-2 shows the TAVG AOC monitoring well locations. 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) specified a quarterly sampling frequency for groundwater monitoring at TA-V (NMED April 2004). However, the sampling frequency was revised in accordance with the *Revised Treatability Study Work Plan for In-Situ Bioremediation at the Technical Area-V Groundwater Area of Concern* (Revised TSWP) (SNL March 2016) as approved by the NMED HWB (NMED HWB May 2016a). The new sampling protocol started in CY 2017.

In September 2021, DOE/NNSA and SNL/NM personnel submitted a work plan to plug and abandon monitoring wells AVN-1, AVN-2, and LWDS-MW2, and install new monitoring well TAV-MW17 (SNL August 2021; DOE September 2021). The need for well abandonment and new well installation was explained in Section 5.6 of the *Annual Groundwater Monitoring Report*, *Calendar Year 2020* (SNL June 2021). The work plan was subsequently approved (with modification) by the NMED HWB (NMED HWB October 2021a). Field activities are planned for CY 2023. Even though wells AVN-1 and LWDS-MW2 were approved for decommissioning, both were sampled and water levels were measured in CY 2022 (Table 5-1).

After the Phase I Treatability Study concluded in May 2021, DOE/NNSA and SNL/NM personnel continued quarterly monitoring of wells TAV-INJ1 and TAV-MW6 (i.e., the treatment zone of Phase I Treatability Study) for one year from the third quarter of CY 2021 to the second quarter of CY 2022 (DOE August 2021; NMED HWB October 2021b). This one-year of additional sampling was concluded in April 2022. Thereafter, DOE/NNSA and SNL/NM personnel requested to decommission injection well TAV-INJ1 and revert monitoring well TAV-MW6 to follow the requirements of the TAVG AOC monitoring network (DOE July 2022). The NMED HWB subsequently approved the request (NMED HWB September 2022). DOE/NNSA and SNL/NM personnel also requested to modify the sampling plan of the TAVG AOC monitoring network (DOE August 2022) and the NMED HWB subsequently approved the request (NMED HWB December 2022). DOE/NNSA and SNL/NM personnel plan to implement the modified sampling plan in CY 2023.

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	✓	✓	Deeper completion (570–590 ft bgs)
AVN-2	1995	NA	NA	Water table completion (492-515 ft bgs), dry since April 2008
LWDS-MW1	1993	✓	✓	Water table completion (495-515 ft bgs)
LWDS-MW2	1992	✓	✓	Water table completion (506-526 ft bgs)
TAV-INJ1[b]	2017	✓[c]	✓	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	✓[c,d]	✓	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)
Total	----	18	18	Total for AGMR reporting

Notes:
[a] Check marks (✓) indicate WQ sampling and WL measurements were obtained in CY 2022.
[b] Approved for decommissioning as of September 2022.
[c] TAV-INJ1 and TAV-MW6 were sampled in the first and second quarters of CY 2022 as part of the one-year additional sampling of the Phase I treatment zone. These monitoring results were provided in corresponding ER Operations quarterly reports and are not repeated in this AGMR.
[d] TAV-MW6 was reverted to follow the requirements of the TAVG AOC monitoring network and was sampled in the third and fourth quarters of CY 2022. These monitoring results are provided in this AGMR.

AGMR = annual groundwater monitoring report
AVN = Area-V (North
bgs = below ground surface
CY = calendar year
ER = Environmental Restoration
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

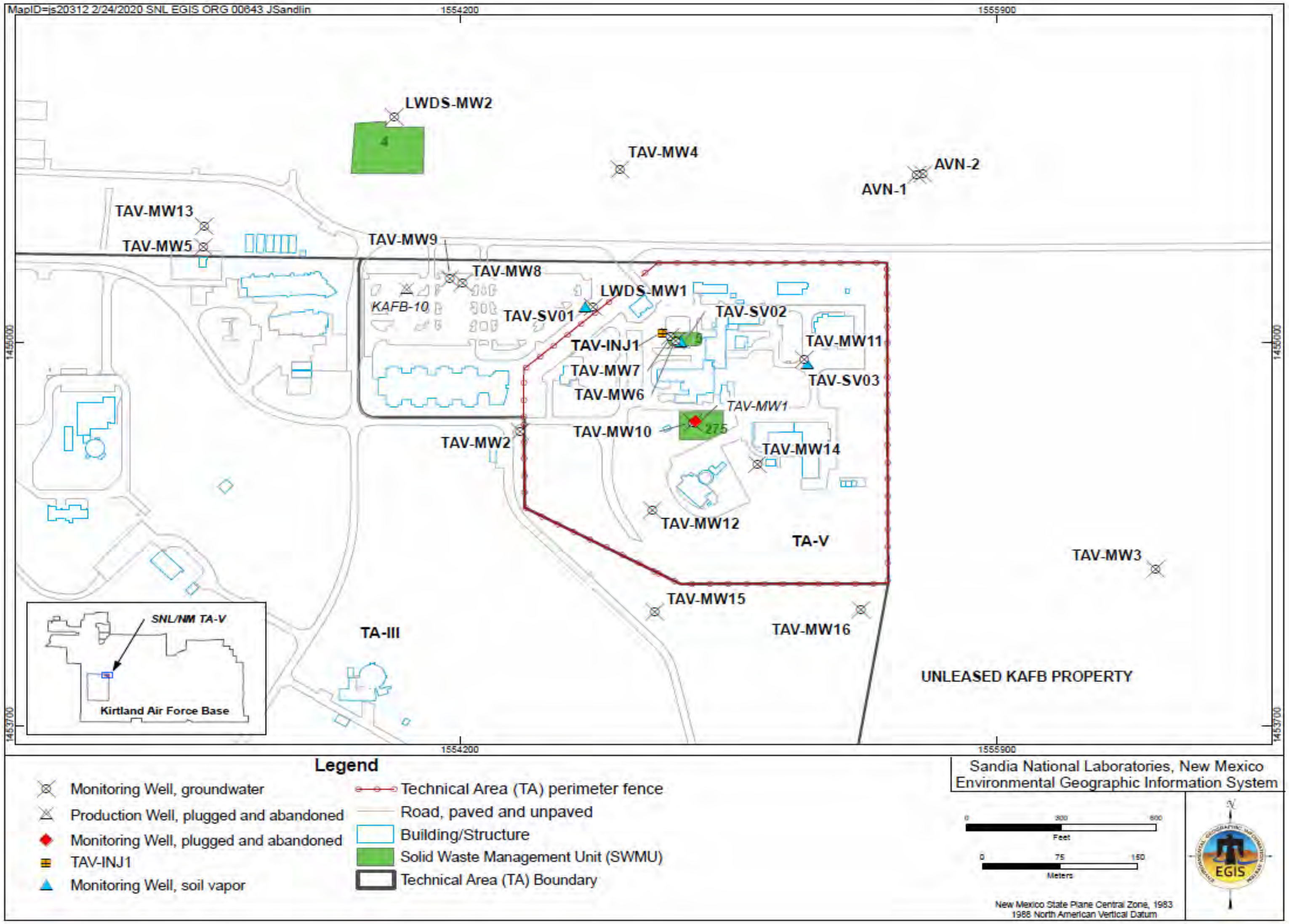


Figure 5-2
Technical Area-V Groundwater Area of Concern Monitoring Well Locations

5.1.5 Summary of Calendar Year 2022 Activities

The following activities were conducted for the TAVG AOC during CY 2022:

- Obtained quarterly water level measurements.
- Prepared mini-sampling and analysis plans (SAPs). The groundwater sampling events were conducted in January/February, May/June/July, August, and November 2022. Note that sampling of monitoring wells AVN-1 and TAV-MW3 was originally scheduled in the second quarter of CY 2022 but was postponed to July 2022 because of Stage III fire restrictions implemented at SNL/NM during May and June 2022.
- Prepared summary tables for the analytical results (Attachment 5B), concentration versus time plots (Attachment 5C), and hydrographs (Attachment 5D).
- Conducted quarterly sampling of the Phase I treatment zone in the first and second quarters of CY 2022. The one-year additional sampling of the Phase I treatment zone was concluded in April 2022. The monitoring results were provided in corresponding ER Operations quarterly reports and are not repeated in this AGMR.
- Obtained approval from the NMED HWB to decommission injection well TAV-INJ1 and to modify the sampling plan of the TAVG AOC monitoring network.

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 2015 and illustrates the geological and hydrogeological framework, contaminant sources, and the distribution and migration paths of contaminants in the subsurface at TA-V (SNL September 2015).

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 from Cochiti Reservoir on the north to San Acacia, New Mexico on the south. The Albuquerque Basin includes TA-V and the western portion of KAFB.

The sedimentary deposits of the Santa Fe Group (SFG) and overlying alluvium that fill the Albuquerque Basin contain the regional SFG aquifer system. This aquifer system provides the primary source of municipal, domestic, and industrial water in the Albuquerque area. The structure of the aquifer system 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 ft thick, extend over tens of square miles, and primarily consist of unconsolidated and partially cemented deposits that interfinger in complex arrangements.

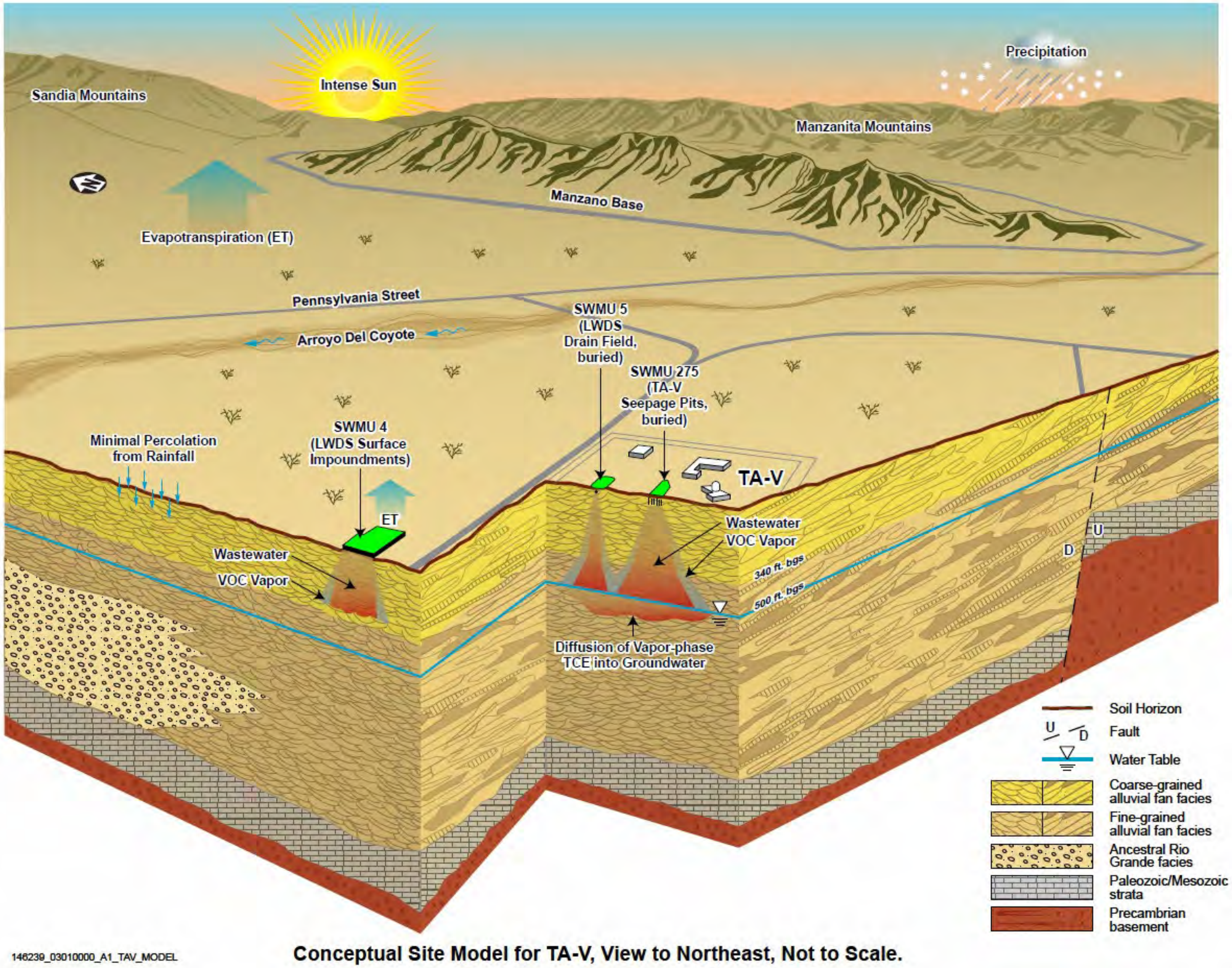


Figure 5-3
Conceptual Site Model for the Technical Area-V Groundwater Area of Concern (SNL September 2015)

TA-V is primarily underlain by a thick section of alluvial fan deposits. The alluvial fan lithofacies are subdivided into lower and upper sections. 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 upper section consists of relatively coarse-grained sediments deposited in a higher-energy environment. The total thickness of the alluvial fan deposits are typically thousands of ft thick. The water table of the regional SFG 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 ft of the vadose zone. These deposits were derived primarily from alluvial fans that developed from Coyote Canyon to the east.

The Regional Aquifer exhibits unconfined conditions. Prior to development of water resources in the Albuquerque area, the groundwater flow direction in the Albuquerque Basin was generally from the north to the south, with a westward component of flow from recharge areas along mountain-front boundaries to the east (Bartolino and Cole 2002). As the SFG – Regional Aquifer was developed as a source for municipal and industrial water supplies, groundwater flow directions were altered toward production wells to the north of TA-V. 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 the TAVG AOC

Average annual precipitation is approximately 8.84 inches at Albuquerque International Sunport (Chapter 2.6.2.1). Most precipitation falls between July and September, 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 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.

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.

The vadose zone, consisting of approximately 500 ft of unconsolidated to semiconsolidated alluvial fan sediments, forms the potential pathway for COC transport from surface and shallow subsurface contaminant sources 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 to the aquifer. Vertical flow through the discontinuous, layered, lenticular sediments in the vadose zone was most likely attenuated or diverted at horizons of varying hydraulic properties.

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 September 2015).

Values of horizontal hydraulic conductivity for the alluvial fan sediments were determined using aquifer pumping tests and slug tests. Aquifer pumping (and recovery) data were collected at 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 the 18 monitoring wells that were installed prior to 2017. The estimates of 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 data from all 18 monitoring wells. The geometric mean hydraulic conductivity was 1.25 ft/day (SNL September 2015).

Vertical hydraulic conductivity is typically estimated to be one-tenth to one-hundredth the horizontal hydraulic conductivity. For the TA-V Current Conceptual Model (CCM), vertical hydraulic gradients were calculated using three monitoring well pairs (SNL September 2015). Between monitoring well pairs TAV-MW5 and TAV-MW13, the hydraulic gradient was downward at 0.12 ft per ft (ft/ft). Between TAV-MW6 and TAV-MW7, the hydraulic gradient was downward at 0.04 ft/ft. Between TAV-MW8 and TAV-MW9, the hydraulic gradient was similarly downward at 0.05 ft/ft.

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

5.1.6.3 Direction of Groundwater Flow

Groundwater flows predominantly from east to west. To the west of TA-V, groundwater flow becomes more northerly in response to pumping from 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 2022 in the current TAVG AOC monitoring network. Figure 5-4 shows the CY 2022 potentiometric surface for the TAVG AOC. The general orientation of the localized potentiometric surface contours shown in Figure 5-4 is consistent with the base-wide potentiometric surface map (Plate 1). The potentiometric surface indicates that the groundwater flow at TA-V is generally to the west, with localized flow to the south and southwest. The horizontal gradient ranges from approximately 0.004 to 0.01 ft/ft. The horizontal groundwater flow velocity at TA-V was calculated from the range of horizontal hydraulic conductivities (0.04 to 30.82 ft/day), a representative horizontal hydraulic gradient of 0.005 ft/ft, and an assumed effective porosity of 0.25. The estimates for linear groundwater flow velocity range greatly (approximately three orders of magnitude) from 0.29 to 225 ft per year (ft/yr) (SNL September 2015).

A subtle mound in the water table near monitoring wells LWDS-MW1 and TAV-MW8 had persisted for several decades; however, this subtle mound has not been evident since CY 2021. 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-3 (Attachment 5D) present the groundwater level fluctuations on a series of hydrographs for the 18 monitoring wells in the TAVG AOC monitoring network (19 wells minus TAV-INJ1). Groundwater elevations have steadily declined at all TA-V groundwater monitoring wells. The declines are due to the combined pumping of the Regional Aquifer by the KAFB, ABCWUA, and VA production wells. The rates of decline range from 0.44 to 0.80 ft/yr with an average decline rate of 0.66 ft/yr. The groundwater elevations are declining fastest in monitoring wells AVN-1 and TAV-MW3 and declining slowest in monitoring wells TAV-MW13, TAV-MW15, and TAV-MW16. The dewatering of the aquifer is expected to continue as long as pumping of production wells in the region continues.

Since late 2008, groundwater levels for 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 the 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 2022 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)
AVN-1	5443.00	4-Oct-2022	528.44	4914.56
LWDS-MW1	5423.83	4-Oct-2022	506.91	4916.92
LWDS-MW2	5412.41	4-Oct-2022	495.86	4916.55
TAV-MW2	5427.33	4-Oct-2022	511.19	4916.14
TAV-MW3	5464.30	4-Oct-2022	549.16	4915.14
TAV-MW4	5427.89	4-Oct-2022	511.17	4916.72
TAV-MW5	5408.71	4-Oct-2022	495.58	4913.13
TAV-MW6	5431.17	4-Oct-2022	514.63	4916.54
TAV-MW7	5430.40	4-Oct-2022	516.74	4913.66
TAV-MW8	5417.00	19-Oct-2022	499.91	4917.09
TAV-MW9	5416.27	4-Oct-2022	502.69	4913.58
TAV-MW10	5437.03	4-Oct-2022	520.91	4916.12
TAV-MW11	5440.12	4-Oct-2022	523.67	4916.45
TAV-MW12	5435.72	4-Oct-2022	520.39	4915.33
TAV-MW13	5409.02	4-Oct-2022	498.91	4910.11
TAV-MW14	5441.52	4-Oct-2022	527.44	4914.08
TAV-MW15	5437.32	4-Oct-2022	522.14	4915.18
TAV-MW16	5448.34	4-Oct-2022	533.57	4914.77

Notes:

amsl = above mean sea level
AVN = Area-V (North)
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

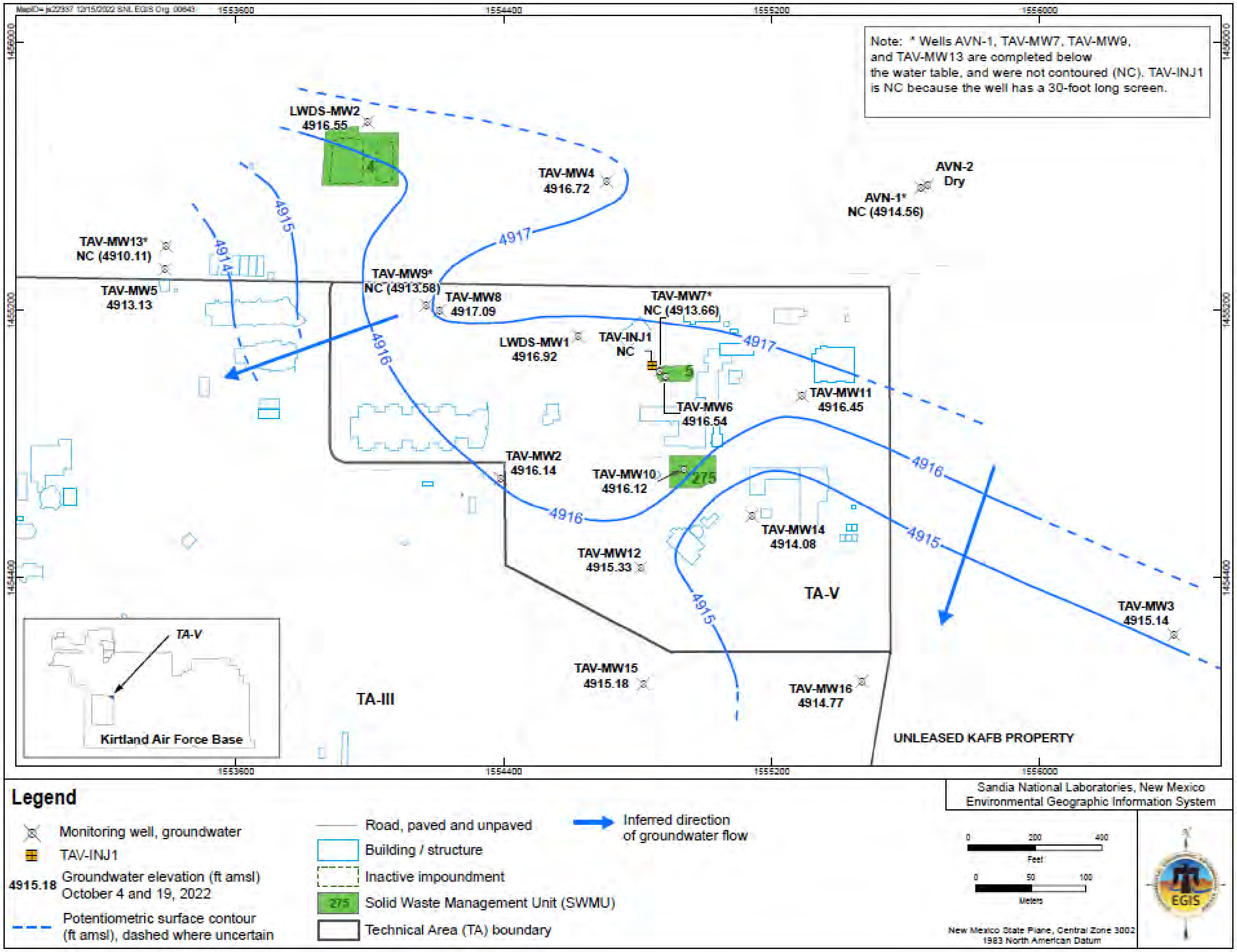


Figure 5-4
Potentiometric Surface of the Regional Aquifer at the Technical Area-V Groundwater Area of Concern (October 2022)

5.1.6.4 Contaminant Sources

The groundwater contamination at TAVG AOC is not associated with a single SWMU at the surface. Prior to 1993, the majority of wastewater disposed at TA-V occurred at SWMUs 4, 5, and 275 (Figures 5-2 and 5-4). Table 5-3 lists the dates of disposal and the estimated volumes. Small volumes of TCE and other organic solvents were presumably present in wastewater that was disposed to the LWDS Drain Field (SWMU 5) from 1962 to 1967, to the LWDS Surface Impoundments (SWMU 4) from 1967 to 1972, and to the TA-V Seepage Pits (SWMU 275) from the 1960s until the early 1980s, when disposal practices were modified to protect the environment. Wastewater continued to be disposed at the TA-V Seepage Pits (SWMU 275) from the early 1980s until 1992 but 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 presents the disposal periods, estimated disposal volumes, types of wastewater, and design characteristics for the three high-discharge SWMUs. The total discharge volume is estimated to range 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	Dates in Use	Estimated Volume (gal)	Percentage of the Estimated Total Volume[a]	Average Disposal Volume in Million gal per Year	Primary Types of Wastewater	Design Characteristics
SWMU 4 - LWDS Surface Impoundments	1967–1972[b]	12 million	18 – 25	2.4	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	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]	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 range of volumes for total discharge (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 seepage pits.

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

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 groundwater sampling results from monitoring well LWDS-MW2, located to the immediate north of the LWDS Surface Impoundments (SWMU 4), indicate that wastewater disposed at the surface impoundments did not impact groundwater. TCE has never been detected in groundwater samples from monitoring well LWDS-MW2, and nitrate concentrations have never exceeded the EPA MCL except for one anomalous detection of 12.3 mg/L in May 2019 (SNL June 2020).

Elevated nitrate concentrations in 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, is not typically sorbed to sediments, and is 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 NMED-suggested background concentration for nitrate in groundwater is 4 mg/L (Dinwiddie September 1997). Nitrate concentrations that may be naturally higher than 4 mg/L have been reported for two monitoring wells located upgradient of TA-V. Monitoring wells AVN-1 and AVN-2 are co-located approximately 310 ft northeast of TA-V. These two monitoring wells have historically showed similar NPN concentrations. The maximum NPN concentration for monitoring well AVN-1 was 11.8 mg/L in June 2009. The maximum NPN concentration for monitoring well AVN-2 was 10.7 mg/L in December 2004. Monitoring well AVN-2 has been dry since April 2008 and has a screen approximately 75 ft shallower than monitoring well AVN-1. Elevated nitrate concentrations at these two monitoring wells 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. 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 the Tijeras Arroyo Groundwater AOC (Chapter 6.0).

5.1.6.5 Contaminant Distribution and Transport in Groundwater

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

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 March 1999a). The possibility of vadose zone contamination was further investigated with the installation of groundwater 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 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 March 1999a).

To characterize the vertical extent of VOCs in the vadose zone at SWMUs 5 and 275, three soil-vapor monitoring wells (TAV-SV01, TAV-SV02, and TAV-SV03) were installed in 2011 (Figure 5-2). Each soil-vapor monitoring well was constructed with a series of 10 one-ft long stainless-steel screens set at

50-ft intervals from 50 to 500 ft bgs. The three soil-vapor monitoring 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 June 2014). TCE was the most prevalent VOC in the vadose zone. Trend analysis for the eight quarters strongly indicates that soil-vapor concentrations have stabilized in the vadose zone (SNL September 2015). Without an active driving force (such as wastewater disposal), it is unlikely for the TCE in the vadose zone to act as an ongoing contaminant source to 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.

The concentrations of TCE and nitrate in groundwater are above 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 September 2015). Groundwater monitoring results over the past two 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. While nitrate does not tend to 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 initial sorbed TCE portion will tend to desorb and reenter groundwater through equilibration processes. The relatively stable TCE and nitrate concentrations in TA-V groundwater can be attributed to the relatively slow processes of dispersion and diffusion, and specifically for TCE the reversible sorption process. The CY 2022 analytical results for TCE and nitrate are discussed in Section 5.6.

5.1.6.6 Biodegradation and Stable Isotope Studies

The potential for natural (intrinsic) biodegradation to occur at TA-V was evaluated in two assessments (SNL July 2004 and SNL April 2005). The anaerobic biodegradation assessment involved the collection of groundwater samples from 10 monitoring wells and analyses for dissolved gases and dechlorination products (SNL July 2004; Appendix E in SNL September 2015). 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 was qualitatively assessed; biologically mediated transformation of nitrate was not likely to occur. To summarize, natural attenuation was not viable for the anaerobic degradation of TCE nor for the denitrification of TA-V groundwater.

The second assessment evaluated aerobic biodegradation. Groundwater samples were collected from 10 monitoring wells (SNL April 2005; Appendix G in SNL September 2015). The study coupled enzymatic probes with DNA analyses of the native groundwater. Aerobic TCE cometabolism by the indigenous microbial population was determined to be an existing mechanism for natural attenuation at TA-V. 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 in TA-V groundwater (Madrid et al. June 2013; Appendix F in SNL September 2015).

5.1.6.7 Potential Receptors of TA-V Groundwater Contamination

The potential for groundwater to reach receptor wells was evaluated in the *Current Conceptual Model for Technical Area-V Groundwater Area of Concern at Sandia National Laboratories* (SNL September 2015). Production wells completed in the Regional Aquifer are the only potential exposure points for the COCs in TA-V groundwater to reach human receptors. However, no consumptive use of groundwater currently occurs within 2.8 miles of TA-V. Production well KAFB-4, the nearest downgradient 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. The results of MODFLOW modeling (SNL July 2005) demonstrated that contaminants in TA-V groundwater do not pose a threat to those production wells. The proposed Mesa del Sol well field, located approximately 3 miles west of TA-V, is unlikely to be a receptor in the foreseeable future. It is improbable that KAFB and ABCWUA pumping will be discontinued, and the groundwater flow path would revert to a westward direction.

In summary, the potential for adverse impacts on human health or environmental receptors is considered very low from the groundwater contamination currently present at the TAVG AOC. There is no current or anticipated use of groundwater in the immediate vicinity of TA-V. Thus, there is no foreseeable risk to human health or a threat to the beneficial use of groundwater downgradient of TA-V.

5.2 Regulatory Criteria

NMED HWB provides regulatory oversight of SNL/NM ER Operations, as well as implements and enforces regulatory standards mandated by the Resource Conservation and Recovery Act (RCRA). All SNL/NM SWMUs and AOCs are listed in the *Resource Conservation and Recovery Act Facility Operating Permit, EPA ID# NM5890110518* (RCRA Permit) (NMED HWB January 2015a).

In April 2004, the Consent Order became effective (NMED April 2004). The regulatory authority for corrective action requirements was transferred from the RCRA Permit to the Consent Order. The Consent Order identified TA-V as a groundwater AOC. The TAVG AOC investigation must comply with requirements set forth in the Consent Order for site characterization and development of a Corrective Measures Evaluation (CME) Report.

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 April 2004a) and the *Corrective Measures Evaluation Work Plan, Technical Area-V Groundwater* (CME Work Plan; SNL April 2004b) to the NMED HWB in April 2004. The CME Work Plan was updated in December 2004 (SNL December 2004). After implementing the CME Work Plan, the *Corrective Measures Evaluation Report for Technical Area-V Groundwater* (CME Report) was submitted to the NMED HWB in July 2005 (SNL July 2005). NMED HWB subsequently issued three Notices of Disapproval (NODs) for the CME Report in July 2008, August 2009, and December 2009, respectively (NMED HWB July 2008, August 2009, and December 2009). Responses to the three NODs were submitted in April 2009, November 2009, and February 2010, respectively (SNL April 2009, November 2009, and February 2010). These NOD responses contained an attachment entitled Technical Area-V Groundwater Investigation Work Plan, which proposed the installation of four additional groundwater monitoring wells and three soil-vapor monitoring 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* (NMED HWB May 2010).

Since the 2005 CME Report, a substantial body of information has become available with additional groundwater monitoring wells and soil-vapor monitoring wells being installed. 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 (DOE December 2013). NMED HWB approved the request (NMED HWB December 2013). Thereafter, in order to allow development of the technical approach and preparation of the associated work plan for a Treatability Study of ISB to address the groundwater contamination at TA-V, a two-year extension of the due date for submittal of the updated CCM/CME Report was requested (DOE November 2014a). NMED HWB approved the request (NMED HWB January 2015b). The updated *Current Conceptual Model for Technical Area-V Groundwater Area of Concern at Sandia National Laboratories, New Mexico* was submitted to NMED HWB on October 20, 2015 (DOE October 2015) to provide the CSM for the Revised TWSP, and it was approved by the NMED HWB on November 30, 2015 (NMED HWB November 2015).

In anticipation of approval of the Revised TSWP (SNL March 2016) and implementation of the phased Treatability Study, DOE/NNSA and SNL/NM personnel requested, and the NMED HWB subsequently agreed to, a milestone extension for submittal of the updated CCM/CME Report to May 20, 2022 (DOE March 2016b; NMED HWB April 2016).

Following completion of the Phase I Treatability Study in May 2021 and the additional year of sampling at the Phase I treatment zone in April 2022, DOE/NNSA and SNL/NM personnel requested another extension for submittal of the updated CCM/CME Report (DOE April 2022b). The extension request was approved by the NMED HWB on May 24, 2022 (NMED HWB May 2022). The updated CCM/CME Report will incorporate the findings of the Phase I Treatability Study and the results of the one-year additional sampling. The updated CCM/CME Report is now due to the NMED HWB by May 20, 2024.

DOE/NNSA and SNL/NM personnel continue to present the TA-V groundwater monitoring data, along with data from other groundwater sites, in this AGMR. The outline of this chapter is based on the required elements of the Periodic Monitoring Report described in Section X.D. of the Consent Order.

In this report, TA-V groundwater monitoring data are presented for both hazardous and radioactive constituents; however, the analytical 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. Additional information on radionuclides and the scope of the Consent Order is available in Section III.A of the Consent Order.

5.3 Scope of Activities

Section 5.1.5 describes the activities for the TA-V groundwater monitoring in CY 2022. The field activities included groundwater level measurements and groundwater sampling. Table 5-4 summarizes the CY 2022 groundwater sampling events. Table 5-5 lists the analytes and parameters for each monitoring well in each of the CY 2022 sampling events.

Quality control (QC) samples are collected in the field at the time of sample collection. Field QC samples are used to monitor the sampling process and include environmental duplicate, equipment blank (EB), field blank (FB), and trip blank (TB) samples. Section 1.3.4 discusses the methodology for the QC samples.

5.4 Field Methods and Measurements

Section 1.3 details the monitoring procedures conducted for the groundwater monitoring at TA-V. The water level measurements obtained in CY 2022 were used to develop the potentiometric surface map presented in Figure 5-4 and the hydrographs presented in Figures 5D-1 through 5D-3 (Attachment 5D).

5.5 Analytical Methods

Section 1.3.2 describes the EPA-specified protocols used by the off-site laboratories for groundwater samples (Tables 1-5 and 1-6).

5.6 Summary of Analytical Results for CY 2022

This section discusses the CY 2022 monitoring results, exceedances of regulatory standards, and pertinent trends in COC concentrations for the TAVG AOC. Tables 5B-1 through 5B-8 (Attachment 5B) present the analytical results and field measurements for all CY 2022 sampling events. Data qualifiers assigned by the analytical laboratory and by data validation are presented with the associated results in Tables 5B-1 and 5B-3 through 5B-7. Figures 5C-1 through 5C-9 (Attachment 5C) present concentration trend plots for the monitoring wells that exceeded corresponding EPA MCLs for TCE and nitrate.

Table 5-5 shows that the second quarter of CY 2022 was the most comprehensive sampling event for the TAVG AOC, when all the active wells of the TAVG AOC monitoring network were sampled and the annual waste characterization parameters were analyzed.

Table 5-4
Groundwater Monitoring Well Network and Sampling Dates for the Technical Area-V Groundwater Area of Concern, Calendar Year 2022

Date of Sampling Event	Wells Sampled	SAP
January/February 2022	LWDS-MW1, TAV-MW2, TAV-MW4, TAV-MW8, TAV-MW10, TAV-MW11, TAV-MW12, TAV-MW14, TAV-MW15, and TAV-MW16	*TA-V Groundwater Monitoring Mini-SAP for Second Quarter, Fiscal Year 2022* (SNL January 2022b)
May/June/July 2022	AVN-1*, LWDS-MW1, LWDS-MW2, TAV-MW2, TAV-MW3*, TAV-MW4, TAV-MW5, TAV-MW7, TAV-MW8, TAV-MW9, TAV-MW10, TAV-MW11, TAV-MW12, TAV-MW13, TAV-MW14, TAV-MW15, and TAV-MW16	*TA-V Groundwater Monitoring Mini-SAP for Third Quarter, Fiscal Year 2022* (SNL May 2022)
August 2022	LWDS-MW1, TAV-MW2, TAV-MW4, TAV-MW6, TAV-MW8, TAV-MW10, TAV-MW11, TAV-MW12, TAV-MW14, TAV-MW15, and TAV-MW16	*TA-V Groundwater Monitoring Mini-SAP for Fourth Quarter, Fiscal Year 2022* (SNL July 2022)
November 2022	LWDS-MW1, TAV-MW2, TAV-MW4, TAV-MW6, TAV-MW7, TAV-MW8, TAV-MW10, TAV-MW11, TAV-MW12, TAV-MW14, TAV-MW15, and TAV-MW16	*TA-V Groundwater Monitoring Mini-SAP for First Quarter, Fiscal Year 2023* (SNL October 2022a)

Notes:
*AVN-1 and TAV-MW3 were sampled in July 2022 due to Stage-III fire restrictions implemented at SNL/NM during May and June 2022.

AVN = Area-V (North)
LWDS = Liquid Waste Disposal System
MW = Monitoring Well
SAP = Sampling and Analysis Plan
SNL = Sandia National Laboratories
SNL/NM = Sandia National Laboratories, New Mexico
TA = Technical Area
TAV = Technical Area-V (acronym used for well identification only)

Table 5-5
Parameters Sampled at Technical Area-V Groundwater Area of Concern Monitoring Wells for Each Sampling Event, Calendar Year 2022

January/February 2022		May/June/July 2022	
Parameter	**Well ID**	**Parameter**	**Well ID**
Arsenic, filtered	LWDS-MW1	Alkalinity[a]	AVN-1
Iron, filtered	TAV-MW2	Anions (Bromide, Chloride,	LWDS-MW1
Manganese, filtered	TAV-MW4	Fluoride, Sulfate)[a]	LWDS-MW2
NPN	TAV-MW8	Arsenic, filtered	TAV-MW2
VOCs	TAV-MW10	Gamma Spectroscopy (short list[a,b])	TAV-MW3
	TAV-MW10 (Duplicate)	Gross Alpha/Beta Activity[a]	TAV-MW3 (Duplicate)
	TAV-MW11	Iron, filtered	TAV-MW4
	TAV-MW12	Manganese, filtered	TAV-MW5
	TAV-MW12 (Duplicate)	NPN	TAV-MW7
	TAV-MW14	TAL Metals plus Total Uranium[a]	TAV-MW8
	TAV-MW15	Tritium[a]	TAV-MW9
	TAV-MW16	VOCs	TAV-MW9 (Duplicate)
			TAV-MW10
			TAV-MW11
			TAV-MW12
			TAV-MW13
			TAV-MW13 (Duplicate)
			TAV-MW14
			TAV-MW15
			TAV-MW15 (Duplicate)
			TAV-MW16
August 2022		**November 2022**	
Parameter	**Well ID**	**Parameter**	**Well ID**
Arsenic, filtered	LWDS-MW1	Arsenic, filtered	LWDS-MW1
Iron, filtered	TAV-MW2	Iron, filtered	LWDS-MW1 (Duplicate)
Manganese, filtered	TAV-MW2 (Duplicate)	Manganese, filtered	TAV-MW2
NPN	TAV-MW4	NPN	TAV-MW4
VOCs	TAV-MW6	VOCs	TAV-MW6
	TAV-MW8		TAV-MW7
	TAV-MW8 (Duplicate)		TAV-MW8
	TAV-MW10		TAV-MW10
	TAV-MW11		TAV-MW11
	TAV-MW11 (Duplicate)		TAV-MW12
	TAV-MW12		TAV-MW14
	TAV-MW14		TAV-MW14 (Duplicate)
	TAV-MW15		TAV-MW15
	TAV-MW16		TAV-MW16
			TAV-MW16 (Duplicate)

Notes:
[a]Analyses performed for waste characterization purposes.
[b]Gamma spectroscopy short list includes americium-241, cesium-137, cobalt-60, and potassium-40.

AVN = Area-V (North)
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

Table 5B-1, Attachment 5B presents a summary of results for VOCs detected above MDLs and Table 5B-2 lists the MDLs. All but six VOCs were qualified as not detected during data validation in groundwater samples from TAVG AOC monitoring wells in CY 2022:

- Acetone
- Chloroform
- cis-1,2-dichloroethene
- 1,2,3-trichlorobenzene
- TCE
- Toluene

The following data were qualified as not detected (with a "U" Validation Qualifier) during data validation due to detection of the analyte in the analytical laboratory method blank samples at concentrations above the effective MDL; they were qualified as B by the analytical laboratory as part of the laboratory's QC procedures:

- Acetone in the July 2022 samples from monitoring well TAV-MW3
- Chloromethane in August 2022 samples from monitoring well TAV-MW11
- Methylene chloride in May/June/July 2022 samples from monitoring wells TAV-MW2, TAV-MW3, and TAV-MW5 and in August 2022 samples from monitoring wells TAV-MW11, TAV-MW12, and TAV-MW16 (Table 5B-1, Attachment 5B)

Data qualification as a result of the field QC samples (environmental duplicates, EB samples, FB samples, and TB samples) is discussed in Section 5.7.

TCE was the only VOC that exceeded the EPA MCL in CY 2022 (Table 5B-1, Attachment 5B). TCE was detected above the EPA MCL (5 µg/L) in samples from six monitoring wells: LWDS-MW1, TAV-MW4, TAV-MW6, TAV-MW8, TAV-MW10, and TAV-MW14. The maximum TCE concentration was 12.4 µg/L in the environmental sample collected from monitoring well LWDS-MW1 in August 2022. Historically, the highest TCE concentrations at TA-V have been consistently detected at monitoring well LWDS-MW1. Figures 5C-1 through 5C-6 (Attachment 5C) present the TCE concentration trend plots for monitoring wells LWDS-MW1, TAV-MW4, TAV-MW6, TAV-MW8, TAV-MW10, and TAV-MW14, respectively. Figures 5C-1 through 5C-6 show that:

- **LWDS-MW1 (Figure 5C-1, Attachment 5C)**—In CY 2022, the maximum TCE concentration was 12.4 µg/L (August 2022). The overall TCE trend is decreasing with concentrations consistently above the EPA MCL of 5 µg/L.
- **TAV-MW4 (Figure 5C-2, Attachment 5C)**—In CY 2022, the maximum TCE concentration was 6.37 µg/L (November 2022). The TCE concentration exceeded the EPA MCL for the first time in May 2019. Since then, the overall TCE trend is increasing with concentrations mostly above the EPA MCL of 5 µg/L.

- **TAV-MW6 (Figure 5C-3, Attachment 5C)** —In CY 2022, the maximum TCE concentration was 9.58 µg/L (the January 2022 result was reported in *July 2022 ER Operations Quarterly Report* [SNL July 2022]). 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 of 5 µg/L. Monitoring well TAV-MW6 was part of the Phase I Treatability Study from November 2017 to May 2021. However, the Treatability Study had minimal impact on the TCE concentrations at this monitoring well (SNL March 2022).
- **TAV-MW8 (Figure 5C-4, Attachment 5C)** —In CY 2022, the maximum TCE concentration was 5.27 µg/L (November 2022). The TCE concentration exceeded the EPA MCL of 5 µg/L in February 2019 for the first time since November 2003. The TCE concentrations have fluctuated above and below the EPA MCL of 5 µg/L since February 2019.
- **TAV-MW10 (Figure 5C-5, Attachment 5C)**—In CY 2022, the maximum TCE concentration was 11.1 µg/L (February 2022). The overall TCE trend is slightly decreasing with concentrations consistently above the EPA MCL of 5 µg/L.
- **TAV-MW14 (Figure 5C-6, Attachment 5C)** —In CY 2022, the maximum TCE concentration was 5.04 µg/L (November 2022). The overall TCE trend is slightly decreasing with the TCE concentrations historically exceeded the EPA MCL of 5 µg/L and fluctuated above and below the EPA MCL in recent years.

TCE has also been consistently detected below the EPA MCL of 4 µg/L at five monitoring wells (TAV-MW2, TAV-MW11, TAV-MW12, and TAV-MW16).

TCE has never been detected above the MDL in the remaining seven monitoring wells (AVN-1, LWDS-MW2, TAV-MW3, TAV-MW5, TAV-MW7, TAV-MW9, and TAV-MW15). Monitoring wells TAV-MW7 and TAV-MW9 are located near monitoring wells TAV-MW6 and TAV-MW8, respectively, but are screened approximately 90 ft deeper based on the mid-point of the screens. TCE has not been detected in the two deeper monitoring wells (TAV-MW7 and TAV-MW9). The lack of TCE detection in deep groundwater near the contaminant sources (SWMUs 5 and 275) strongly indicates that VOCs have not migrated deeper into the Regional Aquifer. Farther west, monitoring well TAV-MW5 is located near monitoring well TAV-MW13. TAV-MW13 is screened approximately 40 ft deeper than TAV-MW5. TCE has never been detected at monitoring well TAV-MW5 and the only detection of 0.410 µg/L (J-qualified) in May 2021 at the deeper monitoring well TAV-MW13 is considered an anomaly (SNL June 2022). Finally, monitoring wells AVN-1, TAV-MW3, TAV-MW15, TAV-MW5, and LWDS-MW2, in a clockwise direction, are background wells surrounding TA-V with no TCE detections.

Figure 5-5 shows the TCE isoconcentration contours for the second quarter of CY 2022. Monitoring wells with historical TCE detections are sampled quarterly. TCE concentrations of the second quarter were used to generate TCE isoconcentration contours shown in Figure 5-5. 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) for CY 2022. NPN concentrations exceeded the nitrate EPA MCL (10 mg/L) in samples from three monitoring wells: AVN-1, LWDS-MW1, and TAV-MW10. The maximum NPN concentration was 13.5 mg/L in the environmental sample collected from monitoring well TAV-MW10 in August 2022. The NPN concentrations in monitoring wells LWDS-MW1 and TAV-MW10 have typically exceeded the EPA MCL of 10 mg/L. Figures 5C-7 through 5C-9 (Attachment 5C) present the NPN concentration trend plots for monitoring wells AVN-1, LWDS-MW1, and TAV-MW10, respectively. Figures 5C-7 through 5C-9 show that:

- **AVN-1 (Figure 5C-7, Attachment 5C)**—Monitoring well AVN-1 is sampled annually. In CY 2022, the NPN concentration was 10.2 mg/L (July 2022). The overall NPN trend is slightly increasing with concentrations fluctuating above and below the EPA MCL of 10 mg/L.
- **LWDS-MW1 (Figure 5C-8, Attachment 5C)**—In CY 2022, the maximum NPN concentration was 13.1 mg/L (August 2022). The overall NPN trend is slightly increasing with most concentrations consistently above the EPA MCL of 10 mg/L.
- **TAV-MW10 (Figure 5C-9, Attachment 5C)**—In CY 2022, the maximum NPN concentration was 13.5 mg/L (August 2022). The overall NPN trend is slightly increasing with most concentrations consistently above the EPA MCL of 10 mg/L.

Nitrate has historically been reported at low concentrations at each of the monitoring wells at TA-V, generally at concentrations ranging from less than 5 mg/L to slightly more than the EPA MCL of 10 mg/L. Nitrate concentrations have previously exceeded the EPA MCL in samples from monitoring wells AVN-1, AVN-2 (dry since April 2008), LWDS-MW1, TAV-MW6, TAV-MW10, and TAV-MW14. Nitrate was also detected once above the EPA MCL 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. As discussed earlier, historical NPN detections above the NMED-specified background (4 mg/L) and the EPA MCL (10 mg/L) at monitoring wells AVN-1 and AVN-2 are interpreted as not being associated with TA-V operations. NPN concentrations exceeding the nitrate EPA MCL have been noted at several locations on KAFB and likely reflect naturally occurring nitrate (Chapter 6.0).

Figure 5-6 shows the NPN isoconcentration contour for the second quarter of CY 2022. NPN concentrations of the second quarter were used to the generate NPN isoconcentration contour because this is the only quarter that all the 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 2022 (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 monitoring well LWDS-MW1, where the highest contaminant concentrations were detected in groundwater. It is possible that a localized low conductivity zone near the water table at monitoring well LWDS-MW1 has acted as a barrier for contaminant migration.

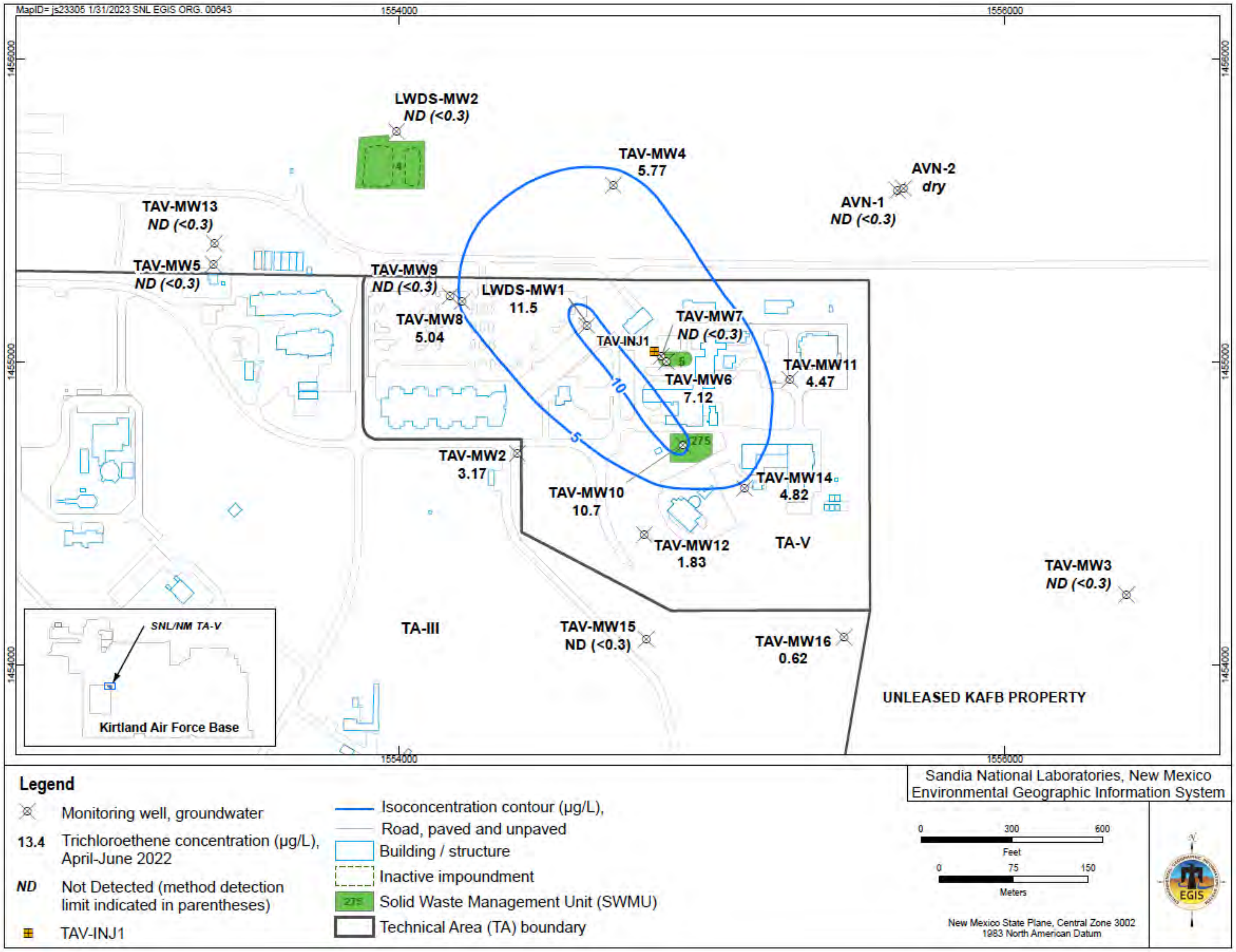
Table 5B-4 (Attachment 5B) presents the analytical results for three filtered metals (arsenic, iron, and manganese). None of the filtered metals exceeded respective EPA MCLs.

Table 5B-5 (Attachment 5B) presents the analytical results for anions (bromide, chloride, fluoride, and sulfate) and for alkalinity (bicarbonate and carbonate). Anions and alkalinity were analyzed in all TA-V monitoring wells during the May/June/July 2022 sampling event. 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 (TAL) metals and total uranium. TAL metals plus uranium were analyzed in all TA-V monitoring wells during the May/June/July 2022 sampling event. No metal parameters were detected above established EPA MCLs in any groundwater sample. Vanadium in monitoring wells AVN-1, TAV-MW3, and TAV-MW15 was qualified as not detected during data validation, because vanadium was reported in environmental and associated laboratory method blank samples at concentrations less than the practical quantitation limit (PQL).

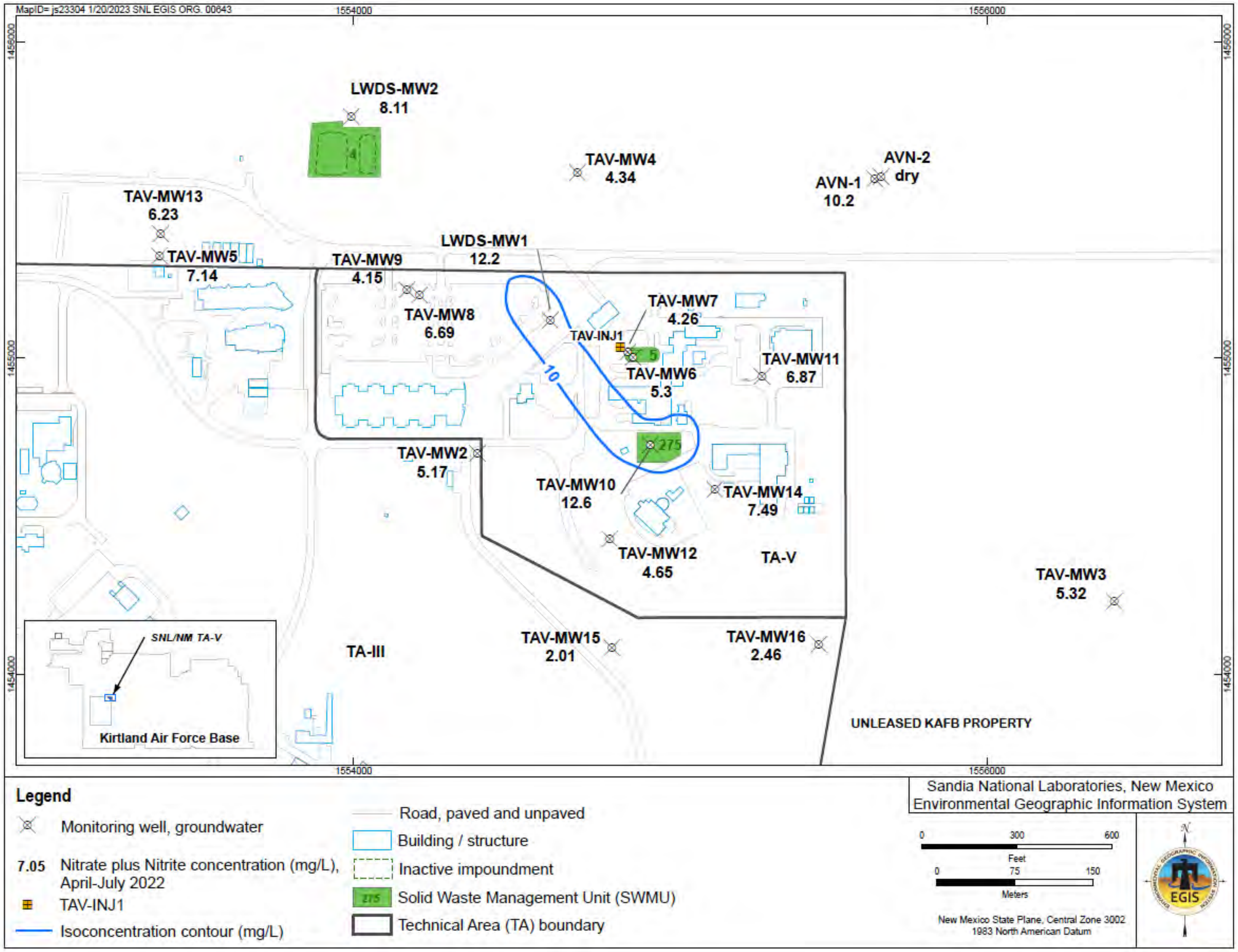
Table 5B-7 (Attachment 5B) presents the gamma spectroscopy short list (americium-241, cesium-137, cobalt-60, and potassium-40), gross alpha/beta activity, and tritium results. These radionuclides were analyzed in all TA-V monitoring wells during the May/June/July 2022 sampling event. All radionuclide results were below established EPA MCLs. Gross alpha activity is measured as a radiological screening tool in accordance with 40 Code of Federal Regulations Part 141. Naturally occurring uranium is measured independently (i.e., total uranium concentration determined by metals analysis described above) and the gross alpha activity measurements are corrected by subtracting the total uranium activity from the uncorrected gross alpha activity results. Radiological results are further reviewed by an SNL/NM health physicist to assure that the samples are nonradioactive. The potassium-40 results in the environmental samples from monitoring wells AVN-1, TAV-MW3, and TAV-MW9 did not meet peak identification criteria at analytical laboratory and were qualified as rejected during data validation.

Table 5B-8 (Attachment 5B) presents the field water quality parameter measurements obtained immediately prior to sample collection at each monitoring well for the CY 2022 sampling events. These parameters consist of temperature, specific conductivity, oxidation-reduction potential, pH, turbidity, and dissolved oxygen. The parameters were measured for evaluating stabilization and determining that representative groundwater samples were being collected in accordance with Section 1.3.1.2. It is worth noting that the groundwater in wells screened across the water table at TA-V is generally aerobic.



Note: Result for TAV-MW6 is provided in *October 2022 ER Operations Quarterly Report* (SNL October 2022).

Figure 5-5
Distribution of TCE in Groundwater at Technical Area-V Groundwater Area of Concern, April – June 2022



Note: Result for TAV-MW6 is provided in October 2022 ER Operations Quarterly Report (SNL October 2022).

Figure 5-6
Distribution of Nitrate plus Nitrite in Groundwater at Technical Area-V Groundwater Area of Concern, April – July 2022

5.7 Quality Control Results

Section 1.3.4 describes how field QC samples were collected and prepared. Tables 5B-1 and 5B-3 through 5B-7 (Attachment 5B) presents data validation qualifiers along with the analytical results for the TAVG AOC. The following paragraphs discuss the results of the Field QC samples (environmental duplicates, EB samples, FB samples, and TB samples) and their impact on data quality for the CY 2022 sampling events.

Environmental duplicate samples were submitted for the same analyses as the environmental samples. For the CY 2022 environmental samples listed in Table 5-5, the corresponding environmental duplicate samples showed good correlation based upon the relative percent difference (RPD) calculations. RPDs are unit-less values calculated for analytes that were detected above the MDL in both environmental and environmental duplicate samples. For the four sampling events in CY 2022, the RPD values for NPN ranged from <1 to 2; all are less than the RPD goal of 35. The calculated RPD values for the TCE sample pairs ranged from 2 to 16; all are less than the RPD goal of 20. Specific RPD values per quarter are as follows:

- **January/February 2022 Sampling Event—**Environmental duplicate samples were collected from two monitoring wells (TAV-MW10 and TAV-MW12). The NPN RPD values were 1 and 2, and TCE RPD values were 3 and 9 at monitoring wells TAV-MW10 and TAV-MW12, respectively.
- **May/June/July 2022 Sampling Event—**Environmental duplicate samples were collected from four monitoring wells (TAV-MW3, TAV-MW9, TAV-MW13, and TAV-MW15). The NPN RPD values ranged from <1 to 1. TCE was not detected at monitoring wells TAV-MW3, TAV-MW9, TAV-MW13, and TAV-MW15; therefore, RPD was not calculated.
- **August 2022 Sampling Event—**Environmental duplicate samples were collected from three monitoring wells (TAV-MW2, TAV-MW8, and TAV-MW11). The NPN RPD values ranged from 1 to 2. The TCE RPD values were 7, 2 and 5 at monitoring wells TAV-MW2, TAV-MW8, and TAV-MW11, respectively.
- **November 2022 Sampling Event**—Environmental duplicate samples were collected from three monitoring wells (LWDS-MW1, TAV-MW14, and TAV-MW16). The NPN RPD values ranged from <1 to 2. The TCE RPD values were 16, 5, and 5 at monitoring wells LWDS-MW1, TAV-MW14, and TAV-MW16, respectively.

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

- **January/February 2022 Sampling Event** —EB samples were collected prior to sampling two monitoring wells (TAV-MW10 and TAV-MW12). Acetone, bromodichloromethane, bromoform, chloroform, and dibromochloromethane were detected above MDLs in various EB samples. No corrective action was necessary because these compounds were not detected in associated environmental samples.

- **May/June/July 2022 Sampling Event** —EB samples were collected prior to sampling four monitoring wells (TAV-MW3, TAV-MW9, TAV-MW13, and TAV-MW15). Acetone, alkalinity, 2-butanone, bromodichloromethane, chloride, chloroform, chlorobenzene, copper, dibromochloromethane, manganese, sodium, sulfate, toluene, and vanadium were detected above MDLs in various EB samples. No corrective action was necessary for acetone, alkalinity, 2-butanone, bromodichloromethane, chloride, chloroform, chlorobenzene, dibromochloromethane, sodium, or sulfate because these compounds were either qualified as not detected, not detected above associated MDLs, or detected in environmental samples at concentrations greater than five times the associated EB result. Copper in TAV-MW3, TAV-MW9, and TAV-MW15; manganese and toluene in TAV-MW15; and vanadium in TAV-MW13 were qualified as not detected during data validation because these compounds were detected at concentrations less than the PQL in both environmental and environmental duplicate and associated EB samples.
- **August 2022 Sampling Event**—EB samples were collected prior to sampling three monitoring wells (TAV-MW2, TAV-MW8, and TAV-MW11). Acetone, 2-butanone, bromodichloromethane, bromoform, chloroform, dibromochloromethane, 1,2-dichloroethane, manganese, and methylene chloride were detected above MDLs in various EB samples. No corrective action was necessary for acetone, 2-butanone, bromodichloromethane, bromoform, chloroform, dibromochloromethane, 1,2-dichloroethane, or methylene chloride because these compounds were either qualified as not detected, not detected above associated MDLs, or detected in environmental samples at concentrations greater than five times the associated EB result. Manganese (filtered) in the environmental duplicate sample from TAV-MW2 was qualified as not detected during data validation, because manganese was detected at concentrations less than the PQL in both environmental duplicate and associated EB sample.
- **November 2022 Sampling Event**—EB samples were collected prior to sampling three monitoring wells (LWDS-MW1, TAV-MW14, and TAV-MW16). Acetone, 2-butanone, bromodichloromethane, bromoform, chloroform, dibromochloromethane, and arsenic (filtered) were detected above MDLs in various EB samples. No corrective action was necessary for acetone, 2-butanone or bromoform because these compounds were either qualified as not detected, not detected above associated MDLs, or detected in environmental samples at concentrations greater than five times the associated EB result. Arsenic (filtered), bromodichloromethane, chloroform, and dibromochloromethane in LWDS-MW1 was qualified as not detected during data validation, because these compounds were detected at concentrations less than the PQL in both environmental and environmental duplicate and associated EB samples.

FB samples were analyzed for VOCs. The results for the FB analyses per quarter are as follows:

- **January/February 2022 Sampling Event** —FB samples were collected at two monitoring wells (TAV-MW2 and TAV-MW14). The compounds detected above MDLs in FB samples included acetone, bromodichloromethane, bromoform, chloroform, and dibromochloromethane. No corrective action was necessary because these compounds were not detected in the associated environmental samples.
- **May/June/July 2022 Sampling Event**—FB samples were collected at four monitoring wells (TAV-MW5, TAV-MW7, TAV-MW11 and TAV-MW12). The compounds detected above MDLs in FB samples included acetone, bromodichloromethane, bromoform, chloroform, chlorobenzene, dibromochloromethane, and methylene chloride. No corrective action was necessary because these compounds were either qualified as not detected or not detected in the associated environmental samples except acetone in TAV-MW12.

- **August 2022 Sampling Event**—FB samples were collected at two monitoring wells (TAV-MW2 and TAV-MW8). The compounds detected above MDLs in FB samples included acetone, bromodichloromethane, bromoform, chloroform, dibromochloromethane, and 1,2-dichloroethane. No corrective action was necessary because these compounds were not detected in the associated environmental samples.
- **November 2022 Sampling Event**—FB samples were collected at two monitoring wells (TAV-MW7 and TAV-MW11). The compounds detected above MDLs in FB samples included acetone, bromodichloromethane, chloroform, and dibromochloromethane. No corrective action was necessary because these compounds were not detected in associated environmental samples. One additional FB sample was collected and analyzed for all parameters from the deionized source water used for the equipment decontamination process. The compounds detected above MDLs in this FB sample included acetone, bromodichloromethane, chloroform, dibromochloromethane, and NPN.

TB samples were analyzed for VOCs. The results for the TB analyses per quarter are as follows:

- **January/February 2022 Sampling Event**—Thirteen TB samples were submitted with the environmental samples. No VOCs were detected above MDLs.
- **May/June/July 2022 Sampling Event**—Twenty-two TB samples were submitted with the environmental samples. Acetone and chlorobenzene were reported at concentrations less than the PQL. The associated environmental samples with acetone (TAV-MW8) and chlorobenzene (TAV-MW7 and TAV-MW15) at concentrations less than the PQL were qualified as not detected during data validation.
- **August 2022 Sampling Event—**Fifteen TB samples were submitted with the environmental samples. Methylene chloride was reported at concentrations less than the PQL. The associated environmental samples with methylene chloride from monitoring wells LWDS-MW1, TAV-MW6, and TAV-MW10 at concentrations less than the PQL were qualified as not detected during data validation.
- **November 2022 Sampling Event**—Sixteen TB samples were submitted with the environmental samples. Acetone was reported at concentrations less than the PQL. The associated environmental and environmental duplicate samples with acetone from monitoring wells LWDS-MW1 and TAV-MW16 at concentrations less than the PQL were qualified as not detected during data validation.

5.8 Variances and Non-Conformances

No variances or non-conformances from requirements specified in the TAVG mini-SAPs (SNL January 2022, May 2022, August 2022, and November 2022) were identified for the CY 2022 sampling activities. However, the following observations and activities associated with the CY 2022 sampling events were noted:

- **All Four Sampling Events in CY 2022—**Monitoring wells LWDS-MW1 and TAV-MW12 were purged dry prior to reaching minimum purge volume requirements. The monitoring wells were allowed to recharge and were sampled on the following day.
- **May/June/July 2022 Sampling Event—**Due to elevated and unstable turbidity measurements while purging monitoring well TAV-MW5, the depth of the pump was raised 5 ft, and the well was purged an extra 12 gal to meet water quality parameter stabilization criteria. Silt and sand were observed in the groundwater and on the sampling equipment.

- **May/June/July 2022 Sampling Event—**Monitoring and sampling at monitoring wells AVN-1 and TAV-MW3 were performed in July 2022 due to Stage III fire restrictions implemented at SNL/NM during May and June 2022.

5.9 Summary and Conclusions

The CSM demonstrates that contaminant releases involving TCE occurred from two primary sources (SWMUs 5 and 275). Wastewater containing the contaminants migrated downward through the vadose zone and into the Regional Aquifer. TCE was present in wastewater that was disposed of at the underground LWDS Drain Field (SWMU 5) during the period from 1962 to 1967, and to the buried TA-V Seepage Pits (SWMU 275) from the 1960s until the early 1980s.

Wastewater devoid of TCE continued to flush through the vadose zone beneath the TA-V Seepage Pits (SWMU 275) until 1992, which most likely removed a significant portion of a potential secondary contaminant source. Upon cessation of wastewater disposal, drainage diminished through vertical pathways in the vadose zone. 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.

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

TCE results 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 2022. The maximum TCE concentration was 12.4 µg/L in the environmental sample collected from monitoring well LWDS-MW1 in August 2022.

NPN results in groundwater samples from three monitoring wells (AVN-1, LWDS-MW1, and TAV-MW10) exceeded the EPA MCL of 10 mg/L in CY 2022. The maximum NPN concentration was 13.5 mg/L in the environmental sample collected from monitoring well TAV-MW10 in August 2022.

The analytical results for CY 2022 are consistent with historical values. The following conclusions are based on a comprehensive review of available information on current groundwater contamination in the TAVG AOC:

- The COCs for the TAVG AOC are TCE and nitrate.
- The primary sources of TCE and nitrate in the TAVG AOC consist of 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 concentrations of TCE in the Regional Aquifer has remained relatively stable which is attributed to the combined effect of fine-grained aquifer lithology, low groundwater flow velocities, dispersion, diffusion, and sorption.
- The distribution of 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 beneath TA-V. An unrelated nitrate source and/or elevated background may contribute to the nitrate concentration at upgradient monitoring well AVN-1, which is located northeast of TA-V.

- The one-year of additional sampling of the Phase I treatment zone of the Treatability Study concluded in April 2022 and the monitoring results were provided in corresponding ER Operations quarterly reports.
- The sampling plan of the TAVG AOC monitoring network was modified based on the recommendations in the 2022 Phase I Treatability Study Report (SNL March 2022). The modification was subsequently approved by the NMED HWB (NMED HWB December 2022). DOE/NNSA and SNL/NM personnel plan to implement the modified sampling plan in CY 2023.

5.10 Summary of Future Activities

Ongoing groundwater monitoring activities in the TAVG AOC include the following:

- Continue obtaining periodic measurements of groundwater elevations at active TA-V groundwater monitoring wells.
- Continue collecting groundwater samples at active TA-V groundwater monitoring wells.
- Report future TAVG AOC investigation results in the AGMRs.
- Field work to plug and abandon monitoring wells AVN-1, AVN-2, and LWDS-MW2 and to install a new groundwater monitoring well TAV-MW17 is planned in CY 2023.
- Submit the work plan to decommission former injection well TAV-INJ1 in CY 2023.

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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 March 1999a
	1992	Wastewater discharges to the vadose zone ceased after the ABCWUA sanitary sewer system was extended to TA-V.	SNL March 1999a
April	1992	The LWDS RFI Work Plan (SWMUs 4, 5, and 52) was submitted.	SNL March 1993
October	1992	Groundwater monitoring well LWDS-MW2 was installed at TA-V for the LWDS investigation.	SNL March 1993
May	1993	Groundwater monitoring well LWDS-MW1 was installed.	SNL September 1995
November	1993	LWDS-MW1 and LWDS-MW2 were sampled. The first sampling event of LWDS-MW1 revealed TCE exceeding the EPA MCL of 5 μg/L.	SNL March 1995
June	1994	Submitted notification letter from DOE to EPA regarding TCE detection 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 March 1995a
June	1995	Wells AVN-1 and AVN-2 were installed.	SNL March 1995b
April	1995	Wells TAV-MW1 and TAV-MW2 were installed.	SNL March 1996
	1995	The LWDS RFI report was completed.	SNL September 1995
March	1996	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 1995 SNL/NM Annual Groundwater Monitoring Report.	SNL 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 April 1996
March	1997	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 1996 SNL/NM Annual Groundwater Monitoring Report.	SNL March 1997
April	1997	Wells TAV-MW3, TAV-MW4, and TAV-MW5 were installed.	SNL 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 HWB September 1997
January	1998	RSI Response submitted to the NMED HWB.	SNL January 1998
March	1998	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 1997 SNL/NM Annual Groundwater Monitoring Report.	SNL 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 March 1999a
March	1999	Groundwater sampling analytical results for TAVG monitoring wells reported in the FY 1998 SNL/NM Annual Groundwater Monitoring Report.	SNL March 1999b

Refer to Notes on page 5A-9.

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 March 2000
April	2001	Groundwater sampling analytical results for TAVG monitoring wells reported in the FY 2000 SNL/NM Annual Groundwater Monitoring Report.	SNL April 2001
May	2001	Wells TAV-MW6, TAV-MW7, TAV-MW8, and TAV-MW9 were installed.	SNL October 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 November 2001
March	2002	Groundwater sampling analytical results for TAVG monitoring wells reported in the FY 2001 SNL/NM Annual Groundwater Monitoring Report.	SNL March 2002
March	2003	Groundwater sampling analytical results for TAVG monitoring wells reported in the FY 2002 SNL/NM Annual Groundwater Monitoring Report.	SNL 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 March 2004
April	2004	The NMED issued the Consent Order to the DOE/Sandia, which identified the TAVG as an AOC with groundwater contamination requiring a CME.	NMED April 2004
May	2004	Submitted the Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Technical Area-V.	SNL April 2004a
May	2004	Submitted the *Corrective Measures Evaluation Work Plan, Technical Area-V Groundwate*r.	SNL April 2004b
July	2004	The potential for natural (intrinsic) anaerobic biodegradation of TCE and nitrate in TA-V groundwater was evaluated.	SNL July 2004
October	2004	The NMED HWB issued an approval with modifications to the TA-V CME Work Plan and the CCM of Groundwater Flow and Contaminant Transport.	NMED HWB October 2004
December	2004	Submitted responses to the NMED HWB approval with modifications of the October 2004 TA-V CME Work Plan. The responses are included in the *Corrective Measures Evaluation Work Plan, Technical Area-V Groundwater, Revision 0*.	SNL December 2004
April	2005	The potential for natural (intrinsic) aerobic biodegradation of TCE in TA-V groundwater was evaluated.	SNL April 2005
July	2005	Submitted the *Corrective Measures Evaluation Report for Technical Area-V Groundwater*. The report details the selection of a preferred remedial alternative, cleanup goals, and the Corrective Measures Implementation Plan.	SNL 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 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 declines.	DOE March 2006

Refer to Notes on page 5A-9.

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

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

Refer to Notes on page 5A-9.

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

Month	Year	Event	Reference
June	2012	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 2011 SNL/NM Annual Groundwater Monitoring Report.	SNL June 2012
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 June 2013
September	2013	NMED HWB approved the summary report for TA-V Groundwater and Soil-Vapor Monitoring Well Installation.	NMED HWB 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 HWB December 2013
June	2014	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 2013 SNL/NM Annual Groundwater Monitoring Report.	SNL 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 HWB 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 June 2015
October	2015	Submitted the 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.	DOE October 2015
November	2015	NMED HWB approved the CCM for TAVG AOC.	NMED HWB 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 HWB 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 HWB January 2016

Refer to Notes on page 5A-9.

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.	DOE March 2016a
March	2016	Submitted a summary of agreements and proposed milestones pursuant to a multi-agency meeting including the NMED HWB on July 20, 2015. Requested an extension of schedule milestones 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 is May 20, 2022.	NMED HWB April 2016
May	2016	NMED HWB approved the Revised TSWP.	NMED HWB 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 TA-V Geophysical Logging and Slug Test Results (SNL November 2010) will be superseded by the updated CCM and CME Report.	NMED HWB May 2016b
June	2016	NMED GWQB stated that a Discharge Permit would be required for the ISB Treatability Study injection wells.	NMED GWQB June 2016
June	2016	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 2015 SNL/NM Annual Groundwater Monitoring Report.	SNL 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 GWQB 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 July 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 HWB May 2016a
May	2017	NMED GWQB issued Discharge Permit, DP-1845, for the ISB Treatability Study injection wells.	NMED GWQB May 2017
June	2017	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 2016 SNL/NM Annual Groundwater Monitoring Report.	SNL June 2017
July	2017	Well installation report for monitoring wells TAV-MW15 and TAV-MW16 was submitted to the NMED HWB.	SNL July 2017
August	2017	NMED HWB approved the well installation report for monitoring wells TAV-MW15 and TAV-MW16.	NMED HWB August 2017
November	2017	Installed injection well TAV-INJ1 for Phase I of the ISB Treatability Study.	SNL 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 treatment solution was discharged at injection well TAV-INJ1.	DOE November 2017

Refer to Notes on page 5A-9.

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 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 HWB August 2018
October	2018	Submitted the summary of the ISB Treatability Study Pilot Test operation and results.	SNL October 2018
October	2018	Full-scale operation for the Phase I ISB Treatability Study started at injection well TAV-INJ1.	SNL April 2019
April	2019	Completed six-month injections at well TAV-INJ1. Approximately 530,000 gallons of treatment solution was discharged.	SNL October 2019
May	2019	Started two-year performance monitoring of the Phase I ISB Treatability Study.	SNL October 2019
June	2019	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 2018 SNL/NM Annual Groundwater Monitoring Report.	SNL June 2019
September	2019	NMED HWB requested a minimum of two sampling events to be conducted for 1,4-dioxane at TAVG AOC.	NMED HWB September 2019
June	2020	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 2019 SNL/NM Annual Groundwater Monitoring Report.	SNL June 2020
May/June	2021	Completed two sampling events for 1,4-dioxane at all groundwater wells at TAVG AOC.	This AGMR
June	2021	Groundwater sampling analytical results for TAVG monitoring wells reported in the CY 2020 SNL/NM Annual Groundwater Monitoring Report.	SNL 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 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 HWB October 2021b
October	2021	NMED HWB approved 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).	NMED HWB October 2021a
November	2021	NMED GWQB agreed with the transition of five groundwater wells to the NMED HWB.	NMED GWQB 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 GWQB February 2022
March/April	2022	Submitted the Phase I Treatability Study Report for In-Situ Bioremediation at the Tech Area-V Groundwater Area of Concern to the NMED HWB.	SNL March 2022; DOE April 2022a
April	2022	Completed the additional year of sampling of wells TAV-INJ1 and TAV-MW6.	SNL October 2022

Refer to Notes on page 5A-9.

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

April	2022	Requested an extension for submittal of the TAVG AOC CCM/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/CME Report.	NMED HWB May 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 HWB September 2022
December	2022	NMED HWB approved the request to modify the sampling plan of the TAVG monitoring network.	NMED HWB December 2022

Notes:

ABCWUA	= Albuquerque Bernalillo County Water Utility Authority
AGMR	= Annual Groundwater Monitoring Report
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
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

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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 2022

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 14-Feb-22	Chloroform	0.520	0.333	1.00	80.0	J		116940-001	SW846-8260D
	Toluene	1.88	0.333	1.00	1000			116940-001	SW846-8260D
	Trichloroethene	**10.1**	0.333	1.00	5.00			116940-001	SW846-8260D
	cis-1,2-Dichloroethene	2.35	0.333	1.00	70.0			116940-001	SW846-8260D
TAV-MW2 04-Feb-22	Toluene	0.690	0.333	1.00	1000	J		116922-001	SW846-8260D
	Trichloroethene	3.28	0.333	1.00	5.00			116922-001	SW846-8260D
TAV-MW4 10-Feb-22	Chloroform	0.950	0.333	1.00	80.0	J		116933-001	SW846-8260D
	Trichloroethene	**5.21**	0.333	1.00	5.00			116933-001	SW846-8260D
	cis-1,2-Dichloroethene	0.500	0.333	1.00	70.0	J		116933-001	SW846-8260D
TAV-MW8 07-Feb-22	Toluene	0.480	0.333	1.00	1000	J		116924-001	SW846-8260D
	Trichloroethene	**5.21**	0.333	1.00	5.00			116924-001	SW846-8260D
	cis-1,2-Dichloroethene	0.500	0.333	1.00	70.0	J		116924-001	SW846-8260D
TAV-MW10 15-Feb-22	Trichloroethene	**11.1**	0.333	1.00	5.00			116937-001	SW846-8260D
	cis-1,2-Dichloroethene	1.77	0.333	1.00	70.0			116937-001	SW846-8260D
TAV-MW10 (Duplicate) 15-Feb-22	Trichloroethene	**10.8**	0.333	1.00	5.00			116938-001	SW846-8260D
	cis-1,2-Dichloroethene	1.82	0.333	1.00	70.0			116938-001	SW846-8260D
TAV-MW11 08-Feb-22	Trichloroethene	4.29	0.333	1.00	5.00			116928-001	SW846-8260D
	cis-1,2-Dichloroethene	0.550	0.333	1.00	70.0	J		116928-001	SW846-8260D
TAV-MW12 02-Feb-22	Toluene	0.810	0.333	1.00	1000	J		116916-001	SW846-8260D
	Trichloroethene	1.89	0.333	1.00	5.00			116916-001	SW846-8260D
TAV-MW12 (Duplicate) 02-Feb-22	Toluene	0.780	0.333	1.00	1000	J		116917-001	SW846-8260D
	Trichloroethene	2.06	0.333	1.00	5.00			116917-001	SW846-8260D
TAV-MW14 09-Feb-22	Toluene	0.340	0.333	1.00	1000	J		116931-001	SW846-8260D
	Trichloroethene	4.59	0.333	1.00	5.00			116931-001	SW846-8260D
	cis-1,2-Dichloroethene	0.430	0.333	1.00	70.0	J		116931-001	SW846-8260D
TAV-MW15 28-Jan-22	Toluene	0.610	0.333	1.00	1000	J		116645-001	SW846-8260D
TAV-MW16 31-Jan-22	Toluene	0.500	0.333	1.00	1000	J		116649-001	SW846-8260D
	Trichloroethene	0.600	0.333	1.00	5.00	J		116649-001	SW846-8260D
AVN-1 18-Jul-22	Acetone	1.82	1.74	5.00	NE	J	J-	118045-001	SW846-8260D
LWDS-MW1 21-Jun-22	Chloroform	0.530	0.333	1.00	80.0	J		118039-001	SW846-8260D
	Toluene	0.640	0.333	1.00	1000	J		118039-001	SW846-8260D
	Trichloroethene	**11.5**	0.333	1.00	5.00			118039-001	SW846-8260D
	cis-1,2-Dichloroethene	2.40	0.333	1.00	70.0			118039-001	SW846-8260D

Refer to Notes on page 5B-46.

Table 5B-1 *(Continued)*
Summary of Detected Volatile Organic Compounds, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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-MW2 01-Jun-22	Methylene chloride	1.27	0.500	5.00	5.00	B, J	5.0U	118041-001	SW846-8260D
	Toluene	0.430	0.333	1.00	1000	J		118041-001	SW846-8260D
	Trichloroethene	3.17	0.333	1.00	5.00			118041-001	SW846-8260D
TAV-MW3 19-Jul-22	Acetone	3.10	1.74	5.00	NE	B, J	5.0UJ	117986-001	SW846-8260D
	Methylene chloride	0.550	0.500	5.00	5.00	B, J	5.0UJ	117986-001	SW846-8260D
TAV-MW3 (Duplicate) 19-Jul-22	Acetone	2.77	1.74	5.00	NE	B, J	5.0UJ	117987-001	SW846-8260D
	Methylene chloride	0.560	0.500	5.00	5.00	B, J	5.0UJ	117987-001	SW846-8260D
TAV-MW4 29-Jun-22	Chloroform	0.940	0.333	1.00	80.0	J		117996-001	SW846-8260D
	Trichloroethene	**5.77**	0.333	1.00	5.00	N, *	J-	117996-001	SW846-8260D
	cis-1,2-Dichloroethene	0.490	0.333	1.00	70.0	J		117996-001	SW846-8260D
TAV-MW5 31-May-22	Methylene chloride	1.42	0.500	5.00	5.00	B, J	5.0U	117989-001	SW846-8260D
TAV-MW7 23-May-22	Chlorobenzene	0.940	0.333	1.00	100	J	1.0U	117974-001	SW846-8260D
TAV-MW8 06-Jun-22	Acetone	2.10	1.74	5.00	NE	J	5.0U	118035-001	SW846-8260D
	Trichloroethene	**5.04**	0.333	1.00	5.00			118035-001	SW846-8260D
	cis-1,2-Dichloroethene	0.440	0.333	1.00	70.0	J		118035-001	SW846-8260D
TAV-MW10 09-Jun-22	Trichloroethene	**10.7**	0.333	1.00	5.00			118043-001	SW846-8260D
	cis-1,2-Dichloroethene	1.81	0.333	1.00	70.0			118043-001	SW846-8260D
TAV-MW11 07-Jun-22	Trichloroethene	4.47	0.333	1.00	5.00			118050-001	SW846-8260D
	cis-1,2-Dichloroethene	0.540	0.333	1.00	70.0	J		118050-001	SW846-8260D
TAV-MW12 03-Jun-22	Acetone	1.99	1.74	5.00	NE	J		118037-001	SW846-8260D
	Toluene	0.370	0.333	1.00	1000	J		118037-001	SW846-8260D
	Trichloroethene	1.83	0.333	1.00	5.00			118037-001	SW846-8260D
TAV-MW14 08-Jun-22	Trichloroethene	4.82	0.333	1.00	5.00			118052-001	SW846-8260D
	cis-1,2-Dichloroethene	0.360	0.333	1.00	70.0	J		118052-001	SW846-8260D
TAV-MW15 20-May-22	Chlorobenzene	0.920	0.333	1.00	100	J	1.0U	117970-001	SW846-8260D
	Toluene	0.370	0.333	1.00	1000	J	1.0U	117970-001	SW846-8260D
TAV-MW15 (Duplicate) 20-May-22	Chlorobenzene	1.10	0.333	1.00	100		1.0U	117971-001	SW846-8260D
	Toluene	0.370	0.333	1.00	1000	J	1.0U	117971-001	SW846-8260D
TAV-MW16 28-Jun-22	Trichloroethene	0.620	0.333	1.00	5.00	J		117999-001	SW846-8260D

Refer to Notes on page 5B-46.

Table 5B-1 *(Continued)*
Summary of Detected Volatile Organic Compounds, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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 15-Aug-22	Methylene chloride	3.26	0.500	5.00	5.00	J	5.0UJ	118385-001	SW846-8260D
	Trichloroethene	**12.4**	0.333	1.00	5.00			118385-001	SW846-8260D
	cis-1,2-Dichloroethene	2.68	0.333	1.00	70.0			118385-001	SW846-8260D
TAV-MW2 10-Aug-22	Trichloroethene	2.80	0.333	1.00	5.00			118354-001	SW846-8260D
TAV-MW2 (Duplicate) 10-Aug-22	Trichloroethene	3.01	0.333	1.00	5.00			118355-001	SW846-8260D
TAV-MW4 11-Aug-22	Chloroform	0.940	0.333	1.00	80.0	J		118364-001	SW846-8260D
	Trichloroethene	**5.76**	0.333	1.00	5.00			118364-001	SW846-8260D
	cis-1,2-Dichloroethene	0.590	0.333	1.00	70.0	J		118364-001	SW846-8260D
TAV-MW6 12-Aug-22	Acetone	2.15	1.74	5.00	NE	J	J-	118370-001	SW846-8260D
	Methylene chloride	3.99	0.500	5.00	5.00	J	5.0UJ	118370-001	SW846-8260D
	Trichloroethene	**8.36**	0.333	1.00	5.00		J-	118370-001	SW846-8260D
	cis-1,2-Dichloroethene	1.03	0.333	1.00	70.0		J-	118370-001	SW846-8260D
TAV-MW8 11-Aug-22	Trichloroethene	**5.07**	0.333	1.00	5.00			118374-001	SW846-8260D
	cis-1,2-Dichloroethene	0.510	0.333	1.00	70.0	J		118374-001	SW846-8260D
TAV-MW8 (Duplicate) 11-Aug-22	Trichloroethene	**5.17**	0.333	1.00	5.00			118375-001	SW846-8260D
	cis-1,2-Dichloroethene	0.550	0.333	1.00	70.0	J		118375-001	SW846-8260D
TAV-MW10 15-Aug-22	Methylene chloride	3.35	0.500	5.00	5.00	J	5.0UJ	118383-001	SW846-8260D
	Trichloroethene	**9.52**	0.333	1.00	5.00			118383-001	SW846-8260D
	cis-1,2-Dichloroethene	1.80	0.333	1.00	70.0			118383-001	SW846-8260D
TAV-MW11 09-Aug-22	Chloromethane	0.620	0.333	1.00	NE	B, J	1.0UJ	118361-001	SW846-8260D
	Methylene chloride	1.14	0.500	5.00	5.00	B, J	5.0UJ	118361-001	SW846-8260D
	Trichloroethene	3.88	0.333	1.00	5.00			118361-001	SW846-8260D
	cis-1,2-Dichloroethene	0.610	0.333	1.00	70.0	J		118361-001	SW846-8260D
TAV-MW11 (Duplicate) 09-Aug-22	Chloromethane	0.600	0.333	1.00	NE	B, J	1.0UJ	118362-001	SW846-8260D
	Methylene chloride	1.17	0.500	5.00	5.00	B, J	5.0UJ	118362-001	SW846-8260D
	Trichloroethene	4.07	0.333	1.00	5.00			118362-001	SW846-8260D
	cis-1,2-Dichloroethene	0.520	0.333	1.00	70.0	J		118362-001	SW846-8260D
TAV-MW12 08-Aug-22	Methylene chloride	0.680	0.500	5.00	5.00	B, J	5.0UJ	118357-001	SW846-8260D
TAV-MW14 10-Aug-22	Trichloroethene	4.21	0.333	1.00	5.00			118366-001	SW846-8260D
	cis-1,2-Dichloroethene	0.390	0.333	1.00	70.0	J		118366-001	SW846-8260D
TAV-MW15 02-Aug-22	1,2,3-Trichlorobenzene	0.380	0.333	1.00	NE	J		118346-001	SW846-8260D
TAV-MW16 03-Aug-22	Methylene chloride	0.590	0.500	5.00	5.00	B, J	5.0UJ	118350-001	SW846-8260D
	Trichloroethene	0.660	0.333	1.00	5.00	J		118350-001	SW846-8260D

Refer to Notes on page 5B-46.

Table 5B-1 *(Concluded)*
Summary of Detected Volatile Organic Compounds, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	Acetone	2.09	1.74	5.00	NE	J	5.0U	118981-001	SW846-8260D
07-Nov-22	Bromodichloromethane	0.580	0.333	1.00	80.0	J	1.0U	118981-001	SW846-8260D
	Chloroform	1.44	0.333	1.00	80.0		1.44U	118981-001	SW846-8260D
	Dibromochloromethane	0.490	0.333	1.00	80.0	J	1.0U	118981-001	SW846-8260D
	Trichloroethene	**7.11**	0.333	1.00	5.00			118981-001	SW846-8260D
	cis-1,2-Dichloroethene	1.79	0.333	1.00	70.0			118981-001	SW846-8260D
LWDS-MW1 (Duplicate)	Acetone	2.42	1.74	5.00	NE	J	5.0U	118982-001	SW846-8260D
07-Nov-22	Bromodichloromethane	0.810	0.333	1.00	80.0	J	1.0U	118982-001	SW846-8260D
	Chloroform	2.08	0.333	1.00	80.0		2.08U	118982-001	SW846-8260D
	Dibromochloromethane	0.680	0.333	1.00	80.0	J	1.0U	118982-001	
	Trichloroethene	**6.04**	0.333	1.00	5.00			118982-001	SW846-8260D
	cis-1,2-Dichloroethene	1.46	0.333	1.00	70.0			118982-001	SW846-8260D
TAV-MW2 08-Nov-22	Trichloroethene	2.60	0.333	1.00	5.00			118988-001	SW846-8260D
TAV-MW4	Chloroform	1.11	0.333	1.00	80.0			118963-001	SW846-8260D
01-Nov-22	Trichloroethene	**6.37**	0.333	1.00	5.00			118963-001	SW846-8260D
	cis-1,2-Dichloroethene	0.650	0.333	1.00	70.0	J		118963-001	SW846-8260D
TAV-MW6	Trichloroethene	**8.97**	0.333	1.00	5.00			118972-001	SW846-8260D
02-Nov-22	cis-1,2-Dichloroethene	1.04	0.333	1.00	70.0			118972-001	SW846-8260D
TAV-MW8	Trichloroethene	**5.27**	0.333	1.00	5.00	N	J+	118998-001	SW846-8260D
11-Nov-22	cis-1,2-Dichloroethene	0.620	0.333	1.00	70.0	J		118998-001	SW846-8260D
TAV-MW10	Trichloroethene	**10.0**	0.333	1.00	5.00			118977-001	SW846-8260D
03-Nov-22	cis-1,2-Dichloroethene	1.76	0.333	1.00	70.0			118977-001	SW846-8260D
TAV-MW11	Trichloroethene	4.59	0.333	1.00	5.00	N	J+	118991-001	SW846-8260D
09-Nov-22	cis-1,2-Dichloroethene	0.480	0.333	1.00	70.0	J		118991-001	SW846-8260D
TAV-MW12 07-Nov-22	Trichloroethene	1.88	0.333	1.00	5.00			118984-001	SW846-8260D
TAV-MW14	Trichloroethene	**5.04**	0.333	1.00	5.00	N	J+	118995-001	SW846-8260D
10-Nov-22	cis-1,2-Dichloroethene	0.500	0.333	1.00	70.0	J		118995-001	SW846-8260D
TAV-MW14 (Duplicate)	Trichloroethene	4.78	0.333	1.00	5.00	N	J+	118996-001	SW846-8260D
10-Nov-22	cis-1,2-Dichloroethene	0.470	0.333	1.00	70.0	J		118996-001	SW846-8260D
TAV-MW16 03-Nov-22	Trichloroethene	0.580	0.333	1.00	5.00	J		118974-001	SW846-8260D
TAV-MW16 (Duplicate)	Acetone	1.76	1.74	5.00	5.00	J	5.0U	118975-001	SW846-8260D
03-Nov-22	Trichloroethene	0.550	0.333	1.00	5.00	J		118975-001	SW846-8260D

Refer to Notes on page 5B-46.

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 2022

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
Trichlorotrifluoroethane	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-46.

Table 5B-3
Summary of Nitrate plus Nitrite Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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 14-Feb-22	Nitrate plus nitrite	**12.2**	0.425	1.25	10.0			116940-002	EPA 353.2
TAV-MW2 04-Feb-22	Nitrate plus nitrite	5.04	0.170	0.500	10.0			116922-002	EPA 353.2
TAV-MW4 10-Feb-22	Nitrate plus nitrite	4.20	0.170	0.500	10.0			116933-002	EPA 353.2
TAV-MW8 07-Feb-22	Nitrate plus nitrite	6.59	0.170	0.500	10.0			116924-002	EPA 353.2
TAV-MW10 15-Feb-22	Nitrate plus nitrite	**12.5**	0.425	1.25	10.0			116937-002	EPA 353.2
TAV-MW10 (Duplicate) 15-Feb-22	Nitrate plus nitrite	**12.6**	0.425	1.25	10.0			116938-002	EPA 353.2
TAV-MW11 08-Feb-22	Nitrate plus nitrite	6.64	0.170	0.500	10.0			116928-002	EPA 353.2
TAV-MW12 02-Feb-22	Nitrate plus nitrite	4.39	0.170	0.500	10.0			116916-002	EPA 353.2
TAV-MW12 (Duplicate) 02-Feb-22	Nitrate plus nitrite	4.47	0.170	0.500	10.0			116917-002	EPA 353.2
TAV-MW14 09-Feb-22	Nitrate plus nitrite	7.58	0.170	0.500	10.0			116931-002	EPA 353.2
TAV-MW15 28-Jan-22	Nitrate plus nitrite	1.94	0.0850	0.250	10.0			116645-002	EPA 353.2
TAV-MW16 31-Jan-22	Nitrate plus nitrite	2.44	0.0850	0.250	10.0			116649-002	EPA 353.2
AVN-1 18-Jul-22	Nitrate plus nitrite	**10.2**	0.425	1.25	10.0			118045-002	EPA 353.2
LWDS-MW1 21-Jun-22	Nitrate plus nitrite	**12.2**	0.170	0.500	10.0			118039-002	EPA 353.2
LWDS-MW2 30-Jun-22	Nitrate plus nitrite	8.11	0.170	0.500	10.0			117982-002	EPA 353.2
TAV-MW2 01-Jun-22	Nitrate plus nitrite	5.17	0.170	0.500	10.0			118041-002	EPA 353.2

Refer to Notes on page 5B-46.

Table 5B-3 *(Continued)*
Summary of Nitrate plus Nitrite Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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 19-Jul-22	Nitrate plus nitrite	5.32	0.170	0.500	10.0			117986-002	EPA 353.2
TAV-MW3 (Duplicate) 19-Jul-22	Nitrate plus nitrite	5.31	0.170	0.500	10.0			117987-002	EPA 353.2
TAV-MW4 29-Jun-22	Nitrate plus nitrite	4.34	0.0850	0.250	10.0			117996-002	EPA 353.2
TAV-MW5 31-May-22	Nitrate plus nitrite	7.14	0.170	0.500	10.0			117989-002	EPA 353.2
TAV-MW7 23-May-22	Nitrate plus nitrite	4.26	0.170	0.500	10.0			117974-002	EPA 353.2
TAV-MW8 06-Jun-22	Nitrate plus nitrite	6.69	0.170	0.500	10.0			118035-002	EPA 353.2
TAV-MW9 25-May-22	Nitrate plus nitrite	4.15	0.170	0.500	10.0			117993-002	EPA 353.2
TAV-MW9 (Duplicate) 25-May-22	Nitrate plus nitrite	4.18	0.170	0.500	10.0			117994-002	EPA 353.2
TAV-MW10 09-Jun-22	Nitrate plus nitrite	**12.6**	0.425	1.25	10.0			118043-002	EPA 353.2
TAV-MW11 07-Jun-22	Nitrate plus nitrite	6.87	0.170	0.500	10.0			118050-002	EPA 353.2
TAV-MW12 03-Jun-22	Nitrate plus nitrite	4.65	0.170	0.500	10.0			118037-002	EPA 353.2
TAV-MW13 24-May-22	Nitrate plus nitrite	6.23	0.425	1.25	10.0			117978-002	EPA 353.2
TAV-MW13 (Duplicate) 24-May-22	Nitrate plus nitrite	6.28	0.425	1.25	10.0			117979-002	EPA 353.2
TAV-MW14 08-Jun-22	Nitrate plus nitrite	7.49	0.170	0.500	10.0			118052-002	EPA 353.2
TAV-MW15 20-May-22	Nitrate plus nitrite	2.01	0.170	0.500	10.0			117970-002	EPA 353.2
TAV-MW15 (Duplicate) 20-May-22	Nitrate plus nitrite	1.99	0.170	0.500	10.0			117971-002	EPA 353.2
TAV-MW16 28-Jun-22	Nitrate plus nitrite	2.46	0.0850	0.250	10.0			117999-002	EPA 353.2

Refer to Notes on page 5B-46.

Table 5B-3 *(Continued)*
Summary of Nitrate plus Nitrite Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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 15-Aug-22	Nitrate plus nitrite	**13.1**	0.425	1.25	10.0			118385-002	EPA 353.2
TAV-MW2 10-Aug-22	Nitrate plus nitrite	5.33	0.425	1.25	10.0			118354-002	EPA 353.2
TAV-MW2 (Duplicate) 10-Aug-22	Nitrate plus nitrite	5.30	0.170	0.500	10.0			118355-002	EPA 353.2
TAV-MW4 11-Aug-22	Nitrate plus nitrite	4.64	0.170	0.500	10.0			118364-002	EPA 353.2
TAV-MW6 12-Aug-22	Nitrate plus nitrite	6.15	0.425	1.25	10.0		J	118370-002	EPA 353.2
TAV-MW8 11-Aug-22	Nitrate plus nitrite	6.93	0.425	1.25	10.0			118374-002	EPA 353.2
TAV-MW8 (Duplicate) 11-Aug-22	Nitrate plus nitrite	7.05	0.425	1.25	10.0			118375-002	EPA 353.2
TAV-MW10 15-Aug-22	Nitrate plus nitrite	**13.5**	0.425	1.25	10.0			118383-002	EPA 353.2
TAV-MW11 09-Aug-22	Nitrate plus nitrite	6.75	0.425	1.25	10.0			118361-002	EPA 353.2
TAV-MW11 (Duplicate) 09-Aug-22	Nitrate plus nitrite	6.90	0.425	1.25	10.0			118362-002	EPA 353.2
TAV-MW12 08-Aug-22	Nitrate plus nitrite	4.65	0.425	1.25	10.0			118357-002	EPA 353.2
TAV-MW14 10-Aug-22	Nitrate plus nitrite	7.93	0.425	1.25	10.0			118366-002	EPA 353.2
TAV-MW15 02-Aug-22	Nitrate plus nitrite	1.82	0.170	0.500	10.0			118346-002	EPA 353.2
TAV-MW16 03-Aug-22	Nitrate plus nitrite	2.27	0.170	0.500	10.0			118350-002	EPA 353.2
LWDS-MW1 07-Nov-22	Nitrate plus nitrite	**12.1**	0.425	1.25	10.0			118981-002	EPA 353.2
LWDS-MW1 (Duplicate) 07-Nov-22	Nitrate plus nitrite	**12.4**	0.425	1.25	10.0			118982-002	EPA 353.2
TAV-MW2 08-Nov-22	Nitrate plus nitrite	5.00	0.170	0.500	10.0			118988-002	EPA 353.2
TAV-MW4 01-Nov-22	Nitrate plus nitrite	4.32	0.170	0.500	10.0			118963-002	EPA 353.2

Refer to Notes on page 5B-46.

Table 5B-3 *(Concluded)*
Summary of Nitrate plus Nitrite Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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 02-Nov-22	Nitrate plus nitrite	5.75	0.850	2.50	10.0		J	118972-002	EPA 353.2
TAV-MW7 02-Nov-22	Nitrate plus nitrite	4.23	0.425	1.25	10.0			118968-002	EPA 353.2
TAV-MW8 11-Nov-22	Nitrate plus nitrite	6.26	0.170	0.500	10.0			118998-002	EPA 353.2
TAV-MW10 03-Nov-22	Nitrate plus nitrite	**12.7**	0.850	2.50	10.0		J	118977-002	EPA 353.2
TAV-MW11 09-Nov-22	Nitrate plus nitrite	6.35	0.425	1.25	10.0			118991-002	EPA 353.2
TAV-MW12 07-Nov-22	Nitrate plus nitrite	4.83	0.170	0.500	10.0			118984-002	EPA 353.2
TAV-MW14 10-Nov-22	Nitrate plus nitrite	7.33	0.425	1.25	10.0			118995-002	EPA 353.2
TAV-MW14 (Duplicate) 10-Nov-22	Nitrate plus nitrite	7.38	0.425	1.25	10.0			118996-002	EPA 353.2
TAV-MW15 01-Nov-22	Nitrate plus nitrite	2.02	0.0850	0.250	10.0			118965-002	EPA 353.2
TAV-MW16 03-Nov-22	Nitrate plus nitrite	2.49	0.170	0.500	10.0			118974-002	EPA 353.2
TAV-MW16 (Duplicate) 03-Nov-22	Nitrate plus nitrite	2.50	0.0850	0.250	10.0			118975-002	EPA 353.2

Refer to Notes on page 5B-46.

Table 5B-4
Summary of Filtered Metal Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	Arsenic	0.00398	0.002	0.005	0.010	J		116940-003	SW846-6020B
14-Feb-22	Iron	ND	0.033	0.100	NE	U		116940-003	SW846-6020B
	Manganese	0.00451	0.001	0.005	NE	J		116940-003	SW846-6020B
TAV-MW2	Arsenic	ND	0.002	0.005	0.010	U		116922-003	SW846-6020B
04-Feb-22	Iron	ND	0.033	0.100	NE	U		116922-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		116922-003	SW846-6020B
TAV-MW4	Arsenic	0.00335	0.002	0.005	0.010	J		116933-003	SW846-6020B
10-Feb-22	Iron	ND	0.033	0.100	NE	U		116933-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		116933-003	SW846-6020B
TAV-MW8	Arsenic	ND	0.002	0.005	0.010	U		116924-003	SW846-6020B
07-Feb-22	Iron	ND	0.033	0.100	NE	U		116924-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		116924-003	SW846-6020B
TAV-MW10	Arsenic	0.00275	0.002	0.005	0.010	J		116937-003	SW846-6020B
15-Feb-22	Iron	ND	0.033	0.100	NE	U		116937-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		116937-003	SW846-6020B
TAV-MW10 (Duplicate)	Arsenic	0.00293	0.002	0.005	0.010	J		116938-003	SW846-6020B
15-Feb-22	Iron	ND	0.033	0.100	NE	U		116938-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		116938-003	SW846-6020B
TAV-MW11	Arsenic	ND	0.002	0.005	0.010	U		116928-003	SW846-6020B
08-Feb-22	Iron	ND	0.033	0.100	NE	U		116928-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		116928-003	SW846-6020B
TAV-MW12	Arsenic	0.00319	0.002	0.005	0.010	J		116916-003	SW846-6020B
02-Feb-22	Iron	ND	0.033	0.100	NE	U		116916-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		116916-003	SW846-6020B
TAV-MW12 (Duplicate)	Arsenic	0.00319	0.002	0.005	0.010	J		116917-003	SW846-6020B
02-Feb-22	Iron	ND	0.033	0.100	NE	U		116917-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		116917-003	SW846-6020B
TAV-MW14	Arsenic	ND	0.002	0.005	0.010	U		116931-003	SW846-6020B
09-Feb-22	Iron	ND	0.033	0.100	NE	U		116931-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		116931-003	SW846-6020B
TAV-MW15	Arsenic	0.00339	0.002	0.005	0.010	J		116645-003	SW846-6020B
28-Jan-22	Iron	ND	0.033	0.100	NE	U		116645-003	SW846-6020B
	Manganese	0.00187	0.001	0.005	NE	J		116645-003	SW846-6020B
TAV-MW16	Arsenic	0.00348	0.002	0.005	0.010	J		116649-003	SW846-6020B
31-Jan-22	Iron	ND	0.033	0.100	NE	U		116649-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		116649-003	SW846-6020B

Refer to Notes on page 5B-46.

Table 5B-4 *(Continued)*
Summary of Filtered Metal Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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]
AVN-1	Arsenic	ND	0.002	0.005	0.010	U		118045-005	SW846-6020B
18-Jul-22	Iron	ND	0.033	0.100	NE	U		118045-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118045-005	SW846-6020B
LWDS-MW1	Arsenic	0.00414	0.002	0.005	0.010	J		118039-005	SW846-6020B
21-Jun-22	Iron	ND	0.033	0.100	NE	U		118039-005	SW846-6020B
	Manganese	0.00197	0.001	0.005	NE	J		118039-005	SW846-6020B
LWDS-MW2	Arsenic	0.00209	0.002	0.005	0.010	J		117982-005	SW846-6020B
30-Jun-22	Iron	ND	0.033	0.100	NE	U		117982-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		117982-005	SW846-6020B
TAV-MW2	Arsenic	0.00253	0.002	0.005	0.010	J		118041-005	SW846-6020B
01-Jun-22	Iron	ND	0.033	0.100	NE	U		118041-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118041-005	SW846-6020B
TAV-MW3	Arsenic	ND	0.002	0.005	0.010	U		117986-005	SW846-6020B
19-Jul-22	Iron	ND	0.033	0.100	NE	U		117986-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		117986-005	SW846-6020B
TAV-MW3 (Duplicate)	Arsenic	ND	0.002	0.005	0.010	U		117987-003	SW846-6020B
19-Jul-22	Iron	ND	0.033	0.100	NE	U		117987-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		117987-003	SW846-6020B
TAV-MW4	Arsenic	0.00222	0.002	0.005	0.010	J		117996-005	SW846-6020B
29-Jun-22	Iron	ND	0.033	0.100	NE	U		117996-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		117996-005	SW846-6020B
TAV-MW5	Arsenic	0.00261	0.002	0.005	0.010	J		117989-005	SW846-6020B
31-May-22	Iron	ND	0.033	0.100	NE	U		117989-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		117989-005	SW846-6020B
TAV-MW7	Arsenic	ND	0.002	0.005	0.010	U		117974-005	SW846-6020B
23-May-22	Iron	ND	0.033	0.100	NE	U		117974-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		117974-005	SW846-6020B
TAV-MW8	Arsenic	0.00238	0.002	0.005	0.010	J		118035-005	SW846-6020B
06-Jun-22	Iron	ND	0.033	0.100	NE	U		118035-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118035-005	SW846-6020B
TAV-MW9	Arsenic	0.00254	0.002	0.005	0.010	J		117993-005	SW846-6020B
25-May-22	Iron	ND	0.033	0.100	NE	U		117993-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		117993-005	SW846-6020B
TAV-MW9 (Duplicate)	Arsenic	0.00251	0.002	0.005	0.010	J		117994-003	SW846-6020B
25-May-22	Iron	ND	0.033	0.100	NE	U		117994-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		117994-003	SW846-6020B

Refer to Notes on page 5B-46.

Table 5B-4 *(Continued)*
Summary of Filtered Metal Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	Arsenic	0.00246	0.002	0.005	0.010	J		118043-005	SW846-6020B
09-Jun-22	Iron	ND	0.033	0.100	NE	U		118043-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118043-005	SW846-6020B
TAV-MW11	Arsenic	0.00254	0.002	0.005	0.010	J		118050-005	SW846-6020B
07-Jun-22	Iron	ND	0.033	0.100	NE	U		118050-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118050-005	SW846-6020B
TAV-MW12	Arsenic	0.00202	0.002	0.005	0.010	J		118037-005	SW846-6020B
03-Jun-22	Iron	ND	0.033	0.100	NE	U		118037-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118037-005	SW846-6020B
TAV-MW13	Arsenic	0.00256	0.002	0.005	0.010	J		117978-005	SW846-6020B
24-May-22	Iron	ND	0.033	0.100	NE	U		117978-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		117978-005	SW846-6020B
TAV-MW13 (Duplicate)	Arsenic	0.00261	0.002	0.005	0.010	J		117979-003	SW846-6020B
24-May-22	Iron	0.117	0.033	0.100	NE			117979-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		117979-003	SW846-6020B
TAV-MW14	Arsenic	0.00230	0.002	0.005	0.010	J		118052-005	SW846-6020B
08-Jun-22	Iron	ND	0.033	0.100	NE	U		118052-005	SW846-6020B
	Manganese	0.00115	0.001	0.005	NE	J		118052-005	SW846-6020B
TAV-MW15	Arsenic	ND	0.002	0.005	0.010	U		117970-005	SW846-6020B
20-May-22	Iron	ND	0.033	0.100	NE	U		117970-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		117970-005	SW846-6020B
TAV-MW15 (Duplicate)	Arsenic	ND	0.002	0.005	0.010	U		117971-003	SW846-6020B
20-May-22	Iron	ND	0.033	0.100	NE	U		117971-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		117971-003	SW846-6020B
TAV-MW16	Arsenic	0.00280	0.002	0.005	0.010	J		117999-005	SW846-6020B
28-Jun-22	Iron	ND	0.033	0.100	NE	U		117999-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		117999-005	SW846-6020B
LWDS-MW1	Arsenic	0.00253	0.002	0.005	0.010	J		118385-003	SW846-6020B
15-Aug-22	Iron	ND	0.033	0.100	NE	U		118385-003	SW846-6020B
	Manganese	0.00149	0.001	0.005	NE	J		118385-003	SW846-6020B
TAV-MW2	Arsenic	ND	0.002	0.005	0.010	U		118354-003	SW846-6020B
10-Aug-22	Iron	ND	0.033	0.100	NE	U		118354-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118354-003	SW846-6020B

Refer to Notes on page 5B-46.

Table 5B-4 *(Continued)*
Summary of Filtered Metal Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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 (Duplicate) 10-Aug-22	Arsenic	ND	0.002	0.005	0.010	U		118355-003	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118355-003	SW846-6020B
	Manganese	0.00114	0.001	0.005	NE	J	0.005U	118355-003	SW846-6020B
TAV-MW4 11-Aug-22	Arsenic	ND	0.002	0.005	0.010	U		118364-003	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118364-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118364-003	SW846-6020B
TAV-MW6 12-Aug-22	Arsenic	ND	0.002	0.005	0.010	U		118370-003	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118370-003	SW846-6020B
	Manganese	0.00464	0.001	0.005	NE	J		118370-003	SW846-6020B
TAV-MW8 11-Aug-22	Arsenic	ND	0.002	0.005	0.010	U		118374-003	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118374-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118374-003	SW846-6020B
TAV-MW8 (Duplicate) 11-Aug-22	Arsenic	ND	0.002	0.005	0.010	U		118375-003	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118375-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118375-003	SW846-6020B
TAV-MW10 15-Aug-22	Arsenic	ND	0.002	0.005	0.010	U		118383-003	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118383-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118383-003	SW846-6020B
TAV-MW11 09-Aug-22	Arsenic	ND	0.002	0.005	0.010	U		118361-003	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118361-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118361-003	SW846-6020B
TAV-MW11 (Duplicate) 09-Aug-22	Arsenic	0.00203	0.002	0.005	0.010	J		118362-003	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118362-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118362-003	SW846-6020B
TAV-MW12 08-Aug-22	Arsenic	ND	0.002	0.005	0.010	U		118357-003	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118357-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118357-003	SW846-6020B
TAV-MW14 10-Aug-22	Arsenic	ND	0.002	0.005	0.010	U		118366-003	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118366-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118366-003	SW846-6020B
TAV-MW15 02-Aug-22	Arsenic	ND	0.002	0.005	0.010	U		118346-003	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118346-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118346-003	SW846-6020B
TAV-MW16 03-Aug-22	Arsenic	0.00225	0.002	0.005	0.010	J		118350-003	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118350-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118350-003	SW846-6020B

Refer to Notes on page 5B-46.

Table 5B-4 *(Continued)*
Summary of Filtered Metal Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	Arsenic	0.00360	0.002	0.005	0.010	J	0.005U	118981-003	SW846-6020B
07-Nov-22	Iron	ND	0.033	0.100	NE	U		118981-003	SW846-6020B
	Manganese	0.00181	0.001	0.005	NE	J		118981-003	SW846-6020B
LWDS-MW1 (Duplicate)	Arsenic	0.00364	0.002	0.005	0.010	J	0.005U	118982-003	SW846-6020B
07-Nov-22	Iron	ND	0.033	0.100	NE	U		118982-003	SW846-6020B
	Manganese	0.00170	0.001	0.005	NE	J		118982-003	SW846-6020B
TAV-MW2	Arsenic	0.00205	0.002	0.005	0.010	J		118988-003	SW846-6020B
08-Nov-22	Iron	ND	0.033	0.100	NE	U		118988-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118988-003	SW846-6020B
TAV-MW4	Arsenic	0.00226	0.002	0.005	0.010	J		118963-003	SW846-6020B
01-Nov-22	Iron	ND	0.033	0.100	NE	U		118963-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118963-003	SW846-6020B
TAV-MW6	Arsenic	0.00212	0.002	0.005	0.010	J		118972-003	SW846-6020B
02-Nov-22	Iron	ND	0.033	0.100	NE	U		118972-003	SW846-6020B
	Manganese	0.00444	0.001	0.005	NE	J		118972-003	SW846-6020B
TAV-MW7	Arsenic	0.00232	0.002	0.005	0.010	J		118968-003	SW846-6020B
02-Nov-22	Iron	ND	0.033	0.100	NE	U		118968-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118968-003	SW846-6020B
TAV-MW8	Arsenic	0.00225	0.002	0.005	0.010	J		118998-003	SW846-6020B
11-Nov-22	Iron	ND	0.033	0.100	NE	U		118998-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118998-003	SW846-6020B
TAV-MW10	Arsenic	0.00389	0.002	0.005	0.010	J		118977-003	SW846-6020B
03-Nov-22	Iron	ND	0.033	0.100	NE	U		118977-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118977-003	SW846-6020B
TAV-MW11	Arsenic	0.00221	0.002	0.005	0.010	J		118991-003	SW846-6020B
09-Nov-22	Iron	ND	0.033	0.100	NE	U		118991-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118991-003	SW846-6020B
TAV-MW12	Arsenic	ND	0.002	0.005	0.010	U		118984-003	SW846-6020B
07-Nov-22	Iron	ND	0.033	0.100	NE	U		118984-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118984-003	SW846-6020B
TAV-MW14	Arsenic	ND	0.002	0.005	0.010	U		118995-003	SW846-6020B
10-Nov-22	Iron	ND	0.033	0.100	NE	U		118995-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118995-003	SW846-6020B
TAV-MW14 (Duplicate)	Arsenic	ND	0.002	0.005	0.010	U		118996-003	SW846-6020B
10-Nov-22	Iron	ND	0.033	0.100	NE	U		118996-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118996-003	SW846-6020B

Refer to Notes on page 5B-46.

Table 5B-4 *(Concluded)*
Summary of Filtered Metal Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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 01-Nov-22	Arsenic	ND	0.002	0.005	0.010	U		118965-003	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118965-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118965-003	SW846-6020B
TAV-MW16 03-Nov-22	Arsenic	0.00320	0.002	0.005	0.010	J		118974-003	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118974-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118974-003	SW846-6020B
TAV-MW16 (Duplicate) 03-Nov-22	Arsenic	0.00390	0.002	0.005	0.010	J		118975-003	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118975-003	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118975-003	SW846-6020B

Refer to Notes on page 5B-46.

Table 5B-5
Summary of Anions and Alkalinity Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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]
AVN-1	Bromide	0.147	0.067	0.200	NE	J		118045-003	SW846-9056A
18-Jul-22	Chloride	9.50	0.134	0.400	NE			118045-003	SW846-9056A
	Fluoride	1.20	0.033	0.100	4.0			118045-003	SW846-9056A
	Sulfate	29.5	0.266	0.800	NE			118045-003	SW846-9056A
	Bicarbonate Alkalinity	157	1.45	4.00	NE			118045-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118045-004	SM 2320B
LWDS-MW1	Bromide	0.898	0.067	0.200	NE			118039-003	SW846-9056A
21-Jun-22	Chloride	80.2	1.34	4.00	NE			118039-003	SW846-9056A
	Fluoride	0.648	0.033	0.100	4.0			118039-003	SW846-9056A
	Sulfate	38.2	2.66	8.00	NE			118039-003	SW846-9056A
	Bicarbonate Alkalinity	195	1.45	4.00	NE			118039-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118039-004	SM 2320B
LWDS-MW2	Bromide	ND	0.067	0.200	NE	U		117982-003	SW846-9056A
30-Jun-22	Chloride	12.1	0.335	1.00	NE			117982-003	SW846-9056A
	Fluoride	1.30	0.033	0.100	4.0			117982-003	SW846-9056A
	Sulfate	39.6	0.665	2.00	NE			117982-003	SW846-9056A
	Bicarbonate Alkalinity	176	1.45	4.00	NE			117982-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		117982-004	SM 2320B
TAV-MW2	Bromide	0.350	0.067	0.200	NE			118041-003	SW846-9056A
01-Jun-22	Chloride	53.4	0.670	2.00	NE			118041-003	SW846-9056A
	Fluoride	1.05	0.033	0.100	4.0			118041-003	SW846-9056A
	Sulfate	55.5	1.33	4.00	NE			118041-003	SW846-9056A
	Bicarbonate Alkalinity	244	1.45	4.00	NE			118041-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118041-004	SM 2320B
TAV-MW3	Bromide	0.253	0.067	0.200	NE			117986-003	SW846-9056A
19-Jul-22	Chloride	26.9	0.335	1.00	NE			117986-003	SW846-9056A
	Fluoride	1.47	0.033	0.100	4.0			117986-003	SW846-9056A
	Sulfate	63.4	0.665	2.00	NE			117986-003	SW846-9056A
	Bicarbonate Alkalinity	197	1.45	4.00	NE			117986-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		117986-004	SM 2320B
TAV-MW4	Bromide	0.401	0.067	0.200	NE			117996-003	SW846-9056A
29-Jun-22	Chloride	38.6	0.335	1.00	NE			117996-003	SW846-9056A
	Fluoride	1.17	0.033	0.100	4.0			117996-003	SW846-9056A
	Sulfate	35.9	0.665	2.00	NE			117996-003	SW846-9056A
	Bicarbonate Alkalinity	173	1.45	4.00	NE			117996-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		117996-004	SM 2320B

Refer to Notes on page 5B-46.

Table 5B-5 *(Continued)*
Summary of Anions and Alkalinity Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	Bromide	0.185	0.067	0.200	NE	J		117989-003	SW846-9056A
31-May-22	Chloride	18.4	0.335	1.00	NE			117989-003	SW846-9056A
	Fluoride	1.30	0.033	0.100	4.0			117989-003	SW846-9056A
	Sulfate	41.3	0.665	2.00	NE			117989-003	SW846-9056A
	Bicarbonate Alkalinity	194	1.45	4.00	NE			117989-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		117989-004	SM 2320B
TAV-MW7	Bromide	0.251	0.067	0.200	NE			117974-003	SW846-9056A
23-May-22	Chloride	29.8	0.335	1.00	NE			117974-003	SW846-9056A
	Fluoride	1.14	0.033	0.100	4.0			117974-003	SW846-9056A
	Sulfate	64.9	0.665	2.00	NE			117974-003	SW846-9056A
	Bicarbonate Alkalinity	224	1.45	4.00	NE			117974-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		117974-004	SM 2320B
TAV-MW8	Bromide	0.374	0.067	0.200	NE			118035-003	SW846-9056A
06-Jun-22	Chloride	42.6	0.670	2.00	NE			118035-003	SW846-9056A
	Fluoride	1.41	0.033	0.100	4.0			118035-003	SW846-9056A
	Sulfate	48.7	1.33	4.00	NE			118035-003	SW846-9056A
	Bicarbonate Alkalinity	198	1.45	4.00	NE			118035-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118035-004	SM 2320B
TAV-MW9	Bromide	0.211	0.067	0.200	NE			117993-003	SW846-9056A
25-May-22	Chloride	35.0	0.335	1.00	NE			117993-003	SW846-9056A
	Fluoride	0.978	0.033	0.100	4.0			117993-003	SW846-9056A
	Sulfate	64.3	0.665	2.00	NE			117993-003	SW846-9056A
	Bicarbonate Alkalinity	243	1.45	4.00	NE			117993-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		117993-004	SM 2320B
TAV-MW10	Bromide	0.322	0.067	0.200	NE			118043-003	SW846-9056A
09-Jun-22	Chloride	47.5	0.670	2.00	NE			118043-003	SW846-9056A
	Fluoride	1.43	0.033	0.100	4.0			118043-003	SW846-9056A
	Sulfate	47.6	1.33	4.00	NE			118043-003	SW846-9056A
	Bicarbonate Alkalinity	186	1.45	4.00	NE			118043-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118043-004	SM 2320B
TAV-MW11	Bromide	0.489	0.067	0.200	NE			118050-003	SW846-9056A
07-Jun-22	Chloride	52.7	0.670	2.00	NE			118050-003	SW846-9056A
	Fluoride	1.34	0.033	0.100	4.0			118050-003	SW846-9056A
	Sulfate	42.4	1.33	4.00	NE			118050-003	SW846-9056A
	Bicarbonate Alkalinity	174	1.45	4.00	NE			118050-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118050-004	SM 2320B

Refer to Notes on page 5B-46.

Table 5B-5 *(Concluded)*
Summary of Anions and Alkalinity Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.255	0.067	0.200	NE			118037-003	SW846-9056A
03-Jun-22	Chloride	49.6	0.670	2.00	NE			118037-003	SW846-9056A
	Fluoride	1.08	0.033	0.100	4.0			118037-003	SW846-9056A
	Sulfate	59.4	1.33	4.00	NE			118037-003	SW846-9056A
	Bicarbonate Alkalinity	234	1.45	4.00	NE			118037-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118037-004	SM 2320B
TAV-MW13	Bromide	0.172	0.067	0.200	NE	J		117978-003	SW846-9056A
24-May-22	Chloride	17.4	0.335	1.00	NE			117978-003	SW846-9056A
	Fluoride	1.27	0.033	0.100	4.0			117978-003	SW846-9056A
	Sulfate	48.6	0.665	2.00	NE			117978-003	SW846-9056A
	Bicarbonate Alkalinity	192	1.45	4.00	NE			117978-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		117978-004	SM 2320B
TAV-MW14	Bromide	0.319	0.067	0.200	NE			118052-003	SW846-9056A
08-Jun-22	Chloride	50.5	0.670	2.00	NE			118052-003	SW846-9056A
	Fluoride	1.22	0.033	0.100	4.0			118052-003	SW846-9056A
	Sulfate	56.0	1.33	4.00	NE			118052-003	SW846-9056A
	Bicarbonate Alkalinity	212	1.45	4.00	NE			118052-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118052-004	SM 2320B
TAV-MW15	Bromide	0.429	0.067	0.200	NE			117970-003	SW846-9056A
20-May-22	Chloride	74.0	1.34	4.00	NE			117970-003	SW846-9056A
	Fluoride	0.960	0.033	0.100	4.0			117970-003	SW846-9056A
	Sulfate	56.6	2.66	8.00	NE			117970-003	SW846-9056A
	Bicarbonate Alkalinity	258	1.45	4.00	NE			117970-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		117970-004	SM 2320B
TAV-MW16	Bromide	0.412	0.067	0.200	NE			117999-003	SW846-9056A
28-Jun-22	Chloride	82.5	1.34	4.00	NE			117999-003	SW846-9056A
	Fluoride	0.888	0.033	0.100	4.0			117999-003	SW846-9056A
	Sulfate	59.9	2.66	8.00	NE			117999-003	SW846-9056A
	Bicarbonate Alkalinity	281	1.45	4.00	NE			117999-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		117999-004	SM 2320B

Refer to Notes on page 5B-46.

Table 5B-6
Summary of TAL Metals plus Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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]
AVN-1	Aluminum	ND	0.0193	0.050	NE	U		118045-006	SW846-6020B
18-Jul-22	Antimony	ND	0.001	0.003	0.006	U		118045-006	SW846-6020B
	Arsenic	0.00215	0.002	0.005	0.010	J		118045-006	SW846-6020B
	Barium	0.0825	0.00067	0.004	2.00			118045-006	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118045-006	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118045-006	SW846-6020B
	Calcium	41.3	0.080	0.200	NE			118045-006	SW846-6020B
	Chromium	0.0419	0.003	0.010	0.100			118045-006	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118045-006	SW846-6020B
	Copper	0.00286	0.0003	0.002	1.3			118045-006	SW846-6020B
	Iron	0.173	0.033	0.100	NE			118045-006	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		118045-006	SW846-6020B
	Magnesium	9.86	0.010	0.030	NE			118045-006	SW846-6020B
	Manganese	0.00129	0.001	0.005	NE	J		118045-006	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118045-006	SW846-7470A
	Nickel	0.00654	0.0006	0.002	NE			118045-006	SW846-6020B
	Potassium	3.39	0.080	0.300	NE			118045-006	SW846-6020B
	Selenium	0.00204	0.015	0.005	0.050	J		118045-006	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118045-006	SW846-6020B
	Sodium	40.2	0.080	0.250	NE			118045-006	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118045-006	SW846-6020B
	Uranium	0.00194	0.000067	0.0002	0.030			118045-006	SW846-6020B
	Vanadium	0.00985	0.0033	0.020	NE	B, J	0.02U	118045-006	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118045-006	SW846-6020B

Refer to Notes on page 5B-46.

Table 5B-6 *(Continued)*
Summary of TAL Metals plus Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		118039-006	SW846-6020B
21-Jun-22	Antimony	ND	0.001	0.003	0.006	U		118039-006	SW846-6020B
	Arsenic	0.00406	0.002	0.005	0.010	J		118039-006	SW846-6020B
	Barium	0.0906	0.00067	0.004	2.00			118039-006	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118039-006	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118039-006	SW846-6020B
	Calcium	68.8	0.800	2.00	NE			118039-006	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		118039-006	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118039-006	SW846-6020B
	Copper	0.000900	0.0003	0.002	1.3	J		118039-006	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118039-006	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		118039-006	SW846-6020B
	Magnesium	19.3	0.010	0.030	NE			118039-006	SW846-6020B
	Manganese	0.00249	0.001	0.005	NE	J		118039-006	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118039-006	SW846-7470A
	Nickel	0.000608	0.0006	0.002	NE	J		118039-006	SW846-6020B
	Potassium	3.45	0.080	0.300	NE	N	J	118039-006	SW846-6020B
	Selenium	0.00597	0.015	0.005	0.050			118039-006	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118039-006	SW846-6020B
	Sodium	68.2	0.800	2.50	NE			118039-006	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118039-006	SW846-6020B
	Uranium	0.00272	0.000067	0.0002	0.030			118039-006	SW846-6020B
	Vanadium	0.00611	0.0033	0.020	NE	J		118039-006	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118039-006	SW846-6020B

Refer to Notes on page 5B-46.

Table 5B-6 *(Continued)*
Summary of TAL Metals plus Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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-MW2	Aluminum	ND	0.0193	0.050	NE	U		117982-006	SW846-6020B
30-Jun-22	Antimony	ND	0.001	0.003	0.006	U		117982-006	SW846-6020B
	Arsenic	0.00221	0.002	0.005	0.010	J		117982-006	SW846-6020B
	Barium	0.0700	0.00067	0.004	2.00			117982-006	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		117982-006	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		117982-006	SW846-6020B
	Calcium	46.6	0.080	0.200	NE			117982-006	SW846-6020B
	Chromium	0.00358	0.003	0.010	0.100	J		117982-006	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		117982-006	SW846-6020B
	Copper	0.00377	0.0003	0.002	1.3			117982-006	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		117982-006	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		117982-006	SW846-6020B
	Magnesium	13.8	0.010	0.030	NE			117982-006	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		117982-006	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		117982-006	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		117982-006	SW846-6020B
	Potassium	2.84	0.080	0.300	NE			117982-006	SW846-6020B
	Selenium	0.00248	0.015	0.005	0.050	J		117982-006	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		117982-006	SW846-6020B
	Sodium	45.0	0.080	0.250	NE			117982-006	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		117982-006	SW846-6020B
	Uranium	0.00279	0.000067	0.0002	0.030			117982-006	SW846-6020B
	Vanadium	0.00940	0.0033	0.020	NE	J		117982-006	SW846-6020B
	Zinc	0.00609	0.0033	0.020	NE	J		117982-006	SW846-6020B

Refer to Notes on page 5B-46.

Table 5B-6 *(Continued)*
Summary of TAL Metals plus Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.0242	0.0193	0.050	NE	J		118041-006	SW846-6020B
01-Jun-22	Antimony	ND	0.001	0.003	0.006	U		118041-006	SW846-6020B
	Arsenic	0.00249	0.002	0.005	0.010	J		118041-006	SW846-6020B
	Barium	0.0634	0.00067	0.004	2.00			118041-006	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118041-006	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118041-006	SW846-6020B
	Calcium	66.4	0.400	1.00	NE			118041-006	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		118041-006	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118041-006	SW846-6020B
	Copper	ND	0.0003	0.002	1.3	U		118041-006	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118041-006	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		118041-006	SW846-6020B
	Magnesium	23.0	0.010	0.030	NE			118041-006	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118041-006	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118041-006	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		118041-006	SW846-6020B
	Potassium	3.72	0.080	0.300	NE			118041-006	SW846-6020B
	Selenium	0.00284	0.015	0.005	0.050	J		118041-006	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118041-006	SW846-6020B
	Sodium	63.4	0.400	1.25	NE			118041-006	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118041-006	SW846-6020B
	Uranium	0.00550	0.000067	0.0002	0.030			118041-006	SW846-6020B
	Vanadium	0.00913	0.0033	0.020	NE	J		118041-006	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118041-006	SW846-6020B

Refer to Notes on page 5B-46.

Table 5B-6 *(Continued)*
Summary of TAL Metals plus Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.0515	0.0193	0.050	NE			117986-006	SW846-6020B
19-Jul-22	Antimony	ND	0.001	0.003	0.006	U		117986-006	SW846-6020B
	Arsenic	0.00205	0.002	0.005	0.010	J		117986-006	SW846-6020B
	Barium	0.0483	0.00067	0.004	2.00			117986-006	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		117986-006	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		117986-006	SW846-6020B
	Calcium	53.1	0.800	2.00	NE			117986-006	SW846-6020B
	Chromium	0.00323	0.003	0.010	0.100	J		117986-006	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		117986-006	SW846-6020B
	Copper	0.000395	0.0003	0.002	1.3	J	0.002U	117986-006	SW846-6020B
	Iron	0.0500	0.033	0.100	NE	J		117986-006	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		117986-006	SW846-6020B
	Magnesium	14.6	0.010	0.030	NE			117986-006	SW846-6020B
	Manganese	0.00538	0.001	0.005	NE			117986-006	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		117986-006	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		117986-006	SW846-6020B
	Potassium	4.65	0.080	0.300	NE			117986-006	SW846-6020B
	Selenium	0.00258	0.015	0.005	0.050	J		117986-006	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		117986-006	SW846-6020B
	Sodium	54.7	0.800	2.50	NE			117986-006	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		117986-006	SW846-6020B
	Uranium	0.00342	0.000067	0.0002	0.030			117986-006	SW846-6020B
	Vanadium	0.00667	0.0033	0.020	NE	B, J	0.02U	117986-006	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		117986-006	SW846-6020B

Refer to Notes on page 5B-46.

Table 5B-6 *(Continued)*
Summary of TAL Metals plus Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		117996-006	SW846-6020B
08-Jun-22	Antimony	ND	0.001	0.003	0.006	U		117996-006	SW846-6020B
	Arsenic	0.00234	0.002	0.005	0.010	J		117996-006	SW846-6020B
	Barium	0.0899	0.00067	0.004	2.00			117996-006	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		117996-006	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		117996-006	SW846-6020B
	Calcium	55.5	0.800	2.00	NE			117996-006	SW846-6020B
	Chromium	0.0287	0.003	0.010	0.100			117996-006	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		117996-006	SW846-6020B
	Copper	ND	0.0003	0.002	1.3	U		117996-006	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		117996-006	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		117996-006	SW846-6020B
	Magnesium	14.6	0.010	0.030	NE			117996-006	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		117996-006	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		117996-006	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		117996-006	SW846-6020B
	Potassium	3.16	0.080	0.300	NE			117996-006	SW846-6020B
	Selenium	0.00308	0.015	0.005	0.050	J		117996-006	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		117996-006	SW846-6020B
	Sodium	45.8	0.080	0.250	NE			117996-006	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		117996-006	SW846-6020B
	Uranium	0.00312	0.000067	0.0002	0.030			117996-006	SW846-6020B
	Vanadium	0.00910	0.0033	0.020	NE	J		117996-006	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		117996-006	SW846-6020B

Refer to Notes on page 5B-46.

Table 5B-6 *(Continued)*
Summary of TAL Metals plus Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.762	0.0193	0.050	NE			117989-006	SW846-6020B
31-May-22	Antimony	ND	0.001	0.003	0.006	U		117989-006	SW846-6020B
	Arsenic	0.00261	0.002	0.005	0.010	J		117989-006	SW846-6020B
	Barium	0.0692	0.00067	0.004	2.00			117989-006	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		117989-006	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		117989-006	SW846-6020B
	Calcium	49.2	0.080	0.200	NE			117989-006	SW846-6020B
	Chromium	0.00383	0.003	0.010	0.100	J		117989-006	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		117989-006	SW846-6020B
	Copper	0.000563	0.0003	0.002	1.3	J		117989-006	SW846-6020B
	Iron	0.581	0.033	0.100	NE			117989-006	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		117989-006	SW846-6020B
	Magnesium	15.1	0.010	0.030	NE			117989-006	SW846-6020B
	Manganese	0.00998	0.001	0.005	NE			117989-006	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		117989-006	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		117989-006	SW846-6020B
	Potassium	2.96	0.080	0.300	NE			117989-006	SW846-6020B
	Selenium	0.00247	0.015	0.005	0.050	J		117989-006	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		117989-006	SW846-6020B
	Sodium	48.8	0.080	0.250	NE			117989-006	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		117989-006	SW846-6020B
	Uranium	0.00321	0.000067	0.0002	0.030			117989-006	SW846-6020B
	Vanadium	0.0102	0.0033	0.020	NE	J		117989-006	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		117989-006	SW846-6020B

Refer to Notes on page 5B-46.

Table 5B-6 *(Continued)*
Summary of TAL Metals plus Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.0285	0.0193	0.050	NE	J		117974-006	SW846-6020B
23-May-22	Antimony	ND	0.001	0.003	0.006	U		117974-006	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	U		117974-006	SW846-6020B
	Barium	0.0551	0.00067	0.004	2.00			117974-006	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		117974-006	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		117974-006	SW846-6020B
	Calcium	57.9	0.800	2.00	NE			117974-006	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		117974-006	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		117974-006	SW846-6020B
	Copper	ND	0.0003	0.002	1.3	U		117974-006	SW846-6020B
	Iron	0.0408	0.033	0.100	NE	J		117974-006	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		117974-006	SW846-6020B
	Magnesium	19.4	0.010	0.030	NE			117974-006	SW846-6020B
	Manganese	0.00322	0.001	0.005	NE	J		117974-006	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		117974-006	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		117974-006	SW846-6020B
	Potassium	3.97	0.080	0.300	NE			117974-006	SW846-6020B
	Selenium	0.00210	0.015	0.005	0.050	J		117974-006	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		117974-006	SW846-6020B
	Sodium	52.7	0.800	2.50	NE			117974-006	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		117974-006	SW846-6020B
	Uranium	0.00452	0.000067	0.0002	0.030			117974-006	SW846-6020B
	Vanadium	0.00866	0.0033	0.020	NE	J		117974-006	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		117974-006	SW846-6020B

Refer to Notes on page 5B-46.

Table 5B-6 *(Continued)*
Summary of TAL Metals plus Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	ND	0.0193	0.050	NE	U		118035-006	SW846-6020B
06-Jun-22	Antimony	ND	0.001	0.003	0.006	U		118035-006	SW846-6020B
	Arsenic	0.00242	0.002	0.005	0.010	J		118035-006	SW846-6020B
	Barium	0.0577	0.00067	0.004	2.00			118035-006	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118035-006	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118035-006	SW846-6020B
	Calcium	61.4	0.800	2.00	NE			118035-006	SW846-6020B
	Chromium	0.00307	0.003	0.010	0.100	J		118035-006	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118035-006	SW846-6020B
	Copper	ND	0.0003	0.002	1.3	U		118035-006	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118035-006	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		118035-006	SW846-6020B
	Magnesium	17.5	0.010	0.030	NE			118035-006	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118035-006	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118035-006	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		118035-006	SW846-6020B
	Potassium	3.94	0.080	0.300	NE			118035-006	SW846-6020B
	Selenium	0.00289	0.015	0.005	0.050	J		118035-006	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118035-006	SW846-6020B
	Sodium	60.9	0.800	2.50	NE			118035-006	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118035-006	SW846-6020B
	Uranium	0.00346	0.000067	0.0002	0.030	B		118035-006	SW846-6020B
	Vanadium	0.00474	0.0033	0.020	NE	J		118035-006	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118035-006	SW846-6020B

Refer to Notes on page 5B-46.

Table 5B-6 *(Continued)*
Summary of TAL Metals plus Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.0328	0.0193	0.050	NE	J		117993-006	SW846-6020B
25-May-22	Antimony	ND	0.001	0.003	0.006	U		117993-006	SW846-6020B
	Arsenic	0.00247	0.002	0.005	0.010	J		117993-006	SW846-6020B
	Barium	0.0706	0.00067	0.004	2.00			117993-006	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		117993-006	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		117993-006	SW846-6020B
	Calcium	63.8	0.400	1.00	NE			117993-006	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		117993-006	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		117993-006	SW846-6020B
	Copper	0.000452	0.0003	0.002	1.3	J	0.002U	117993-006	SW846-6020B
	Iron	0.0350	0.033	0.100	NE	J		117993-006	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		117993-006	SW846-6020B
	Magnesium	23.3	0.010	0.030	NE			117993-006	SW846-6020B
	Manganese	0.00130	0.001	0.005	NE	J		117993-006	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		117993-006	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		117993-006	SW846-6020B
	Potassium	4.37	0.080	0.300	NE			117993-006	SW846-6020B
	Selenium	0.00249	0.015	0.005	0.050	J		117993-006	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		117993-006	SW846-6020B
	Sodium	62.6	0.400	1.25	NE			117993-006	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		117993-006	SW846-6020B
	Uranium	0.00521	0.000067	0.0002	0.030			117993-006	SW846-6020B
	Vanadium	0.00844	0.0033	0.020	NE	J		117993-006	SW846-6020B
	Zinc	0.00692	0.0033	0.020	NE	J		117993-006	SW846-6020B

Refer to Notes on page 5B-46.

Table 5B-6 *(Continued)*
Summary of TAL Metals plus Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		118043-006	SW846-6020B
09-Jun-22	Antimony	ND	0.001	0.003	0.006	U		118043-006	SW846-6020B
	Arsenic	0.00237	0.002	0.005	0.010	J		118043-006	SW846-6020B
	Barium	0.0610	0.00067	0.004	2.00			118043-006	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118043-006	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118043-006	SW846-6020B
	Calcium	59.9	0.800	2.00	NE			118043-006	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		118043-006	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118043-006	SW846-6020B
	Copper	ND	0.0003	0.002	1.3	U		118043-006	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118043-006	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		118043-006	SW846-6020B
	Magnesium	16.7	0.010	0.030	NE			118043-006	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118043-006	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118043-006	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		118043-006	SW846-6020B
	Potassium	4.08	0.080	0.300	NE			118043-006	SW846-6020B
	Selenium	0.00265	0.015	0.005	0.050	J		118043-006	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118043-006	SW846-6020B
	Sodium	55.5	0.800	2.50	NE			118043-006	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118043-006	SW846-6020B
	Uranium	0.00312	0.000067	0.0002	0.030			118043-006	SW846-6020B
	Vanadium	0.00472	0.0033	0.020	NE	J		118043-006	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118043-006	SW846-6020B

Refer to Notes on page 5B-46.

Table 5B-6 *(Continued)*
Summary of TAL Metals plus Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		118050-006	SW846-6020B
07-Jun-22	Antimony	ND	0.001	0.003	0.006	U		118050-006	SW846-6020B
	Arsenic	0.00258	0.002	0.005	0.010	J		118050-006	SW846-6020B
	Barium	0.0771	0.00067	0.004	2.00			118050-006	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118050-006	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118050-006	SW846-6020B
	Calcium	58.9	0.800	2.00	NE			118050-006	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		118050-006	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118050-006	SW846-6020B
	Copper	ND	0.0003	0.002	1.3	U		118050-006	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118050-006	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		118050-006	SW846-6020B
	Magnesium	16.5	0.010	0.030	NE			118050-006	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118050-006	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118050-006	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		118050-006	SW846-6020B
	Potassium	3.89	0.080	0.300	NE			118050-006	SW846-6020B
	Selenium	0.00354	0.015	0.005	0.050	J		118050-006	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118050-006	SW846-6020B
	Sodium	56.8	0.800	2.50	NE			118050-006	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118050-006	SW846-6020B
	Uranium	0.00291	0.000067	0.0002	0.030	B		118050-006	SW846-6020B
	Vanadium	0.00490	0.0033	0.020	NE	J		118050-006	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118050-006	SW846-6020B

Refer to Notes on page 5B-46.

Table 5B-6 *(Continued)*
Summary of TAL Metals plus Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	ND	0.0193	0.050	NE	U		118037-006	SW846-6020B
03-Jun-22	Antimony	ND	0.001	0.003	0.006	U		118037-006	SW846-6020B
	Arsenic	0.00206	0.002	0.005	0.010	J		118037-006	SW846-6020B
	Barium	0.0794	0.00067	0.004	2.00			118037-006	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118037-006	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118037-006	SW846-6020B
	Calcium	71.2	0.800	2.00	NE			118037-006	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		118037-006	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118037-006	SW846-6020B
	Copper	ND	0.0003	0.002	1.3	U		118037-006	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118037-006	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		118037-006	SW846-6020B
	Magnesium	22.8	0.010	0.030	NE			118037-006	SW846-6020B
	Manganese	0.00154	0.001	0.005	NE	J		118037-006	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118037-006	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		118037-006	SW846-6020B
	Potassium	4.22	0.080	0.300	NE			118037-006	SW846-6020B
	Selenium	0.00204	0.015	0.005	0.050	J		118037-006	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118037-006	SW846-6020B
	Sodium	69.8	0.800	2.50	NE			118037-006	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118037-006	SW846-6020B
	Uranium	0.00607	0.000067	0.0002	0.030	B		118037-006	SW846-6020B
	Vanadium	ND	0.0033	0.020	NE	U		118037-006	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118037-006	SW846-6020B

Refer to Notes on page 5B-46.

Table 5B-6 *(Continued)*
Summary of TAL Metals plus Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		117978-006	SW846-6020B
24-May-22	Antimony	ND	0.001	0.003	0.006	U		117978-006	SW846-6020B
	Arsenic	0.00262	0.002	0.005	0.010	J		117978-006	SW846-6020B
	Barium	0.0593	0.00067	0.004	2.00			117978-006	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		117978-006	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		117978-006	SW846-6020B
	Calcium	48.7	0.080	0.200	NE			117978-006	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		117978-006	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		117978-006	SW846-6020B
	Copper	ND	0.0003	0.002	1.3	U		117978-006	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		117978-006	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		117978-006	SW846-6020B
	Magnesium	15.6	0.010	0.030	NE			117978-006	SW846-6020B
	Manganese	0.00115	0.001	0.005	NE	J		117978-006	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		117978-006	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		117978-006	SW846-6020B
	Potassium	3.30	0.080	0.300	NE			117978-006	SW846-6020B
	Selenium	0.00214	0.015	0.005	0.050	J		117978-006	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		117978-006	SW846-6020B
	Sodium	49.0	0.080	0.250	NE			117978-006	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		117978-006	SW846-6020B
	Uranium	0.00334	0.000067	0.0002	0.030			117978-006	SW846-6020B
	Vanadium	0.00889	0.0033	0.020	NE	J	0.02U	117978-006	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		117978-006	SW846-6020B

Refer to Notes on page 5B-46.

Table 5B-6 *(Continued)*
Summary of TAL Metals plus Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		118052-006	SW846-6020B
08-Jun-22	Antimony	ND	0.001	0.003	0.006	U		118052-006	SW846-6020B
	Arsenic	0.00227	0.002	0.005	0.010	J		118052-006	SW846-6020B
	Barium	0.0647	0.00067	0.004	2.00			118052-006	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118052-006	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118052-006	SW846-6020B
	Calcium	67.1	0.800	2.00	NE			118052-006	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		118052-006	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118052-006	SW846-6020B
	Copper	ND	0.0003	0.002	1.3	U		118052-006	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118052-006	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		118052-006	SW846-6020B
	Magnesium	20.6	0.010	0.030	NE			118052-006	SW846-6020B
	Manganese	0.00112	0.001	0.005	NE	J		118052-006	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118052-006	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		118052-006	SW846-6020B
	Potassium	4.35	0.080	0.300	NE			118052-006	SW846-6020B
	Selenium	0.00244	0.015	0.005	0.050	J		118052-006	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118052-006	SW846-6020B
	Sodium	65.7	0.800	2.50	NE			118052-006	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118052-006	SW846-6020B
	Uranium	0.00462	0.000067	0.0002	0.030	B		118052-006	SW846-6020B
	Vanadium	0.00362	0.0033	0.020	NE	J		118052-006	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118052-006	SW846-6020B

Refer to Notes on page 5B-46.

Table 5B-6 *(Continued)*
Summary of TAL Metals plus Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		117970-006	SW846-6020B
20-May-22	Antimony	ND	0.001	0.003	0.006	U		117970-006	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	U		117970-006	SW846-6020B
	Barium	0.0653	0.00067	0.004	2.00			117970-006	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		117970-006	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		117970-006	SW846-6020B
	Calcium	72.2	0.400	1.00	NE			117970-006	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		117970-006	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		117970-006	SW846-6020B
	Copper	0.000635	0.0003	0.002	1.3	J	0.002U	117970-006	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		117970-006	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		117970-006	SW846-6020B
	Magnesium	27.4	0.010	0.030	NE			117970-006	SW846-6020B
	Manganese	0.00108	0.001	0.005	NE	J	0.005U	117970-006	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		117970-006	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		117970-006	SW846-6020B
	Potassium	4.21	0.080	0.300	NE			117970-006	SW846-6020B
	Selenium	0.00166	0.015	0.005	0.050	J		117970-006	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		117970-006	SW846-6020B
	Sodium	69.4	0.400	1.25	NE			117970-006	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		117970-006	SW846-6020B
	Uranium	0.00692	0.000067	0.0002	0.030			117970-006	SW846-6020B
	Vanadium	0.00695	0.0033	0.020	NE	B, J	0.02U	117970-006	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		117970-006	SW846-6020B

Refer to Notes on page 5B-46.

Table 5B-6 *(Concluded)*
Summary of TAL Metals plus Uranium Results, Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		117999-006	SW846-6020B
28-Jun-22	Antimony	ND	0.001	0.003	0.006	U		117999-006	SW846-6020B
	Arsenic	0.00288	0.002	0.005	0.010	J		117999-006	SW846-6020B
	Barium	0.0713	0.00067	0.004	2.00			117999-006	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		117999-006	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		117999-006	SW846-6020B
	Calcium	82.5	0.800	2.00	NE			117999-006	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		117999-006	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		117999-006	SW846-6020B
	Copper	0.00108	0.0003	0.002	1.3	J		117999-006	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		117999-006	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		117999-006	SW846-6020B
	Magnesium	25.7	0.010	0.030	NE			117999-006	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		117999-006	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		117999-006	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		117999-006	SW846-6020B
	Potassium	4.96	0.080	0.300	NE	N	J	117999-006	SW846-6020B
	Selenium	0.00248	0.015	0.005	0.050	J		117999-006	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		117999-006	SW846-6020B
	Sodium	78.0	0.800	2.50	NE			117999-006	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		117999-006	SW846-6020B
	Uranium	0.00633	0.000067	0.0002	0.030			117999-006	SW846-6020B
	Vanadium	0.00548	0.0033	0.020	NE	J		117999-006	SW846-6020B
	Zinc	0.00446	0.0033	0.020	NE	J		117999-006	SW846-6020B

Refer to Notes on page 5B-46.

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 2022

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]
AVN-1	Americium-241	-2.03 ± 13.2	21.7	10.5	NE	U	BD	118045-007	EPA 901.1
18-Jul-22	Cesium-137	-4.84 ± 5.58	6.91	3.35	NE	U	BD	118045-007	EPA 901.1
	Cobalt-60	0.557 ± 2.24	4.21	1.93	NE	U	BD	118045-007	EPA 901.1
	Potassium-40	41.2 ± 59.1	37.8	17.2	NE	X	R	118045-007	EPA 901.1
	Gross Alpha	0.85	NA	NA	15 pCi/L	NA	None	118045-008	EPA 900.0
	Gross Beta	4.32 ± 0.851	1.23	0.599	4 mrem/yr			118045-008	EPA 900.0
	Tritium	-52.7 ± 96.1	183	84.5	4 mrem/yr	U	BD	118045-009	EPA 906.0M
LWDS-MW1	Americium-241	13.7 ± 20.9	25.3	12.2	NE	U	BD	118039-007	EPA 901.1
21-Jun-22	Cesium-137	-3.93 ± 3.88	3.61	1.71	NE	U	BD	118039-007	EPA 901.1
	Cobalt-60	4.14 ± 5.76	4.14	1.78	NE	U	BD	118039-007	EPA 901.1
	Potassium-40	27.3 ± 54.0	40.1	18.5	NE	U	BD	118039-007	EPA 901.1
	Gross Alpha	3.35	NA	NA	15 pCi/L	NA	None	118039-008	EPA 900.0
	Gross Beta	4.36 ± 0.990	1.41	0.680	4 mrem/yr			118039-008	EPA 900.0
	Tritium	26.7 ± 78.0	136	63.6	4 mrem/yr	U	BD	118039-009	EPA 906.0M
LWDS-MW2	Americium-241	0.816 ± 12.6	22.6	10.9	NE	U	BD	117982-007	EPA 901.1
30-Jun-22	Cesium-137	-0.120 ± 1.78	3.12	1.46	NE	U	BD	117982-007	EPA 901.1
	Cobalt-60	0.781 ± 2.00	3.75	1.72	NE	U	BD	117982-007	EPA 901.1
	Potassium-40	11.0 ± 60.9	36.2	16.6	NE	U	BD	117982-007	EPA 901.1
	Gross Alpha	2.76	NA	NA	15 pCi/L	NA	None	117982-008	EPA 900.0
	Gross Beta	2.78 ± 0.730	1.12	0.545	4 mrem/yr		J	117982-008	EPA 900.0
	Tritium	67.9 ± 89.6	151	68.1	4 mrem/yr	U	BD	117982-009	EPA 906.0M
TAV-MW2	Americium-241	-2.38 ± 9.69	16.7	8.12	NE	U	BD	118041-007	EPA 901.1
01-Jun-22	Cesium-137	1.29 ± 2.07	3.62	1.73	NE	U	BD	118041-007	EPA 901.1
	Cobalt-60	-0.708 ± 1.93	3.39	1.56	NE	U	BD	118041-007	EPA 901.1
	Potassium-40	3.57 ± 46.5	33.4	15.3	NE	U	BD	118041-007	EPA 901.1
	Gross Alpha	4.04	NA	NA	15 pCi/L	NA	None	118041-008	EPA 900.0
	Gross Beta	4.23 ± 1.06	1.53	0.736	4 mrem/yr	*	J	118041-008	EPA 900.0
	Tritium	13.9 ± 96.0	172	79.6	4 mrem/yr	U	BD	118041-009	EPA 906.0M
TAV-MW3	Americium-241	5.86 ± 12.7	22.6	10.9	NE	U	BD	117986-007	EPA 901.1
19-Jul-22	Cesium-137	0.00550 ± 1.79	3.15	1.48	NE	U	BD	117986-007	EPA 901.1
	Cobalt-60	-0.893 ± 2.03	3.46	1.58	NE	U	BD	117986-007	EPA 901.1
	Potassium-40	49.0 ± 52.6	34.3	15.6	NE	X	R	117986-007	EPA 901.1
	Gross Alpha	4.02	NA	NA	15 pCi/L	NA	None	117986-008	EPA 900.0
	Gross Beta	5.84 ± 1.16	1.74	0.851	4 mrem/yr			117986-008	EPA 900.0
	Tritium	-56.9 ± 92.4	177	81.8	4 mrem/yr	U	BD	117986-009	EPA 906.0M

Refer to Notes on page 5B-46.

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 2022

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	-10.3 ± 13.7	22.5	10.8	NE	U	BD	117996-007	EPA 901.1
29-Jun-22	Cesium-137	1.28 ± 2.26	4.06	1.92	NE	U	BD	117996-007	EPA 901.1
	Cobalt-60	0.919 ± 2.38	4.42	2.03	NE	U	BD	117996-007	EPA 901.1
	Potassium-40	66.3 ± 41.4	66.3	27.8	NE	U	BD	117996-007	EPA 901.1
	Gross Alpha	3.95	NA	NA	15 pCi/L	NA	None	117996-008	EPA 900.0
	Gross Beta	3.66 ± 0.712	0.712	0.967	4 mrem/yr			117996-008	EPA 900.0
	Tritium	71.0 ± 89.7	150	67.8	4 mrem/yr	U	BD	117996-009	EPA 906.0M
TAV-MW5	Americium-241	1.06 ± 4.42	6.78	3.30	NE	U	BD	117989-007	EPA 901.1
31-May-22	Cesium-137	-2.66 ± 4.92	5.91	2.83	NE	U	BD	117989-007	EPA 901.1
	Cobalt-60	-0.548 ± 3.09	4.78	2.19	NE	U	BD	117989-007	EPA 901.1
	Potassium-40	-46.9 ± 64.1	69.8	32.8	NE	U	BD	117989-007	EPA 901.1
	Gross Alpha	3.84	NA	NA	15 pCi/L	NA	None	117989-008	EPA 900.0
	Gross Beta	4.30 ± 0.744	0.994	0.478	4 mrem/yr	*		117989-008	EPA 900.0
	Tritium	47.2 ± 95.1	164	76.1	4 mrem/yr	U	BD	117989-009	EPA 906.0M
TAV-MW7	Americium-241	1.59 ± 16.6	29.5	14.3	NE	U	BD	117974-007	EPA 901.1
23-May-22	Cesium-137	1.02 ± 2.08	3.70	1.75	NE	U	BD	117974-007	EPA 901.1
	Cobalt-60	2.38 ± 2.68	3.90	1.80	NE	U	BD	117974-007	EPA 901.1
	Potassium-40	-23.0 ± 52.2	62.0	29.4	NE	U	BD	117974-007	EPA 901.1
	Gross Alpha	3.18	NA	NA	15 pCi/L	NA	None	117974-008	EPA 900.0
	Gross Beta	6.90 ± 1.02	1.41	0.686	4 mrem/yr			117974-008	EPA 900.0
	Tritium	80.0 ± 85.1	140	63.3	4 mrem/yr	U	BD	117974-009	EPA 906.0M
TAV-MW8	Americium-241	7.51 ± 17.4	28.5	13.7	NE	U	BD	118035-007	EPA 901.1
06-Jun-22	Cesium-137	-2.60 ± 4.22	3.82	1.81	NE	U	BD	118035-007	EPA 901.1
	Cobalt-60	-2.91 ± 4.29	4.26	1.96	NE	U	BD	118035-007	EPA 901.1
	Potassium-40	-1.84 ± 45.6	61.9	29.3	NE	U	BD	118035-007	EPA 901.1
	Gross Alpha	2.04	NA	NA	15 pCi/L	NA	None	118035-008	EPA 900.0
	Gross Beta	3.77 ± 0.991	1.46	0.708	4 mrem/yr		J	118035-008	EPA 900.0
	Tritium	31.1 ± 94.0	165	76.5	4 mrem/yr	U	BD	118035-009	EPA 906.0M
TAV-MW9	Americium-241	-9.53 ± 18.3	25.9	12.5	NE	U	BD	117993-007	EPA 901.1
25-May-22	Cesium-137	0.281 ± 4.55	3.62	1.71	NE	U	BD	117993-007	EPA 901.1
	Cobalt-60	8.54 ± 8.45	8.54	1.85	NE	U	BD	117993-007	EPA 901.1
	Potassium-40	48.3 ± 66.5	35.5	16.3	NE	X	R	117993-007	EPA 901.1
	Gross Alpha	5.30	NA	NA	15 pCi/L	NA	None	117993-008	EPA 900.0
	Gross Beta	5.35 ± 0.924	1.30	0.632	4 mrem/yr	*		117993-008	EPA 900.0
	Tritium	-32.6 ± 82.8	155	71.9	4 mrem/yr	U	BD	117993-009	EPA 906.0M

Refer to Notes on page 5B-46.

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 2022

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-MW10	Americium-241	3.87 ± 17.1	25.9	12.6	NE	U	BD	118043-007	EPA 901.1
09-Jun-22	Cesium-137	1.27 ± 4.43	3.45	1.63	NE	U	BD	118043-007	EPA 901.1
	Cobalt-60	0.404 ± 2.19	4.01	1.86	NE	U	BD	118043-007	EPA 901.1
	Potassium-40	-23.3 ± 45.7	41.7	19.4	NE	U	BD	118043-007	EPA 901.1
	Gross Alpha	4.05	NA	NA	15 pCi/L	NA	None	118043-008	EPA 900.0
	Gross Beta	4.97 ± 0.775	1.01	0.485	4 mrem/yr			118043-008	EPA 900.0
	Tritium	-113 ± 79.6	163	75.6	4 mrem/yr	U	BD	118043-009	EPA 906.0M
TAV-MW11	Americium-241	0.616 ± 13.9	23.1	11.2	NE	U	BD	118050-007	EPA 901.1
07-Jun-22	Cesium-137	1.75 ± 1.98	3.42	1.61	NE	U	BD	118050-007	EPA 901.1
	Cobalt-60	0.409 ± 1.99	3.70	1.70	NE	U	BD	118050-007	EPA 901.1
	Potassium-40	-8.00 ± 54.4	54.6	25.8	NE	U	BD	118050-007	EPA 901.1
	Gross Alpha	0.43	NA	NA	15 pCi/L	NA	None	118050-008	EPA 900.0
	Gross Beta	4.23 ± 1.11	1.73	0.845	4 mrem/yr		J	118050-008	EPA 900.0
	Tritium	-33.3 ± 89.4	168	77.5	4 mrem/yr	U	BD	118050-009	EPA 906.0M
TAV-MW12	Americium-241	-10.4 ± 13.7	20.9	9.96	NE	U	BD	118037-007	EPA 901.1
03-Jun-22	Cesium-137	0.959 ± 2.26	4.08	1.93	NE	U	BD	118037-007	EPA 901.1
	Cobalt-60	2.41 ± 2.58	4.66	2.15	NE	U	BD	118037-007	EPA 901.1
	Potassium-40	35.0 ± 70.7	44.0	20.2	NE	U	BD	118037-007	EPA 901.1
	Gross Alpha	2.32	NA	NA	15 pCi/L	NA	None	118037-008	EPA 900.0
	Gross Beta	6.48 ± 0.958	1.30	0.627	4 mrem/yr			118037-008	EPA 900.0
	Tritium	-12.7 ± 88.0	162	74.8	4 mrem/yr	U	BD	118037-009	EPA 906.0M
TAV-MW13	Americium-241	5.88 ± 8.69	13.9	6.71	NE	U	BD	117978-007	EPA 901.1
24-May-22	Cesium-137	0.506 ± 1.76	3.15	1.48	NE	U	BD	117978-007	EPA 901.1
	Cobalt-60	-0.0679 ± 1.74	3.22	1.46	NE	U	BD	117978-007	EPA 901.1
	Potassium-40	-15.3 ± 38.9	55.1	26.0	NE	U	BD	117978-007	EPA 901.1
	Gross Alpha	4.70	NA	NA	15 pCi/L	NA	None	117978-008	EPA 900.0
	Gross Beta	3.76 ± 0.790	1.11	0.535	4 mrem/yr			117978-008	EPA 900.0
	Tritium	158 ± 97.3	142	64.4	4 mrem/yr		J	117978-009	EPA 906.0M
TAV-MW14	Americium-241	4.31 ± 14.9	26.3	12.8	NE	U	BD	118052-007	EPA 901.1
08-Jun-22	Cesium-137	-0.720 ± 1.75	2.94	1.39	NE	U	BD	118052-007	EPA 901.1
	Cobalt-60	-0.274 ± 1.68	3.05	1.40	NE	U	BD	118052-007	EPA 901.1
	Potassium-40	-23.8 ± 37.7	54.8	26.1	NE	U	BD	118052-007	EPA 901.1
	Gross Alpha	4.87	NA	NA	15 pCi/L	NA	None	118052-008	EPA 900.0
	Gross Beta	4.75 ± 0.894	1.28	0.618	4 mrem/yr			118052-008	EPA 900.0
	Tritium	-0.561 ± 89.0	162	74.8	4 mrem/yr	U	BD	118052-009	EPA 906.0M

Refer to Notes on page 5B-46.

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 2022

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-MW15	Americium-241	9.09 ± 15.9	24.2	11.8	NE	U	BD	117970-007	EPA 901.1
20-May-22	Cesium-137	1.97 ± 6.38	3.57	1.68	NE	U	BD	117970-007	EPA 901.1
	Cobalt-60	-0.928 ± 2.30	4.00	1.83	NE	U	BD	117970-007	EPA 901.1
	Potassium-40	-63.0 ± 53.1	54.3	25.4	NE	U	BD	117970-007	EPA 901.1
	Gross Alpha	6.56	NA	NA	15 pCi/L	NA	None	117970-008	EPA 900.0
	Gross Beta	5.46 ± 1.42	2.18	1.06	4 mrem/yr		J	117970-008	EPA 900.0
	Tritium	21.3 ± 80.0	144	65.1	4 mrem/yr	U	BD	117970-009	EPA 906.0M
TAV-MW16	Americium-241	5.93 ± 16.3	26.7	13.0	NE	U	BD	117999-007	EPA 901.1
28-Jun-22	Cesium-137	1.60 ± 1.94	3.34	1.59	NE	U	BD	117999-007	EPA 901.1
	Cobalt-60	-0.574 ± 1.94	3.43	1.58	NE	U	BD	117999-007	EPA 901.1
	Potassium-40	-11.3 ± 49.5	57.1	27.3	NE	U	BD	117999-007	EPA 901.1
	Gross Alpha	8.06	NA	NA	15 pCi/L	NA	None	117999-008	EPA 900.0
	Gross Beta	6.27 ± 1.61	2.49	1.22	4 mrem/yr		J	117999-008	EPA 900.0
	Tritium	37.4 ± 85.9	151	68.3	4 mrem/yr	U	BD	117999-009	EPA 906.0M

Refer to Notes on page 5B-46.

Table 5B-8
Summary of Field Water Quality Measurements[h], Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

Well ID	Sample Date	Temperature (ºC)	Specific Conductivity (µmho/cm)	Oxidation Reduction Potential (mV)	pH	Turbidity (NTU)	Dissolved Oxygen (% Sat)	Dissolved Oxygen (mg/L)
LWDS-MW1	14-Feb-22	18.43	651.73	186.5	6.91	0.67	94.77	8.00
TAV-MW2	04-Feb-22	15.45	623.63	145.7	7.41	1.12	66.82	6.01
TAV-MW4	10-Feb-22	18.90	533.49	182.5	7.61	1.69	73.84	6.28
TAV-MW8	07-Feb-22	18.71	586.60	115.1	7.54	2.32	74.08	6.26
TAV-MW10	15-Feb-22	19.48	635.47	148.2	7.56	0.43	79.36	6.61
TAV-MW11	08-Feb-22	19.59	571.99	167.4	7.59	0.24	73.61	6.11
TAV-MW12	02-Feb-22	13.80	589.92	149.2	7.28	0.89	65.72	6.18
TAV-MW14	09-Feb-22	19.32	680.22	143.7	7.51	1.71	69.25	5.80
TAV-MW15	28-Jan-22	18.78	759.95	105.9	7.34	0.71	60.49	5.05
TAV-MW16	31-Jan-22	20.20	852.81	127.3	7.24	0.56	45.12	3.66
AVN-1	18-Jul-22	23.15	441.33	89.9	8.18	1.29	38.66	3.15
LWDS-MW1	21-Jun-22	21.46	643.59	189.1	6.97	0.46	88.57	7.21
LWDS-MW2	30-Jun-22	22.04	477.90	121.0	7.67	0.52	63.53	5.30
TAV-MW2	01-Jun-22	22.18	682.52	85.9	7.41	0.78	71.43	5.78
TAV-MW3	19-Jul-22	22.57	595.00	90.9	7.69	2.53	66.34	5.48
TAV-MW4	29-Jun-22	21.77	522.97	94.2	7.58	0.62	75.14	6.31
TAV-MW5	31-May-22	20.68	505.29	117.9	7.70	20.8	69.44	5.75
TAV-MW7	23-May-22	20.91	618.51	143.9	7.42	1.12	3.00	0.22
TAV-MW8	06-Jun-22	22.99	601.34	86.6	7.59	0.50	76.96	6.13
TAV-MW9	25-May-22	20.24	660.83	51.6	7.37	1.15	11.63	0.92
TAV-MW10	09-Jun-22	22.85	669.90	133.7	7.66	0.24	86.83	6.59
TAV-MW11	07-Jun-22	24.10	604.48	103.5	7.60	0.25	79.04	6.05
TAV-MW12	03-Jun-22	22.03	666.39	105.0	7.44	0.89	70.37	5.72
TAV-MW13	24-May-22	19.84	564.22	134.4	7.53	0.45	25.64	1.99
TAV-MW14	08-Jun-22	23.30	690.69	114.3	7.55	1.32	76.00	5.97
TAV-MW15	20-May-22	22.14	805.06	161.4	7.31	0.99	62.60	4.87
TAV-MW16	28-Jun-22	20.68	840.16	94.7	7.26	0.27	43.44	3.66

Refer to Notes on page 5B-46.

Table 5B-8 *(Concluded)*
Summary of Field Water Quality Measurements[h], Technical Area-V Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	15-Aug-22	23.23	739.30	177.4	6.75	1.19	87.42	7.21
TAV-MW2	10-Aug-22	23.45	723.85	194.3	7.42	1.36	75.62	5.63
TAV-MW4	11-Aug-22	22.34	528.88	217.3	7.63	0.90	81.94	6.21
TAV-MW6	12-Aug-22	20.75	632.35	167.4	7.50	2.17	32.07	2.51
TAV-MW8	11-Aug-22	22.94	626.20	117.5	7.58	1.02	74.99	6.07
TAV-MW10	15-Aug-22	21.68	611.93	196.8	7.54	0.30	81.96	6.42
TAV-MW11	09-Aug-22	22.65	613.50	133.2	7.65	0.47	73.21	5.96
TAV-MW12	08-Aug-22	21.56	709.20	119.2	7.46	0.74	73.69	6.10
TAV-MW14	10-Aug-22	23.16	705.30	119.3	7.47	1.12	73.61	5.91
TAV-MW15	02-Aug-22	21.81	784.39	112.6	7.45	0.26	58.66	4.81
TAV-MW16	03-Aug-22	21.59	853.54	96.3	7.41	0.45	44.43	3.66
LWDS-MW1	07-Nov-22	21.36	37.85	165.8	5.44	1.75	118.04	8.59
TAV-MW2	08-Nov-22	20.21	685.84	119.4	7.37	0.90	76.36	5.73
TAV-MW4	01-Nov-22	23.76	533.20	182.5	7.56	0.45	79.02	5.61
TAV-MW6	02-Nov-22	24.30	763.70	171.5	7.36	3.22	31.58	2.27
TAV-MW7	02-Nov-22	20.48	593.88	87.5	7.43	0.79	2.64	0.20
TAV-MW8	11-Nov-22	19.72	583.57	160.0	7.54	0.79	78.69	6.09
TAV-MW10	03-Nov-22	22.51	655.07	173.2	7.45	0.27	79.90	5.94
TAV-MW11	09-Nov-22	20.93	591.90	179.6	7.58	0.20	78.80	5.94
TAV-MW12	07-Nov-22	20.66	686.87	108.7	7.27	0.73	79.30	5.91
TAV-MW14	10-Nov-22	19.89	655.61	161.5	7.43	0.55	76.77	5.91
TAV-MW15	01-Nov-22	20.82	757.54	118.9	7.28	0.21	65.88	4.96
TAV-MW16	03-Nov-22	19.57	811.37	120.5	7.27	0.28	46.45	3.56

Refer to Notes on page 5B-46.

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-6. Activity applies to Table 5B-7.

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-6. MDA applies to Table 5B-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 the total uranium activity.

[c]PQL or Critical Level

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

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.
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 RPD's are not applicable where the concentration falls below the effective PQL.

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.
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., R.B. Baird, A.D. Eaton, and L.S. Clesceri 2012, *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.

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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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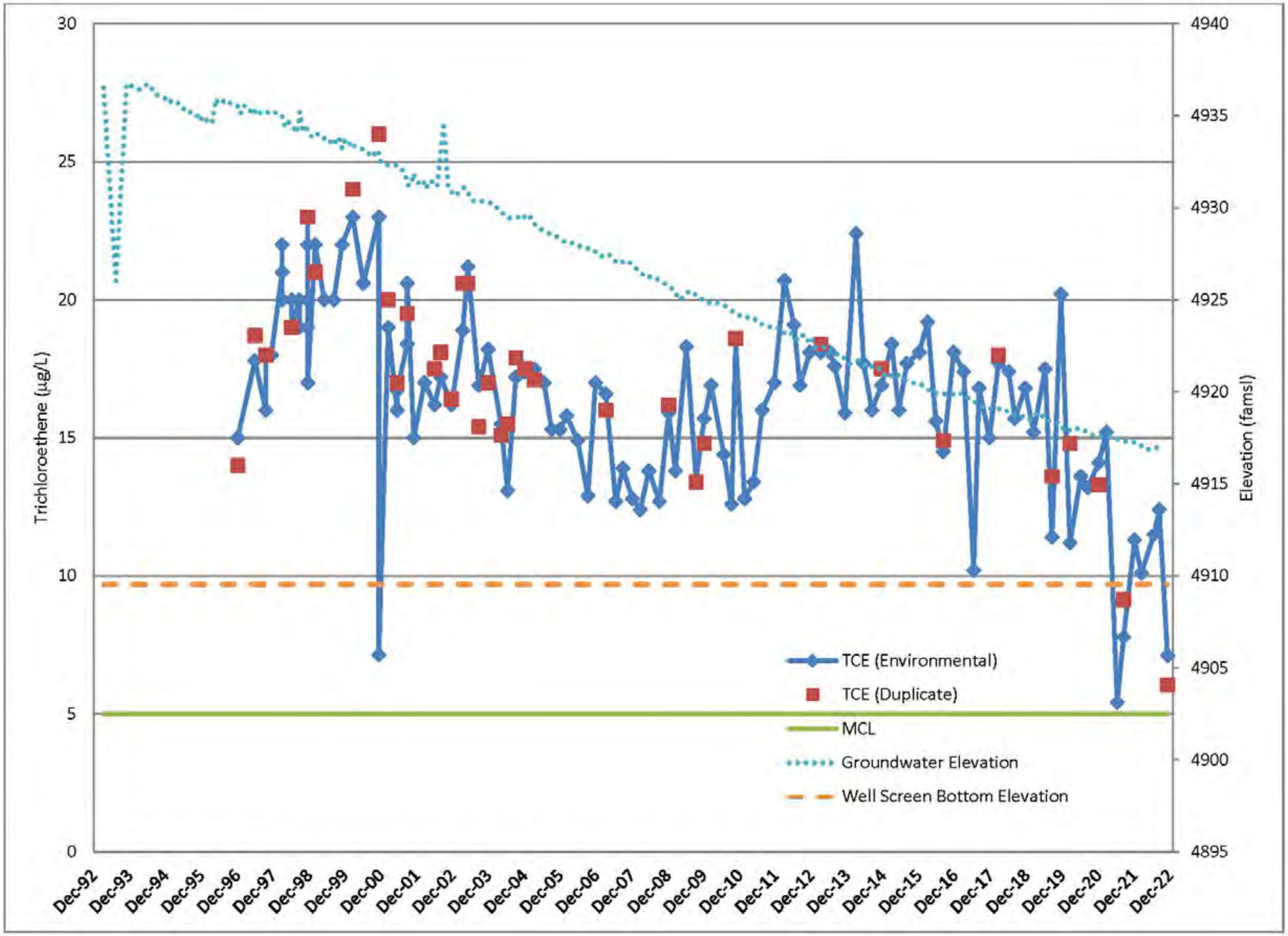

Figure 5C-1
Trichloroethene Concentrations, LWDS-MW1

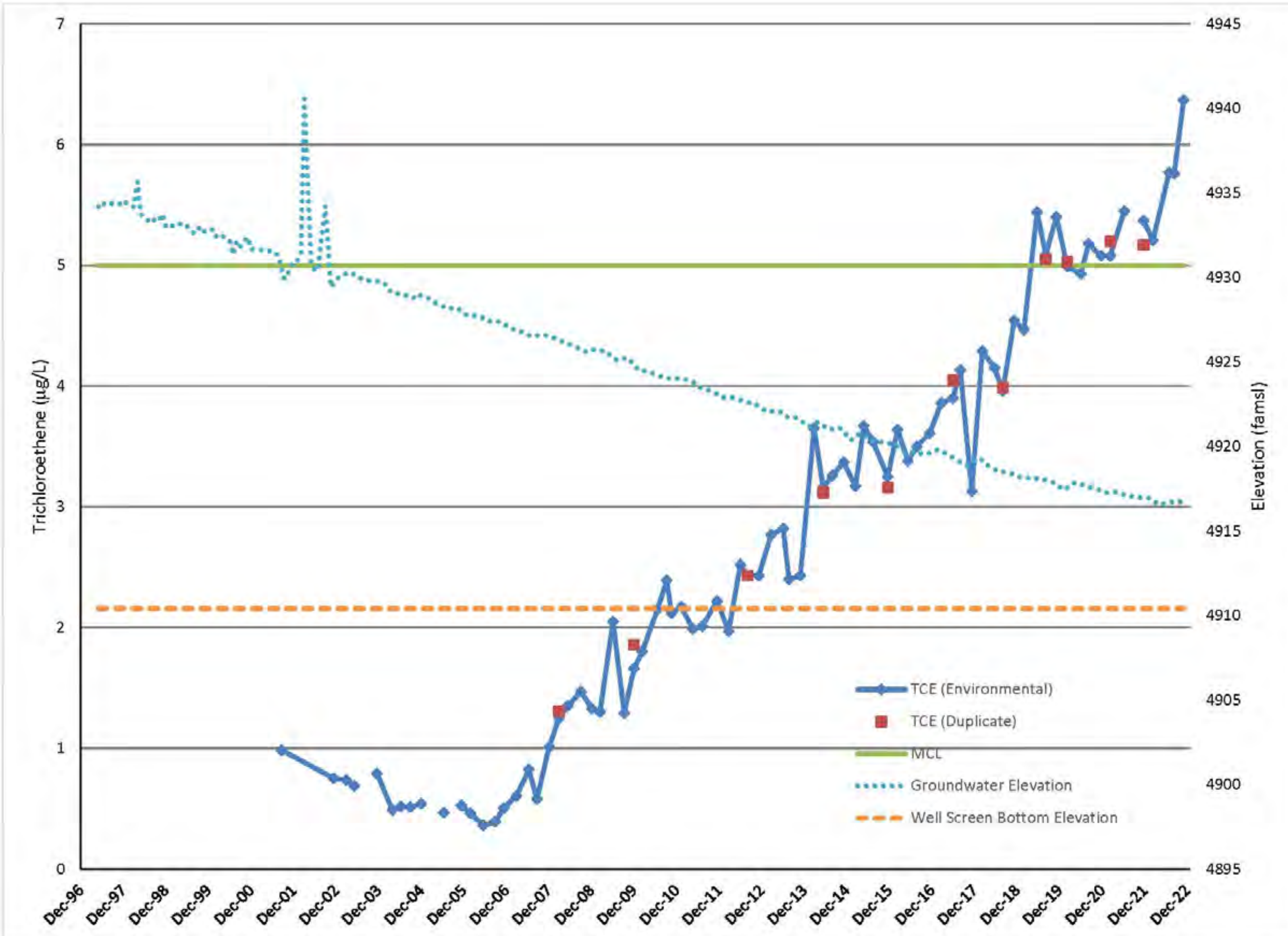

Figure 5C-2
Trichloroethene Concentrations, TAV-MW4

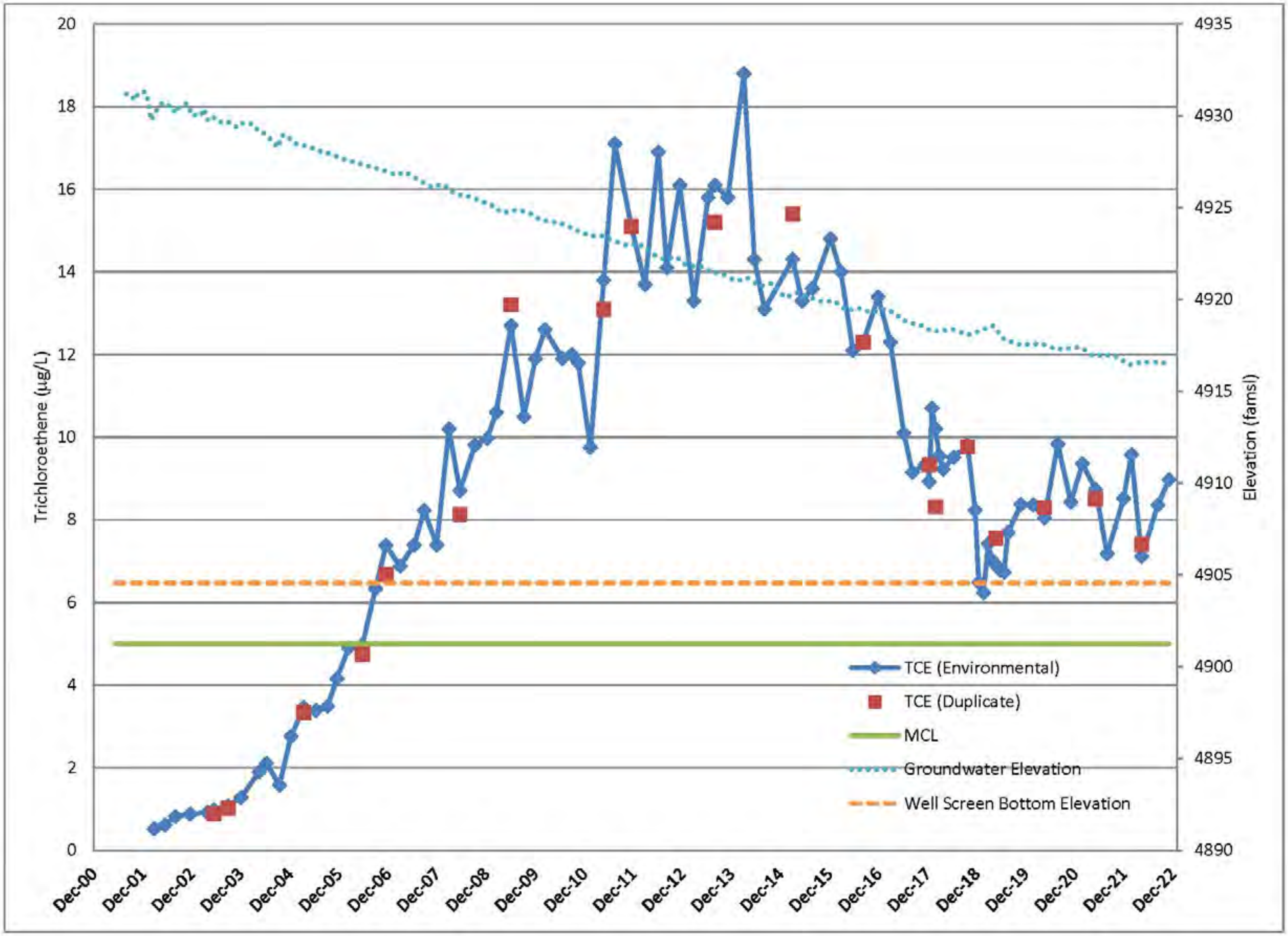

Figure 5C-3
Trichloroethene Concentrations, TAV-MW6

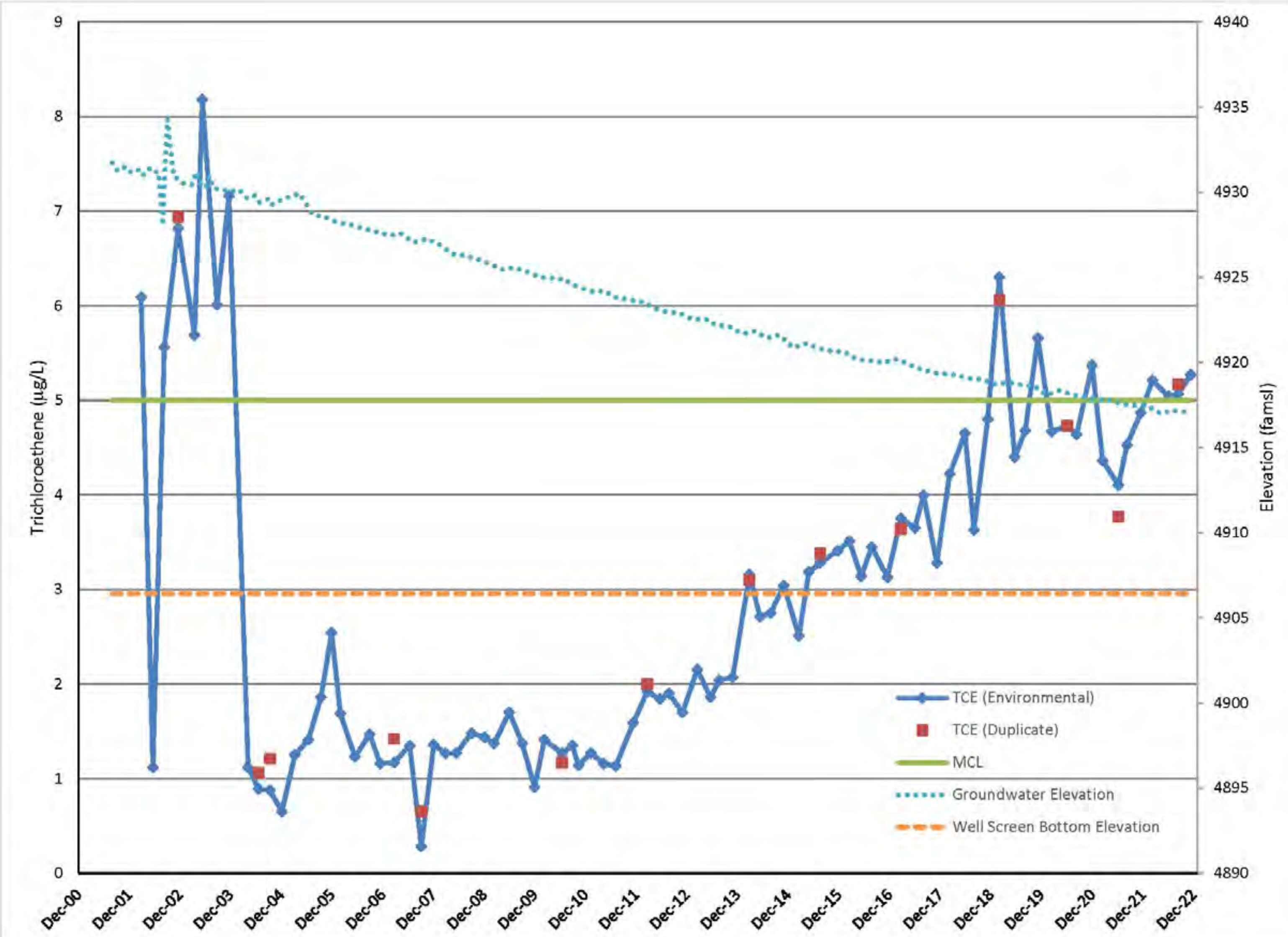

Figure 5C-4
Trichloroethene Concentrations, TAV-MW8

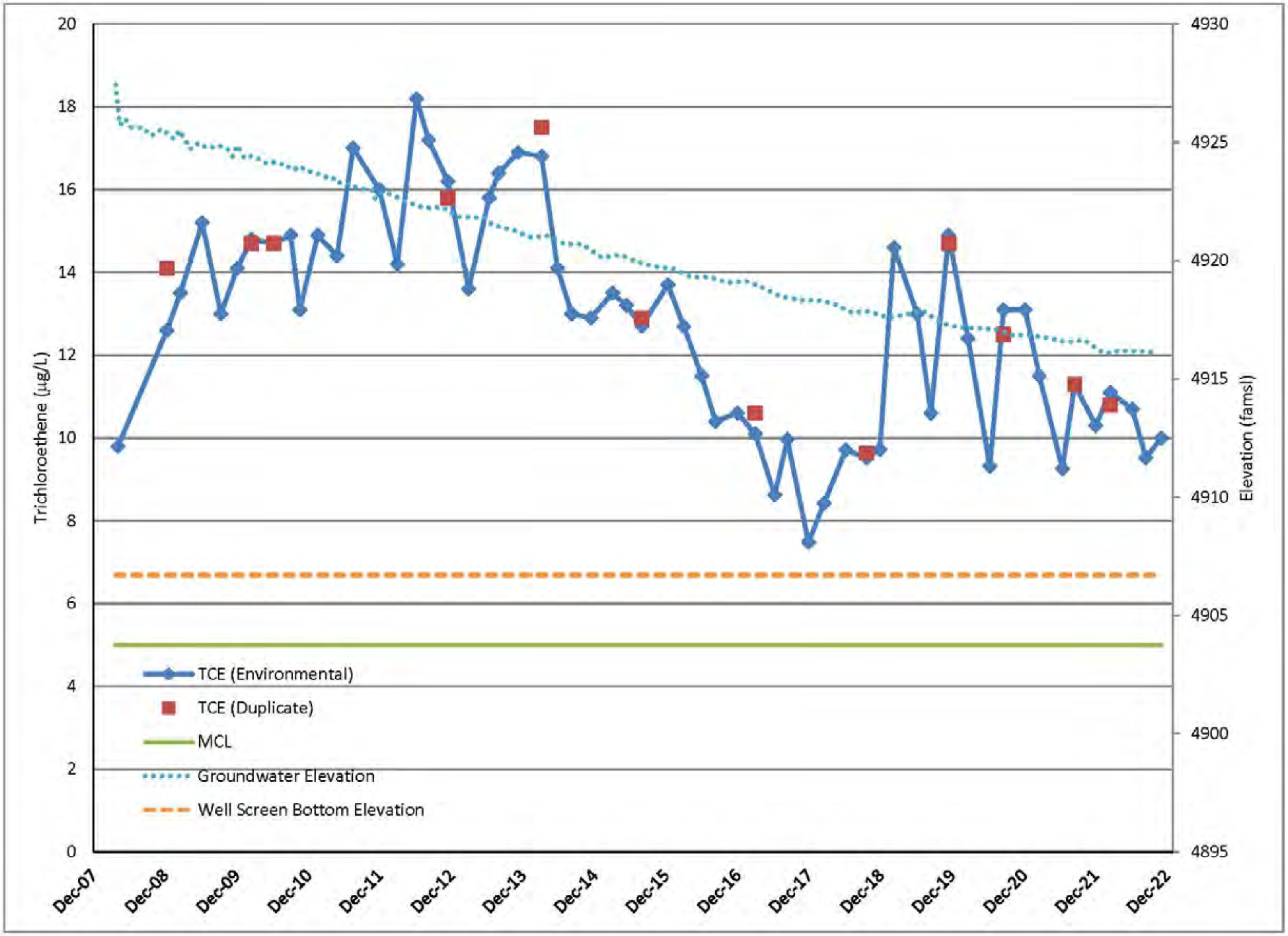

Figure 5C-5
Trichloroethene Concentrations, TAV-MW10

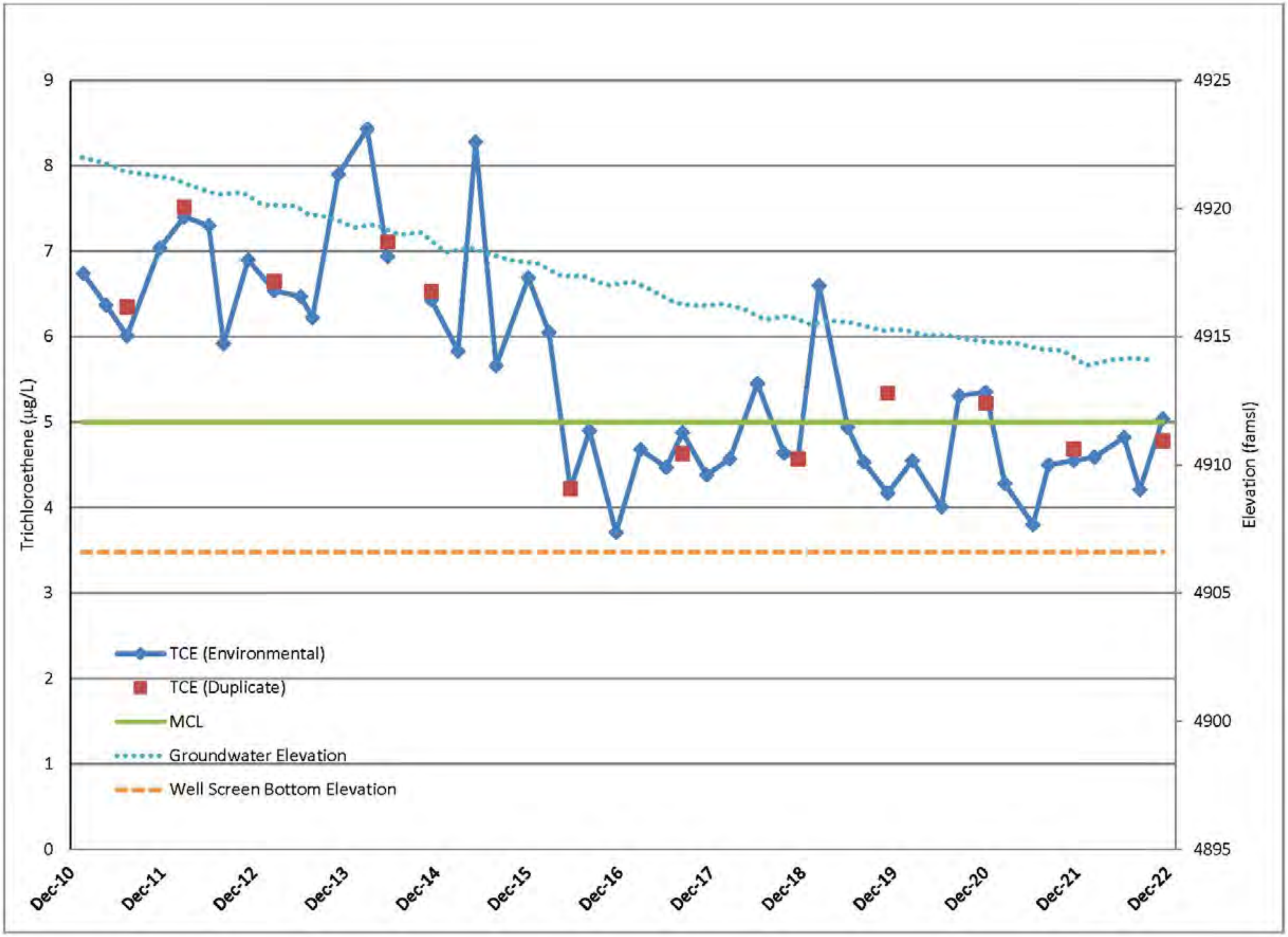

Figure 5C-6
Trichloroethene Concentrations, TAV-MW14

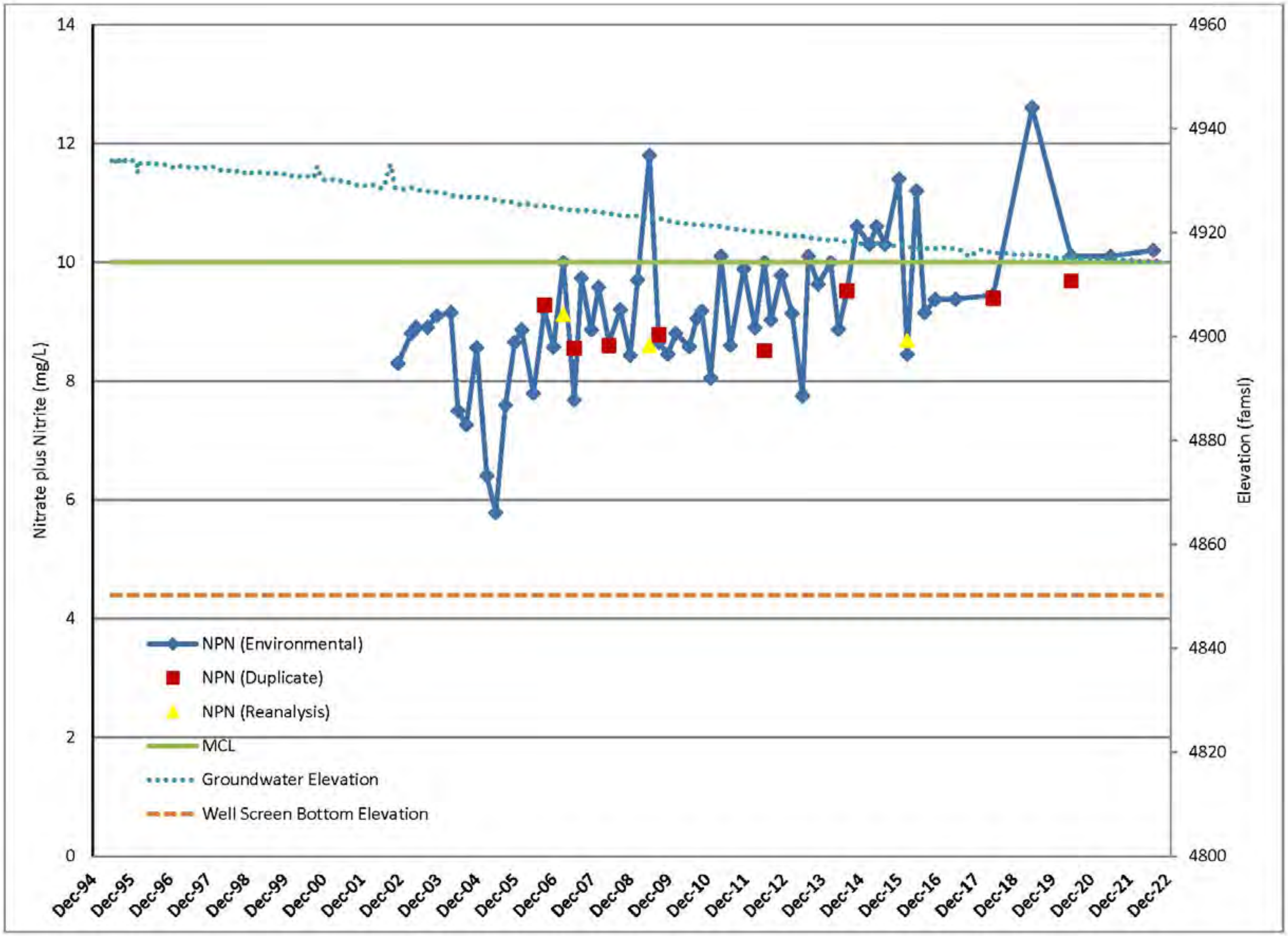

Figure 5C-7
Nitrate Plus Nitrite Concentrations, AVN-1

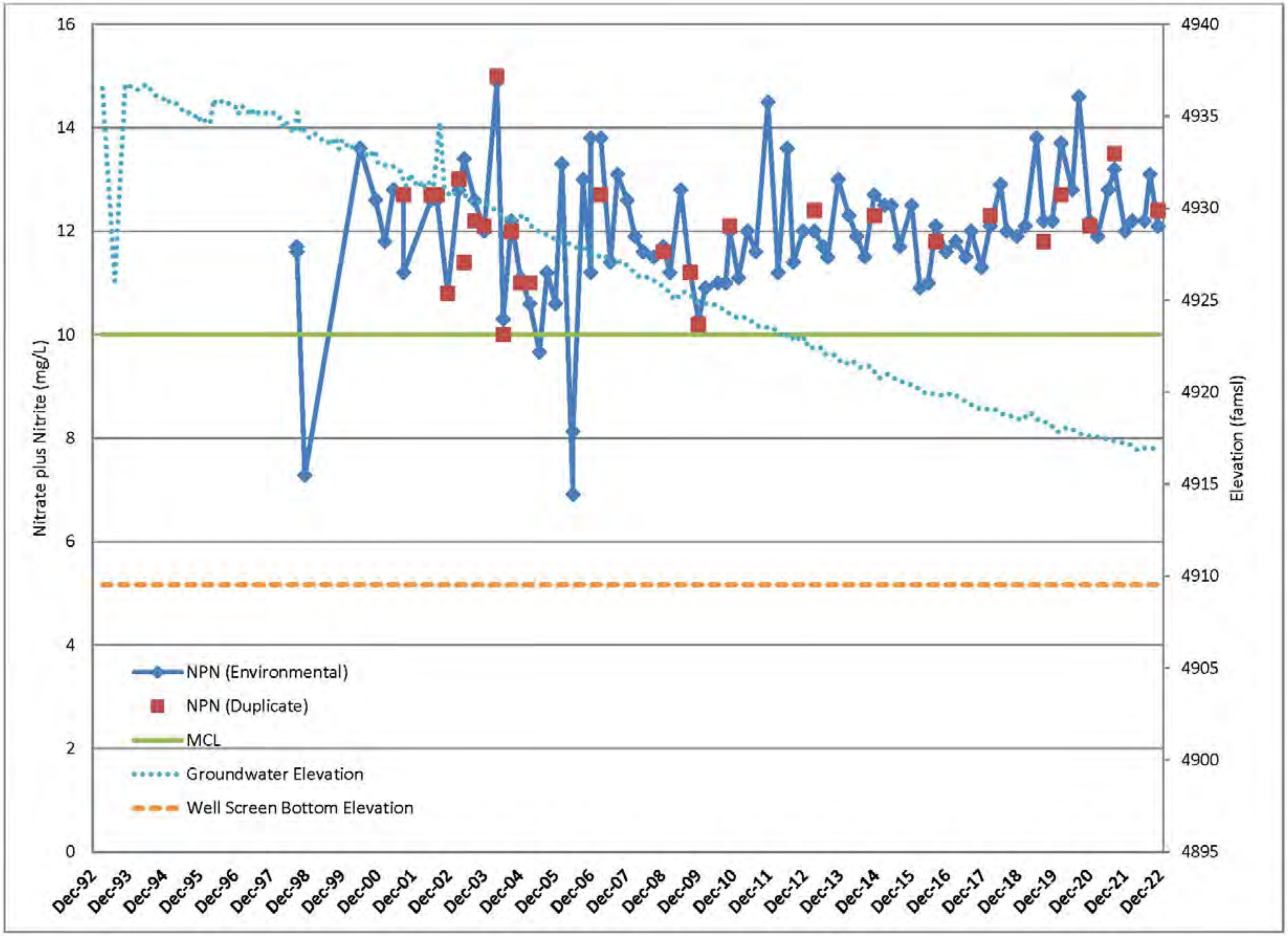

Figure 5C-8
Nitrate Plus Nitrite Concentrations, LWDS-MW1

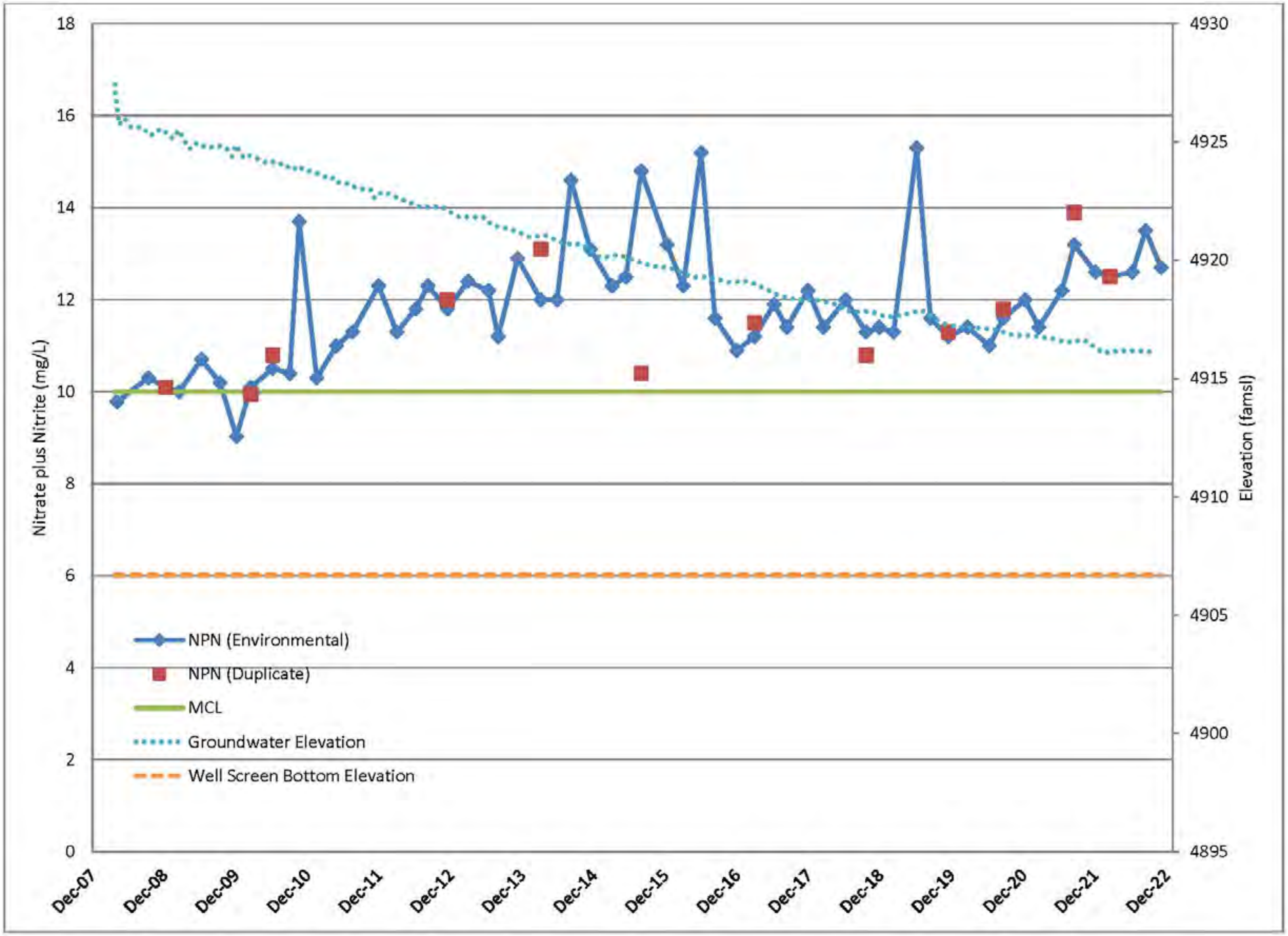

Figure 5C-9
Nitrate Plus Nitrite Concentrations, TAV-MW10

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Attachment 5D
Technical Area-V Hydrographs

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Attachment 5D Hydrographs

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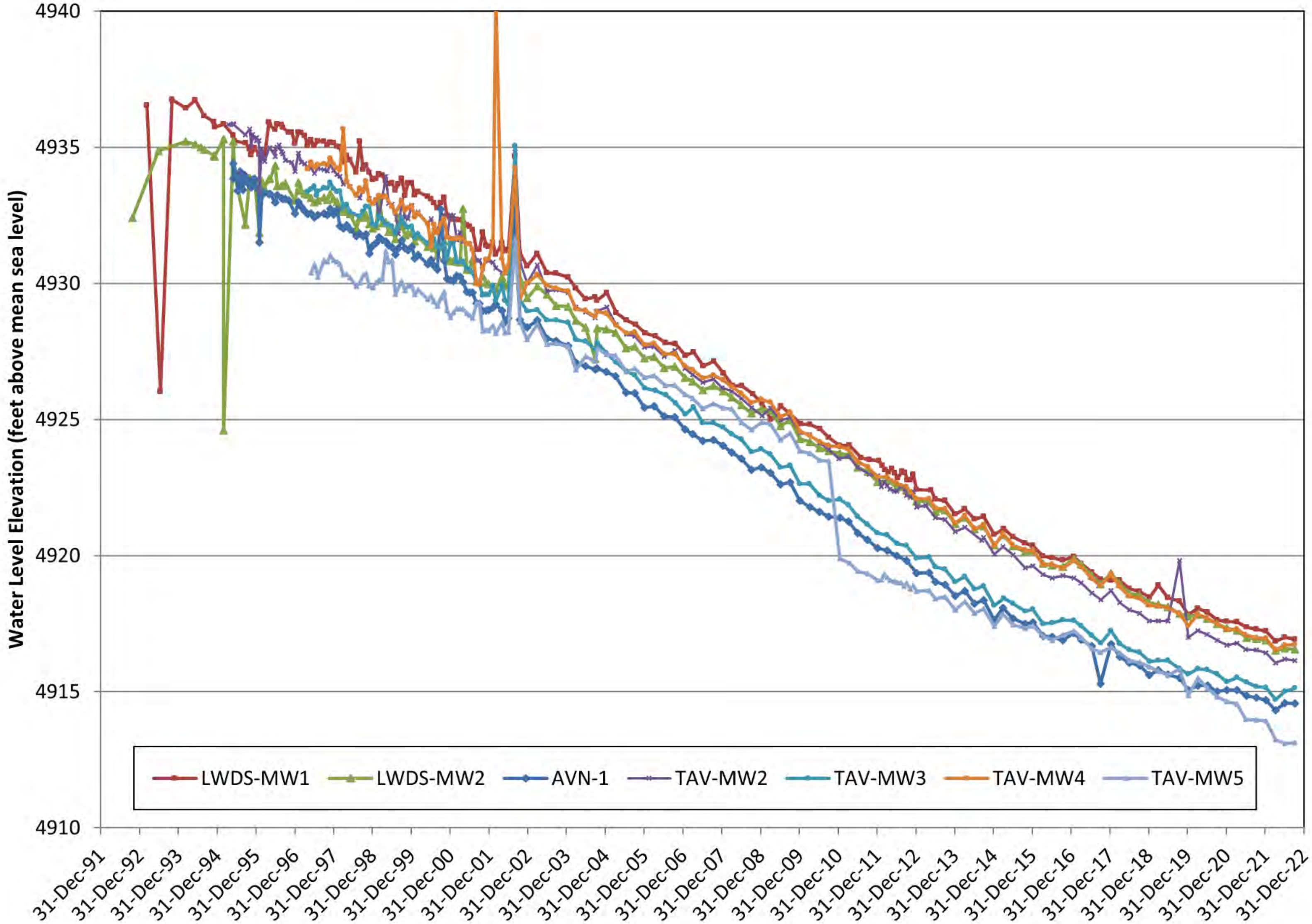

Figure 5D-1
Technical Area-V Groundwater Area of Concern Wells (1 of 3)

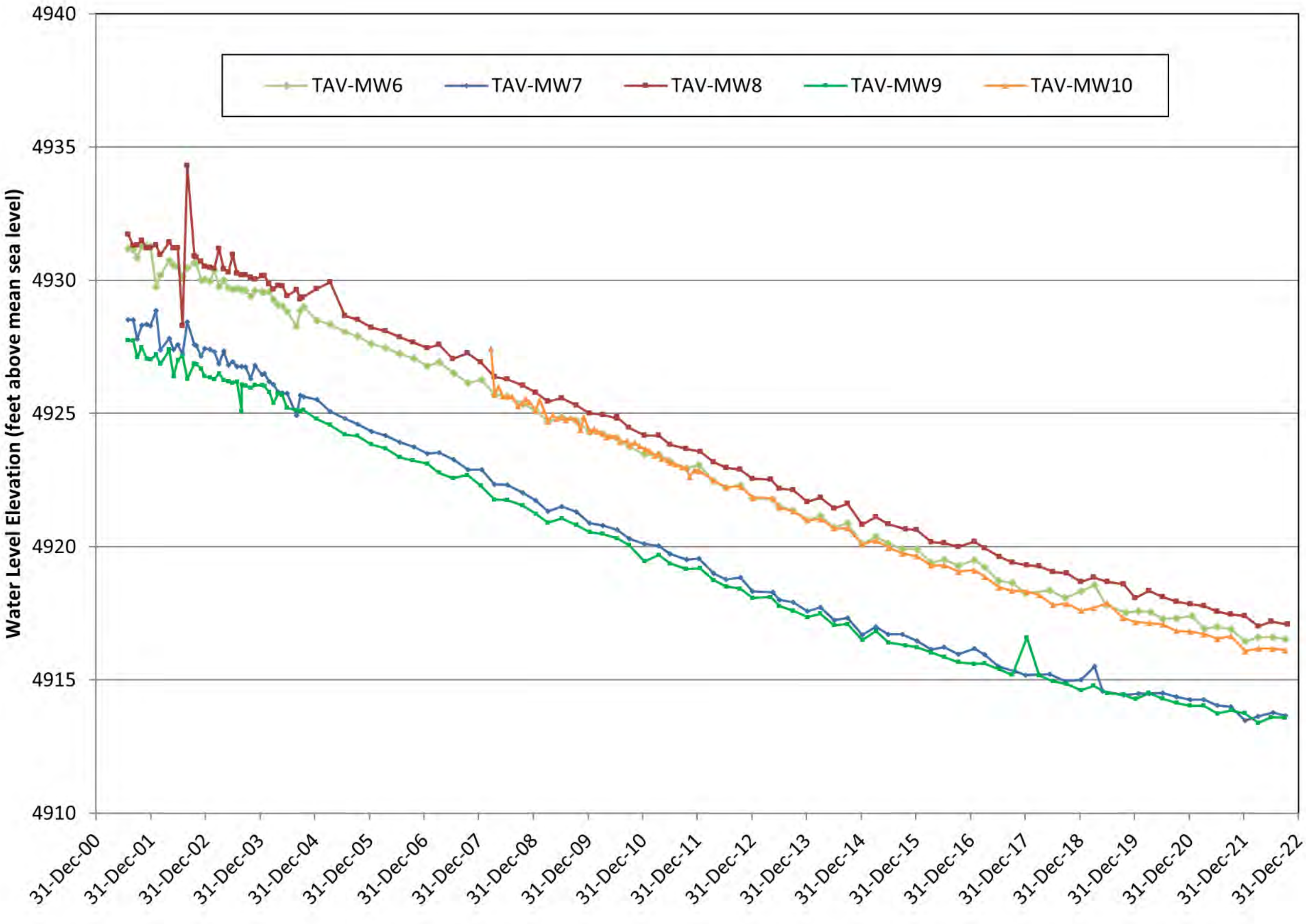

Figure 5D-2
Technical Area-V Groundwater Area of Concern Wells (2 of 3)

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

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Chapter 5.0
Technical Area-V References

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6.0 Tijeras Arroyo Groundwater Area of Concern

6.1 Introduction

The Tijeras Arroyo Groundwater (TAG) Area of Concern (AOC) was identified by the New Mexico Environment Department (NMED) in 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) because two chemicals, nitrate and trichloroethene (TCE), had groundwater concentrations that exceeded the respective U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs). Groundwater monitoring in the TAG AOC has been conducted since 1992. Figure 6-1 shows the TAG AOC at Sandia National Laboratories, New Mexico (SNL/NM). When the Consent Order was issued, nitrate and TCE were specified as constituents of concern (COCs) because (1) the Perched Groundwater System (PGWS) contained concentrations of nitrate and TCE that exceeded the EPA MCLs, and (2) the Regional Aquifer contained nitrate concentrations that exceeded the EPA MCL.

Historical groundwater analyses for the TAG AOC have demonstrated that nitrite concentrations are below laboratory method detection limits (MDLs) and are therefore considered as non-contributory to the analytical results of nitrate plus nitrite (NPN) as nitrogen analyses (SNL February 2018). Therefore, NPN results are used to represent nitrate concentrations in this report. In the TAG AOC, the historical maximum NPN concentration has been 38.4 milligrams per liter (mg/L) and the historical maximum TCE concentration has been 19.7 micrograms per liter (µg/L). The EPA MCLs and State of New Mexico drinking water standards for nitrate (as nitrogen) and TCE are 10 mg/L and 5 µg/L, respectively.

In response to the Consent Order (NMED April 2004), the *Corrective Measures Evaluation Work Plan, Tijeras Arroyo Groundwater* was submitted to the NMED Hazardous Waste Bureau (HWB) in July 2004 (SNL July 2004). In April 2005, U.S. Department of Energy/National Nuclear Security Administration (DOE/NNSA) and SNL/NM personnel submitted a *Corrective Measures Evaluation (CME) Report* (SNL August 2005), but the NMED HWB did not finalize its review of that document. In 2016, DOE/NNSA and SNL/NM personnel submitted a combined *Tijeras Arroyo Groundwater Current Conceptual Model and Corrective Measures Evaluation Report* (SNL December 2016), referred to hereafter as the TAG CCM/CME Report. The NMED HWB issued a disapproval letter in May 2017 (NMED HWB May 2017). The Revised TAG CCM/CME Report was submitted to the NMED HWB in 2018 (SNL February 2018). The revised report addressed: (1) the issues presented in the NMED HWB May 2017 disapproval letter, (2) findings from the August 2017 meeting held between NMED HWB, DOE/NNSA, and SNL/NM personnel, and (3) proposed remedial alternatives for the elevated nitrate concentrations in the PGWS. In August 2022, the NMED HWB issued a Public Notice (NMED HWB August 2022) that initiated a public comment period concerning the Revised TAG CCM/CME Report (SNL February 2018). In 2023, SNL/NM personnel will prepare a Corrective Measures Implementation (CMI) Plan in accordance with the monitoring specified in the Revised TAG CCM/CME Report (SNL February 2018). That report proposed monitored natural attenuation (MNA) for the elevated nitrate concentrations in the PGWS. The MNA remedy was endorsed by the NMED HWB Public Notice (NMED HWB August 2022).

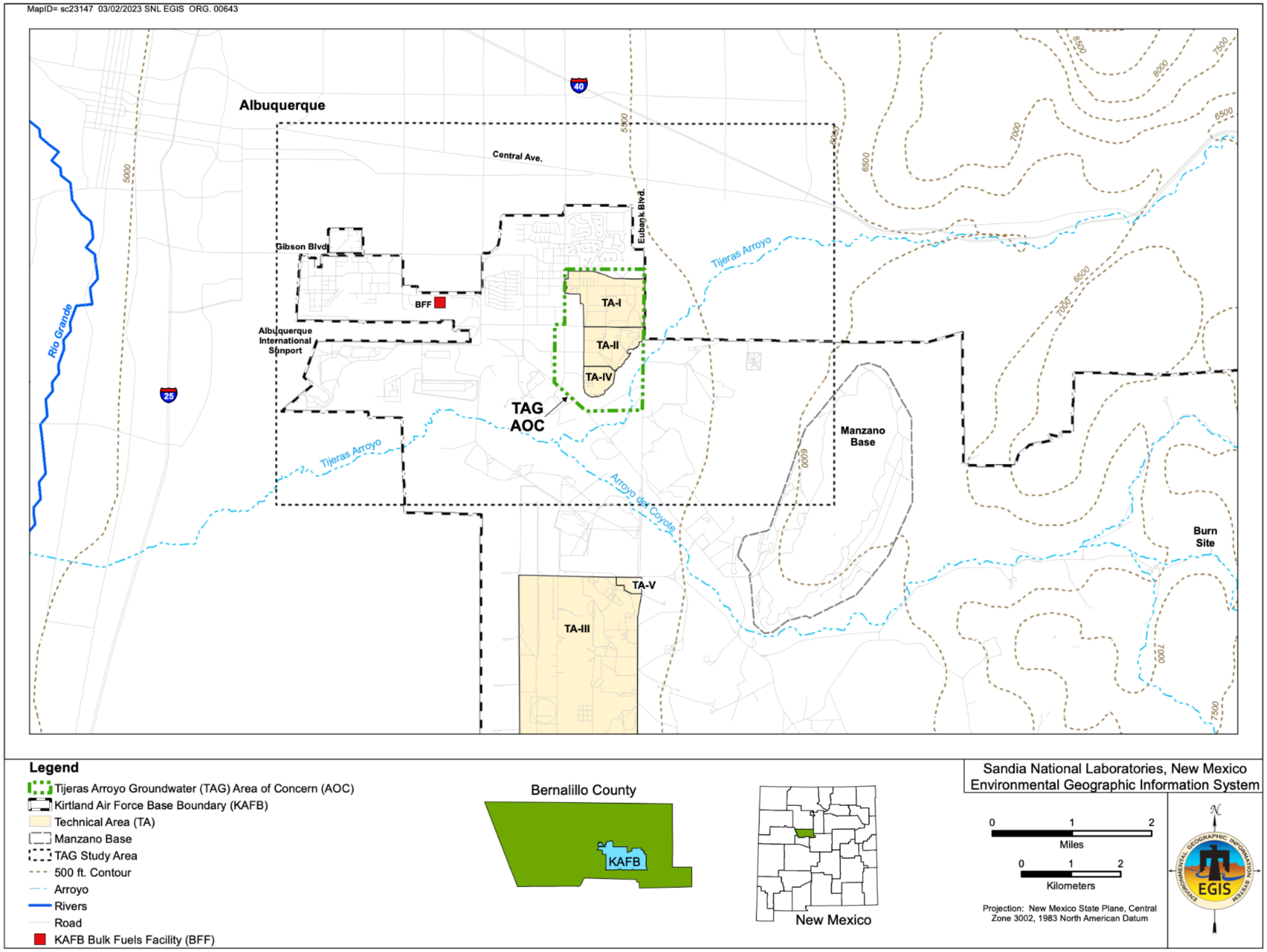


Figure 6-1
Location of the Tijeras Arroyo Groundwater Area of Concern

6.1.1 Location

The TAG AOC covers approximately 1.82 square miles (sq mi) and contains three Technical Areas (TAs) (TA-I, TA-II, and TA-IV). The TAG AOC is analogous with the previously used term "TAG Area of Responsibility" as discussed in the Corrective Measures Evaluation Report for Tijeras Arroyo Groundwater (SNL August 2005). Figure 6-1 shows the surrounding TAG Study Area of approximately 40 sq mi that is situated in the north-central portion of Kirtland Air Force Base (KAFB) and the southern portion of the City of Albuquerque (COA). From October 2000 to October 2003, the NMED HWB directed a series of twenty High Performing Team meetings that served as a forum for discussing groundwater issues in the TAG Study Area. The facilities identified by the High Performing Team as potentially responsible for groundwater contamination within the TAG Study Area included the DOE/NNSA, SNL/NM, KAFB, the Albuquerque Bernalillo County Water Utility Authority (ABCWUA), and the COA.

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 three TAs are KAFB undeveloped open spaces, an active landfill, closed landfills, emergency response training areas, and the KAFB Tijeras Arroyo Golf Course. COA residential areas and the closed COA Eubank Landfill are located along the northern boundary of KAFB.

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 much greater extent by the military. 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 to be known as Sandia Base. After World War II, the old Oxnard Field runways and an extensive grid of taxiways were used for parking aircraft (SNL February 2018). Starting in 1946, the War Assets Administration managed the sale or 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 identified 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. The primary management and administrative operations have historically been conducted at several TA-I office buildings. 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 (ER) Operations has conducted numerous environmental and groundwater investigations in the TAG AOC. The historical timeline (Attachment 6A, Table 6A-1) lists the field investigations concerning groundwater quality in the TAG AOC. The majority of the SNL/NM ER Operations efforts have consisted of site-specific investigations that were conducted in support of Solid Waste Management Unit (SWMU) assessments involving potential soil contamination. Where required, contaminated soil and debris were excavated and removed. The NMED HWB has granted Corrective Action Complete status to all SWMUs in the TAG AOC. Only the groundwater issue remains.

Both KAFB and COA have also completed numerous groundwater investigations near the TAG AOC. The initial findings were incorporated in the *Tijeras Arroyo Groundwater Investigation Report* (SNL November 2005). KAFB has issued nitrate abatement reports (KAFB December 2015, KAFB January 2019) describing potential nitrate release sites and groundwater monitoring data. As a separate endeavor, KAFB is remediating the Bulk Fuels Facility that is located approximately 1.6 miles west of the TAG AOC (Figure 6-1). Petroleum hydrocarbons (primarily aviation gasoline and jet fuel), associated with the Bulk Fuels Facility do not affect groundwater quality beneath the TAG AOC.

Beginning in 1992, groundwater quality has been evaluated as part of the TA-II investigation with the installation of groundwater monitoring wells in the central portion of the TAG AOC. During this initial investigation, 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. In October 1994, the first detection of TCE in a groundwater sample from an SNL/NM well near Tijeras Arroyo was reported at monitoring well TA2-W-01, which is completed in the PGWS. Subsequent drilling activities identified that a localized Merging Zone of limited lateral extent was present between the PGWS and the Regional Aquifer. The Conceptual Site Model (CSM) in Section 6.1.7 describes the hydrogeologic setting in greater detail.

To date (end of calendar year [CY] 2022), 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. 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. The maximum NPN concentration for the Regional Aquifer exclusive of the Merging Zone was 4.24 mg/L and corresponded to the June 2019 environmental sample collected from monitoring well TJA-3.

To date (end of CY 2022), the maximum TCE concentration for the PGWS has been 19.7 µg/L and corresponded to the environmental sample collected in August 2022 from monitoring well TA2-W-26. The occurrence of TCE above the EPA MCL at monitoring well TA2-W-26 is discussed in Section 6.6. TCE has historically not been reported above the MDLs (0.09 - 0.6 µg/L) at Merging Zone well TJA-4. TCE has not exceeded the EPA MCL in the Regional Aquifer. The maximum TCE concentration of 4.27 µg/L for the Regional Aquifer corresponds to the August 2013 environmental sample collected from monitoring well TJA-3.

6.1.4 Current Monitoring Network

During CY 2022, SNL/NM personnel collected groundwater samples at 21 monitoring wells located in the TAG AOC (Table 6-1). Variances from the sampling frequency are discussed in Section 6.8. As shown on Figure 6-2, water levels were measured by SNL/NM personnel at 27 monitoring wells. Additional monitoring wells owned by KAFB and the COA are utilized by the TAG investigation for characterizing the hydrogeologic setting.

Table 6-1
Groundwater Monitoring Conducted at the Tijeras Arroyo Groundwater Area of Concern During Calendar Year 2022

Well ID	Installation Year	Sampling Frequency	WQ	WL	Comments
Eubank-1	1988			✓	Regional Aquifer (COA owned well)
PGS-2	1995	A	n.s.	✓	Regional Aquifer
TA1-W-01	1997	A	✓	✓	Regional Aquifer
TA1-W-02	1998	A	✓	✓	Regional Aquifer
TA1-W-03	1998	A	n.s.	✓	Perched Groundwater System
TA1-W-04	1998	A	✓	✓	Regional Aquifer
TA1-W-05	1998	A	✓	✓	Regional Aquifer
TA1-W-06	1998	SA	✓	✓	Perched Groundwater System
TA1-W-07	1998			✓	Perched Groundwater System
TA1-W-08	2001	A	✓	✓	Perched Groundwater System
TA2-NW1-325	1993			✓	Perched Groundwater System
TA2-NW1-595	1993	A	✓	✓	Regional Aquifer
TA2-W-01	1994	SA	✓	✓	Perched Groundwater System
TA2-W-19	1995	Q	✓	✓	Perched Groundwater System
TA2-W-24	1998	spec.	✓	✓	Regional Aquifer
TA2-W-25	1997	spec.	✓	✓	Regional Aquifer
TA2-W-26	1998	Q	✓	✓	Perched Groundwater System
TA2-W-27	1998	SA	✓	✓	Perched Groundwater System
TA2-W-28	2014	Q	✓	✓	Perched Groundwater System, replaced TA2-SW1-320
TJA-2	1994	Q	✓	✓	Perched Groundwater System
TJA-3	1998	Q	✓	✓	Regional Aquifer
TJA-4	1998	Q	✓	✓	Regional Aquifer – Merging Zone
TJA-5	1998	spec.	✓	✓	Perched Groundwater System
TJA-6	2001	SA	✓	✓	Regional Aquifer
TJA-7	2001	Q	✓	✓	Perched Groundwater System
WYO-3	2001	A	✓	✓	Regional Aquifer, replaced WYO-1
WYO-4	2001	Q	n.s.	✓	Perched Groundwater System, replaced WYO-2
Total	----	24	21	27	Both water-bearing units

Nptes:
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). Wells screened in the Regional Aquifer are not shaded.
Check mark indicates WQ sample or WL measurement was conducted by SNL/NM personnel.
Sampling frequency is used by SNL/NM personnel: Q = quarterly, SA = semiannual, A = annual.
The special (spec.) wells were sampled voluntarily by SNL/NM personnel. The wells are not listed in an SNL/NM work plan.
COA personnel collect a water sample at Eubank-1 on an approximately annual basis.

COA = City of Albuquerque
ID = identifier
n.s. = not sampled (as a variance from an SNL/NM work plan)
PGS = Parade Ground South
WL = water level
SNL/NM = Sandia National Laboratories, New Mexico
TA1-W = Technical Area-I (Well)
TA2-NW = Technical Area-II (Northwest)
TA2-SW = Technical Area-II (Southwest)
TA2-W = Technical Area-II (Well)
TJA = Tijeras Arroyo
WQ = water quality
WYO = Wyoming

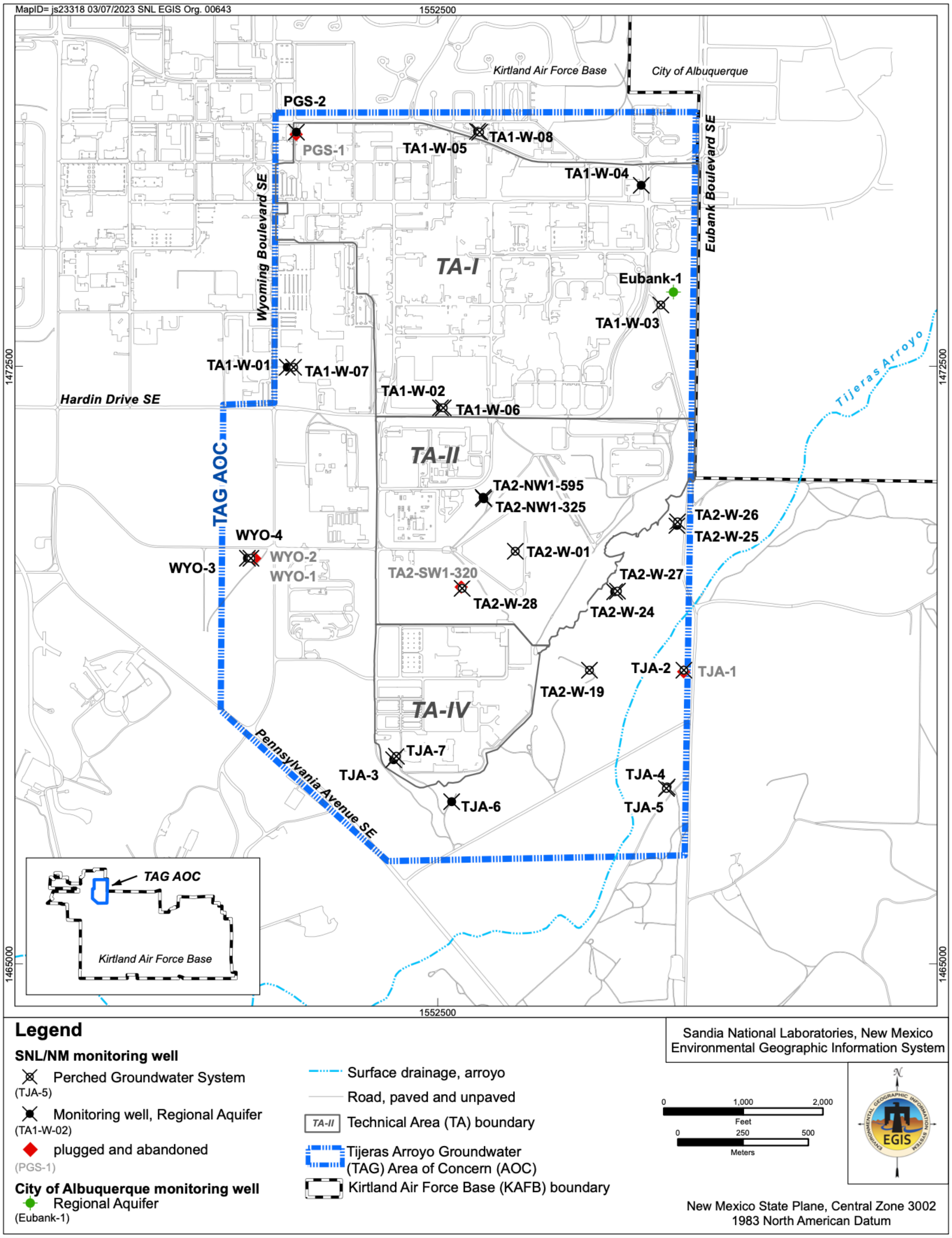


Figure 6-2
Groundwater Monitoring Wells Owned by Sandia National Laboratories, New Mexico and the City of Albuquerque in the Tijeras Arroyo Groundwater Area of Concern

6.1.5 Summary of Calendar Year 2022 Activities

The following activities were conducted by SNL/NM personnel for the TAG AOC during CY 2022:

- Water level measurements were obtained from 27 monitoring wells (Table 6-1). Hydrographs through CY 2022 are presented in Attachment 6B.
- Groundwater samples were collected at 21 monitoring wells.
- The first quarter (January/February/March CY 2022), third quarter (July/August/September CY 2022), and fourth quarter (October/November/December CY 2022) sampling events were conducted on schedule.
- The second quarter (April/May/June CY 2022) groundwater sampling event was delayed because KAFB management implemented Stage 1 fire restrictions due to extremely dry weather. TAG monitoring wells located on the Tijeras Arroyo floodplain are surrounded by sparse vegetation that could have been ignited by vehicle exhaust systems. The second quarter sampling was conducted in July/August 2022.
- Quarterly groundwater samples were collected at seven monitoring wells (TA2-W-19, TA2-W-26, TA2-W-28, TJA-2, TJA-3, TJA-4, and TJA-7) in February/March 2022 (first quarter CY 2022 event), July/August 2022 (delayed second quarter CY 2022 event), August/September 2022 (third quarter CY 2022 event), and November/December 2022 (fourth quarter CY 2022 event).
- Semiannual groundwater samples were collected at four monitoring wells (TA1-W-06, TA2-W-01, TA2-W-27, and TJA-6) in February 2022 and August/September 2022.
- Annual groundwater samples were collected at 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 2022.
- Three monitoring wells (TA2-W-24, TA2-W-25, and TJA-5) were voluntarily sampled in anticipation of the CMI Plan being prepared in accordance with the Revised TAG CCM/CME Report (SNL February 2018). Earlier work plans did not require these wells to be sampled. The three wells had been infrequently sampled prior to 2018. The voluntary sampling was conducted in August/September 2022.
- Groundwater sample collection was not conducted at three monitoring wells. Monitoring well WYO-4 was not sampled because responsibility for the well was transferred to the KAFB Environmental Restoration Program (ERP) in 2018 (Section 6.2). The collection of groundwater samples at wells TA1-W-03 (dry) and PGS-2 (grout intrusion) was not attempted (Section 6.8).
- Analytical results for groundwater samples were validated and summarized (Attachment 6C).
- Concentration trend plots for groundwater samples were prepared (Attachment 6D).

6.1.6 Summary of Future Activities

The following activities are anticipated for the TAG AOC during the next reporting period (CY 2023):

- Measurement of water levels at 27 monitoring wells.
- Collection of groundwater samples at 21 monitoring wells.
- Preparation and submittal of the TAG AOC CMI Plan.

6.1.7 Conceptual Site Model

The Revised TAG CCM/CME Report (SNL February 2018) presented a CSM for the vicinity of the TAG AOC that describes the contaminant release sites, the geological and hydrogeological setting, and the distribution and migration of contaminants in the subsurface. The CSM incorporated previous studies conducted by Van Hart (June 2001 and June 2003). Revisions to the CCM/CME focused on the inclusion of stratigraphic cross-sections, geophysical logs, and lithologic descriptions for cores and cuttings obtained from boreholes associated with well installations. The TAG AOC is underlain by two primary water-bearing units of interest: (1) the PGWS, and (2) the underlying Regional Aquifer. The CSM (Figure 6-3) was updated in 2020 in order to better depict the Merging Zone near the Tijeras Arroyo Golf Course and the isolated lenses of saturation that have water elevations that do not contour readily with either the PGWS or the Regional Aquifer. Also, the Sewer Interceptor Line beneath the active Tijeras Arroyo channel south of the TAG AOC was removed from the CSM figure because a 2017 video-camera survey showed that the ABCWUA Sewer Interceptor Line was not suspected of leaking.

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

- The TAG AOC covers approximately 1.82 sq mi.
- The PGWS has an extent of approximately 4.43 sq mi and overlies the Regional Aquifer.
- The PGWS merges with the Regional Aquifer near the Tijeras Arroyo Golf Course.
- The Tijeras Arroyo channel crosses KAFB and trends along the southern edge of the TAG AOC.
- The former KAFB Sewage Lagoons site (WP-26) is located to the west of the TAG AOC.
- The SNL/NM SWMU 46 waste-water outfall is located on the southern edge of the TAG AOC.
- The SNL/NM TA-II Discharge site is located near the center of the TAG AOC.
- Possibly ongoing KAFB and SNL/NM infrastructure leaks at sewer and water lines.
- One golf course is located on KAFB and another is located off KAFB.

Alluvial-fan sediments of the Santa Fe Group underlie the TAG AOC. The sediment layers are not laterally continuous and consist mostly of silty sands, clayey layers, and poorly sorted gravels. The Santa Fe Group underlying the TAG AOC contains two water-bearing units: (1) the PGWS and (2) the Regional Aquifer. Beneath the TAG AOC, the depth to water for the PGWS ranges from approximately 270 to 320 ft bgs. Depth to water for the Regional Aquifer ranges from approximately 410 to 560 ft bgs. The two water-bearing zones are separated by a Perching Horizon and an approximately 200-ft thick sequence of unsaturated sediments. A localized Merging Zone that partially extends under the southeast corner of the TAG AOC hydraulically connects the two water-bearing zones.

Table 6-2 summarizes the hydrogeologic characteristics of the two water-bearing units (the PGWS and the Regional Aquifer). Across the TAG AOC, the saturated thickness of the PGWS ranges from approximately 7 to 20 ft in the northern and central portions on the TAG AOC. In the far southeast corner, the saturated thickness reaches approximately 40 ft. The thickness estimates are based upon October 2015 water levels and the interpretation of downhole geophysical logs. Across the TAG AOC, the estimated thickness of the Perching Horizon beneath the PGWS ranges from 4 to 11 ft based upon correlation of downhole geophysical logs and lithologic descriptions (SNL February 2018). The average thickness is approximately seven ft. The Perching Horizon is composed of a layer of low permeability sediments (mostly clay) that dip to the southeast at approximately one degree.

Balleau Groundwater Inc. (BGW September 2002) used a 3-dimensional, numerical, variably saturated flow model (FEMWATER) of the PGWS to study recharge in the TAG AOC vicinity. Various simulations were run to determine the rate and volumes for several potential sources of recharge to the PGWS over the 12.5-sq mi modeling grid. The most significant recharge sources were the former KAFB Sewage Lagoons, leaking water lines, ancestral arroyos, and infiltration of irrigation water used at the Tijeras Arroyo Golf Course. The modeling suggested that the PGWS has a net discharge (drains and merges) to the Regional Aquifer. The lateral extent of the PGWS is shrinking due to the former KAFB Sewage Lagoons and other anthropogenic water sources being taken out of service.

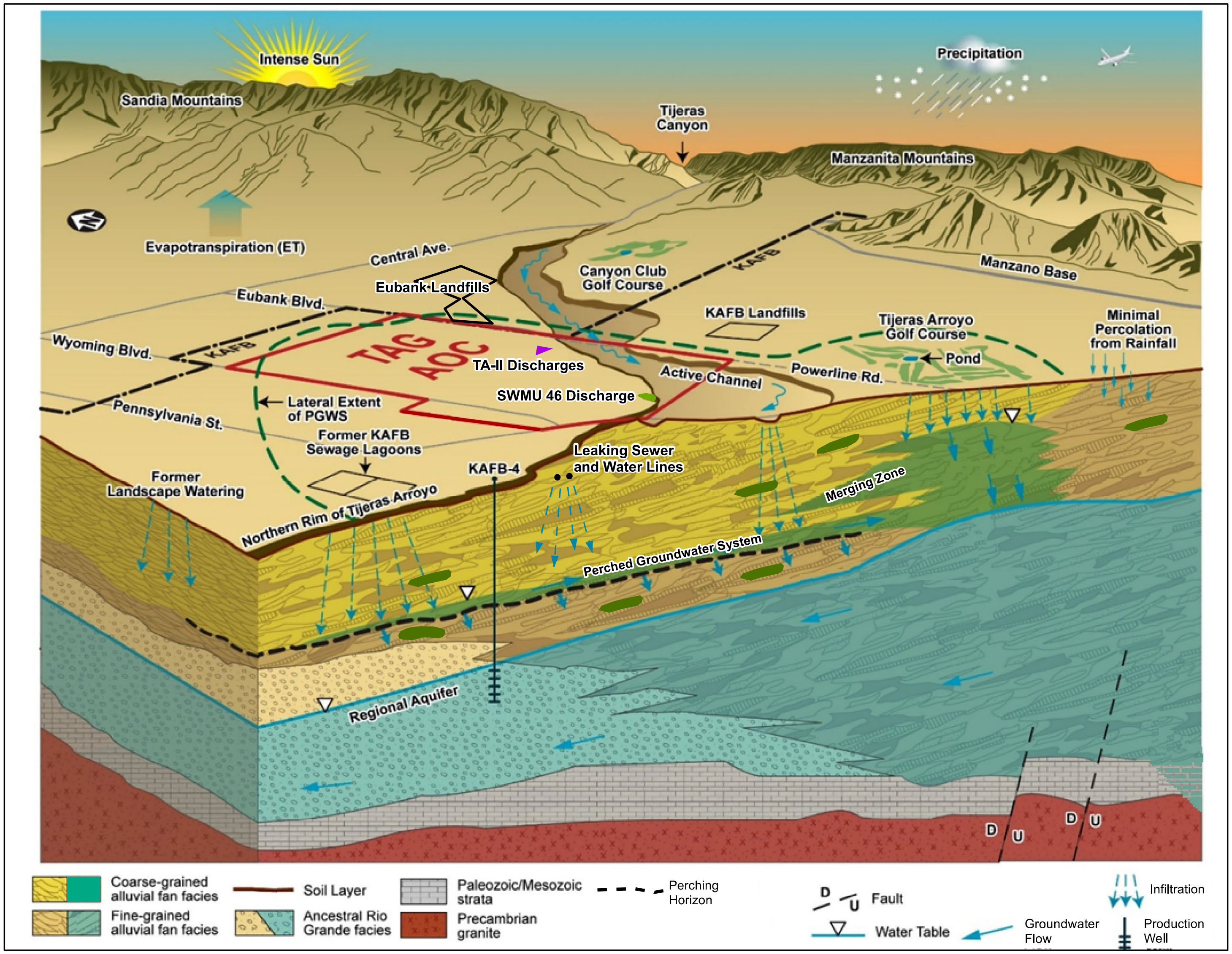


Figure 6-3
Tijeras Arroyo Groundwater Conceptual Site Model (SNL June 2021)

Table 6-2
Comparison of Hydrogeologic Characteristics for the Perched Groundwater System and the Regional Aquifer in the Tijeras Arroyo Groundwater Area of Concern

Characteristic	Perched Groundwater System	Regional Aquifer
Potentiometric Surface	Surface is inferred to slope primarily to the southeast.	Surface is inferred to slope primarily to the west and northwest.
Pressure Head	Unconfined (water table) conditions.	Unconfined to semi-confined conditions.
Lithofacies Distribution	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 0.018. Much steeper east of Powerline Road at 0.03 to 0.045. Nearly flat to the west of Wyoming Boulevard.
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	0.25 (25 percent), based upon studies at TA-V (SNL September 2015).	0.25 (25 percent), based upon studies at TA-V (SNL September 2015).
Groundwater Velocity, Horizontal	0.002 to 0.122 ft/day. Equivalent to 0.778 to 44.68 ft/yr.	0.066 to 0.310 ft/day. Equivalent to 24.24 to 113.15 ft/yr.
Groundwater Velocity, Horizontal Average	Approximately 24 ft/yr, based on five monitoring wells screened in the Perched Groundwater System.	Approximately 55 ft/yr, based on five monitoring wells screened in the Regional Aquifer.
Usage	Not used for water production purposes.	Utilized for water production by KAFB, ABCWUA, and VA.
Lateral extent	Approximately 4.43 sq mi across north-central KAFB.	Laterally extensive across the Albuquerque Basin.
Saturated Thickness	Estimated from geophysical logs to range from approximately 7 to 20 ft across the northern and central portions of the TAG AOC. In the far southeast corner, the saturated thickness reaches approximately 40 ft.	In excess of 1,000 ft in thickness across much of the TAG AOC vicinity.
Geochemical Variability	Geochemical signatures variable between monitoring wells.	Geochemical signatures consistent between monitoring wells.
Geochemical Uniqueness	High chloride, nitrate, and sulfate concentrations.	Low calcium concentrations, but high bicarbonate/alkalinity concentrations.

Refer to Notes on page 6-12.

Table 6-2 *(Concluded)*
Comparison of Hydrogeologic Characteristics for the Perched Groundwater System and the Regional Aquifer in the Tijeras Arroyo Groundwater Area of Concern

Characteristic	Perched Groundwater System	Regional Aquifer
Water Levels	Steadily declining groundwater elevations across the entire TAG AOC ranging from 0.06 to 1.17 ft/yr, except in southeast corner at monitoring well TJA-5.	Increasing groundwater elevations across the entire TAG AOC, except at the southwest corner. Variable rate ranges from a declining 0.07 to an increasing 2.65 ft/yr.
Recharge Sources	Historically recharged by KAFB and SNL/NM leaking water supply/sewer lines, landscape watering, the KAFB Tijeras Arroyo Golf Course, former outfalls, the former KAFB Sewage Lagoons), and ongoing natural sources such as Tijeras Arroyo.	Historically recharged by KAFB and SNL/NM anthropogenic sources (leaking water supply/sewer lines, irrigated lawns, the KAFB Tijeras Arroyo Golf Course, the former KAFB Sewage Lagoons), and natural sources such as Tijeras Arroyo.
Principal Hydrologic Controls	Stratigraphic dip of 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. North to south trending paleochannels with high conductivities to the west of Wyoming Boulevard. Low conductivity east to west trending alluvial-fan deposits east of Wyoming Boulevard.

Notes:
Table was updated using the Revised TAG CCM/CME Report (SNL February 2018). All characteristics, except for effective porosity, were obtained from studies conducted in the TAG AOC.

ABCWUA = Albuquerque Bernalillo County Water Utility Authority
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
SNL = Sandia National Laboratories
SNL/NM = Sandia National Laboratories, New Mexico
sq mi = square mile(s)
TA = Technical Area
TAG = Tijeras Arroyo Groundwater
TJA = Tijeras Arroyo
VA = Veterans Administration (Veterans Affairs)

BGW (September 2002) endorsed the supposition of Brady and Domski (2001) that sediments in the PGWS were most likely at residual saturation due to natural drainage prior to the introduction of anthropogenic sources. Geochemical modeling indicated that the chemical composition of the PGWS is broadly similar to present-day Tijeras Canyon recharge, suggesting that the natural component was substantial prior to the input from anthropogenic sources. Prior to land development, the sediments would not have contained sufficient natural water to fill a well casing. Subsequent water inputs from anthropogenic sources created a "triggering effect" that resulted in the artificial creation of the PGWS.

A useful analogy for determining recharge rates through the vadose zone 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.

Principal hydrogeologic controls on the direction of groundwater flow in the PGWS consist of: (1) the stratigraphic dip of the Perching Horizon to the southeast, (2) lesser effect of the complex depositional fabric with braided paleochannels trending westward from the mountain flank, and (3) former multiple recharge locations in the northwestern and central parts of the TAG AOC.

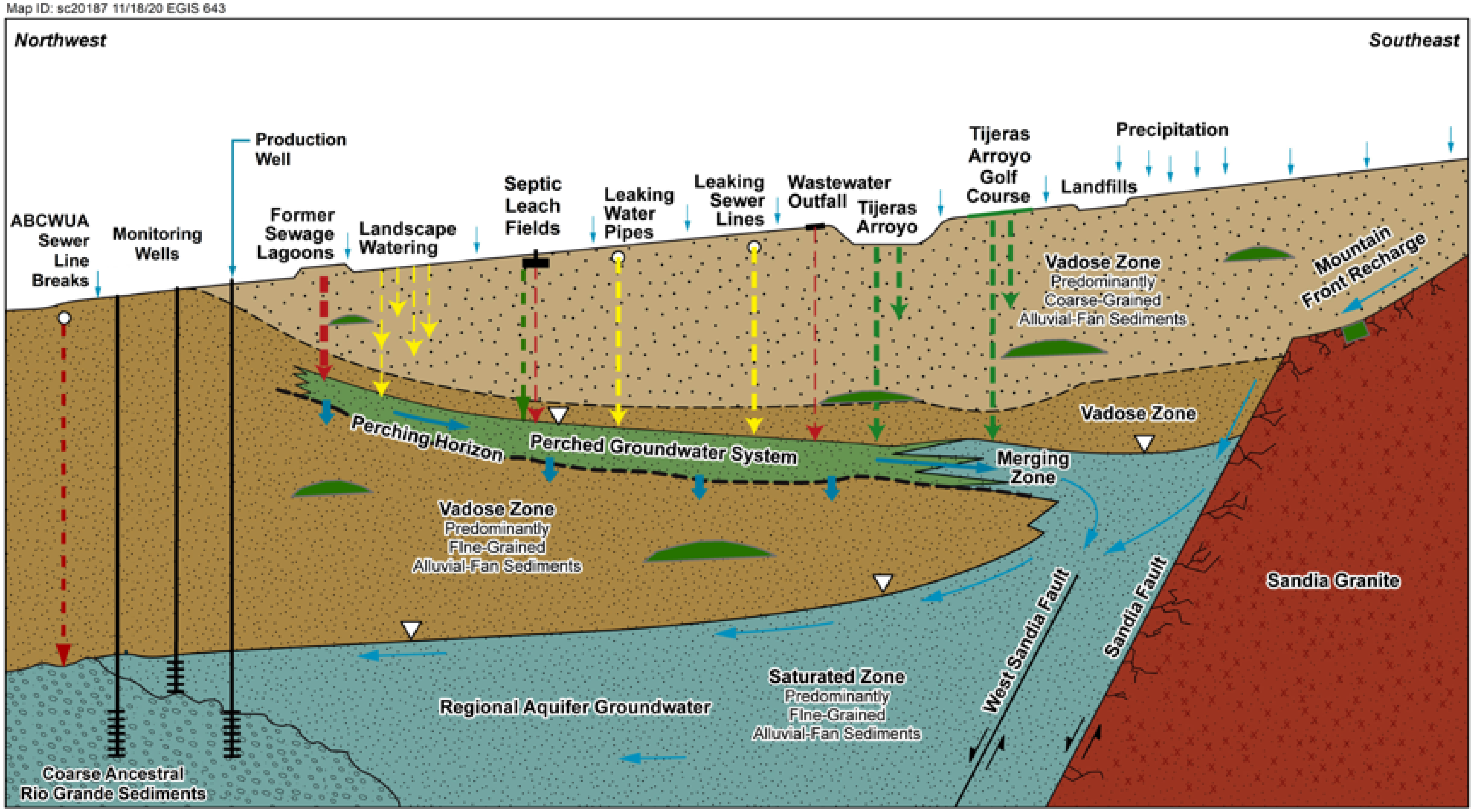
The PGWS is not used for any type of water production in the TAG AOC. The PGWS is a thin, dissipating water-bearing unit that mostly formed as a result of historical anthropogenic discharges of wastewater and septic water. Groundwater in the PGWS migrates toward the southeast and merges with the underlying Regional Aquifer southeast of Tijeras Arroyo near Powerline Road. Based upon MODFLOW mass-balance modeling, approximately 25 percent of the total groundwater loss from the PGWS is estimated to result from lateral flow toward the southeast where it merges with the underlying Regional Aquifer (SNL February 2018). The remaining 75 percent likely flows vertically downward through the Perching Horizon and dissipates in the upper portion of over 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. Declining water level trends indicate that nearly the entire extent of the PGWS will naturally dewater (dissipate) in the TAG AOC by the year 2050 (Section 6.1.7.4). Some portions of the PGWS in the TAG AOC have already dewatered.

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 greatest 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 purposes in the TAG AOC.

Figure 6-4 shows the variety of recharge sources (active and inactive) that are located near the TAG AOC. These recharge sources likely impacted the PGWS:

- Landscape watering of grassy areas such as the Parade Ground north of TA-I (active),
- Ephemeral surface water and base flow along Tijeras Arroyo (active),
- Possible leaking water lines and sewer lines (active),
- Wastewater outfalls (inactive),
- Buried septic systems (active and inactive),
- The former KAFB Sewage Lagoons (inactive), and
- The Tijeras Arroyo Golf Course operated by KAFB (active).

Map ID: sc20187 11/18/20 EGIS 643



Recharge Schematic for TAG Area Showing Principal Recharge and Discharge Features, View to Northeast, Not to Scale. Width of recharge arrow signifies relative volume. Color signifies the duration: green arrow denotes ongoing recharge, yellow arrow denotes a reduced rate of discharge, red arrow signifies that recharge was eliminated. (Precipitation and groundwater arrows are not scaled.)

Figure 6-4
Recharge Features Near the Tijeras Arroyo Groundwater Area of Concern (SNL June 2021)

The Regional Aquifer is more laterally extensive than the PGWS, underlying the entire TAG AOC as well as the Albuquerque Basin. The Regional Aquifer is composed of both the Ancestral Rio Grande (ARG) fluvial lithofacies and the alluvial-fan lithofacies. Locally, groundwater in the Regional Aquifer flows to the northwest, in a nearly opposite direction to that of the PGWS. The gradient in the Regional Aquifer averages approximately 0.018 ft per ft across the TAG AOC but is steeper near production wells operated by KAFB, the ABCWUA, and the Veterans Affairs (VA). The Regional Aquifer is recharged on the eastern side of the study area by natural sources including mountain front recharge, Tijeras Arroyo, and the PGWS. The principal hydrogeologic control upon groundwater flow direction in the Regional Aquifer is the combined drawdown effect of the KAFB, ABCWUA, and VA production wells.

The geochemical signatures of the PGWS and the Regional Aquifer are distinctive. Figure 6-5 presents two Piper diagrams depicting the most comprehensive set of geochemical data for the PGWS and the Regional Aquifer. The geochemical signature of the PGWS exhibits a wide range of geochemistry that as a group does not correspond to a dominant type. This variability indicates several sources of recharge. The PGWS exhibits relatively higher concentrations of chloride and sulfate than the Regional Aquifer. Groundwater samples from the Regional Aquifer exhibit a more consistent chemistry that is classified as a calcium bicarbonate type. The Regional Aquifer also exhibits higher bicarbonate concentrations. The tight group of the Regional Aquifer data points indicates that the monitoring wells are screened in the same hydrostratigraphic interval (groundwater from all wells is chemically similar; therefore, in direct hydraulic communication). This water appears to have a single source, such as mountain-front recharge.

6.1.7.1 Regional Hydrogeologic Conditions

Tijeras Arroyo is the most significant surface water drainage feature on KAFB and trends westward across the northern portion of KAFB and eventually drains into the Rio Grande approximately 5.6 miles west of KAFB. Water flows in the arroyo several times per year as a result of significant thunderstorms. The 30-year average annual precipitation for the area, as measured at 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 February 1998).

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. Van Hart (June 2003) used an extensive set of borehole logs and geophysical surveys for interpreting stratigraphic and structural features across KAFB. As shown on Plate 1, 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 probably dips 65 degrees westward on KAFB.

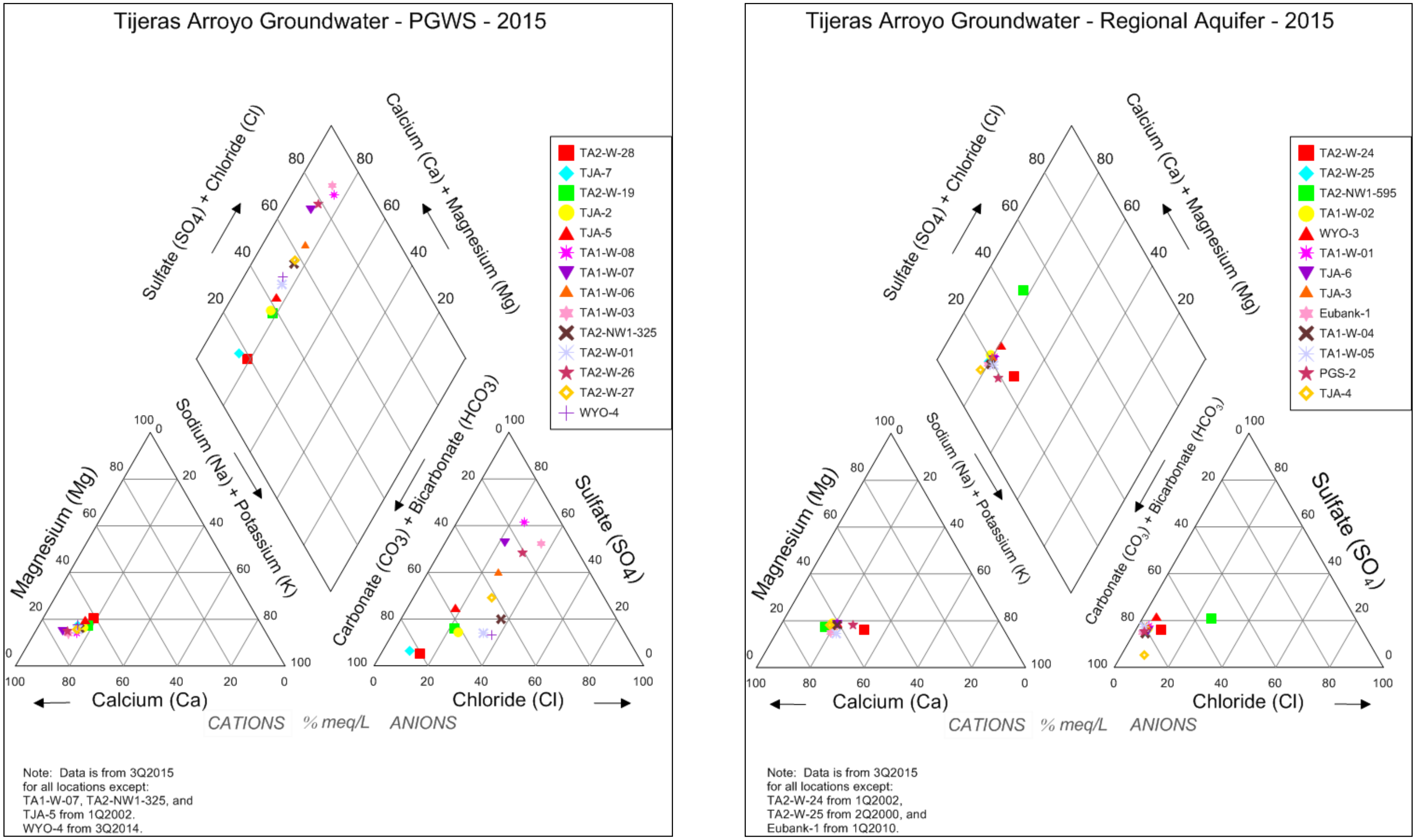


Figure 6-5
Piper Diagrams for Groundwater Samples Collected from Monitoring Wells Screened in the Perched Groundwater System and the Regional Aquifer (SNL February 2018)

6.1.7.2 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) 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 east of the study area. Fine-grained units within the alluvial-fan lithofacies produce low-permeability zones 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 portion of the TAG AOC is approximately 3,000 ft. These sediments are underlain by Mesozoic/Paleozoic limestone strata.

Across the TAG AOC, the PGWS is encountered at approximately 270 to 320 ft bgs, and the Regional Aquifer system is encountered at approximately 410 to 560 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 composed of moist sediments that will not yield groundwater to a well. Based on data collected in October 2015, this unsaturated thickness of sediments below the Perching Horizon averaged approximately 202 ft thick, decreasing from approximately 258 ft in the northwest corner of the TAG AOC to 177 ft in the southeast corner near the Merging Zone. 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 is present. As noted earlier, Table 6-2 presents a comparison of the hydrogeologic characteristics for the two water-bearing units.

6.1.7.3 Local Direction of Groundwater Flow

Figure 6-6 presents the CY 2022 potentiometric surface for the PGWS. Table 6-3 lists the CY 2022 groundwater elevations. During preparation of the Revised TAG CCM/CME Report (SNL February 2018), the lateral extent of the PGWS was estimated at approximately 4.43 sq mi. The direction of groundwater flow in the PGWS is inferred from the potentiometric surface to be principally to the east and southeast, with an average horizontal gradient of approximately 0.01. 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 6-7 presents the CY 2022 potentiometric surface for the Regional Aquifer. Table 6-3 lists the CY 2022 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 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 0.018. 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 the distant pumping of the production wells. The depicted location of the Sandia Fault near Manzano Base is based upon interpretation of the water table. For example, the groundwater elevations at monitoring wells KAFB-0621 and ST105-MW009 are significantly different (Figure 6-7).

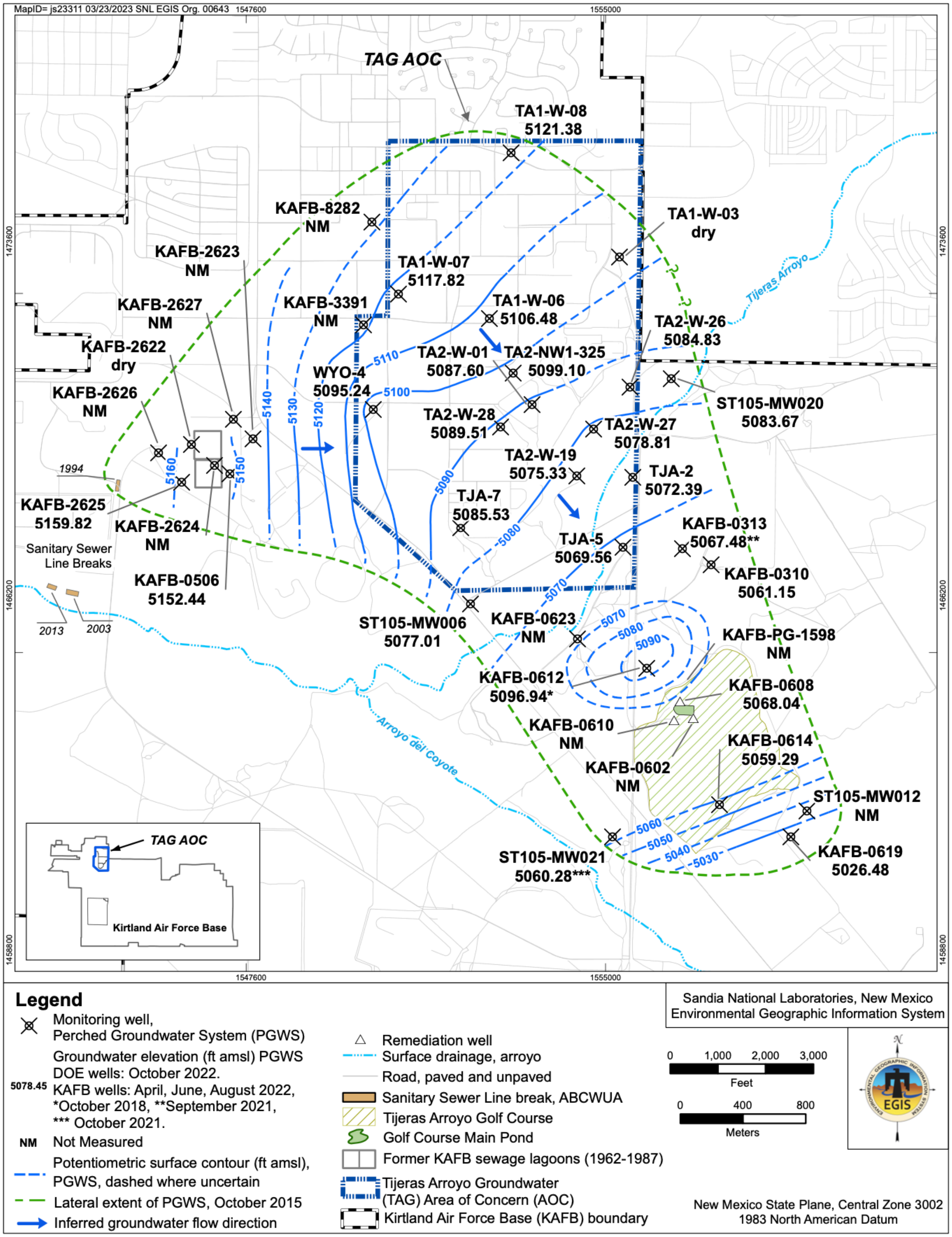


Figure 6-6
Potentiometric Surface Map for the Perched Groundwater System at the Tijeras Arroyo Groundwater Area of Concern (Calendar Year 2022)

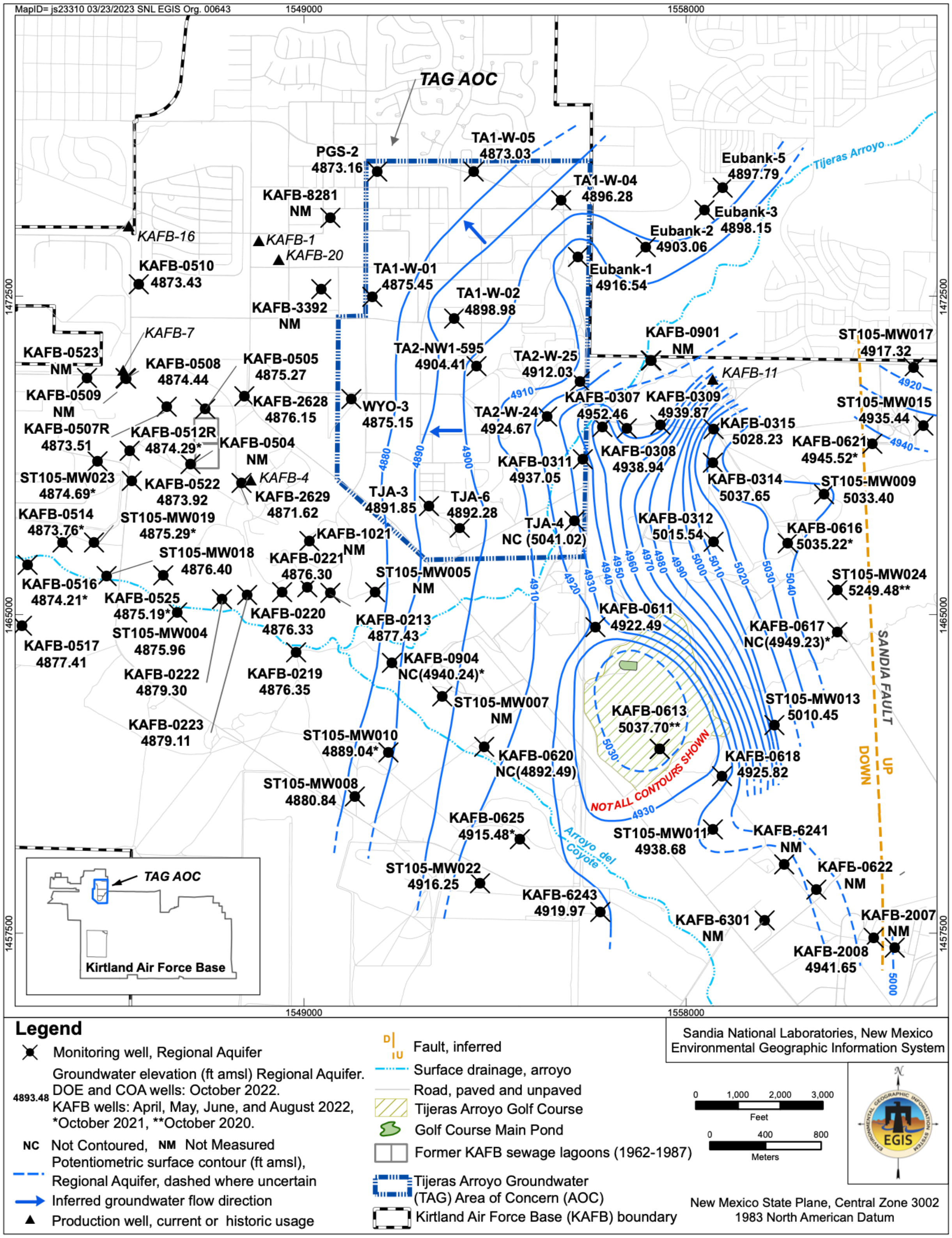


Figure 6-7
Potentiometric Surface Map of the Regional Aquifer at the Tijeras Arroyo Groundwater Area of Concern (Calendar Year 2022)

Table 6-3
Groundwater Elevations Measured in Calendar Year 2022 at Monitoring and Remediation Wells Near the Tijeras Arroyo Groundwater Area of Concern

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	14-Oct-2022	543.48	4916.54	Regional Aquifer
Eubank-2	5474.39	25-Oct-2022	571.33	4903.06	Regional Aquifer
Eubank-3	5498.73	25-Oct-2022	600.58	4898.15	Regional Aquifer
Eubank-5	5507.40	25-Oct-2022	609.61	4897.79	Regional Aquifer
PGS-2	5408.29	7-Oct-2022	535.13	4873.16	Regional Aquifer
TA1-W-01	5403.82	14-Oct-2022	528.37	4875.45	Regional Aquifer
TA1-W-02	5416.62	14-Oct-2022	517.64	4898.98	Regional Aquifer
TA1-W-03	5457.03	6-Oct-2022	dry	dry	PGWS
TA1-W-04	5460.98	7-Oct-2022	564.70	4896.28	Regional Aquifer
TA1-W-05	5433.84	7-Oct-2022	560.81	4873.03	Regional Aquifer
TA1-W-06	5417.10	14-Oct-2022	310.62	5106.48	PGWS
TA1-W-07	5404.92	14-Oct-2022	287.10	5117.82	PGWS
TA1-W-08	5434.19	7-Oct-2022	312.81	5121.38	PGWS
TA2-NW1-325	5421.94	6-Oct-2022	322.84	5099.10	PGWS
TA2-NW1-595	5421.26	6-Oct-2022	516.85	4904.41	Regional Aquifer
TA2-W-01	5419.99	6-Oct-2022	332.39	5087.60	PGWS
TA2-W-19	5351.21	6-Oct-2022	275.88	5075.33	PGWS
TA2-W-24	5363.66	6-Oct-2022	438.99	4924.67	Regional Aquifer
TA2-W-25	5374.86	14-Oct-2022	462.83	4912.03	Regional Aquifer
TA2-W-26	5375.77	14-Oct-2022	290.94	5084.83	PGWS
TA2-W-27	5362.85	6-Oct-2022	284.04	5078.81	PGWS
TA2-W-28	5412.41	6-Oct-2022	322.90	5089.51	PGWS
TJA-2	5353.20	6-Oct-2022	280.81	5072.39	PGWS
TJA-3	5390.56	6-Oct-2022	498.71	4891.85	Regional Aquifer
TJA-4	5341.16	6-Oct-2022	300.14	5041.02	Merging Zone
TJA-5	5341.33	6-Oct-2022	271.77	5069.56	PGWS
TJA-6	5343.16	6-Oct-2022	450.88	4892.28	Regional Aquifer
TJA-7	5391.27	6-Oct-2022	305.74	5085.53	PGWS
WYO-3	5392.09	14-Oct-2022	516.94	4875.15	Regional Aquifer
WYO-4	5392.57	14-Oct-2022	297.33	5095.24	PGWS
KAFB-0213	5283.29	20-Apr-2022	405.86	4877.43	Regional Aquifer
KAFB-0219	5263.69	20-Apr-2022	387.34	4876.35	Regional Aquifer
KAFB-0220	5265.10	20-Apr-2022	388.77	4876.33	Regional Aquifer
KAFB-0221	5274.36	20-Apr-2022	398.06	4876.30	Regional Aquifer
KAFB-0222	5247.65	20-Apr-2022	368.35	4879.30	Regional Aquifer
KAFB-0223	5254.49	20-Apr-2022	375.38	4879.11	Regional Aquifer
KAFB-0307	5364.53	20-Apr-2022	412.07	4952.46	Regional Aquifer
KAFB-0308	5381.65	20-Apr-2022	442.71	4938.94	Regional Aquifer
KAFB-0309	5411.80	20-Apr-2022	471.93	4939.87	Regional Aquifer
KAFB-0310	5416.48	20-Apr-2022	355.33	5061.15	PGWS
KAFB-0311	5353.29	20-Apr-2022	416.24	4937.05	Regional Aquifer
KAFB-0312	5432.17	20-Apr-2022	416.63	5015.54	Regional Aquifer
KAFB-0313	5418.98	22-Sep-2021	351.50	5067.48	PGWS
KAFB-0314	5455.75	20-Apr-2022	418.10	5037.65	Regional Aquifer
KAFB-0315	5466.11	20-Apr-2022	437.88	5028.23	Regional Aquifer
KAFB-0504	5357.87	n.m.	n.m.	n.m.	Regional Aquifer

Refer to Notes on page 6-22.

Table 6.3 *(Continued)*
Groundwater Elevations Measured in Calendar Year 2022 at Monitoring and Remediation Wells Near the Tijeras Arroyo Groundwater Area of Concern

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	20-Apr-2022	487.54	4875.27	Regional Aquifer
KAFB-0506	5363.47	20-Apr-2022	211.27	5152.44	PGWS
KAFB-0507R	5358.21	7-Oct-2021	484.70	4873.51	Regional Aquifer
KAFB-0508	5351.88	13-Jun-2022	477.44	4874.44	Regional Aquifer
KAFB-0509	5441.56	n.m.	n.m.	n.m.	Above PGWS
KAFB-0510	5367.10	13-Jun-2022	493.67	4873.43	Regional Aquifer
KAFB-0512R	5302.73	6-Oct-2021	428.44	4874.29	Regional Aquifer
KAFB-0514	5206.41	6-Oct-2021	332.65	4873.76	Regional Aquifer
KAFB-0516	5205.64	6-Oct-2021	331.43	4874.21	Regional Aquifer
KAFB-0517	5197.10	13-Jun-2022	319.69	4877.41	Regional Aquifer
KAFB-0522	5267.48	20-Apr-2022	393.56	4873.92	Regional Aquifer
KAFB-0523	5352.62	n.m.	n.m.	n.m.	Regional Aquifer
KAFB-0525	5229.75	6-Oct-2021	354.56	4875.19	Regional Aquifer
KAFB-0602	5365.47	n.m.	n.m.	n.m.	PGWS
KAFB-0608	5361.17	20-Apr-2022	293.13	5068.04	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	8-Aug-2022	331.60	5059.29	PGWS
KAFB-0616	5481.07	7-Oct-2021	445.85	5035.22	Regional Aquifer
KAFB-0617	5505.78	7-Oct-2021	556.55	4949.23	Regional Aquifer
KAFB-0618	5410.05	13-Jun-2022	484.23	4925.82	Regional Aquifer
KAFB-0619	5410.78	13-Jun-2022	384.30	5026.48	PGWS
KAFB-0620	5334.64	13-Jun-2022	442.15	4892.49	Regional Aquifer
KAFB-0621	5569.89	7-Oct-2021	624.37	4945.52	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	6-Oct-2021	474.75	4915.48	Regional Aquifer
KAFB-0901	5390.07	nm	nm	nm	Regional Aquifer
KAFB-0903	5391.63	nm	nm	nm	Above PGWS
KAFB-0904	5291.75	6-Oct-2021	351.51	4940.24	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	dry	dry	dry	PGWS
KAFB-2623	5367.48	n.m.	n.m.	n.m.	PGWS
KAFB-2624	5362.27	n.m.	n.m.	n.m.	PGWS
KAFB-2625	5359.26	20-Apr-2022	199.44	5159.82	PGWS
KAFB-2626	5357.51	n.m.	n.m.	n.m.	PGWS
KAFB-2627	5367.47	n.m.	n.m.	n.m.	PGWS
KAFB-2628	5369.64	20-Apr-2022	493.49	4876.15	Regional Aquifer
KAFB-2629	5361.53	13-Jun-2022	489.91	4871.62	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 on page 6-22.

Table 6.3 *(Concluded)*
Groundwater Elevations Measured in Calendar Year 2022 at Monitoring and Remediation Wells Near the Tijeras Arroyo Groundwater Area of Concern

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	13-Jun-2022	358.65	4875.96	Regional Aquifer
ST105-MW005	5287.57	n.m.	n.m.	n.m.	Regional Aquifer
ST105-MW006	5313.26	13-Jun-2022	236.25	5077.01	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	6-Oct-2021	445.66	4889.04	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	6-Oct-2021	342.65	4875.29	Regional Aquifer
ST105-MW020	5383.72	13-Jun-2022	300.05	5083.67	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	6-Oct-2021	401.17	4874.69	Regional Aquifer
ST105-MW024	5595.67	19-Oct-2020	346.19	5249.48	Regional Aquifer

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).
Wells screened in the Regional Aquifer are not shaded.
The depth to water values from previous years are used for KAFB wells not measured in Calendar Year 2022.
The WYO-4 water level was 0.04 ft above the screen bottom in October 2022.

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-II (Northwest)
TA2-W = Technical Area-II (Well)
TJA = Tijeras Arroyo
WYO = Wyoming

6.1.7.4 Groundwater Elevations

The series of hydrographs (Attachment 6B, Figures 6B-1 through 6B-10) depict the historical trends of groundwater elevations in the TAG AOC. No seasonality, such as a response to the summer monsoon rainfall, is apparent for either the PGWS or the Regional Aquifer. 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. Within the TAG AOC, 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.

Table 6-4 lists the annual decline rate per TAG AOC monitoring well from October 2015 through October 2022, and the predicted year when the water level will decline below the depth of each PGWS well screen. Excluding dry monitoring well TA1-W-03, the annual decline rate in groundwater elevations for the 7-year period ranged from 0.12 to 0.57 ft per year (ft/yr). The average 7-year decline rate for the 13 monitoring wells was approximately 0.39 ft/yr. Figure 6-8 shows that the greatest annual decline rate in groundwater elevations occurred in the central portion of the TAG AOC. The hydrographs on Figure 6-9 illustrate the consistently declining water levels for PGWS monitoring wells in the TAG AOC. Water levels in the monitoring wells have followed a consistent downward trend since about 2005 as the PGWS naturally dewaters (dissipates). Monitoring well TA1-W-03 went dry (the water column declined below the screen) in December 2018 and monitoring well WYO-4 is expected to go dry in 2023. Figure 6-10 shows that PGWS monitoring wells located across the central portion of the TAG AOC have the shortest predicted lifespans. Four monitoring wells will be dry in 2030. In 2040, five monitoring wells will be dry. By 2050, 10 of the 14 PGWS monitoring wells are predicted to be dry. Only near the northwest and southeast corners of the TAG AOC will submerged (wet) well screens remain after 2050. For a TAG well screened in a clean (highly productive) sand such as monitoring well TA2-W-01, a minimum of approximately 1 ft of water column in the well screen is typically needed for a groundwater sample to be collected with the Bennett® system. For a monitoring well such as WYO-4 that is screened in a tight (low productive) silty sand, a minimum of approximately 5 ft of water column is needed for the Bennett® system. Low productive wells with water columns exceeding 5 ft are occasionally purged dry and allowed to recover overnight before sampling.

During preparation of the Revised TAG CCM/CME Report (SNL February 2018), the thickness of saturated sediments located below each PGWS well screen was estimated using geophysical logs. For the 12 monitoring wells that are completely screened above the Perching Horizon, the thickness of saturated sediments below the well screens ranged from 1 to 16 ft (Table 6-4). The average saturated thickness was 6 ft. Two monitoring wells (TA2-W-28 and TJA-2) have negative values because their screens extend downward (penetrate) into the Perching Horizon.

Some Regional Aquifer monitoring wells, such as TA1-W-05 and PGS-2, show a cycle related to the pumping of production wells operated by KAFB, ABCWUA, and VA, because of increased demand in the summer months. Starting in late 2008, hydrographs for the Regional Aquifer monitoring wells in the TAG AOC show 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 production wells immediately north of KAFB. Since 2010, the overall trend in groundwater elevations in the northern and central parts of the TAG AOC increased at approximately 0.5 to 2.7 ft/yr. The hydrographs for TA1-W-04 and TA1-W-05 have differing slopes, indicating a possible impermeable barrier between the two monitoring wells. Water levels at the southwest corner of the TAG AOC at monitoring wells TJA-3 and TJA-6 have been stable since 2000. For the period of October 2015 to October 2022, the rate of water-level increase in the TAG AOC Regional Aquifer monitoring wells ranged from

0.08 to 1.53 ft/yr. Increases southeast of Tijeras Arroyo in some of the Regional Aquifer monitoring wells owned by KAFB probably result from irrigation at the Tijeras Arroyo Golf Course (BGW February 2001).

Table 6-4
Rate of Annual Decrease of Groundwater Elevation in PGWS Wells from October 2015 through October 2022 and the Predicted Year When Water Level Declines Below Well Screen

Well ID	Annual Decline Rate in Groundwater Elevation From October 2015 Through October 2022, ft	Predicted Year When Water Level Declines Below Well Screen	Thickness of Saturated PGWS Sediments Below Well Screen (SNL February 2018), ft
TA1-W-03	2.93*	2019	5
TA1-W-06	0.36	2047	6
TA1-W-07	0.12	2051	1
TA1-W-08	0.21	2063	6
TA2-NW1-325	0.57	2029	3
TA2-W-01	0.51	2026	8
TA2-W-19	0.49	2046	10
TA2-W-26	0.43	2038	7
TA2-W-27	0.49	2048	1
TA2-W-28	0.44	2044	-3
TJA-2	0.44	2058	-1
TJA-5	0.24	2097	16
TJA-7	0.28	2049	2
WYO-4	0.54	2022	3
Average	0.39	2046	4.6

Notes:
Average decline rate does not include dry well TA1-W-03.
October 2015 is used as the starting point for this table because that was the last month in the dataset for the TAG AOC CCM/CME Report (SNL December 2016) and the Revised TAG AOC CCM/CME Report (SNL February 2018).
Negative saturated thickness indicates that the bottom of the well screen extends into the Perching Horizon.

* = Annual decline rate for TA1-W-3 was calculated using October 2015 through October 2018 dataset. The water level at TA1-W-03 declined below the screen in December 2018.
ft = foot (feet)
ID = identifier
PGWS = Perched Groundwater System
SNL = Sandia National Laboratories
TA1-W = Technical Area-I (Well)
TA2-NW = Technical Area-II (Northwest)
TA2-W = Technical Area-II (Well)
TJA = Tijeras Arroyo
WYO = Wyoming

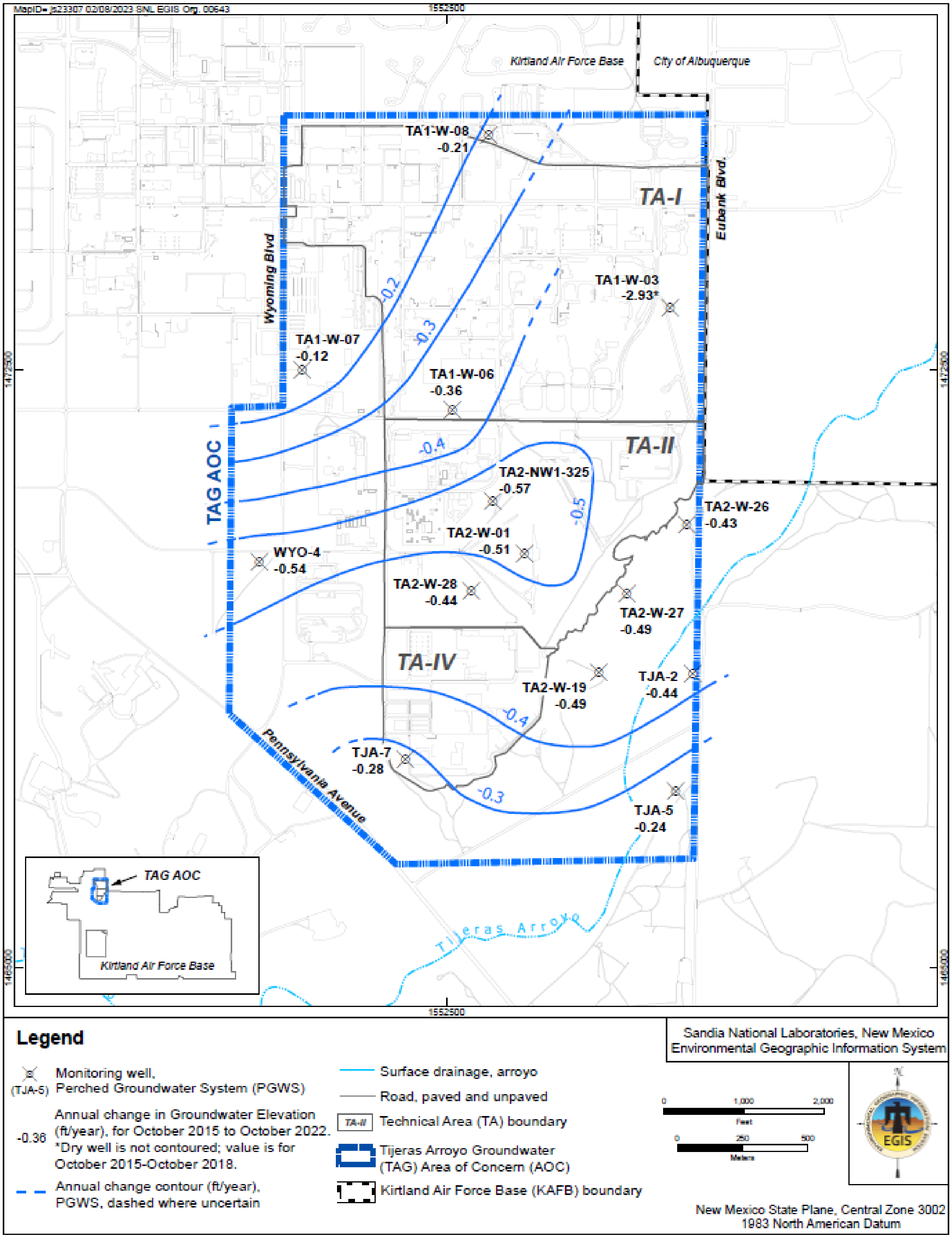


Figure 6-8
Annual Decline Rate of Groundwater Elevations in TAG AOC Perched Groundwater System Monitoring Wells from October 2015 through October 2022

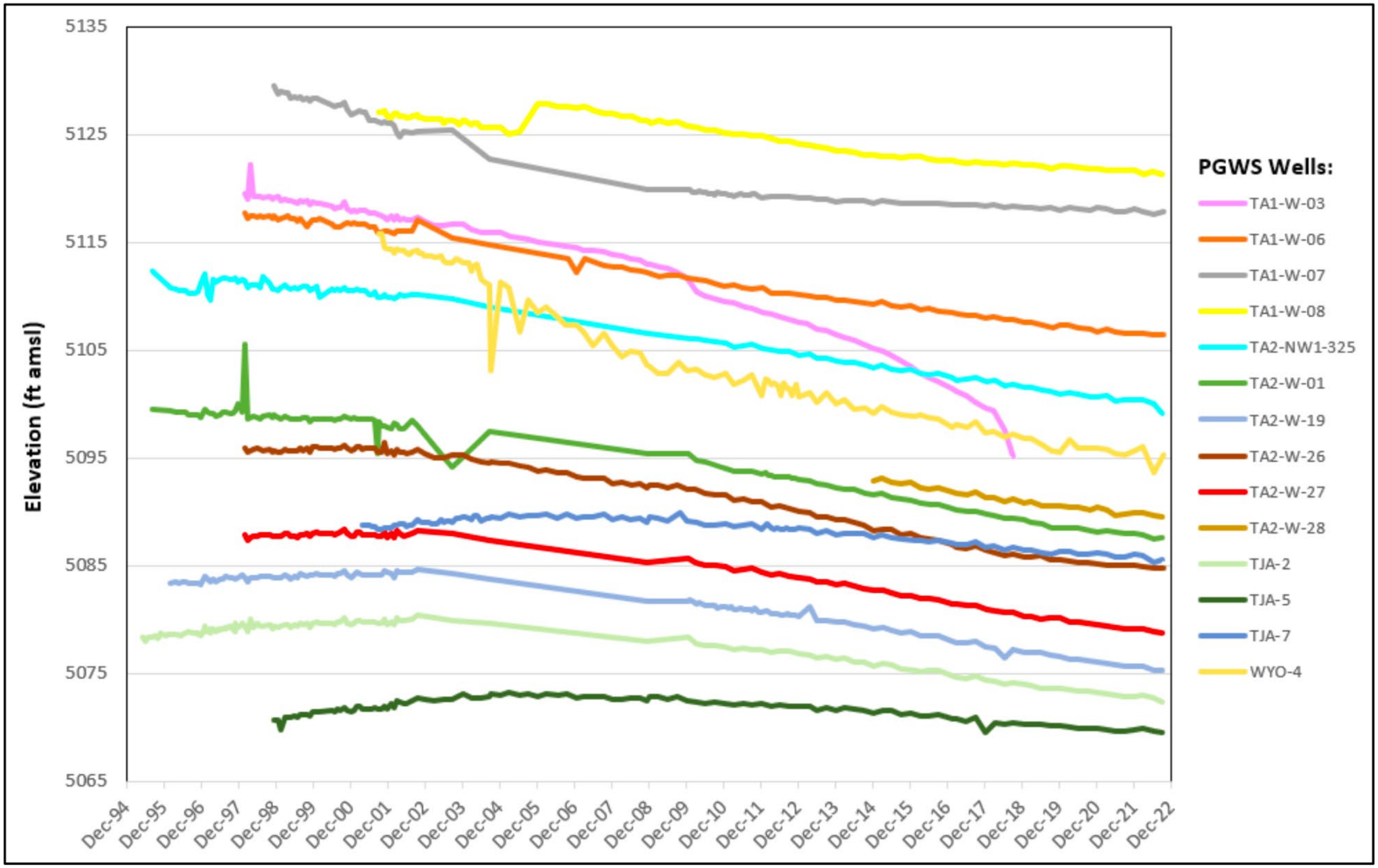


Figure 6-9
Hydrographs for Perched Groundwater System Monitoring Wells Located in the Tijeras Arroyo Groundwater Area of Concern through Calendar Year 2022

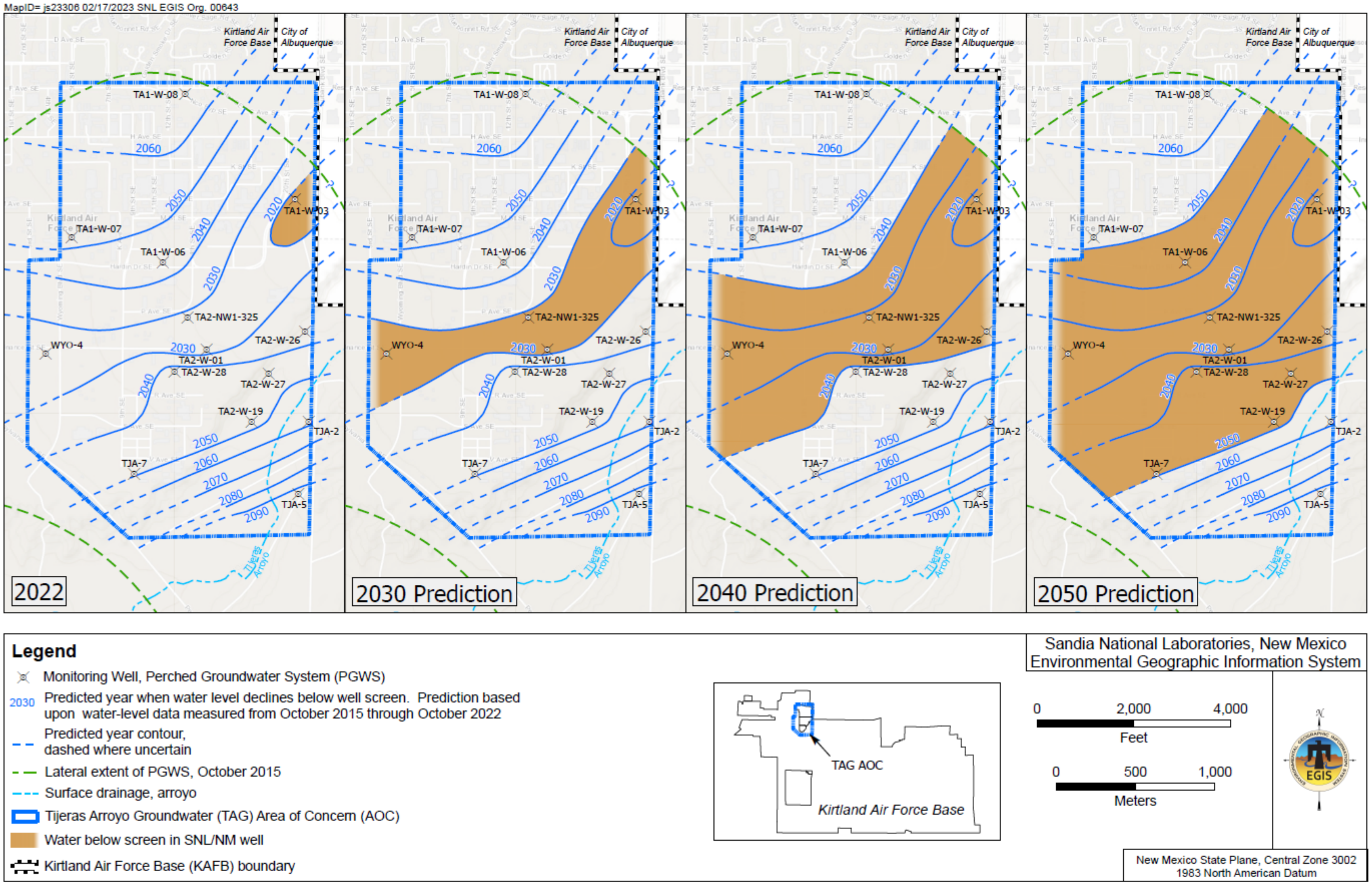


Figure 6-10
Predicted Years When Groundwater Elevations Will Decline to the Lowest Slots at Monitoring Wells Screened in the Perched Groundwater System in the Tijeras Arroyo Groundwater Area of Concern

6.1.7.5 *Occurrence of Nitrate in the Environment*

Nitrate in groundwater can be the result of both anthropogenic and natural sources (Interstate Technology and Regulatory Council, 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. Holloway et al. (2001) coined the term "geologic nitrogen" to refer to nitrogen incorporated into the matrix of rock during diagenesis (the physical or chemical changes occurring during the conversion of sediment to sedimentary rock) or through secondary alteration. Potential sources of elevated nitrate concentrations in surface water and groundwater have been attributed to the dissolution of various rock types including sedimentary, igneous, and metamorphic units (Holloway et al. October 1998 and Houlton et al. April 2018). Bedrock weathering is also considered an important part of the terrestrial nitrogen cycle.

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.

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 converted by irrigation, dam construction, or by 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 are produced by the decay of vegetation and 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. Naturally occurring nitrate concentrations in soil at up to 2,000 mg/L were observed in the Chihuahuan Desert.

To test the Walvoord et al. (November 2003) hypothesis on KAFB, the U.S. Geologic Survey (USGS) 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. Also in 2017, the USGS collected water samples from 59 locations (wells, springs, and arroyos) from 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 (14C, 15N, and 18O), tritium, dissolved noble gases, and major ion geochemistry.

The USGS subsequently published two articles concerning nitrate occurrence in vadose-zone soils and the groundwater underlying arroyos, floodplains, and mesa tops (KAFB November 2022). The journal article, "Discovery of a Large Subsoil Nitrate Reservoir in an Arroyo Floodplain and Associated Aquifer Contamination," was published in June 2021 (Linhoff and Lunzer February 2021). The study concluded that the arid region hydrology and 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. A key marker indicative of this natural mechanism of nitrate transport to groundwater is the nitrate to chloride ratio. The second journal article, "Deciphering Natural and Anthropogenic Nitrate and Recharge Sources in Arid Region Groundwater" (Linhoff July 2022), evaluated a diverse set of parameters and identified the specific types of nitrate sources that have impacted the PGWS and the Regional Aquifer at KAFB.

In 2017, the USGS collected groundwater samples from 33 monitoring wells located on KAFB that consisted of 26 wells owned by KAFB and seven wells owned by DOE/NNSA. 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 and Personal Care Products, and 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 was determined to be anthropogenic for the five wells screened in the PGWS (TA2-W-19, TA2-W-28, TJA-2, TJA-5, and TJA-7). Regional Aquifer monitoring well TJA-3 was interpreted as being representative of background conditions. Merging Zone 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 and in the PGWS (KAFB July 2003 and KAFB December 2015). Linhoff (July 2022) did not identify denitrification as occurring at any of the 10 sampled PGWS monitoring wells. Unfortunately, none of the PGWS monitoring wells were evaluated by Madrid et al. (June 2013). However, denitrification is unlikely to occur in the PGWS because the groundwater is aerobic and typically contains dissolved oxygen in the range of 3 to 9 mg/L.

6.1.7.6 Contaminant Sources

Environmental investigations of potential contaminant release sites were initially summarized in the Tijeras Arroyo Groundwater Continuing Investigation Report (SNL November 2002). The potential release sites were again evaluated in the Revised TAG CCM/CME Report (SNL February 2018). Historical discharges of wastewater and septic waters from SWMU 46 (Old Acid Waste Line Outfall) and nine SWMUs at TA-II with lesser discharge volumes are the most likely sites to have impacted groundwater in the TAG AOC. As shown in Table 6-5, discharges at SWMU 46 ended in 1974. Discharges at the TA-II SWMUs were curtailed in 1992 (SNL February 2018). The nine SWMUs at TA-II are contained within the purple triangle shown on the CSM (Figure 6-3).

Table 6-5
Sandia National Laboratories, New Mexico Solid Waste Management Units in the Tijeras Arroyo Groundwater Area of Concern with the Greatest Potential for Having Impacted Groundwater

SWMU	SWMU Name	Years of Discharge	Wastewater Source	Septic Water Source
46	SWMU 46, Old Acid Waste Line Outfall	1948–1974	TA-I	TA-I, possibly
48	SWMU 48, Building 904 Septic System	1947–1992	TA-II	TA-II
135	SWMU 135, Building 906 Septic System	1950–1992	TA-II	TA-II
136	SWMU 136, Building 907 Septic System	1948–1992	TA-II	TA-II
159	SWMU 159, Building 935 Septic System	1963–1991	TA-II	TA-II
165	SWMU 165, Building 901 Septic System	1948–1992	TA-II	TA-II
166	SWMU 166, Building 919 Septic System	1969–1990	TA-II	TA-II
167	SWMU 167, Building 940 Septic System	1965–1990	TA-II	TA-II
227	SWMU 227, Building 904 Outfall	1947–1992	TA-II	None
229	SWMU 229, Storm Drain System Outfall (Building 904)	1947–1992	TA-II	None

Notes:
SWMU = Solid Waste Management Unit
TA = Technical Area

A comprehensive study of potential nitrate release sites was conducted for the north-central portion of KAFB including the TAG AOC (SNL December 2019). The study included the preparation of a detailed large-scale figure (Plate A) with an extent of 23 sq mi. The study summarizes the locations, operational years, and types of water associated with natural sources and 66 anthropogenic sites owned by DOE/NNSA, KAFB, ABCWUA, COA, and private entities. Historical maximum NPN concentrations for 150 wells are shown.

Of special interest, Linhoff (July 2022) determined that the likely nitrate source for monitoring well ST105-MW006 was "arroyo floodplain vadose zone nitrate mixed with anthropogenic nitrate". Monitoring well ST105-MW006 is located approximately 200 ft south of the TAG AOC and has yielded a maximum NPN concentration of 77 mg/L. This concentration was confirmed in several sampling events. Samples collected in May 2013, January 2015, January 2017, and October 2018 had NPN concentrations of 71.7, 70, 71, and 77 mg/L, respectively. These values are more than twice that of any historical detections of nitrate within the TAG AOC. Based on Linhoff's articles, SNL/NM personnel postulates that recent construction activities (1999 and 2004) might have flushed geologic nitrate from the vadose zone to groundwater near the Pennsylvania Boulevard bridge (SNL in press). The elevated nitrate concentrations in groundwater samples are likely the result of large precipitation events that deposited water on previously undisturbed areas on the Tijeras Arroyo floodplain. In 1999, a concrete storm-water channel was constructed at the south end of the Ninth Street Channel storm-water dissipator (Plate A) that receives water from a 475-acre area. In 2004, a pair of bridge abutment berms were constructed at the Pennsylvania Boulevard bridge; ponding occasionally occurs adjacent to the berms. Historical nitrate concentrations in the PGWS monitoring wells ST105-MW006 (maximum of 77 mg/L) and nearby well KAFB-0623 (maximum of 63.2 mg/L) are interpreted as having a contribution of arroyo floodplain vadose zone nitrate mixed with anthropogenic nitrate (Linhoff July 2022). The maximum NPN concentrations at both wells are approximately twice the nitrate concentrations seen at monitoring wells located nearby on KAFB and at SNL septic water /wastewater disposal sites. Above average rainfall in the vicinity of Tijeras Arroyo likely increased the volume of water infiltrating through the vadose zone there. The annual rainfall recorded at the nearby TA-II rainfall gauge A21 for 1994 through 2019 was 8.30 inches. Some years significantly exceeded the average. For example, the years of 2004 through 2006 had annual rainfalls that ranged from 150 to 173 percent of average.

6.1.7.7 Contaminant Distribution and Transport in the Vadose Zone

Nitrate was present in septic waters discharged at SNL/NM and KAFB septic systems in the area. The nitrate was transported to the PGWS by the high volumes of septic water and wastewater disposed of at various locations. Nitrate is extremely soluble in water. Absence of water saturation in core samples collected in the vadose zone above the PGWS coupled with cessation of significant recharge activities suggests that no significant amounts of residual anthropogenic nitrate contamination remains in the vadose zone beneath the release sites.

Volatile organic compound (VOC) analyses of soil and soil-vapor samples collected from the vadose zone (from the land surface to the top of the PGWS) during drilling operations and from the soil-vapor monitoring network have indicated evidence of vapor-phase chlorinated solvents. Fourteen soil-vapor monitoring wells were installed in the TAG AOC. However, no free-phase TCE and no water-saturated core samples were encountered in any of the soil samples collected from the boreholes. The original source of the TCE was likely from former wastewater outfalls. All anthropogenic sources of SNL/NM recharge (wastewater and septic water) have been removed from service and no longer contribute water to the vadose zone.

The following discussion of the May 2021 soil-vapor sampling was previously presented in the *Environmental Restoration Operations Consolidated Quarterly Report April – May 2021* (SNL October 2021a). In response to TCE concentrations in groundwater exceeding the EPA MCL at PGWS monitoring well TA2-W-26 in September 2020, SNL/NM personnel voluntarily collected soil-vapor samples at nearby soil-vapor monitoring wells TAG-SV-04 and TAG-SV-05 in May 2021. Soil-vapor monitoring wells TAG-SV-04 and TAG-SV-05 are located 930 ft to the northeast, and 1,060 ft to the north of groundwater monitoring well TA2-W-26, respectively. The northernmost soil-vapor monitoring well, TAG-SV-05, is located on the east side of the TAG AOC and adjacent to the closed COA Eubank Landfill (Figures 6-11 and 6-12). Well TAG-SV-04 is located on the Tijeras Arroyo floodplain at an elevation approximately 64 ft lower than well TAG-SV-05. Both soil-vapor monitoring wells are equipped with FLUTe® samplers with multiple ports set at 50-ft intervals. The soil-vapor sampling ports are set adjacent to alluvial-fan sediments that have variable lithologies that mostly consist of silty fine sands, fine to coarse sands, and sandy fine gravels. The deepest port at each location was installed above saturation in the alluvial-fan sediments (i.e., above the PGWS water table). TAG-SV-04 has five sampling ports ranging from 46.5 to 246 ft bgs. TAG-SV-05 has six sampling ports ranging from 50 to 299.5 ft bgs.

Soil-vapor monitoring wells TAG-SV-04 and TAG-SV-05 were first sampled in December 2004 and the analytical results were summarized in the *Tijeras Arroyo Groundwater Investigation Report* (SNL/NM November 2005). The December 2004 samples were collected using SUMMA® canisters and were analyzed by GEL Laboratories LLC using EPA Method TO-14A. The maximum TCE and tetrachloroethene (PCE) concentrations at soil-vapor monitoring well TAG-SV-04 were 55 and 58 parts per billion by volume (ppbv), respectively, and were collected from a depth of 96.5 ft bgs. The maximum TCE and PCE concentrations at soil-vapor monitoring well TAG-SV-05 were 11,000 and 3,100 ppbv and were collected from a depth of 50 ft bgs. Deeper samples at both soil-vapor monitoring wells had lower concentrations of TCE and PCE. For example, the 246-ft bgs sample from TAG-SV-04 contained TCE and PCE at 11 and 13 ppbv, respectively. The 299.5-ft bgs samples from well TAG-SV-05 contained TCE and PCE at 140 and 30 ppbv, respectively. The VOC concentrations were considered to be low (SNL November 2005) and the NMED HWB did not require additional sampling and did not specify any soil-vapor guidance levels (NMED HWB February 2010).

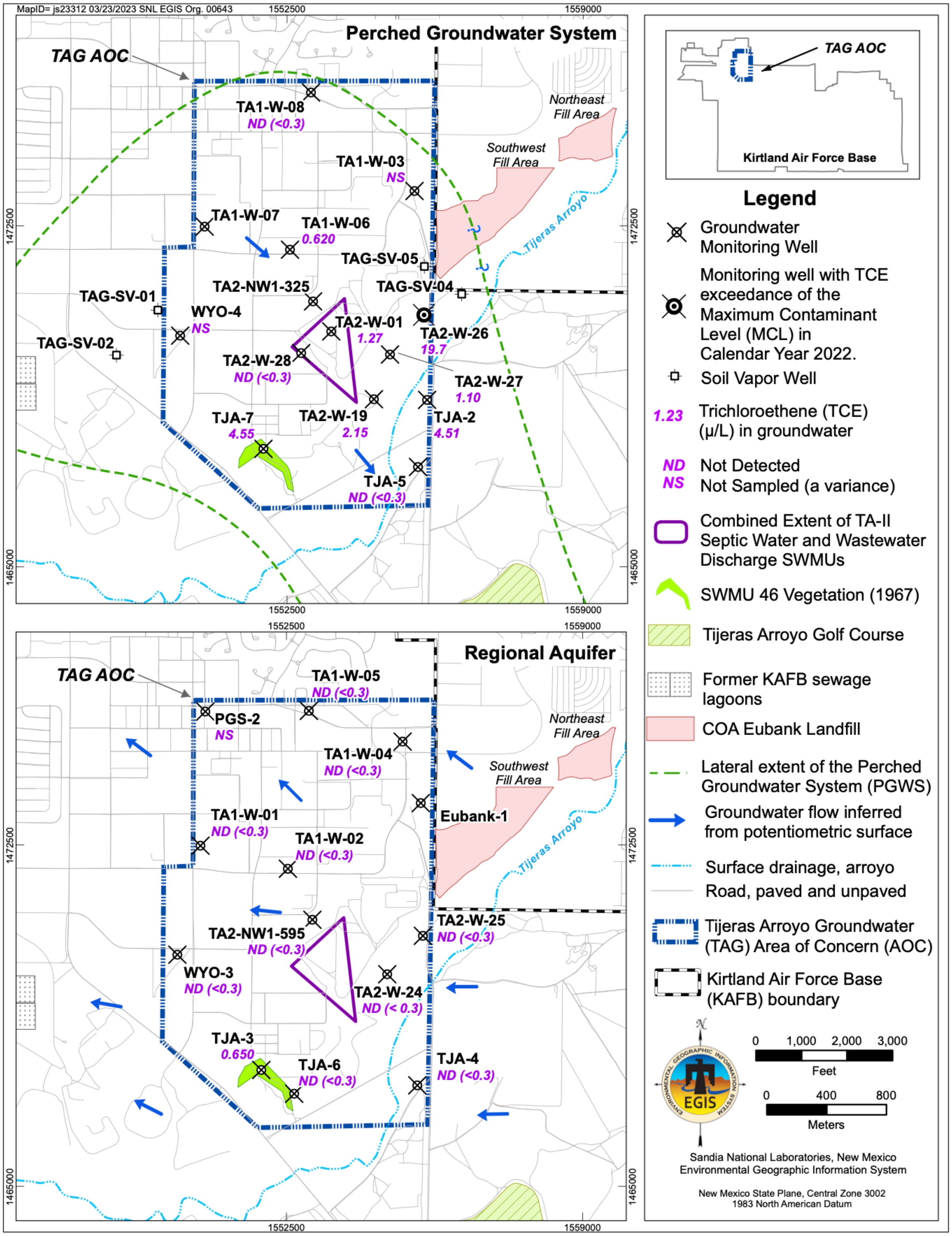


Figure 6-11
Maximum Concentrations of TCE in the Perched Groundwater System and the Regional Aquifer at the Tijeras Arroyo Groundwater Area of Concern for Calendar Year 2022

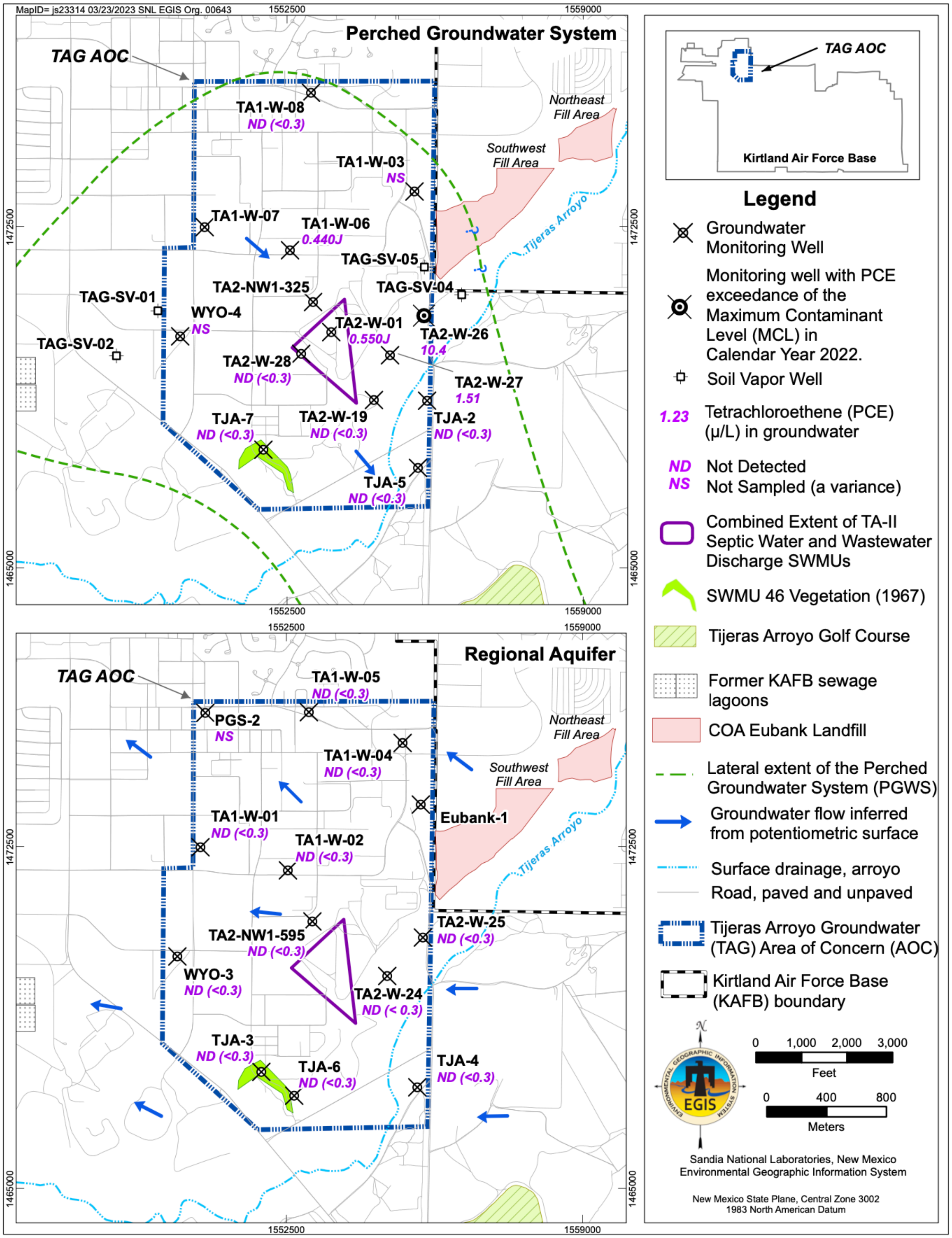


Figure 6-12
Maximum Concentrations of PCE in the Perched Groundwater System and the Regional Aquifer at the Tijeras Arroyo Groundwater Area of Concern for Calendar Year 2022

On May 14, 2021, the second round of soil-vapor samples were collected from wells TAG-SV-04 and TAG-SV-05 using SUMMA® canisters (SNL June 2022). The samples were analyzed by Eurofins TestAmerica using EPA Method TO-15, which is an improved version of EPA Method TO-14A. The maximum TCE and PCE concentrations at soil-vapor monitoring well TAG-SV-04 were 89 and 110 ppbv, respectively, for the sample collected at 96.5 ft bgs. The maximum TCE and PCE concentrations at soil-vapor monitoring well TAG-SV-05 were 4,800 (100 ft bgs) and 1,400 ppbv (150 ft bgs). Deeper samples at both soil-vapor monitoring wells had lower VOC concentrations. For example, the 246-ft bgs sample from well TAG-SV-04 contained TCE and PCE at 35 and 52 ppbv, respectively. The 299.5-ft bgs sample from well TAG-SV-05 contained TCE and PCE concentrations at 910 and 270 ppbv, respectively. In conclusion, TCE and PCE concentrations for the two soil-vapor monitoring wells (TAG-SV-04 and TAG-SV-05) were similar for the two sampling events conducted in December 2004 and May 2021. VOC concentrations had not changed significantly over the 17-year period.

6.1.7.8 Contaminant Distribution and Transport in Groundwater

The distribution of low nitrate concentrations is discontinuous in the PGWS and does not indicate a single contaminant release site. Based on the past disposal of septic and wastewaters at SNL/NM, the occurrence of nitrate is most likely associated with multiple release sites. The maximum historical concentration of NPN in the PGWS within the TAG AOC is 30.0 mg/L and corresponded to the March 2011 sample collected from monitoring well TJA-7, which is located at SWMU 46, Old Acid Waste Line Outfall. The maximum NPN concentration for the Merging Zone was 38.4 mg/L at monitoring well TJA-4 (November 2013); this well is located in the extreme southeast corner of the TAG AOC. Because groundwater predominantly migrates to the west and northwest in the Regional Aquifer, the occurrence of nitrate at monitoring well TJA-4 is likely associated with geologic nitrate and/or fertilizer usage at the KAFB Tijeras Arroyo Golf Course. The maximum NPN concentration for the Regional Aquifer exclusive of the Merging Zone was 4.24 mg/L and corresponded to the June 2019 sample collected from monitoring well TJA-3, which is located at SWMU 46.

Historically, only four PGWS monitoring wells (WYO-4, TA2-W-19, TA2-W-26, and TJA-2) have yielded groundwater samples that exceeded the TCE EPA MCL. The maximum TCE concentration at monitoring well WYO-4 was 10.5 µg/L in a sample collected in November 2014. However, responsibility for monitoring well WYO-4 was transferred to the KAFB ERP in 2018 because this PGWS well is located upgradient of SNL/NM facilities (Section 6.2). Monitoring wells TA2-W-19, TA2-W-26, and TJA-2 are located on the Tijeras Arroyo floodplain in the south-central portion of the TAG AOC. Details for the three monitoring wells are:

- The historical maximum TCE concentration for monitoring well TA2-W-19 was 6.23 µg/L, occurring in October 2007. The last exceedance of the TCE EPA MCL at well TA2-W-19 was 5.1 µg/L in November 2009.
- Following installation in January 1998, monitoring well TA2-W-26 initially had TCE concentrations above the TCE EPA MCL that ranged from 8 to 9.2 (J-qualified) µg/L. During an approximately 17-year period (August 2003 through June 2020), the TCE concentrations at well TA2-W-26 ranged from 0.79 (J-qualified) to 3.68 µg/L. Since September 2020, TCE concentrations at well TA2-W-26 have ranged from 11.6 to 19.7 µg/L. More details for well TA2-W-26 are discussed in Section 6.6.
- Monitoring well TJA-2 has exceeded the TCE EPA MCL once; the February 2019 sample contained 5.71 µg/L. All quarterly samples collected prior to and after that date had TCE concentrations below the EPA MCL (Section 6.6).

Potential downgradient receptors in the Regional Aquifer are production wells operated by KAFB, ABCWUA, and the VA. 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 February 2001),
- Contaminant transport modeling (SNL August 2005), and
- Conceptual groundwater modeling incorporating recharge features and stratigraphic controls (BGW September 2002).

The nearest receptor for the potential contaminants in the Regional Aquifer is the ABCWUA Ridgecrest Well Field. The computer modeling predicted that elevated nitrate concentrations in the TAG AOC could potentially reach the well field after a travel time of 130 years and would be attenuated to 0.24 mg/L, which is well below the EPA MCL of 10 mg/L for nitrate. TCE would be reduced to 0.03 µg/L, which is well below the EPA MCL of 5 µg/L for TCE. Thus, there is no foreseeable risk to human health or a threat to beneficial use of groundwater from historical SNL/NM operations.

6.2 Regulatory Criteria

The NMED HWB provides regulatory oversight of SNL/NM ER Operations, as well as implements and enforces regulations mandated by the Resource Conservation and Recovery Act (RCRA). All SWMUs and AOCs are listed in the *Resource Conservation and Recovery Act Facility Operating Permit, EPA ID# NM5890110518* (NMED HWB January 2015).

All corrective action requirements pertaining to the TAG AOC are contained in the Consent Order (NMED April 2004). Groundwater monitoring has been conducted in the TAG AOC since 1992. NMED identified the TAG AOC in the Consent Order because nitrate and TCE concentrations in groundwater had exceeded the respective EPA MCLs. When the Consent Order was issued, nitrate and TCE were specified as COCs because: (1) the PGWS contained concentrations of nitrate and TCE that exceeded the corresponding EPA MCLs, and (2) the Regional Aquifer contained nitrate concentrations that exceeded the EPA MCL. TCE did not exceed the EPA MCL in the Regional Aquifer when the Consent Order was issued and has not exceeded the EPA MCL since then. The following discussion is based upon EPA MCLs.

The groundwater monitoring activities for the TAG AOC are not associated with a single SWMU but have a broader scope. Groundwater characterization activities for TAG were originally conducted voluntarily as proposed in the *Sandia North Groundwater Investigation Plan* (SNL March 1996a). During the TAG High Performing Team meetings, participants (personnel from DOE/NNSA, SNL/NM, KAFB, COA, NMED HWB, and the U.S. EPA) debated the validity of using groundwater analytical results previously collected using low-flow sampling devices. Based on the perceived inadequacy of the sampling method, TAG groundwater sampling was temporarily suspended until an alternative sampling method could be implemented. In June 2003, DOE/NNSA and SNL/NM personnel submitted the *Tijeras Arroyo Groundwater Investigation Work Plan* (SNL June 2003) to the NMED HWB. The work plan presented a comprehensive scope of work for groundwater investigations that would be jointly conducted by personnel from SNL/NM, KAFB, and the COA. Based on the requirements of the work plan, groundwater sampling at SNL/NM resumed in July 2003 using conventional low-flow groundwater purging/sampling techniques.

As mentioned above, the Consent Order became effective in April 2004. The six quarterly sampling events specified in the *Tijeras Arroyo Groundwater Corrective Measures Evaluation Work Plan Tijeras Arroyo Groundwater* (SNL November 2004) were completed in Fiscal Year 2005. Since then, groundwater sampling has continued using a variety of frequencies (quarterly, semiannually, and annually) according to the NMED HWB-approved work plans. The *Tijeras Arroyo Groundwater Investigation Report* (SNL November 2005) specified that data would continue to be presented in annual reports, such as this annual groundwater monitoring report (AGMR). The outline of this chapter for the TAG AOC is based on the required elements of the Periodic Monitoring Report described in Section X.D of the Consent Order.

Prior to 2018, groundwater sampling at monitoring well WYO-4 was conducted by SNL/NM personnel. Monitoring well WYO-4 is located west of Wyoming Boulevard on land managed by KAFB (not leased or owned by DOE/NNSA). The well was not installed for investigating any of the SNL/NM SWMUs. Personnel from DOE/NNSA, SNL/NM, and the NMED HWB discussed the status of monitoring well WYO-4 in an August 2017 meeting. The NMED HWB verbally stated that the monitoring well no longer needed to be considered the responsibility of DOE/NNSA and SNL/NM personnel for groundwater sampling or remedial purposes. Responsibility for well WYO-4 was transferred to the KAFB ERP in 2018. SNL/NM personnel have not collected groundwater samples at well WYO-4 since then, but water levels are measured periodically by SNL/NM personnel. In this report, the discontinuance of sampling at the well is tracked as a variance from the work plan because formal correspondence concerning the transfer of responsibility has not been received from the NMED HWB.

As mentioned above in Section 6.1, the Revised TAG CCM/CME Report (SNL February 2018) was submitted in response to a NMED HWB disapproval letter (NMED HWB May 2017). The revised report utilized the understanding reached in an August 2017 meeting with NMED HWB, DOE/NNSA, and SNL/NM personnel. The revised report contained a series of new attachments for borehole lithologic logs, geophysical logs, well diagrams, and stratigraphic cross-sections. These materials were used for updating the body of the revised report concerning the interpretation and mapping of the structural dip and thickness of the Perching Horizon that underlies the PGWS. Accordingly, the discussion of the hydrogeologic setting and CSM were updated. Also, a more rigorous identification and screening of potential remedial technologies was conducted for addressing the elevated nitrate concentrations in the PGWS. Three remedial alternatives (MNA, in-situ bioremediation, and groundwater extraction and treatment) were evaluated in detail for issues such as modeling optimal well locations, sampling frequency, reporting, and cost estimates for installing additional wells and associated infrastructure.

In this AGMR, the TAG AOC analytical data include both hazardous and radioactive constituents; however, the analytical data for radionuclides (gamma spectroscopy, gross alpha/beta activity, and tritium) are provided voluntarily by the 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. Additional information on radionuclides and the scope of the Consent Order is presented in Section III.A of the Consent Order.

6.3 Scope of Activities

Section 6.1.5 lists the CY 2022 activities for the TAG AOC including the measurement of groundwater levels and the collection of groundwater samples. Table 6-6 summarizes the groundwater sampling events per monitoring well. The corresponding analytical parameters for each well are listed in Table 6-7. During CY 2022, a total of 21 monitoring wells were sampled. These wells consisted of 10 PGWS monitoring wells and 11 Regional Aquifer monitoring wells. The list of wells sampled in CY 2022 was previously summarized in Table 6-1. Monitoring wells PGS-2, TA1-W-03, and WYO-4 were not sampled; Section 6.8 discusses these variances.

Quality control (QC) samples were collected in the field at the time of environmental sample collection. Field QC samples include environmental duplicate, equipment blank (EB), field blank (FB), and trip blank (TB) samples. Section 1.3.3 discusses the utility of QC samples.

6.4 Field Methods and Measurements

Section 1.3 describes in detail the procedures used for groundwater monitoring. Specific information is discussed below. Sampling and analyses plans for the TAG AOC are listed in Table 6-6.

6.5 Analytical Methods

All groundwater samples were analyzed by the off-site laboratory using EPA-specified protocols described in Section 1.3.2.

6.6 Summary of Analytical Results for CY 2022

This section discusses the CY 2022 analytical results and pertinent trends in COC concentrations in the TAG AOC. Attachment 6C (Tables 6C-1 through 6C-7) presents the CY 2022 analytical results and field measurements for all TAG sampling events; Attachment 6D (Figures 6D-2 through 6D-6) presents the NPN concentration trend plots for 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 nitrate EPA MCL. Attachment 6D (Figure 6D-1) presents a TCE and PCE concentration trend plot for monitoring well TA2-W-26 where groundwater samples have exceeded the TCE EPA MCL since September 2020. Groundwater samples for well TA2-W-26 has exceeded the PCE EPA MCL since December 2020.

Table 6-6
Groundwater Monitoring Well Network and Sampling Dates for the Tijeras Arroyo Groundwater Area of Concern in Calendar Year 2022

Date of Sampling Event	Wells Sampled		SAP
February/March 2022	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 FY22, 2nd Quarter Sampling* (SNL January 2022)
July/August 2022 (delayed event)	TA2-W-19 TA2-W-26 TA2-W-28 TJA-2	TJA-3 TJA-4 TJA-7	*Tijeras Arroyo Groundwater Investigation, Mini-SAP for FY22, 3rd Quarter Sampling* (SNL May 2022)
August/September 2022	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 FY22, 4th Quarter Sampling* (SNL July 2022)
November/December 2022	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, 1st Quarter Sampling* (SNL October 2022b)

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).
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
TA2-NW = Technical Area-II (Northwest)
TA2-W = Technical Area-II (Well)
TJA = Tijeras Arroyo

Table 6-7
Analytes and Parameters for Tijeras Arroyo Groundwater Area of Concern Monitoring Wells per Sampling Event in Calendar Year 2022

Parameter	February/March 2022	
NPN VOCs	TA1-W-06 TA2-W-01 TA2-W-01 (Duplicate) TA2-W-19 TA2-W-26 TA2-W-26 (Duplicate) TA2-W-27	TA2-W-28 TJA-2 TJA-3 TJA-4 TJA-6 TJA-6 (Duplicate) TJA-7
Parameter	**July/August 2022 (delayed event)**	
NPN VOCs	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 2022**	
Alkalinity Anions Gamma Spectroscopy (short lista) Gross Alpha/Beta Activity NPN TAL Metals, plus Total Uranium Tritium VOCs	TA1-W-01 TA1-W-01 (Duplicate) TA1-W-02 TA1-W-04 TA1-W-05 TA1-W-05 (Duplicate) TA1-W-06 TA1-W-08 TA2-NW1-595 TA2-NW1-595 (Duplicate) TA2-W-01 TA2-W-19 TA2-W-24	TA2-W-24 (Duplicate) TA2-W-25 TA2-W-26 TA2-W-26 (Duplicate) TA2-W-27 TA2-W-28 TJA-2 TJA-3 TJA-4 TJA-5 TJA-6 TJA-7 WYO-3
Parameter	**November/December 2022**	
NPN VOCs	TA2-W-19 TA2-W-26 TA2-W-26 (Duplicate) TA2-W-28 TJA-2	TJA-2 (Duplicate) TJA-3 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).
Wells screened in the Regional Aquifer are not shaded.
Duplicate samples are not analyzed for alkalinity, anions, radionuclides, and metals.

[a] Gamma spectroscopy shortlist (americium-241, cesium-137, cobalt-60, and potassium-40)
NPN = nitrate plus nitrite (reported as nitrogen)
TAL = Target Analyte List
TA1-W = Technical Area-I (Well)
TA2-NW = Technical Area-II (Northwest)
TA2-W = Technical Area-II (Well)
TJA = Tijeras Arroyo
VOC = volatile organic compound
WYO = Wyoming

Analytical Results for Volatile Organic Compounds

Table 6C-1 presents a summary of the VOC results detected above the MDL for groundwater samples collected at the TAG AOC in CY 2022. Table 6C-2 lists the MDLs for VOCs. The following data discussion and figures cite the independent validation qualifiers as listed in Table 6C-1. Six VOCs were classified as detected following independent data validation:

- Chloroform (J-qualified)
- cis-1,2-dichloroethene
- 1,1-dichloroethane
- 1,1-dichloroethene
- PCE
- TCE

Figures 6-11 and 6-12 show the monitoring well locations with the corresponding maximum TCE and PCE concentrations in CY 2022 environmental samples for the PGWS and the Regional Aquifer, respectively. Table 6-8 lists the monitoring wells where EPA MCLs for TCE and PCE were exceeded in CY 2022. For the PGWS, groundwater samples from one monitoring well (TA2-W-26) exceeded the EPA MCLs for TCE and PCE. The maximum TCE and PCE concentrations detected in the quarterly environmental samples for well TA2-W-26 were 19.7 and 10.4 µg/L, respectively. TCE and PCE were not detected in groundwater samples collected from the Merging Zone. In the Regional Aquifer, the maximum TCE concentration was 0.650 µg/L at well TJA-3; PCE was not detected. Additional details for VOC concentrations and trends are discussed below.

Table 6-8
Matrix Summarizing the Monitoring Wells Where Contaminant Concentrations in Groundwater Samples Exceeded the Respective Maximum Contaminant Levels for TCE and PCE in Calendar Year 2022

Aquifer	Number of Wells Exceeding the TCE EPA MCL of 5 µg/L in CY 2022	Maximum TCE Concentration in CY 2022 (µg/L)	Number of Wells Exceeding the PCE EPA MCL of 5 µg/L in CY 2022	Maximum PCE Concentration in CY 2022 (µg/L
Perched Groundwater System	One	19.7 µg/L at TA2-W-26	One	10.4 µg/L at TA2-W-26
Merging Zone	None	ND (<0.333)	None	ND (<0.333)
Regional Aquifer	None	0.650 µg/L at TJA-3	None	ND (<0.333)

Notes:
< = less than
µg/L = microgram(s) per liter
CY = calendar year
EPA = U.S. Environmental Protection Agency
MCL = maximum contaminant level
ND = not detected
TA2-W = Technical Area-II (Well)
PCE = tetrachloroethene
TCE = trichloroethene
TJA = Tijeras Arroyo

Two monitoring wells (TJA-2 and TJA-7) had TCE concentrations close to, but below, the TCE EPA MCL in CY 2022. In response to the February 2019 sample that contained TCE at 5.71 µg/L, a BaroBall™ (passive venting device) was installed on top of the TJA-2 well casing in April 2019. Subsequent groundwater samples have not exceeded the EPA MCL. Table 6C-1 presents the CY 2022 sampling results; TCE concentrations at well TJA-2 ranged from 3.62 to 4.51 µg/L. The BaroBall™ is possibly reducing the accumulation of VOCs in the well casing above the water column. Prior to April 2019, VOCs in soil vapor higher up in the vadose zone were suspected of having entered the well through casing joints and subsequently diffused into the water column. Video logging was conducted at well TJA-2 in 2019. The casing and screen were in good condition. PCE was not detected at well TJA-2 in CY 2022.

The maximum TCE concentration at monitoring well TJA-7 in CY 2022 was 4.55 µg/L. This is a new maximum concentration for TCE at that well. PCE was not detected at well TJA-7 in CY 2022. The historical maximum PCE concentration at well TJA-7 has been 0.36 µg/L (September 2021).

Monitoring well TA2-W-26 is the only PGWS monitoring well that exceeded a VOC EPA MCL in CY 2022. The CY 2022 TCE concentrations for well TA2-W-26 ranged from 15.0 to 19.7 µg/L (Table 6C-1). Following installation in January 1998, well TA2-W-26 initially had TCE concentrations above the TCE EPA MCL (5 µg/L) that ranged from 8 to 9.2 (J-qualified) µg/L. The TCE trend plot (Figure 6D-1) shows that in September 2020 TCE concentrations at well TA2-W-26 increased above the TCE EPA MCL after nearly 17 years (October 2003 through March 2020) of TCE concentrations being below the MCL. Since September 2020, TCE concentrations at well TA2-W-26 have ranged from 11.6 to 19.7 µg/L. Based upon the historical trend of water levels, well TA2-W-26 is predicted to go dry (the water level declines below the well screen) in 2038 (Table 6-4).

Since December 2020, PCE concentrations in samples collected from monitoring well TA2-W-26 have also exceeded the EPA MCL of 5 µg/L. The CY 2022 PCE concentrations for the quarterly environmental samples collected at well TA2-W-26 ranged from 7.18 (J-qualified) to 10.4 µg/L (Table 6C-1). The concentration trend plot for PCE is similar to that of TCE (Figure 6D-1).

The suspected disposal of chlorinated solvents at the closed COA Eubank Landfill appears to be the most likely source of TCE and PCE concentrations detected in groundwater at monitoring well TA2-W-26. The recent TCE concentrations at well TA2-W-26 are much greater than TCE detections for wells located adjacent to SNL/NM SWMUs at TA-II and at SWMU 46 (Figure 6-11). The suspected pathway from the Eubank Landfill to the well is the migration of VOCs by vapor-phase transport and subsequent partitioning to groundwater. The Eubank Landfill was in operation from 1973 to 1984 and received an estimated 2 to 4 million cubic yards of residential and industrial waste (COA December 2021). The waste was buried to a maximum depth of approximately 40 ft bgs; numerous "chemical" drums from a former electronics manufacturing plant were also placed in the landfill (Nelson June 1997). In 2001, a soil-vapor investigation was conducted across both fill areas at the Eubank Landfill (DBS&A April 2002). Eleven temporary soil-vapor probes were set at 10 ft bgs. Twenty-six individual VOCs were detected. The nearest probe to well TA2-W-26 was located approximately 1,000 ft north-northeast of the well. Samples from this probe yielded a TCE concentration of 1,400 ppbv. PCE and cis-1,2-dichloroethene were reported at 2,800 and 8,100 ppbv, respectively. Calculations conducted by SNL personnel using Henry's Law indicate that the soil-vapor concentrations beneath the Eubank Landfill are sufficient to create the VOCs reported in groundwater at monitoring well TA2-W-26. Unfortunately, the most recent COA landfill-gas investigations conducted during 2016 through 2018 for methane monitoring did not evaluate VOCs at the Eubank Landfill (COA December 2021). The Eubank Landfill is not covered with an engineered cap and is not lined.

Because of increased turbidity while purging, video logging was conducted at monitoring well TA2-W-26 in July 2020. The casing and screen were in good condition. No significant damage was noted; however, the water was slightly cloudy. A detailed viewing of the screen slots using the pivoting camera showed that only a minor amount of fine-grained material was present in the slots. Increased turbidity starting in June 2020 appears to coincide with the onset of increasing TCE concentrations. TCE can be sorbed onto particles in turbid water. Sample-preservation acid can subsequently dissolve sorbed TCE into water samples.

A review of the geophysical log for nearby monitoring well TA2-W-25 (the well pair for TA2-W-26, located 50 ft apart) indicates that as the water level declines, the 2020 and later groundwater samples from TA2-W-26 are likely derived from more clayey sediments than when the water level was higher and more permeable sediments were contributing water to the well. A review of SNL and COA geophysical logs indicate that the PGWS may extend beneath the closed COA Eubank Landfill. The COA installed four Regional Aquifer monitoring wells at the Eubank Landfill using the mud-rotary technique in 1996. Presence of the PGWS might have been obscured by the drilling technique.

PCE was detected in monitoring well TA2-W-26 groundwater samples above the EPA MCL (5 µg/L) in all four of the CY 2022 quarterly events; the maximum concentration was 10.4 µg/L in the August 2022 environmental sample. The December 2022 environmental sample for well TA2-W-26 contained 8.10 µg/L. Three other monitoring wells (TA1-W-06, TA2-W-01, and TA2-W-27) had PCE concentrations ranging from 0.440 (J-qualified) to 1.51 µg/L in CY 2022 (Table 6C-1).

Monitoring wells TA2-W-26 and TJA-2 had detectable concentrations of 1,1-dichloroethane in CY 2022 (Table 6C-1). An EPA MCL has not been established for 1,1-dichloroethane. The maximum 1,1-dichloroethane concentration for the four quarterly events in CY 2022 for well TA2-W-26 was 7.06 µg/L. Detectable concentrations of 1,1-dichloroethane were reported for the four quarterly events for well TJA-2; the maximum 1,1-dichloroethane concentration was 0.420 µg/L.

Monitoring wells TA1-W-06 and TA2-W-26 had detectable concentrations of 1,1-dichloroethene in CY 2022 (Table 6C-1). The EPA MCL for 1,1-dichloroethene is 7 µg/L. The maximum 1,1-dichloroethene concentration for the two semiannual events in CY 2022 for well TA1-W-06 was 1.01 µg/L. Detectable concentrations of 1,1-dichloroethene were reported for all four of the quarterly events at well TA2-W-26; the maximum 1,1-dichloroethene concentration was 3.02 µg/L.

Monitoring wells TA2-W-26 and TJA-2 had detectable concentrations of cis-1,2-dichloroethene in CY 2022 (Table 6C-1). The EPA MCL for cis-1,2-dichloroethene is 70 µg/L. Detectable concentrations of cis-1,2-dichloroethene were reported for all four of the quarterly events in CY 2022 at well TA2-W-26; the maximum cis-1,2-dichloroethene concentration was 6.22 µg/L. Detectable concentrations of cis-1,2-dichloroethene were reported for all four quarterly events for well TJA-2; the maximum cis-1,2-dichloroethene concentration was 0.430 µg/L.

Chloroform was detected at one monitoring well (TA2-W-26) in CY 2022. Chloroform was detected for all four quarters with a maximum concentration of 0.710 µg/L (J-qualified). The chloroform EPA MCL is 80 µg/L.

Only one Regional Aquifer monitoring well had a TCE concentration above the detection limit of 0.333 µg/L in CY 2022 (Table 6C-2). The semiannual environmental samples for monitoring well TJA-3 had TCE concentrations of 0.510 and 0.650 µg/L in July and September 2022, respectively (Table 6C-1). TCE has been sporadically detected at well TJA-3 since 2001 but has never exceeded the EPA MCL.

Analytical Results for Nitrate

Table 6-9 lists the monitoring wells where the EPA MCL for nitrate was exceeded in CY 2022. Figure 6-13 shows the monitoring well locations with the corresponding maximum NPN concentrations in CY 2022 environmental samples for the PGWS and the Regional Aquifer. 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 (measured as NPN). The Merging Zone well TJA-4 exceeded the EPA MCL for nitrate. None of the Regional Aquifer monitoring wells exceeded the EPA MCL for nitrate. Additional details for nitrate concentrations and trends are discussed below.

Table 6-9
Matrix Summarizing the Monitoring Wells Where Contaminant Concentrations in Groundwater Samples Exceeded the Maximum Contaminant Level for Nitrate in Calendar Year 2022

Aquifer	Number of Monitoring Wells Exceeding the nitrate EPA MCL of 10 mg/L in CY 2022	Maximum NPN Concentration in CY 2022 (mg/L)
Perched Groundwater System	Five wells (TA2-W-19, TA2-W-28, TJA-2, TJA-5, TJA-7)	22.2
Merging Zone	One well (TJA-4)	34.4
Regional Aquifer	None	3.92

Notes:
CY = calendar year
EPA = U.S. Environmental Protection Agency
MCL = maximum contaminant level
mg/L = milligram(s) per liter
NPN = nitrate plus nitrite (reported as nitrogen)
TA2-W = Technical Area-II (Well)
TJA = Tijeras Arroyo

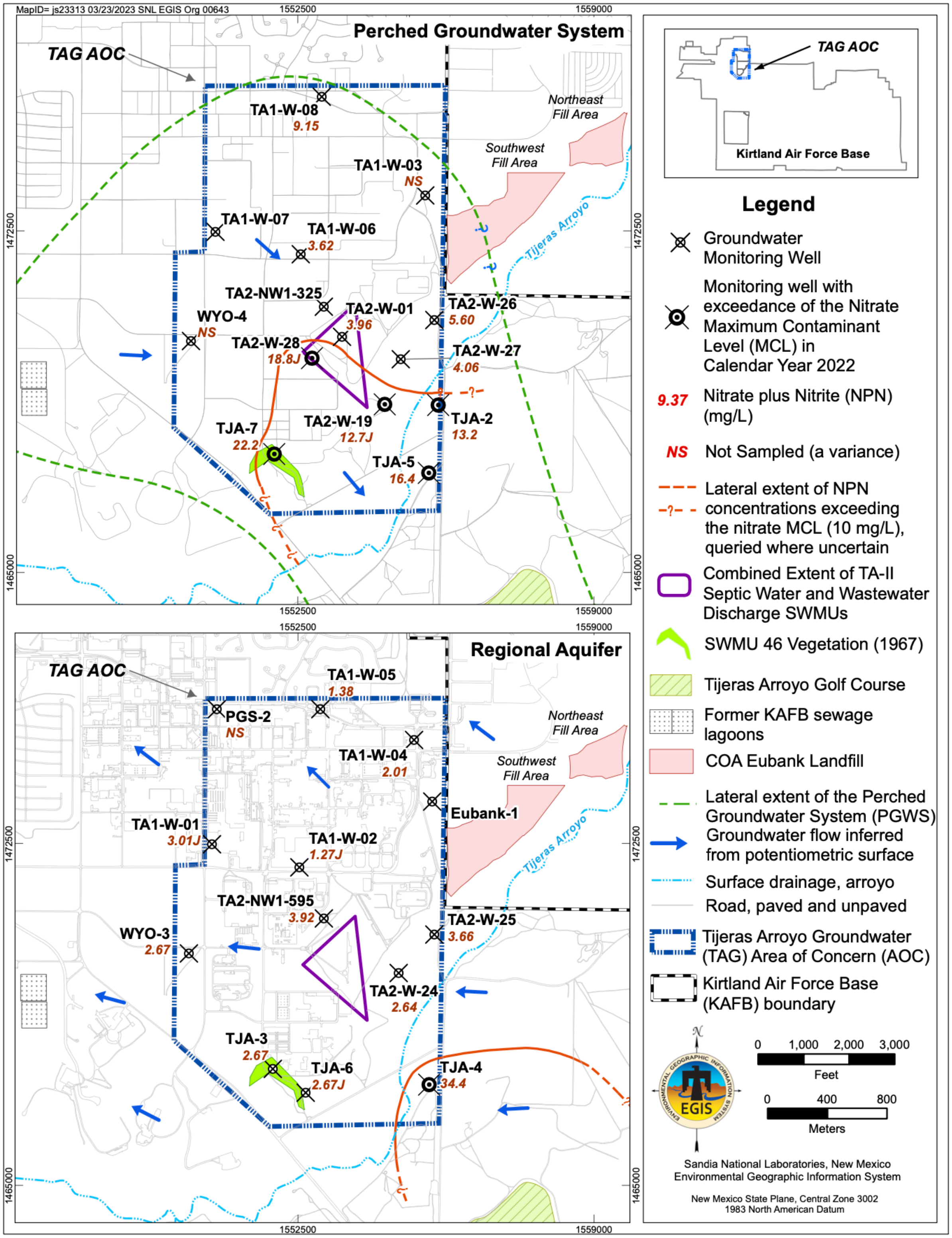


Figure 6-13
Maximum Concentrations of NPN in the Perched Groundwater System and the Regional Aquifer at the Tijeras Arroyo Groundwater Area of Concern for Calendar Year 2022

Five PGWS monitoring wells (TA2-W-19, TA2-W-28, TJA-2, TJA-5, and TJA-7) had NPN results exceeding the nitrate EPA MCL of 10 mg/L in CY 2022 (Table 6C-3). The maximum NPN concentration was 22.2 mg/L in the March 2022 sample from well TJA-7. Since 2015, the NPN trends for the environmental samples are as follows:

- TA2-W-19 (Figure 6D-2). NPN concentrations have ranged from 11.6 mg/L (March 2015) to a maximum of 13.8 mg/L (June 2019). In CY 2022, the maximum NPN concentration was 12.7 (J-qualified) mg/L. The overall NPN trend for the last seven years is stable while the water level consistently declined at approximately 0.49 ft/yr.
- TA2-W-28 (Figure 6D-3). NPN concentrations have decreased from a high of 27.8 mg/L (September 2015) to the most recent 14.4 mg/L (December 2022). In CY 2022, the maximum NPN concentration was 18.8 (J-qualified) mg/L. The overall NPN trend for the last seven years shows overall decreasing concentrations while the water level consistently declined at approximately 0.44 ft/yr. Monitoring well TA2-W-28 (first sampled in December 2014) is the replacement well for TA2-SW1-320 (last sampled in August 2014). Monitoring well 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-4). NPN concentrations have ranged from 10.6 mg/L (March 2017) to a maximum of 13.9 mg/L (June 2019). In CY 2022, the maximum NPN concentration was 13.2 mg/L. The overall NPN trend for the last seven years is stable while the water level consistently declined at approximately 0.44 ft/yr.
- TJA-4 (Figure 6D-5). NPN concentrations have ranged from 26.5 mg/L (September 2015) to a maximum of 37.1 mg/L in the environmental sample (June 2019). The corresponding environmental sample duplicate had a NPN concentration 39.7 mg/L (June 2019). In CY 2022, the maximum NPN concentration was 34.4 mg/L. The overall NPN trend for the last seven years is stable while the water level increased at 0.09 ft/yr. This is the only DOE/NNSA-owned monitoring well completed in the Merging Zone.
- TJA-7 (Figure 6D-6). NPN concentrations have ranged from 20.3 mg/L (September 2015) to 26 mg/L (December 2017). In CY 2022, the maximum NPN concentration was 22.2 mg/L. The overall NPN trend for the last seven years is slightly decreasing while the water level consistently declined at a rate of approximately 0.28 ft/yr.
- TJA-5 (Figure 6D-7). The collection of groundwater samples has not been a regulatory requirement for monitoring well TJA-5. However, in anticipation of a CMI Plan being prepared for the TAG AOC, the well was returned to annual sampling status in June 2018. The August 2022 NPN concentration was 16.4 mg/L. The overall NPN trend for the last four years shows decreasing concentrations. SNL/NM personnel did not sample the well from 2001 to 2017. However, water levels have been measured quarterly since the well was installed in 1998. For the last seven years, the water level consistently declined at a rate of approximately 0.24 ft/yr.

Monitoring well (TJA-4) had the highest NPN concentration (34.4 mg/L) of all the TAG AOC wells sampled in CY 2022. The four quarterly samples had NPN concentrations ranging from 29.8 to 34.4 mg/L. This well is located at the southeast corner of the TAG AOC and is screened in the Merging Zone above the Regional Aquifer. Figure 6D-5 shows that the general trend of NPN concentrations is relatively stable or slightly increasing since 2013. 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 between 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 nearby KAFB Tijeras Arroyo Golf Course that is located approximately 0.6 miles to the southeast. Elevated nitrate in this well likely reflects contributions from geologic nitrate and/or anthropogenic sources located upgradient of the TAG AOC such as fertilizer usage at the KAFB Tijeras Arroyo Golf Course.

Analytical Results for Anions, Metals, Radionuclides, and Field Parameters

Table 6C-4 presents the CY 2022 analytical results for major anions (bromide, chloride, fluoride, and sulfate) and alkalinity; no anion concentrations exceeded the established EPA MCLs.

Table 6C-5 presents the CY 2022 analytical results for the 23 Target Analyte List (TAL) metals and total uranium. No analytes exceeded the established EPA MCLs.

Table 6C-6 presents the CY 2022 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 40 Code of Federal Regulations Part 141. 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. All reported radionuclide activities were below EPA MCLs, where established. Gross beta results are used as a radiological screening tool; the results do not indicate the presence of a beta-emitting radionuclide that would exceed the established 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 CY 2022 field parameter measurements obtained immediately before sample collection at each monitoring well. The parameters consist of temperature, specific conductivity, oxidation-reduction potential, potential of hydrogen, turbidity, and dissolved oxygen. The parameters are measured for determining that stabilization has occurred as defined in Section 1.3.1.2 so that representative groundwater samples are collected.

6.7 Quality Control Results

Section 1.3.3 (Chapter 1) describes the groundwater sampling and QC analyses protocols. Tables 6C-1 through 6C-6 (Attachment 6C) provide analytical data and corresponding validation qualifiers for groundwater samples collected in TAG AOC. The results of QC samples and the influence on data quality for the TAG sampling events are discussed below. Four types of field QC samples were evaluated: environmental duplicate samples, EB samples, FB samples, and TB samples.

For CY 2022, the results for the environmental duplicate sample pairs for each sampling event (Table 6C-8) showed generally good agreement based on the relative percent difference (RPD) values for VOCs and NPN. RPDs are unitless values calculated for those constituents with detections above the MDL in both the environmental and environmental duplicate samples at any well.

The calculated RPD values for the CY 2022 NPN sample pairs (environmental and environmental duplicate samples) for the TAG AOC ranged from less than 1 to 3; thus, are less than the RPD goal of 35. The calculated RPD values for the VOC sample pairs ranged from less than to 20; thus, are less than or at the RPD goal of 20.

The calculated RPD values for the environmental duplicate analyses per quarter are as follows:

- **February/March 2022—Sampling Event**—Environmental duplicate samples were collected from three monitoring wells (TA2-W-01, TA2-W-26, and TJA-6). The NPN RPD values were less than 1 (Table 6C-8). The VOC RPD values ranged from less than 1 to 18.
- **July/August 2022 Sampling Event**—Environmental duplicate samples were collected from two monitoring wells (TA2-W-26 and TA2-W-28). Both NPN RPD values were 1 (Table 6C-8). The VOC RPD values ranged from less than 1 to 3.
- **August/September 2022—Sampling Event**—Environmental duplicate samples were collected from five monitoring wells (TA1-W-01, TA1-W-05, TA2-NW1-595, TA2-W-24, and TA2-W-26). The NPN RPD values ranged from 1 to 3 (Table 6C-8). VOCs were only detected at monitoring well TA2-W-26; the RPDs for the six detected VOCs including TCE ranged from 6 to 10.
- **November/December 2022 Sampling Event**—Environmental duplicate samples were collected from two monitoring wells (TA2-W-26 and TJA-2). The NPN RPD values were 3 and 2, respectively (Table 6C-8). The six VOCs detected at well TA2-W-26 had RPDs ranging from 5 to 20. The three VOCs detected at TJA-2 had RPDs ranging from 1 to 8.

The results for the EB analyses per quarter are as follows:

- **February/March 2022 Sampling Event**—EB samples were collected prior to sampling three monitoring wells (TA2-W-01, TA2-W-26, and TJA-6). The EB samples were analyzed for the same analytes as the environmental samples. The VOCs acetone, bromodichloromethane, bromoform, chloroform, dibromochloromethane, PCE, and TCE were detected in the EB samples. No corrective action was required for acetone, bromodichloromethane, bromoform, dibromochloromethane, PCE, and TCE because these compounds were not detected in associated environmental samples. Chloroform in the TA2-W-26 environmental and environmental duplicate samples was qualified as estimated values, because chloroform has been detected in historical samples.
- **July/August 2022 Sampling Event**—EB samples were collected prior to sampling two monitoring wells (TA2-W-26 and TA2-W-28). The EB samples were analyzed for the same analytes as the environmental samples. Acetone, bromodichloromethane, chloroform, and dibromochloromethane were detected in the EB samples. No corrective action was necessary because these analytes were not detected above MDLs in the associated environmental samples or detected in environmental samples at concentrations greater than five times the associated EB result.
- **August/September 2022 Sampling Event**—EB samples were collected prior to sampling five monitoring wells (TA1-W-01, TA1-W-05, TA2-NW1-595, TA2-W-24, and TA2-W-26). The EB samples were analyzed for the same analytes as the environmental samples. Acetone, alkalinity, bromodichloromethane, bromoform, 2-butanone, cadmium, chloride, chloroform, copper, dibromochloromethane, 1,2-dichloroethane, lead, sodium, and sulfate were detected above MDLs in various EB samples. No corrective action was required for acetone, alkalinity, bromodichloromethane, bromoform, 2-butanone, cadmium, chloride, chloroform, dibromochloromethane, 1,2-dichloroethane, lead, sodium, or sulfate because these parameters were not detected in environmental samples or reported values in environmental samples are greater than five times the EB concentration. Copper in well TA2-W-26 was qualified as not detected during data validation because copper was reported at concentrations less than PQLs in both EB and environmental samples.

- **November/December 2022 Sampling Event**—EB samples were collected prior to the sampling of two monitoring wells (TA2-W-26 and TJA-3). The EB samples were analyzed for the same analytes as the environmental samples. 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 for TA2-W-26 was qualified as an estimated value during data validation because chloroform has been historically reported in TA2-W-26 environmental samples.

The results for the FB analyses per quarter are as follows:

- **February/March 2022 Sampling Event**—A total of three FB samples were analyzed for VOCs to assess whether contamination of the samples had resulted from ambient field conditions. Two FB samples were prepared by pouring deionized (DI) water into sample containers at the sample point (i.e., inside the sampling truck at TJA-4 and TJA-7 monitoring well locations) to simulate the transfer of environmental samples from the sampling system to the sample container. One FB sample was collected from the source water used for the equipment decontamination process. Acetone, bromodichloromethane, bromoform, chloroform, and dibromochloromethane were reported in FB samples. No corrective action was necessary because these compounds were not detected in associated environmental samples.
- **July/August 2022 Sampling Event**—A total of three FB samples were analyzed for VOCs to assess whether contamination of the samples had resulted from ambient field conditions. Two FB samples were prepared by pouring DI water into sample containers at the sample point (i.e., inside the sampling truck at TJA-3 and TJA-4 monitoring well locations) to simulate the transfer of environmental samples from the sampling system to the sample container. One FB sample was collected from the source water used for the equipment decontamination process. Bromodichloromethane, chloroform, and dibromochloromethane were reported in FB samples. No corrective action was necessary because these compounds were not detected in associated environmental samples.
- **August/September 2022 Sampling Event**—FB samples for VOC analysis were collected at five monitoring wells (TA1-W-01, TA1-W-06, TA1-W-08, TA2-W-26, and TA2-W-28). to assess whether contamination of the samples resulted from ambient field conditions. These FB samples were prepared by pouring DI water into sample containers at the sample point (i.e., inside the sampling truck at well locations to simulate the transfer of environmental samples from the sampling system to the sample container). The compounds detected in FB samples included acetone, bromodichloromethane, bromoform, chloroform, dibromochloromethane, and 1,2-dichloroethane. No corrective action was necessary because these compounds were not detected in the associated environmental samples. One additional FB sample was collected and analyzed for all parameters from the source water used for the equipment decontamination process. Alkalinity, bromodichloromethane, bromoform, chloride, chloroform, copper, dibromochloromethane, 1,2-dichloroethane, sodium, and sulfate were reported above the MDL.
- **November/December 2022 Sampling Event**—A total of three FB samples were analyzed for VOCs. FB samples were collected at two monitoring wells (TJA-3 and TJA-4). Another FB sample was collected from the DI water source used for equipment decontamination. Bromodichloromethane, bromoform, chloroform, and dibromochloromethane were reported in FB samples. No corrective action was necessary because these compounds were not detected in associated environmental samples.

The results for the TB analyses per quarter are as follows:

- **February/March 2022 Sampling Event**—A total of 15 TB samples were submitted for VOC analysis. No VOCs were detected above MDLs in any TB sample, except methylene chloride and TCE. Methylene chloride was reported in three TB samples and TCE in one TB sample. Methylene chloride in samples from monitoring wells TA2-W-28 and TJA-2, and TCE in TJA-3 were qualified as not detected during data validation because these compounds were reported below PQLs in both environmental and TB samples.
- **July/August 2022 Sampling Event**—A total of 9 TB samples were submitted for VOC analysis. No VOCs were detected above MDLs in any of the TB samples, except for acetone and methylene chloride. Acetone was reported in one TB sample and methylene chloride was reported in four TB samples. No corrective action was necessary because these compounds were not detected in associated environmental samples.
- **August/September 2022 Sampling Event**—A total of 27 TB samples were submitted for VOC analysis. Acetone (7 TB samples), bromochloromethane (1 TB sample), and methylene chloride (8 TB samples) were detected above MDLs. No corrective action was required for bromochloromethane because this compound was not reported in the associated environmental samples. Acetone in TA1-W-05 and methylene chloride in TA2-NW1-595, TA2-W-25, TA2-W-27, and TJA-3 samples were qualified as not detected during data validation because reported concentrations were less than PQL in both the environmental and TB samples.
- **December 2022 Sampling Event**—A total of 10 TB samples were submitted for VOC analysis. No VOCs were detected above MDLs in any TB sample, except acetone and methylene chloride. Acetone was reported in seven TB samples and methylene chloride was reported in six TB samples. Acetone (in TA2-W-19 and TJA-2) and methylene chloride (in TA2-W-26 and TJA-7) were qualified as not detected during data validation because these compounds were reported below PQLs in both environmental and associated TB samples.

6.8 Variances and Non-Conformances

Variances (non-conformances) from field or sampling requirements as specified in the four Tijeras Arroyo Groundwater Investigation mini-sampling and analysis plans (SNL January 2022, May 2022, July 2022, and October 2022b) are noted as follows:

- **All Quarterly Events in CY 2022**—Monitoring well WYO-4 was not sampled because responsibility for the well was transferred to the KAFB ERP in 2018. This well will be discussed as a variance until the NMED HWB approves the TAG CMI Plan.
- **February/March 2022 Sampling Event**—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 NTU during the purge. As a result, well TA2-W-26 had a variance for turbidity. The other five parameters were stable. The well was purged dry prior to meeting the stability criteria for turbidity. The well was allowed to recover overnight prior to sample collection.
- **July/August 2022 Sampling Event**— 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 NTU during the purge. As a result, well TA2-W-26 had a variance for turbidity. The other five parameters were stable. The well was purged dry prior to meeting the stability criteria for turbidity. The well was allowed to recover overnight prior to sample collection.

- **August/September 2022 Sampling Event**—Four monitoring wells (TA1-W-03, PGS-2 WYO-4, and TA2-W-26) had variances. Wells TA1-W-03 and PGS-2 are scheduled for annual sampling (Table 6-1) but neither could be sampled. The conditions at wells TA1-W-03, PGS-2, and WYO-4 were taken into account during preparation of the Revised TAG CCM/CME Report (SNL February 2018). Monitoring well TA1-W-03 is screened in the PGWS and has not contained a sufficient volume of water for collecting a groundwater sample since August 2017; continued natural dewatering of the PGWS was anticipated. Since 2018, water has been not present in the TA1-W-03 well screen. Grout intrusion into the screen at Regional Aquifer monitoring well PGS-2 precludes the collection of representative groundwater samples. However, well PGS-2 continues to be useful for measuring water levels. Monitoring well WYO-4 was not sampled because responsibility for the well was transferred to the KAFB ERP in 2018. The fourth variance involved well TA2-W-26. Fine-grained sand and silt material were observed on the sampling pump after retrieval at TA2-W-26. As a result, the well had a variance for turbidity. The other five parameters were stable. The well was purged dry prior to meeting the stability criteria for turbidity. Monitoring well TA2-W-26 was subsequently allowed to recover overnight prior to sample collection.
- **November/December 2022 Sampling Event**—During purging, fine-grained sand and silt material were observed at monitoring well TA2-W-26. As a result, the well had a variance for turbidity. The other five parameters were stable. The well was purged dry prior to meeting the stability criteria for turbidity. The well was allowed to recover overnight prior to sample collection. The December 2022 sampling event was the twelfth consecutive sampling event where elevated turbidity had occurred. As noted in the Calendar Year 2021 Annual Ground Water Monitoring Report (SNL June 2022), redevelopment of well TA2-W-26 is not recommended. Agitation of the fine-grained sediments would likely increase turbidity in subsequent groundwater samples.

6.9 Summary, Conclusions, and Ongoing Studies

The TAG AOC encompasses an area of approximately 1.82 sq mi in the north-central portion of KAFB. Groundwater investigations were initiated in 1992 and the current groundwater network consists of 24 monitoring wells for water quality analysis and 27 monitoring wells for groundwater level measurements. In CY 2022, monitoring wells were sampled in four events (February/March 2022, July/August 2022, August/September 2022, and November/December 2022). The groundwater samples for each event were analyzed for VOCs and NPN. Additional analytes (anions, alkalinity, TAL metals [and total uranium], gamma spectroscopy [short list], gross alpha/beta activity, and tritium) were analyzed in the August/September 2022 event. Analytical results for VOCs, NPN, anions, alkalinity, metals, and radionuclides were compared to EPA MCLs for drinking water (EPA March 2018) where established.

In CY 2022, the maximum NPN concentration in the PGWS was 22.2 mg/L. The maximum NPN concentration in the Regional Aquifer exclusive of the Merging Zone was 3.92 mg/L. In the Merging Zone above the Regional Aquifer, the maximum NPN concentration was 34.4 mg/L. NPN concentrations exceeded the EPA MCL of 10 mg/L in CY 2022 samples from five monitoring wells (TA2-W-19, TA2-W-28, TJA-2, TJA-5, and TJA-7) that are screened in the PGWS and from the one monitoring well (TJA-4) that is screened in the Merging Zone above the Regional Aquifer. NPN concentrations at three monitoring wells (TA2-W-19, TJA-2, and TJA-4) are stable while NPN concentrations at three other monitoring wells (TA2-W-28, TJA-5, and TJA-7) are decreasing. The lateral extent of NPN in the PGWS exceeding the EPA MCL for nitrate is consistent with previous years and is restricted to the southeast corner of the TAG AOC and likely reflects anthropogenic sources from multiple release sites and impacts from naturally occurring (geologic) nitrate. In the Regional Aquifer, the distribution of NPN concentrations exceeding the nitrate EPA MCL is restricted to the Merging Zone in the extreme southeast corner of the TAG AOC and is likely attributable to geologic nitrate and/or anthropogenic release sites that are located upgradient of the TAG AOC.

In CY 2022, two VOCs (TCE and PCE) exceeded EPA MCLs at one PGWS monitoring well (TA2-W-26). The quarterly environmental samples for monitoring well TA2-W-26 had maximum TCE and PCE concentrations of 19.7 and 10.4 µg/L, respectively. The potential anthropogenic sources of TCE and PCE are likely located both within and outside the TAG AOC. The maximum TCE concentration in the Regional Aquifer exclusive of the Merging Zone was 0.650 µg/L. PCE was not detected in the Regional Aquifer. In the Merging Zone above the Regional Aquifer, TCE and PCE were not detected.

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 to the southeast. Water levels continue to decline in the PGWS monitoring wells as the system naturally dewaters (dissipates). For the period of October 2015 to October 2022, the rate of decline per PGWS monitoring well ranged from 0.12 to 0.57 ft/yr. Four monitoring wells are predicted to be dry by 2030. In 2040, five monitoring wells will be dry. By 2050, 10 of the 14 PGWS monitoring wells are predicted to be dry. Only near the northwest and southeast corners of the TAG AOC will submerged well screens remain after 2050. Groundwater from the PGWS is not pumped for potable use within or near the TAG AOC.

Groundwater in the Regional Aquifer flows to the west and northwest. Water levels continue to increase in the Regional Aquifer monitoring wells. For the period of October 2015 to October 2022, the rate of increase per monitoring well ranged from 0.08 to 1.53 ft/yr. There is no foreseeable risk to human health involving production (potable) wells completed in the Regional Aquifer.

Ongoing environmental studies in the TAG AOC include the following:

- Collecting groundwater samples from monitoring wells on a quarterly, semiannual, or annual basis. At a minimum, the analytes for groundwater samples at all wells will consist of NPN and VOCs.
- Measuring groundwater levels at all monitoring wells.
- Maintaining contact with the KAFB ERP personnel with respect to the results of their nitrate in groundwater studies.
- Obtaining groundwater results (elevations and analytical data) relevant to the TAG AOC from KAFB, USGS, and the COA.
- Reporting future groundwater monitoring results in the CY 2023 AGMR.
- In CY 2023, SNL/NM personnel will prepare a CMI Plan in accordance with the monitoring requirements specified in the Revised TAG CCM/CME Report (SNL February 2018). That report was approved by the NMED HWB in a Public Notice (NMED August 2022). MNA is the preferred remedial action for addressing elevated nitrate concentrations in the PGWS. The CMI Plan will follow guidance in the Consent Order. Assuming that the CMI Plan is approved by NMED HWB in CY 2023, water-level measurements will be conducted at 26 monitoring wells and groundwater samples will be collected at a revised list of 19 monitoring wells starting in January 2024. PGWS monitoring wells will be sampled semiannually. Regional Aquifer monitoring wells will be sampled annually.

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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.	www.airfields-freeman.com 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; en.wikipedia.org 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 at TA-II. All discharges to the ground surface or buried leach fields ended in 1992.	SNL November 2005
1948	Wastewater and possibly septic-water discharges associated with TA-I begin at SWMU 46. All discharges to ground surface at the outfall ditches ceased in 1974.	SNL 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 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 begins conducting investigations using the CEARP list of sites.	SNL March 1995a
1992	ER Project starts 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 March 1995a
1994	Installed groundwater monitoring wells TA2-W-01 and TJA-2.	SNL 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 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 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 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 HWB.	SNL March 1996b

Refer to Notes on page 6A-6.

Table 6A-1 *(Continued)*
Historical Timeline of the Tijeras Arroyo Groundwater Area of Concern

Year	Event	Reference
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 March 1998
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 HWB.	Fritts and Van Hart March 1997
1997	Installed groundwater monitoring wells TA1-W-01 and TA2-W-25.	SNL 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 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 June 2000
1998	Revision of the 1995 comprehensive study of the geologic and hydrogeologic setting for SNL/NM and KAFB area was completed.	SNL 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 HPT held its first meeting in Albuquerque, New Mexico.	SNL June 2003
2001	Installed groundwater monitoring wells TA1-W-08, TJA-6, and TJA-7.	SNL November 2002
2001	Installed soil-vapor monitoring wells 46-VW-01, 46-VW-02, and 227-VW-01.	SNL 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 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 August 2001
2001	Installed replacement groundwater monitoring wells WYO-3 and WYO-4. Plugged and abandoned wells WYO-1 and WYO-2.	SNL 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 HWB.	SNL 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 HWB. The plan discussed the tasks that SNL/NM personnel proposed to conduct.	SNL June 2003
2003	TAG Investigation Work Plan was approved by the NMED HWB.	NMED HWB September 2003
2003	Installed soil-vapor monitoring wells 159-VW-01, 165-VW-01, 1004-VW-01, and 1052-VW-01.	SNL 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).	Copland and Skelly October 2003

Refer to Notes on page 6A-6.

Table 6A-1 *(Continued)*
Historical Timeline of the Tijeras Arroyo Groundwater Area of Concern

Year	Event	Reference
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 HWB April 2004
2004	TAG CME Work Plan was submitted to the NMED HWB.	SNL 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 November 2005
2004	Stable isotope ($\delta^{15}N$) analyses conducted for five Perched Groundwater System monitoring wells.	SNL November 2004
2004	TAG CME Work Plan was approved by the NMED HWB.	NMED HWB October 2004
2005	TAG CME Report was submitted to the NMED HWB. Report included contaminant transport modeling for groundwater.	SNL August 2005
2005	TAG Investigation Report (analogous to a CCM) was submitted to the NMED HWB.	SNL November 2005
2006	Plugged and abandoned soil-vapor monitoring well TAG-SV-03.	Skelly November 2006
2008	NMED HWB issued a NOD on the TAG Investigation Report.	NMED HWB August 2008
2009	Response to the August 2008 NOD for the TAG Investigation Report submitted to the NMED HWB.	SNL February 2009
2009	NMED HWB issued a second NOD concerning the TAG Investigation Report.	NMED HWB August 2009
2010	Response to the second NOD concerning the TAG Investigation Report submitted to the NMED HWB.	SNL January 2010
2010	NMED HWB issued a Notice of Approval for the TAG Investigation Report.	NMED HWB 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 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 April 2015
2015	Meeting was held between personnel from SNL/NM, DOE/NNSA, and NMED HWB 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 HWB milestones letter required that an “Updated CCM and CME Report” for the TAG AOC be submitted in December 2016.	NMED HWB April 2016
2016	A combined and updated TAG CCM/CME Report (dated December 2016) was submitted to the NMED HWB. The transmittal letter was dated November 23, 2016.	DOE December 2016, DOE November 2016
2017	NMED HWB issued a disapproval letter for the TAG CCM/CME Report. NMED HWB requested submittal of a revised report before November 30, 2017.	NMED HWB May 2017
2017	Meeting held between SNL/NM, DOE/NNSA, and NMED HWB personnel to discuss the disapproval letter issues.	None

Refer to Notes on page 6A-6.

Table 6A-1 *(Concluded)*
Historical Timeline of the Tijeras Arroyo Groundwater Area of Concern

Year	Event	Reference
2017	Requested a time extension for submittal of the Revised TAG CCM/CME Report.	DOE September 2017
2017	NMED HWB approved the time extension request. Submittal date for the Revised TAG CCM/CME Report was set for February 15, 2018.	NMED HWB October 2017
2018	The Revised TAG CCM/CME Report was submitted to the NMED HWB.	SNL 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
2018	Responsibility for well WYO-4 was transferred to the KAFB ERP.	SNL June 2019
2019	BaroBall™ (passive venting device) installed at well TJA-2 on April 26, 2019.	SNL June 2020
2019	Conducted extensive review of potential nitrate-release sites located in the north-central portion of KAFB and adjacent Albuquerque.	SNL December 2019
2020	Personnel from DOE/NNSA, SNL/NM, and NMED HWB met virtually to discuss NMED's ongoing review of the Revised TAG CCM/CME Report (SNL February 2018) on September 23, 2020.	SNL June 2021
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 June 2021
2021	Personnel from DOE/NNSA, SNL/NM, and NMED HWB met virtually on May 11, 2021 to discuss NMED's ongoing review of the Revised TAG CCM/CME Report (SNL February 2018).	SNL June 2022
2021	Collected soil-vapor samples from monitoring wells TAG-SV-04 and TAG-SV-05 on May 14, 2021.	SNL June 2022
2022	Virtual meeting between SNL/NM, DOE/NNSA, and NMED HWB on June 30, 2022.	This report
2022	NMED HWB 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
2022	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)
TA2-SW = Technical Area-II (Southwest)
TA2-W = Technical Area-II (Well)
TAG = Tijeras Arroyo Groundwater
TCE = trichloroethene
TJA = Tijeras Arroyo
USAF = U.S. Air Force
USGS = U.S. Geological Survey
VW = Vapor Well
WYO = Wyoming

Attachment 6B
Tijeras Arroyo Groundwater Hydrographs

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Attachment 6B Hydrographs

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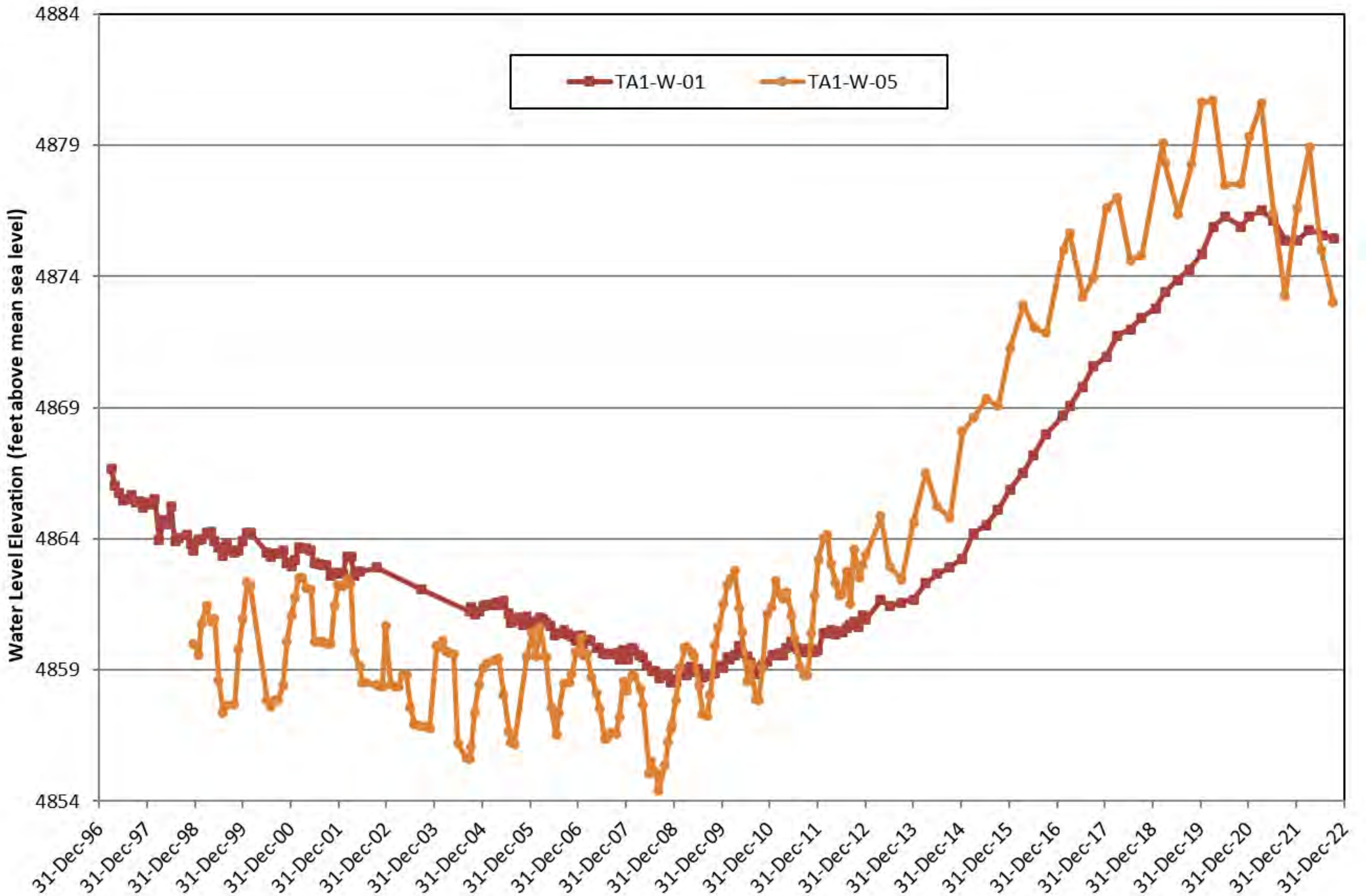

Figure 6B-1
Tijeras Arroyo Groundwater Area of Concern Monitoring Wells (1 of 10)

Figure 6B-2
Tijeras Arroyo Groundwater Area of Concern Monitoring Wells (2 of 10)

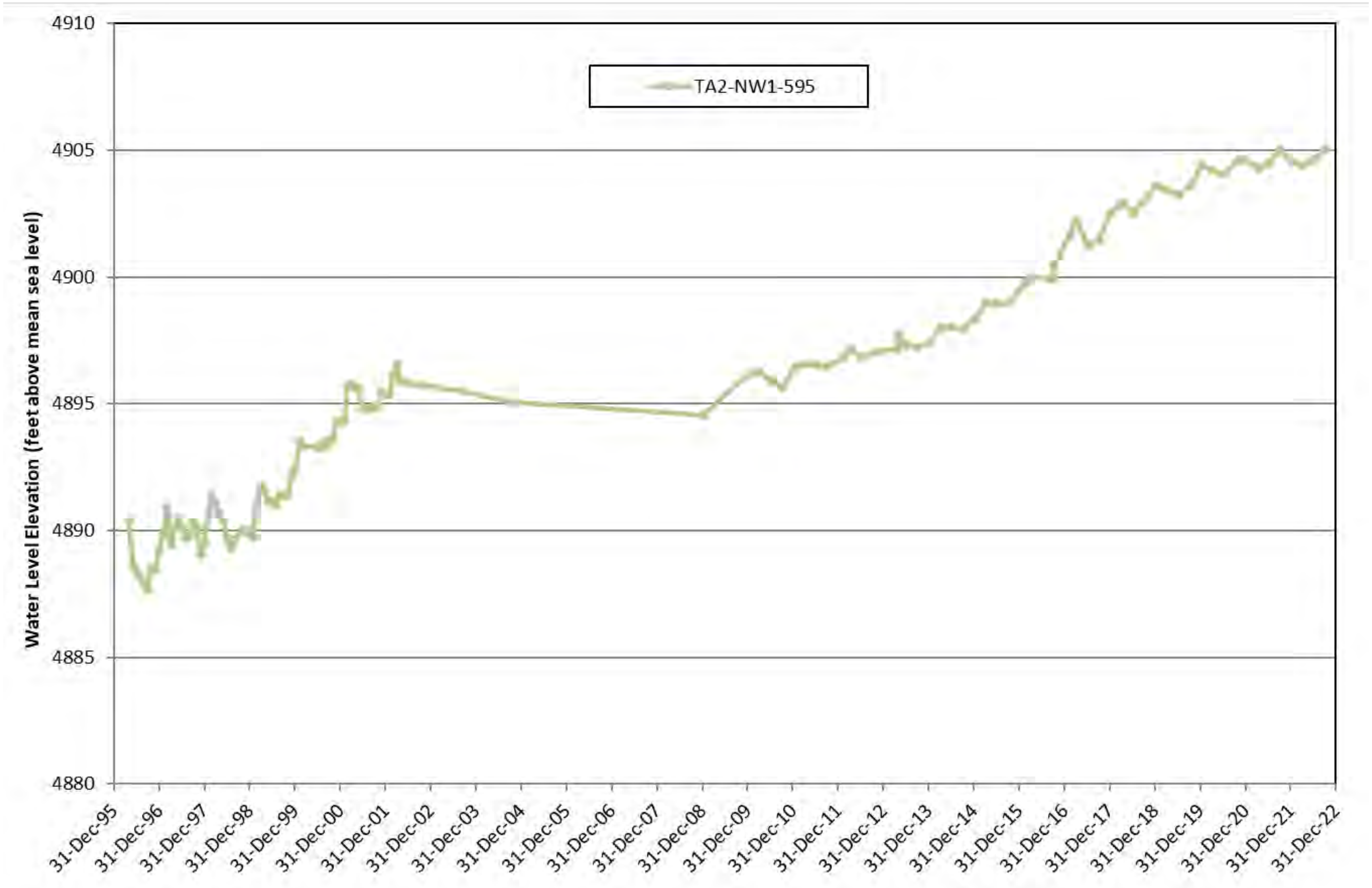

Figure 6B-3
Tijeras Arroyo Groundwater Area of Concern Monitoring Wells (3 of 10)

Figure 6B-4
Tijeras Arroyo Groundwater Area of Concern Monitoring Wells (4 of 10)

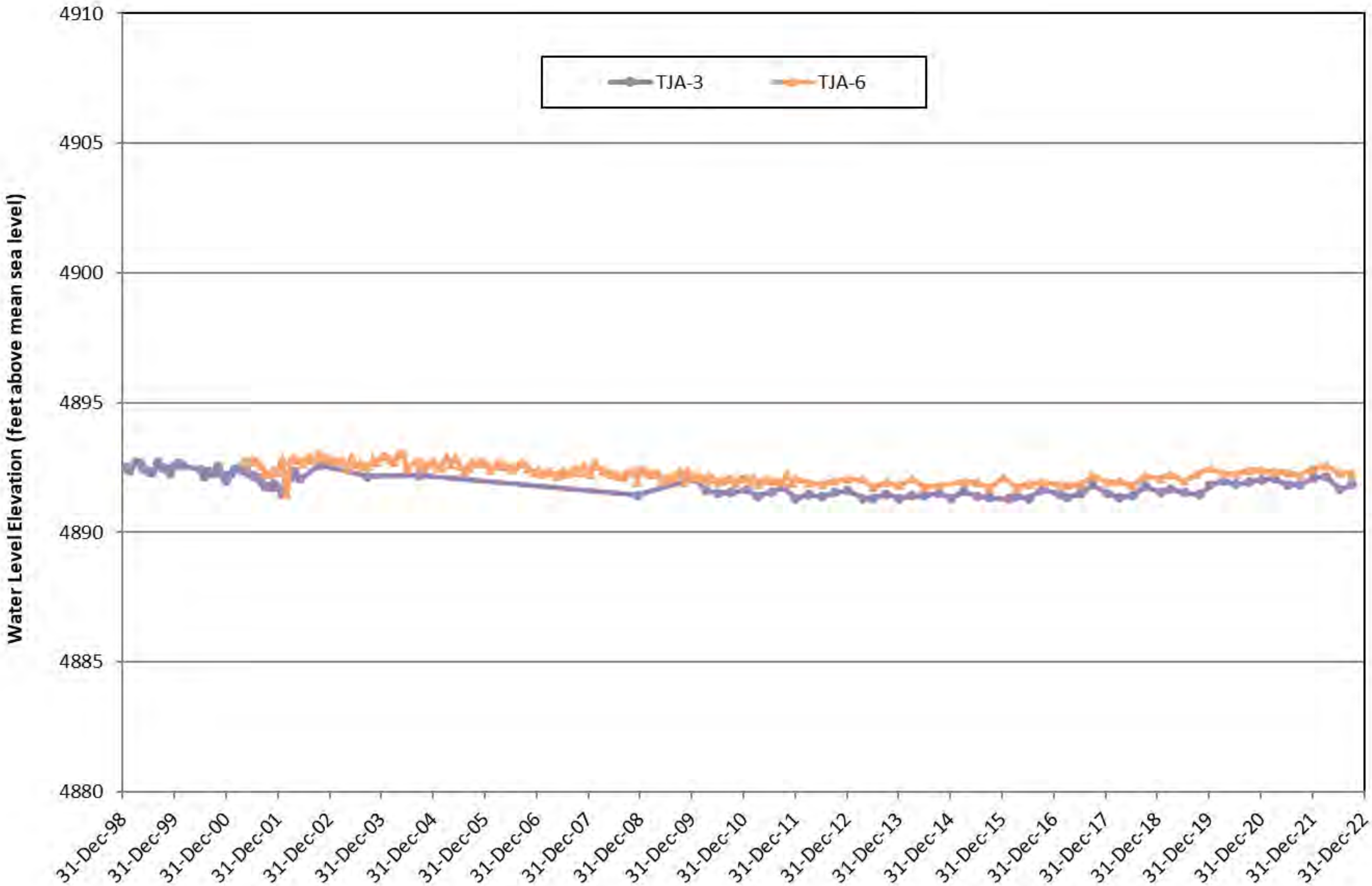

Figure 6B-5
Tijeras Arroyo Groundwater Area of Concern Monitoring Wells (5 of 10)

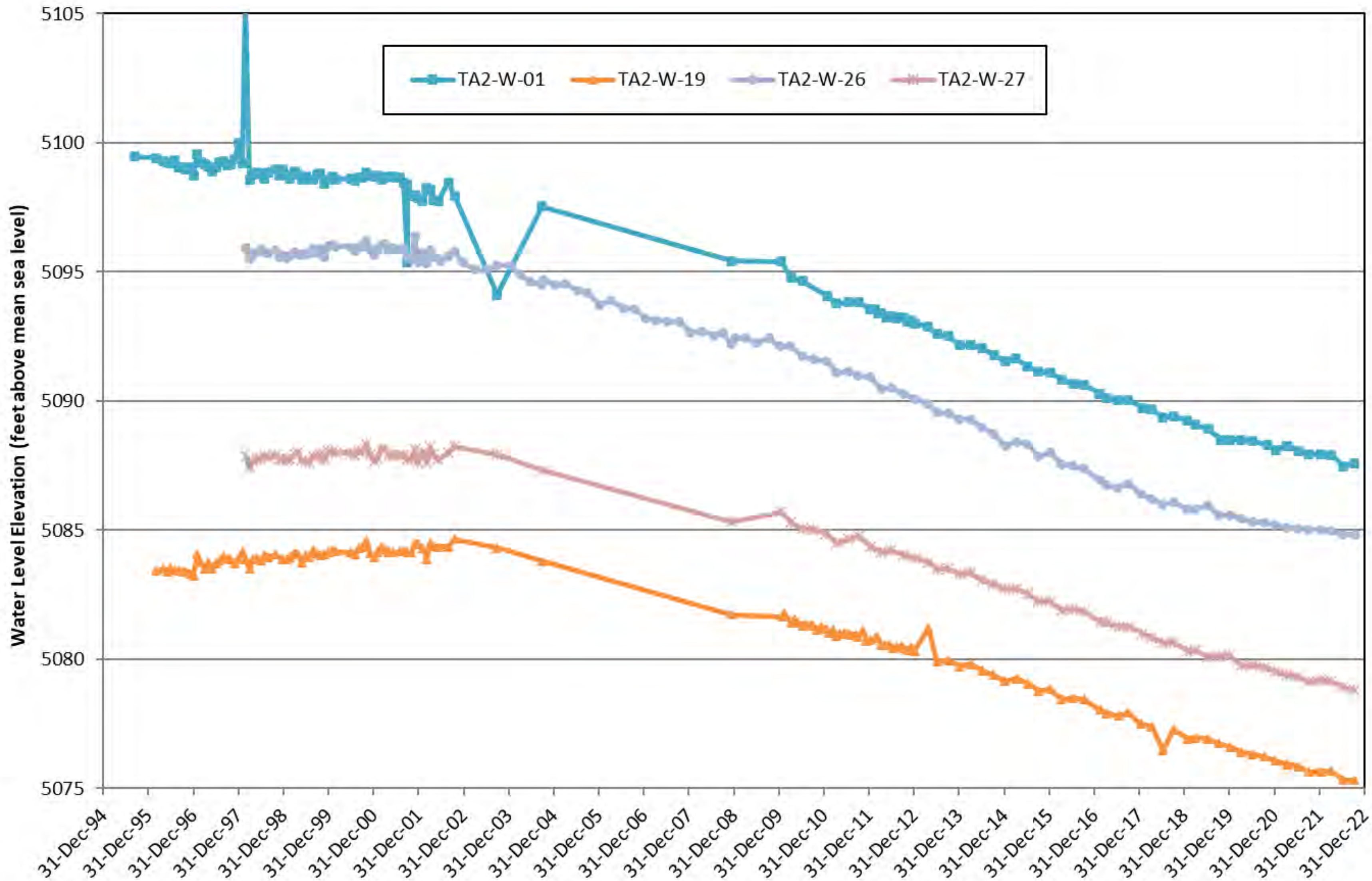

Figure 6B-6
Tijeras Arroyo Groundwater Area of Concern Monitoring Wells (6 of 10)

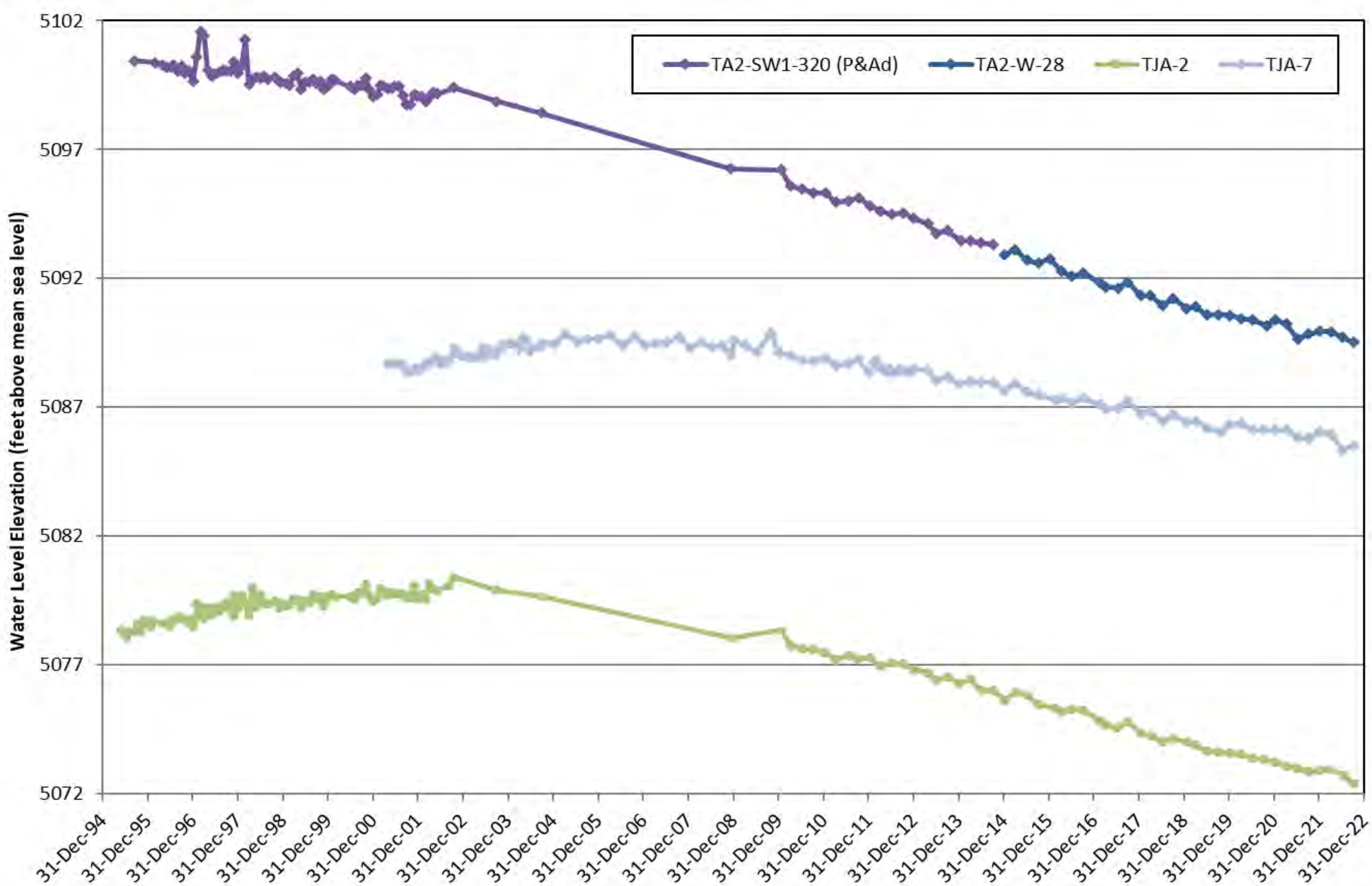

Figure 6B-7
Tijeras Arroyo Groundwater Area of Concern Monitoring Wells (7 of 10)

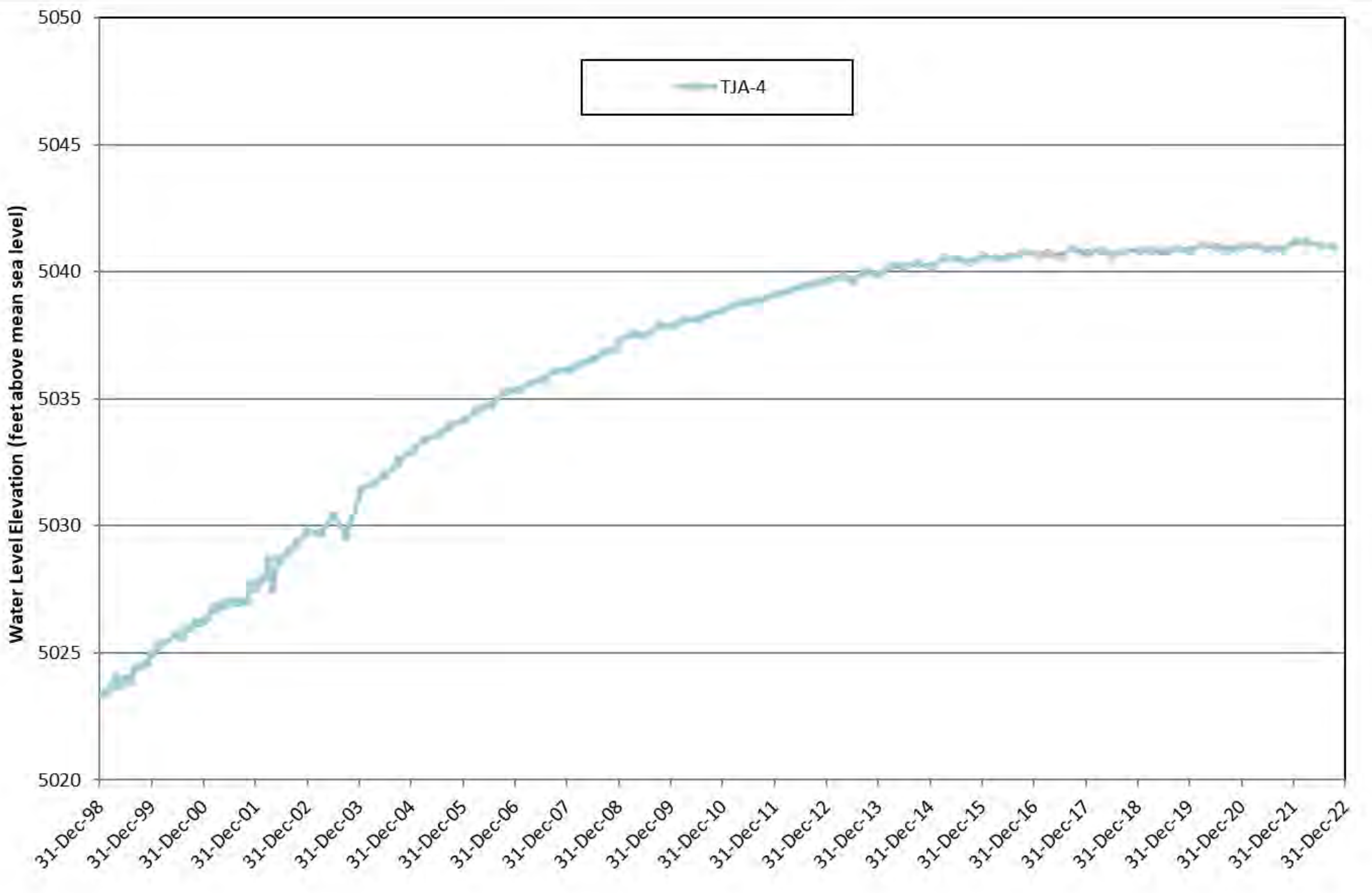

Figure 6B-8
Tijeras Arroyo Groundwater Area of Concern Monitoring Wells (8 of 10)

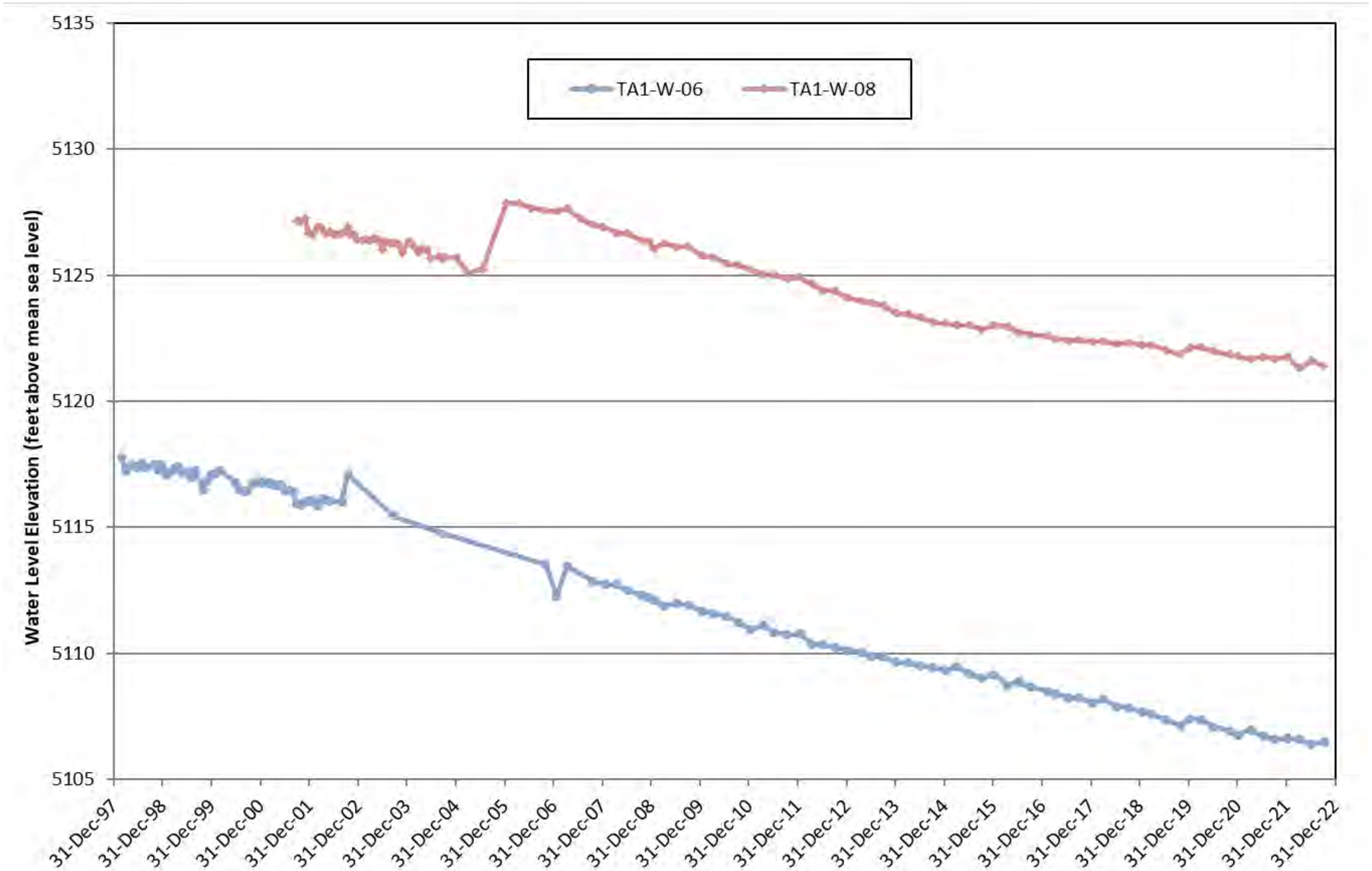

Figure 6B-9
Tijeras Arroyo Groundwater Area of Concern Monitoring Wells (9 of 10)

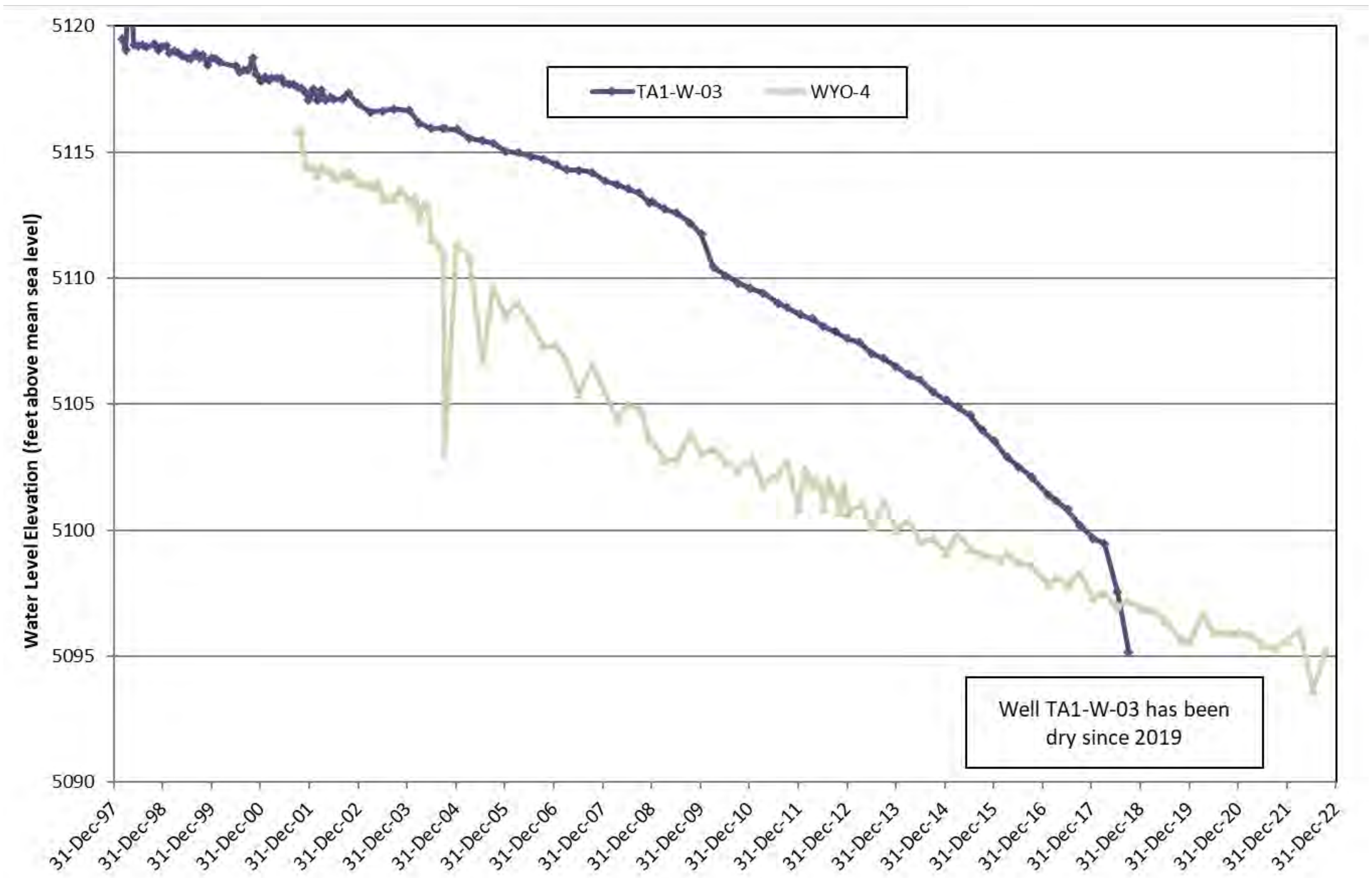

Figure 6B-10
Tijeras Arroyo Groundwater Area of Concern Monitoring Wells (10 of 10)

Attachment 6C
Tijeras Arroyo Groundwater Analytical Results Tables

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Attachment 6C Tables

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Table 6C-1
Summary of Detected Volatile Organic Compounds, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	1.01	0.333	1.00	7.00			116942-001	SW846-8260D
21-Feb-22	Tetrachloroethene	0.440	0.333	1.00	5.00	J, *	J	116942-001	SW846-8260D
	Trichloroethene	0.620	0.333	1.00	5.00	J		116942-001	SW846-8260D
TA2-W-01	Tetrachloroethene	0.550	0.333	1.00	5.00	J, *	J	117010-001	SW846-8260D
23-Feb-22	Trichloroethene	1.27	0.333	1.00	5.00			117010-001	SW846-8260D
TA2-W-01 (Duplicate)	Tetrachloroethene	0.460	0.333	1.00	5.00	J, *	J	117011-001	SW846-8260D
23-Feb-22	Trichloroethene	1.27	0.333	1.00	5.00			117011-001	SW846-8260D
TA2-W-19 24-Feb-22	Trichloroethene	1.70	0.333	1.00	5.00			117013-001	SW846-8260D
TA2-W-26	1,1-Dichloroethane	4.80	0.333	1.00	NE			117029-001	SW846-8260D
04-Mar-22	1,1-Dichloroethene	1.90	0.333	1.00	7.00			117029-001	SW846-8260D
	Chloroform	0.620	0.333	1.00	80.0	J	J	117029-001	SW846-8260D
	Tetrachloroethene	**7.44**	0.333	1.00	5.00			117029-001	SW846-8260D
	Trichloroethene	**15.0**	0.333	1.00	5.00			117029-001	SW846-8260D
	cis-1,2-Dichloroethene	4.47	0.333	1.00	70.0			117029-001	SW846-8260D
TA2-W-26 (Duplicate)	1,1-Dichloroethane	5.20	0.333	1.00	NE			117030-001	SW846-8260D
04-Mar-22	1,1-Dichloroethene	2.05	0.333	1.00	7.00			117030-001	SW846-8260D
	Chloroform	0.680	0.333	1.00	80.0	J	J	117030-001	SW846-8260D
	Tetrachloroethene	**8.05**	0.333	1.00	5.00			117030-001	SW846-8260D
	Trichloroethene	**16.0**	0.333	1.00	5.00			117030-001	SW846-8260D
	cis-1,2-Dichloroethene	4.67	0.333	1.00	70.0			117030-001	SW846-8260D
TA2-W-27	Tetrachloroethene	1.45	0.333	1.00	5.00	*	J	116944-001	SW846-8260D
22-Feb-22	Trichloroethene	1.07	0.333	1.00	5.00			116944-001	SW846-8260D
TA2-W-28 28-Feb-22	Methylene chloride	1.44	0.500	5.00	5.00	J	5.0U	117019-001	SW846-8260D
TJA-2	1,1-Dichloroethane	0.420	0.333	1.00	NE	J		117015-001	SW846-8260D
25-Feb-22	Methylene chloride	1.05	0.500	5.00	5.00	J	5.0U	117015-001	SW846-8260D
	Trichloroethene	4.39	0.333	1.00	5.00			117015-001	SW846-8260D
	cis-1,2-Dichloroethene	0.420	0.333	1.00	70.0	J		117015-001	SW846-8260D
TJA-3 18-Feb-22	Tetrachloroethene	0.400	0.333	1.00	5.00	J	1.0U	116919-001	SW846-8260D
TJA-7	Methylene chloride	0.640	0.500	5.00	5.00	B, J	5.0UJ	117025-001	SW846-8260D
02-Mar-22	Trichloroethene	4.08	0.333	1.00	5.00			117025-001	SW846-8260D

Refer to Notes on page 6C-51.

Table 6C-1 *(Continued)*
Summary of Detected Volatile Organic Compounds, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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-19 22-Jul-22	Trichloroethene	2.15	0.333	1.00	5.00			118295-001	SW846-8260D
TA2-W-26 01-Aug-22	1,1-Dichloroethane	5.72	0.333	1.00	NE		J-	118313-001	SW846-8260D
	1,1-Dichloroethene	2.15	0.333	1.00	7.00		J-	118313-001	SW846-8260D
	Chloroform	0.660	0.333	1.00	80.0	J	J-	118313-001	SW846-8260D
	Tetrachloroethene	**7.18**	0.333	1.00	5.00		J-	118313-001	SW846-8260D
	Trichloroethene	**16.3**	0.333	1.00	5.00		J-	118313-001	SW846-8260D
	cis-1,2-Dichloroethene	5.01	0.333	1.00	70.0		J-	118313-001	SW846-8260D
TA2-W-26 (Duplicate) 01-Aug-22	1,1-Dichloroethane	5.59	0.333	1.00	NE		J-	118314-001	SW846-8260D
	1,1-Dichloroethene	2.14	0.333	1.00	7.00		J-	118314-001	SW846-8260D
	Chloroform	0.680	0.333	1.00	80.0	J	J-	118314-001	SW846-8260D
	Tetrachloroethene	**7.43**	0.333	1.00	5.00		J-	118314-001	SW846-8260D
	Trichloroethene	**16.2**	0.333	1.00	5.00		J-	118314-001	SW846-8260D
	cis-1,2-Dichloroethene	4.92	0.333	1.00	70.0		J-	118314-001	SW846-8260D
TA2-W-28 26-Jul-22	Methylene chloride	0.570	0.500	5.00	5.00	B, J	5.0UJ	118301-001	SW846-8260D
TA2-W-28 (Duplicate) 26-Jul-22	Methylene chloride	0.530	0.500	5.00	5.00	B, J	5.0UJ	118302-001	SW846-8260D
TJA-2 25-Jul-22	1,1-Dichloroethane	0.410	0.333	1.00	NE	J		118297-001	SW846-8260D
	Methylene chloride	0.550	0.500	5.00	5.00	B, J	5.0UJ	118297-001	SW846-8260D
	Trichloroethene	4.51	0.333	1.00	5.00			118297-001	SW846-8260D
	cis-1,2-Dichloroethene	0.430	0.333	1.00	70.0	J		118297-001	SW846-8260D
TJA-3 21-Jul-22	Acetone	2.08	1.74	5.00	NE	B, J	5.0UJ	118293-001	SW846-8260D
	Methylene chloride	0.570	0.500	5.00	5.00	B, J	5.0UJ	118293-001	SW846-8260D
	Trichloroethene	0.510	0.333	1.00	5.00	J		118293-001	SW846-8260D
TJA-7 28-Jul-22	Trichloroethene	4.17	0.333	1.00	5.00			118309-001	SW846-8260D
TA1-W-02 18-Aug-22	Methylene chloride	0.770	0.500	5.00	5.00	B, J	5.0UJ	118394-001	SW846-8260D
TA1-W-04 22-Aug-22	Methylene chloride	0.740	0.500	5.00	5.00	B, J	5.0UJ	118415-001	SW846-8260D
TA1-W-05 19-Aug-22	Methylene chloride	0.540	0.500	5.00	5.00	B, J	5.0UJ	118407-001	SW846-8260D

Refer to Notes on page 6C-51.

Table 6C-1 *(Continued)*
Summary of Detected Volatile Organic Compounds, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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-05 (Duplicate)	Acetone	2.19	1.74	5.00	NE	J	5.0U	118408-001	SW846-8260D
19-Aug-22	Methylene chloride	0.570	0.500	5.00	5.00	B, J	5.0UJ	118408-001	SW846-8260D
TA1-W-06	1,1-Dichloroethene	1.01	0.333	1.00	7.00			118457-001	SW846-8260D
20-Sep-22	Acetone	2.48	1.74	5.00	NE	B, J	5.0U	118457-001	SW846-8260D
	Trichloroethene	0.420	0.333	1.00	5.00	J		118457-001	SW846-8260D
TA1-W-08 19-Sep-22	Acetone	2.68	1.74	5.00	NE	B, J	5.0U	118460-001	SW846-8260D
TA2-NW1-595 13-Sep-22	Methylene chloride	0.650	0.500	5.00	5.00	J	5.0UJ	118450-001	SW846-8260D
TA2-NW1-595 (Duplicate) 13-Sep-22	Methylene chloride	0.610	0.500	5.00	5.00	J	5.0UJ	118451-001	SW846-8260D
TA2-W-01	Acetone	3.22	1.74	5.00	NE	B, J	5.0U	118462-001	SW846-8260D
21-Sep-22	Trichloroethene	1.03	0.333	1.00	5.00			118462-001	SW846-8260D
TA2-W-19	Methylene chloride	0.620	0.500	5.00	5.00	B, J	5.0UJ	118410-001	SW846-8260D
19-Aug-22	Trichloroethene	1.74	0.333	1.00	5.00			118410-001	SW846-8260D
TA2-W-25 12-Sep-22	Methylene chloride	0.530	0.500	5.00	5.00	J	5.0UJ	118446-001	SW846-8260D
TA2-W-26	1,1-Dichloroethane	7.06	0.333	1.00	NE			118439-001	SW846-8260D
29-Aug-22	1,1-Dichloroethene	3.02	0.333	1.00	7.00			118439-001	SW846-8260D
	Chloroform	0.670	0.333	1.00	80.0	J	J	118439-001	SW846-8260D
	Tetrachloroethene	**10.4**	0.333	1.00	5.00			118439-001	SW846-8260D
	Trichloroethene	**19.7**	0.333	1.00	5.00			118439-001	SW846-8260D
	cis 1,2-Dichloroethene	6.22	0.333	1.00	70.0			118439-001	SW846-8260D
TA2-W-26 (Duplicate)	1,1-Dichloroethane	6.36	0.333	1.00	NE			118440-001	SW846-8260D
29-Aug-22	1,1-Dichloroethene	2.80	0.333	1.00	7.00			118440-001	SW846-8260D
	Chloroform	0.630	0.333	1.00	80.0	J	J	118440-001	SW846-8260D
	Tetrachloroethene	**9.37**	0.333	1.00	5.00			118440-001	SW846-8260D
	Trichloroethene	**18.1**	0.333	1.00	5.00			118440-001	SW846-8260D
	cis 1,2-Dichloroethene	5.84	0.333	1.00	70.0			118440-001	SW846-8260D
TA2-W-27	Methylene chloride	0.610	0.500	5.00	5.00	J	5.0UJ	118453-001	SW846-8260D
14-Sep-22	Tetrachloroethene	1.51	0.333	1.00	5.00			118453-001	SW846-8260D
	Trichloroethene	1.10	0.333	1.00	5.00			118453-001	SW846-8260D
TA2-W-28 23-Aug-22	Methylene chloride	0.560	0.500	5.00	5.00	B, J	5.0UJ	118418-001	SW846-8260D

Refer to Notes on page 6C-51.

Table 6C-1 *(Continued)*
Summary of Detected Volatile Organic Compounds, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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 22-Aug-22	1,1-Dichloroethane	0.360	0.333	1.00	NE	J		118413-001	SW846-8260D
	Methylene chloride	0.700	0.500	5.00	5.00	B, J	5.0UJ	118413-001	SW846-8260D
	Trichloroethene	3.62	0.333	1.00	5.00			118413-001	SW846-8260D
	cis 1,2-Dichloroethene	0.400	0.333	1.00	70.0	J		118413-001	SW846-8260D
TJA-3 15-Sep-22	Methylene chloride	0.570	0.500	5.00	5.00	J	5.0UJ	118455-001	SW846-8260D
	Trichloroethene	0.650	0.333	1.00	5.00	J		118455-001	SW846-8260D
TJA-5 18-Aug-22	Methylene chloride	0.750	0.500	5.00	5.00	B, J	5.0UJ	118405-001	SW846-8260D
TJA-7 25-Sep-22	Methylene chloride	0.600	0.500	5.00	5.00	B, J	5.0UJ	118429-001	SW846-8260D
	Trichloroethene	4.25	0.333	1.00	5.00			118429-001	SW846-8260D
WYO-3 23-Aug-22	Methylene chloride	0.660	0.500	5.00	5.00	B, J	5.0UJ	118420-001	SW846-8260D
TA2-W-19 01-Dec-22	Acetone	2.39	1.74	5.00	NE	J	5.0U	119120-001	SW846-8260D
	Methylene chloride	2.56	0.500	5.00	5.00	B, J	5.0U	119120-001	SW846-8260D
	Trichloroethene	1.98	0.333	1.00	5.00			119120-001	SW846-8260D
TA2-W-26 16-Dec-22	1,1-Dichloroethane	5.85	0.333	1.00	NE			119138-001	SW846-8260D
	1,1-Dichloroethene	2.73	0.333	1.00	7.00			119138-001	SW846-8260D
	Chloroform	0.710	0.333	1.00	80.0	J	J	119138-001	SW846-8260D
	Methylene chloride	0.840	0.500	5.00	5.00	J	5.0UJ	119138-001	SW846-8260D
	Tetrachloroethene	**8.10**	0.333	1.00	5.00			119138-001	SW846-8260D
	Trichloroethene	**17.7**	0.333	1.00	5.00			119138-001	SW846-8260D
	cis-1,2-Dichloroethene	4.68	0.333	1.00	70.0			119138-001	SW846-8260D
TA2-W-26 (Duplicate) 16-Dec-22	1,1-Dichloroethane	5.28	0.333	1.00	NE			119139-001	SW846-8260D
	1,1-Dichloroethene	2.23	0.333	1.00	7.00			119139-001	SW846-8260D
	Chloroform	0.670	0.333	1.00	80.0	J	J	119139-001	SW846-8260D
	Tetrachloroethene	**7.48**	0.333	1.00	5.00			119139-001	SW846-8260D
	Trichloroethene	**15.1**	0.333	1.00	5.00			119139-001	SW846-8260D
	cis-1,2-Dichloroethene	4.47	0.333	1.00	70.0			119139-001	SW846-8260D
TJA-2 02-Dec-22	1,1-Dichloroethane	0.390	0.333	1.00	NE	J		119124-001	SW846-8260D
	Methylene chloride	2.51	0.500	5.00	5.00	B, J	5.0U	119124-001	SW846-8260D
	Trichloroethene	4.29	0.333	1.00	5.00			119124-001	SW846-8260D
	cis-1,2-Dichloroethene	0.350	0.333	1.00	70.0	J		119124-001	SW846-8260D

Refer to Notes on page 6C-51.

Table 6C-1 *(Concluded)*
Summary of Detected Volatile Organic Compounds, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico,
Calendar Year 2022

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 (Duplicate)	1,1-Dichloroethane	0.400	0.333	1.00	NE	J		119125-001	SW846-8260D
02-Dec-22	Acetone	1.98	1.74	5.00	NE	J	5.0U	119125-001	SW846-8260D
	Methylene chloride	2.35	0.500	5.00	5.00	B, J	5.0U	119125-001	SW846-8260D
	Trichloroethene	4.35	0.333	1.00	5.00			119125-001	SW846-8260D
	cis-1,2-Dichloroethene	0.380	0.333	1.00	70.0	J		119125-001	SW846-8260D
TJA-3	Acetone	2.10	1.74	5.00	NE	J	5.0U	119118-001	SW846-8260D
30-Nov-22	Methylene chloride	2.46	0.500	5.00	5.00	B, J	5.0U	119118-001	SW846-8260D
TJA-7	Methylene chloride	0.870	0.500	5.00	5.00	J	5.0UJ	119134-001	SW846-8260D
14-Dec-22	Trichloroethene	4.55	0.333	1.00	5.00			119134-001	SW846-8260D

Refer to Notes on page 6C-51.

Table 6C-2
Method Detection Limits for Volatile Organic Compounds (EPA Method[g] 8260D), Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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-51.

Table 6C-3
Summary of Nitrate plus Nitrite Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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 21-Feb-22	Nitrate plus nitrite	3.62	0.170	0.500	10.0			116942-002	EPA 353.2
TA2-W-01 23-Feb-22	Nitrate plus nitrite	3.96	0.0850	0.250	10.0			117010-002	EPA 353.2
TA2-W-01 (Duplicate) 23-Feb-22	Nitrate plus nitrite	3.97	0.0850	0.250	10.0			117011-002	EPA 353.2
TA2-W-19 24-Feb-22	Nitrate plus nitrite	**12.3**	0.425	1.25	10.0			117013-002	EPA 353.2
TA2-W-26 04-Mar-22	Nitrate plus nitrite	5.56	0.170	0.500	10.0			117029-002	EPA 353.2
TA2-W-26 (Duplicate) 04-Mar-22	Nitrate plus nitrite	5.54	0.170	0.500	10.0			117030-002	EPA 353.2
TA2-W-27 22-Feb-22	Nitrate plus nitrite	4.03	0.170	0.500	10.0			116944-002	EPA 353.2
TA2-W-28 28-Feb-22	Nitrate plus nitrite	**17.8**	0.850	2.50	10.0			117019-002	EPA 353.2
TJA-2 25-Feb-22	Nitrate plus nitrite	**11.9**	0.425	1.25	10.0			117015-002	EPA 353.2
TJA-3 18-Feb-22	Nitrate plus nitrite	2.66	0.0850	0.250	10.0			116919-002	EPA 353.2
TJA-4 01-Mar-22	Nitrate plus nitrite	**32.2**	0.850	2.50	10.0			117022-002	EPA 353.2
TJA-6 17-Feb-22	Nitrate plus nitrite	2.63	0.0850	0.250	10.0			116913-002	EPA 353.2
TJA-6 (Duplicate) 17-Feb-22	Nitrate plus nitrite	2.62	0.0850	0.250	10.0			116914-002	EPA 353.2
TJA-7 02-Mar-22	Nitrate plus nitrite	**22.2**	0.850	2.50	10.0			117025-002	EPA 353.2
TA2-W-19 22-Jul-22	Nitrate plus nitrite	**11.2**	0.850	2.50	10.0			118295-002	EPA 353.2
TA2-W-26 01-Aug-22	Nitrate plus nitrite	5.33	0.170	0.500	10.0		J	118313-002	EPA 353.2
TA2-W-26 (Duplicate) 01-Aug-22	Nitrate plus nitrite	5.27	0.170	0.500	10.0		J	118314-002	EPA 353.2
TA2-W-28 26-Jul-22	Nitrate plus nitrite	**15.5**	0.850	2.50	10.0			118301-002	EPA 353.2

Refer to Notes on page 6C-51.

Table 6C-3 *(Continued)*
Summary of Nitrate plus Nitrite Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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 (Duplicate) 26-Jul-22	Nitrate plus nitrite	**15.4**	0.850	2.50	10.0			118302-002	EPA 353.2
TJA-2 25-Jul-22	Nitrate plus nitrite	**11.3**	0.850	2.50	10.0			118297-002	EPA 353.2
TJA-3 21-Jul-22	Nitrate plus nitrite	2.60	0.170	0.500	10.0			118293-002	EPA 353.2
TJA-4 27-Jul-22	Nitrate plus nitrite	**29.8**	4.25	12.5	10.0			118305-002	EPA 353.2
TJA-7 28-Jul-22	Nitrate plus nitrite	**21.4**	1.70	5.00	10.0			118309-002	EPA 353.2
TA1-W-01 30-Aug-22	Nitrate plus nitrite	3.01	0.170	0.500	10.0		J	118443-002	EPA 353.2
TA1-W-01 (Duplicate) 30-Aug-22	Nitrate plus nitrite	2.99	0.170	0.500	10.0		J	118444-002	EPA 353.2
TA1-W-02 18-Aug-22	Nitrate plus nitrite	1.27	0.0170	0.0500	10.0		J	118394-002	EPA 353.2
TA1-W-04 22-Aug-22	Nitrate plus nitrite	2.01	0.0850	0.250	10.0			118415-002	EPA 353.2
TA1-W-05 19-Aug-22	Nitrate plus nitrite	1.38	0.0850	0.250	10.0			118407-002	EPA 353.2
TA1-W-05 (Duplicate) 19-Aug-22	Nitrate plus nitrite	1.42	0.0850	0.250	10.0			118408-002	EPA 353.2
TA1-W-06 20-Sep-22	Nitrate plus nitrite	3.28	0.425	1.25	10.0			118457-002	EPA 353.2
TA1-W-08 19-Sep-22	Nitrate plus nitrite	9.15	0.425	1.25	10.0			118460-002	EPA 353.2
TA2-NW1-595 13-Sep-22	Nitrate plus nitrite	3.92	0.170	0.500	10.0			118450-002	EPA 353.2
TA2-NW1-595 (Duplicate) 13-Sep-22	Nitrate plus nitrite	3.90	0.170	0.500	10.0			118451-002	EPA 353.2
TA2-W-01 21-Sep-22	Nitrate plus nitrite	3.55	0.425	1.25	10.0			118462-002	EPA 353.2
TA2-W-19 19-Aug-22	Nitrate plus nitrite	**12.7**	0.850	2.50	10.0		J	118410-002	EPA 353.2

Refer to Notes on page 6C-51.

Table 6C-3 *(Continued)*
Summary of Nitrate plus Nitrite Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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 24-Aug-22	Nitrate plus nitrite	2.64	0.0850	0.250	10.0			118426-002	EPA 353.2
TA2-W-24 (Duplicate) 24-Aug-22	Nitrate plus nitrite	2.61	0.0850	0.250	10.0			118427-002	EPA 353.2
TA2-W-25 12-Sep-22	Nitrate plus nitrite	3.66	0.170	0.500	10.0			118446-002	EPA 353.2
TA2-W-26 29-Aug-22	Nitrate plus nitrite	5.45	0.170	0.500	10.0		J	118439-002	EPA 353.2
TA2-W-26 (Duplicate) 29-Aug-22	Nitrate plus nitrite	5.50	0.170	0.500	10.0		J	118440-002	EPA 353.2
TA2-W-27 14-Sep-22	Nitrate plus nitrite	4.06	0.170	0.500	10.0			118453-002	EPA 353.2
TA2-W-28 23-Aug-22	Nitrate plus nitrite	**18.8**	0.850	2.50	10.0		J	118418-002	EPA 353.2
TJA-2 22-Aug-22	Nitrate plus nitrite	**12.6**	0.850	2.50	10.0		J	118413-002	EPA 353.2
TJA-3 15-Sep-22	Nitrate plus nitrite	2.67	0.170	0.500	10.0			118455-002	EPA 353.2
TJA-4 24-Aug-22	Nitrate plus nitrite	**32.8**	0.850	2.50	10.0		J	118424-002	EPA 353.2
TJA-5 18-Aug-22	Nitrate plus nitrite	**16.4**	0.850	2.50	10.0			118405-002	EPA 353.2
TJA-6 25-Aug-22	Nitrate plus nitrite	2.67	0.170	0.500	10.0		J	118435-002	EPA 353.2
TJA-7 25-Aug-22	Nitrate plus nitrite	**21.9**	1.70	5.00	10.0			118429-002	EPA 353.2
WYO-3 23-Aug-22	Nitrate plus nitrite	2.67	0.0850	0.250	10.0			118420-002	EPA 353.2
TA2-W-19 01-Dec-22	Nitrate plus nitrite	**12.1**	0.850	2.50	10.0			119120-002	EPA 353.2
TA2-W-26 16-Dec-22	Nitrate plus nitrite	5.60	0.0850	0.250	10.0			119138-002	EPA 353.2
TA2-W-26 (Duplicate) 16-Dec-22	Nitrate plus nitrite	5.45	0.0850	0.250	10.0			119139-002	EPA 353.2

Refer to Notes on page 6C-51.

Table 6C-3 *(Concluded)*
Summary of Nitrate plus Nitrite Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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 12-Dec-22	Nitrate plus nitrite	**14.4**	0.850	2.50	10.0			119127-002	EPA 353.2
TJA-2 02-Dec-22	Nitrate plus nitrite	**13.2**	0.170	0.500	10.0			119124-002	EPA 353.2
TJA-2 (Duplicate) 02-Dec-22	Nitrate plus nitrite	**12.9**	0.170	0.500	10.0			119125-002	EPA 353.2
TJA-3 30-Nov-22	Nitrate plus nitrite	2.63	0.170	0.500	10.0			119118-002	EPA 353.2
TJA-4 13-Dec-22	Nitrate plus nitrite	**34.4**	1.70	5.00	10.0			119132-002	EPA 353.2
TJA-7 14-Dec-22	Nitrate plus nitrite	**21.7**	0.425	1.25	10.0			119134-002	EPA 353.2

Refer to Notes on page 6C-51.

Table 6C-4
Summary of Anions and Alkalinity Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.192	0.0670	0.200	NE	J		118443-003	SW846-9056A
30-Aug-22	Chloride	14.0	0.335	1.00	NE			118443-003	SW846-9056A
	Fluoride	0.495	0.0330	0.100	4.0			118443-003	SW846-9056A
	Sulfate	76.1	0.665	2.00	NE			118443-003	SW846-9056A
	Bicarbonate Alkalinity	175	1.45	4.00	NE			118443-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118443-004	SM 2320B
TA1-W-02	Bromide	0.213	0.0670	0.200	NE			118394-003	SW846-9056A
18-Aug-22	Chloride	15.4	0.335	1.00	NE			118394-003	SW846-9056A
	Fluoride	0.418	0.0330	0.100	4.0			118394-003	SW846-9056A
	Sulfate	78.8	0.665	2.00	NE			118394-003	SW846-9056A
	Bicarbonate Alkalinity	166	1.45	4.00	NE			118394-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118394-004	SM 2320B
TA1-W-04	Bromide	0.181	0.0670	0.200	NE	J		118415-003	SW846-9056A
22-Aug-22	Chloride	13.0	0.670	2.00	NE			118415-003	SW846-9056A
	Fluoride	0.412	0.0330	0.100	4.0			118415-003	SW846-9056A
	Sulfate	62.5	1.33	4.00	NE			118415-003	SW846-9056A
	Bicarbonate Alkalinity	186	1.45	4.00	NE			118415-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118415-004	SM 2320B
TA1-W-05	Bromide	0.149	0.0670	0.200	NE	J		118407-003	SW846-9056A
19-Aug-22	Chloride	10.6	0.670	2.00	NE			118407-003	SW846-9056A
	Fluoride	0.298	0.0330	0.100	4.0			118407-003	SW846-9056A
	Sulfate	92.8	1.33	4.00	NE			118407-003	SW846-9056A
	Bicarbonate Alkalinity	205	1.45	4.00	NE			118407-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118407-004	SM 2320B
TA1-W-06	Bromide	1.65	0.0670	0.200	NE			118457-003	SW846-9056A
20-Sep-22	Chloride	101	1.34	4.00	NE			118457-003	SW846-9056A
	Fluoride	0.343	0.0330	0.100	4.0			118457-003	SW846-9056A
	Sulfate	199	2.66	8.00	NE			118457-003	SW846-9056A
	Bicarbonate Alkalinity	95.8	1.45	4.00	NE	B		118457-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118457-004	SM 2320B
TA1-W-08	Bromide	2.94	0.670	2.00	NE		J	118460-003	SW846-9056A
19-Sep-22	Chloride	234	3.35	10.0	NE			118460-003	SW846-9056A
	Fluoride	0.168	0.0330	0.100	4.0			118460-003	SW846-9056A
	Sulfate	688	6.65	20.0	NE			118460-003	SW846-9056A
	Bicarbonate Alkalinity	86.0	1.45	4.00	NE			118460-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118460-004	SM 2320B

Refer to Notes on page 6C-51.

Table 6C-4 *(Continued)*
Summary of Anions and Alkalinity Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	1.18	0.0670	0.200	NE			118450-003	SW846-9056A
13-Sep-22	Chloride	71.8	0.670	2.00	NE			118450-003	SW846-9056A
	Fluoride	0.365	0.0330	0.100	4.0			118450-003	SW846-9056A
	Sulfate	85.4	1.33	4.00	NE			118450-003	SW846-9056A
	Bicarbonate Alkalinity	139	1.45	4.00	NE			118450-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118450-004	SM 2320B
TA2-W-01	Bromide	1.35	0.0670	0.200	NE			118462-003	SW846-9056A
21-Sep-22	Chloride	92.7	1.34	4.00	NE			118462-003	SW846-9056A
	Fluoride	0.283	0.0330	0.100	4.0			118462-003	SW846-9056A
	Sulfate	61.5	2.66	8.00	NE			118462-003	SW846-9056A
	Bicarbonate Alkalinity	99.2	1.45	4.00	NE	B		118462-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118462-004	SM 2320B
TA2-W-19	Bromide	0.733	0.0670	0.200	NE			118410-003	SW846-9056A
19-Aug-22	Chloride	50.6	0.670	2.00	NE			118410-003	SW846-9056A
	Fluoride	0.384	0.0330	0.100	4.0			118410-003	SW846-9056A
	Sulfate	53.6	1.33	4.00	NE			118410-003	SW846-9056A
	Bicarbonate Alkalinity	113	1.45	4.00	NE			118410-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118410-004	SM 2320B
TA2-W-24	Bromide	0.189	0.0670	0.200	NE	J		118426-003	SW846-9056A
24-Aug-22	Chloride	13.6	0.335	1.00	NE			118426-003	SW846-9056A
	Fluoride	0.415	0.0330	0.100	4.0			118426-003	SW846-9056A
	Sulfate	45.0	0.665	2.00	NE			118426-003	SW846-9056A
	Bicarbonate Alkalinity	60.6	1.45	4.00	NE			118426-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118426-004	SM 2320B
TA2-W-25	Bromide	0.217	0.0670	0.200	NE			118446-003	SW846-9056A
12-Sep-22	Chloride	15.2	0.335	1.00	NE			118446-003	SW846-9056A
	Fluoride	0.335	0.0330	0.100	4.0			118446-003	SW846-9056A
	Sulfate	71.2	0.665	2.00	NE			118446-003	SW846-9056A
	Bicarbonate Alkalinity	169	1.45	4.00	NE	B		118446-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118446-004	SM 2320B
TA2-W-26	Bromide	0.359	0.0670	0.200	NE			118439-003	SW846-9056A
29-Aug-22	Chloride	29.8	0.670	2.00	NE			118439-003	SW846-9056A
	Fluoride	0.299	0.0330	0.100	4.0			118439-003	SW846-9056A
	Sulfate	92.9	1.33	4.00	NE			118439-003	SW846-9056A
	Bicarbonate Alkalinity	153	1.45	4.00	NE			118439-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118439-004	SM 2320B

Refer to Notes on page 6C-51.

Table 6C-4 *(Continued)*
Summary of Anions and Alkalinity Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	1.49	0.0670	0.200	NE			118453-003	SW846-9056A
14-Sep-22	Chloride	104	1.34	4.00	NE			118453-003	SW846-9056A
	Fluoride	0.241	0.0330	0.100	4.0			118453-003	SW846-9056A
	Sulfate	145	2.66	8.00	NE			118453-003	SW846-9056A
	Bicarbonate Alkalinity	97.4	1.45	4.00	NE			118453-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118453-004	SM 2320B
TA2-W-28	Bromide	0.707	0.0670	0.200	NE			118418-003	SW846-9056A
23-Aug-22	Chloride	42.7	0.670	2.00	NE			118418-003	SW846-9056A
	Fluoride	0.408	0.0330	0.100	4.0			118418-003	SW846-9056A
	Sulfate	16.9	0.133	0.400	NE			118418-003	SW846-9056A
	Bicarbonate Alkalinity	115	1.45	4.00	NE			118418-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118418-004	SM 2320B
TJA-2	Bromide	0.822	0.0670	0.200	NE			118413-003	SW846-9056A
22-Aug-22	Chloride	59.9	0.670	2.00	NE			118413-003	SW846-9056A
	Fluoride	0.350	0.0330	0.100	4.0			118413-003	SW846-9056A
	Sulfate	48.8	1.33	4.00	NE			118413-003	SW846-9056A
	Bicarbonate Alkalinity	108	1.45	4.00	NE			118413-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118413-004	SM 2320B
TJA-3	Bromide	0.172	0.0670	0.200	NE	J		118455-003	SW846-9056A
15-Sep-22	Chloride	13.1	0.670	2.00	NE			118455-003	SW846-9056A
	Fluoride	0.372	0.0330	0.100	4.0			118455-003	SW846-9056A
	Sulfate	78.8	1.33	4.00	NE			118455-003	SW846-9056A
	Bicarbonate Alkalinity	169	1.45	4.00	NE			118455-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118455-004	SM 2320B
TJA-4	Bromide	0.369	0.0670	0.200	NE			118424-003	SW846-9056A
24-Aug-22	Chloride	21.4	0.335	1.00	NE			118424-003	SW846-9056A
	Fluoride	0.376	0.0330	0.100	4.0			118424-003	SW846-9056A
	Sulfate	16.1	0.665	2.00	NE			118424-003	SW846-9056A
	Bicarbonate Alkalinity	132	1.45	4.00	NE			118424-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118424-004	SM 2320B
TJA-5	Bromide	0.287	0.0670	0.200	NE			118405-003	SW846-9056A
18-Aug-22	Chloride	17.1	0.670	2.00	NE			118405-003	SW846-9056A
	Fluoride	0.364	0.0330	0.100	4.0			118405-003	SW846-9056A
	Sulfate	105	1.33	4.00	NE			118405-003	SW846-9056A
	Bicarbonate Alkalinity	120	1.45	4.00	NE			118405-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118405-004	SM 2320B

Refer to footnotes on page 6C-51.

Table 6C-4 *(Concluded)*
Summary of Anions and Alkalinity Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.184	0.0670	0.200	NE	J		118435-003	SW846-9056A
25-Aug-22	Chloride	13.5	0.335	1.00	NE			118435-003	SW846-9056A
	Fluoride	0.386	0.0330	0.100	4.0			118435-003	SW846-9056A
	Sulfate	59.1	0.665	2.00	NE			118435-003	SW846-9056A
	Bicarbonate Alkalinity	154	1.45	4.00	NE			118435-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118435-004	SM 2320B
TJA-7	Bromide	0.437	0.0670	0.200	NE			118429-003	SW846-9056A
25-Aug-22	Chloride	23.6	0.335	1.00	NE			118429-003	SW846-9056A
	Fluoride	0.375	0.0330	0.100	4.0			118429-003	SW846-9056A
	Sulfate	23.0	0.665	2.00	NE			118429-003	SW846-9056A
	Bicarbonate Alkalinity	128	1.45	4.00	NE			118429-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118429-004	SM 2320B
WYO-3	Bromide	0.188	0.0670	0.200	NE	J		118420-003	SW846-9056A
23-Aug-22	Chloride	13.1	0.670	2.00	NE			118420-003	SW846-9056A
	Fluoride	0.484	0.0330	0.100	4.0			118420-003	SW846-9056A
	Sulfate	75.2	1.33	4.00	NE			118420-003	SW846-9056A
	Bicarbonate Alkalinity	198	1.45	4.00	NE			118420-004	SM 2320B
	Carbonate Alkalinity	ND	1.45	4.00	NE	U		118420-004	SM 2320B

Refer to Notes on page 6C-51.

Table 6C-5
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		118443-005	SW846-6020B
30-Aug-22	Antimony	ND	0.001	0.003	0.006	U		118443-005	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	U		118443-005	SW846-6020B
	Barium	0.0519	0.00067	0.004	2.00			118443-005	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118443-005	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118443-005	SW846-6020B
	Calcium	65.5	0.800	2.00	NE			118443-005	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		118443-005	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118443-005	SW846-6020B
	Copper	ND	0.0003	0.002	NE	U		118443-005	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118443-005	SW846-6020B
	Lead	ND	0.0005	0.002	NE	U		118443-005	SW846-6020B
	Magnesium	13.5	0.010	0.030	NE	B		118443-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118443-005	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118443-005	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		118443-005	SW846-6020B
	Potassium	2.30	0.080	0.300	NE			118443-005	SW846-6020B
	Selenium	0.00156	0.0015	0.005	0.050	J		118443-005	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118443-005	SW846-6020B
	Sodium	25.5	0.080	0.250	NE		J	118443-005	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118443-005	SW846-6020B
	Uranium	0.00313	0.000067	0.0002	0.030			118443-005	SW846-6020B
	Vanadium	0.00481	0.0033	0.020	NE	J		118443-005	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118443-005	SW846-6020B

Refer to Notes on page 6C-51.

Table 6C-5 *(Continued)*
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.355	0.0193	0.050	NE			118394-005	SW846-6020B
18-Aug-22	Antimony	ND	0.001	0.003	0.006	U		118394-005	SW846-6020B
	Arsenic	0.00238	0.002	0.005	0.010	J		118394-005	SW846-6020B
	Barium	0.0511	0.00067	0.004	2.00			118394-005	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118394-005	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118394-005	SW846-6020B
	Calcium	71.9	0.800	2.00	NE			118394-005	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		118394-005	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118394-005	SW846-6020B
	Copper	0.000581	0.0003	0.002	NE	J		118394-005	SW846-6020B
	Iron	0.349	0.033	0.100	NE			118394-005	SW846-6020B
	Lead	0.000592	0.0005	0.002	NE	J		118394-005	SW846-6020B
	Magnesium	13.5	0.010	0.030	NE			118394-005	SW846-6020B
	Manganese	0.0131	0.001	0.005	NE			118394-005	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118394-005	SW846-7470A
	Nickel	0.000981	0.0006	0.002	NE	J		118394-005	SW846-6020B
	Potassium	2.15	0.080	0.300	NE			118394-005	SW846-6020B
	Selenium	0.00176	0.0015	0.005	0.050	J		118394-005	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118394-005	SW846-6020B
	Sodium	23.5	0.080	0.250	NE			118394-005	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118394-005	SW846-6020B
	Uranium	0.00305	0.000067	0.0002	0.030			118394-005	SW846-6020B
	Vanadium	0.00719	0.0033	0.020	NE	J		118394-005	SW846-6020B
	Zinc	0.00404	0.0033	0.020	NE	J		118394-005	SW846-6020B

Refer to Notes on page 6C-51.

Table 6C-5 *(Continued)*
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		118415-005	SW846-6020B
22-Aug-22	Antimony	ND	0.001	0.003	0.006	U		118415-005	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	U		118415-005	SW846-6020B
	Barium	0.0717	0.00067	0.004	2.00			118415-005	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118415-005	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118415-005	SW846-6020B
	Calcium	65.3	0.800	2.00	NE			118415-005	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		118415-005	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118415-005	SW846-6020B
	Copper	ND	0.0003	0.002	NE	U		118415-005	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118415-005	SW846-6020B
	Lead	ND	0.0005	0.002	NE	U		118415-005	SW846-6020B
	Magnesium	11.8	0.010	0.030	NE			118415-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118415-005	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118415-005	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		118415-005	SW846-6020B
	Potassium	2.27	0.080	0.300	NE			118415-005	SW846-6020B
	Selenium	0.00167	0.0015	0.005	0.050	J		118415-005	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118415-005	SW846-6020B
	Sodium	23.6	0.080	0.250	NE			118415-005	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118415-005	SW846-6020B
	Uranium	0.00342	0.000067	0.0002	0.030			118415-005	SW846-6020B
	Vanadium	0.00597	0.0033	0.020	NE	J		118415-005	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118415-005	SW846-6020B

Refer to Notes on page 6C-51.

Table 6C-5 *(Continued)*
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		118407-005	SW846-6020B
19-Aug-22	Antimony	ND	0.001	0.003	0.006	U		118407-005	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	U		118407-005	SW846-6020B
	Barium	0.0380	0.00067	0.004	2.00			118407-005	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118407-005	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118407-005	SW846-6020B
	Calcium	82.5	0.800	2.00	NE			118407-005	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		118407-005	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118407-005	SW846-6020B
	Copper	ND	0.0003	0.002	NE	U		118407-005	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118407-005	SW846-6020B
	Lead	ND	0.0005	0.002	NE	U		118407-005	SW846-6020B
	Magnesium	11.5	0.010	0.030	NE			118407-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118407-005	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118407-005	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		118407-005	SW846-6020B
	Potassium	2.22	0.080	0.300	NE			118407-005	SW846-6020B
	Selenium	0.00172	0.0015	0.005	0.050	J		118407-005	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118407-005	SW846-6020B
	Sodium	29.8	0.080	0.250	NE			118407-005	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118407-005	SW846-6020B
	Uranium	0.00345	0.000067	0.0002	0.030			118407-005	SW846-6020B
	Vanadium	0.00395	0.0033	0.020	NE	J		118407-005	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118407-005	SW846-6020B

Refer to Notes on page 6C-51.

Table 6C-5 *(Continued)*
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	ND	0.0193	0.050	NE	U		118457-005	SW846-6020B
20-Sep-22	Antimony	ND	0.001	0.003	0.006	U		118457-005	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	U		118457-005	SW846-6020B
	Barium	0.0237	0.00067	0.004	2.00			118457-005	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118457-005	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118457-005	SW846-6020B
	Calcium	127	0.800	2.00	NE			118457-005	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		118457-005	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118457-005	SW846-6020B
	Copper	ND	0.0003	0.002	NE	U		118457-005	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118457-005	SW846-6020B
	Lead	ND	0.0005	0.002	NE	U		118457-005	SW846-6020B
	Magnesium	17.2	0.010	0.030	NE			118457-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118457-005	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118457-005	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		118457-005	SW846-6020B
	Potassium	2.03	0.080	0.300	NE			118457-005	SW846-6020B
	Selenium	0.00731	0.0015	0.005	0.050			118457-005	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118457-005	SW846-6020B
	Sodium	31.7	0.080	0.250	NE			118457-005	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118457-005	SW846-6020B
	Uranium	0.00107	0.000067	0.0002	0.030			118457-005	SW846-6020B
	Vanadium	0.00441	0.0033	0.020	NE	J		118457-005	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118457-005	SW846-6020B

Refer to Notes on page 6C-51.

Table 6C-5 *(Continued)*
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		118460-005	SW846-6020B
19-Sep-22	Antimony	ND	0.001	0.003	0.006	U		118460-005	SW846-6020B
	Arsenic	0.00369	0.002	0.005	0.010	J		118460-005	SW846-6020B
	Barium	0.0180	0.00067	0.004	2.00			118460-005	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118460-005	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118460-005	SW846-6020B
	Calcium	312	0.800	2.00	NE			118460-005	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		118460-005	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118460-005	SW846-6020B
	Copper	ND	0.0003	0.002	NE	U		118460-005	SW846-6020B
	Iron	0.0478	0.033	0.100	NE	J		118460-005	SW846-6020B
	Lead	ND	0.0005	0.002	NE	U		118460-005	SW846-6020B
	Magnesium	43.0	0.010	0.030	NE			118460-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U	R	118460-005	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118460-005	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		118460-005	SW846-6020B
	Potassium	2.96	0.080	0.300	NE			118460-005	SW846-6020B
	Selenium	0.0286	0.0015	0.005	0.050			118460-005	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118460-005	SW846-6020B
	Sodium	79.3	0.800	2.50	NE			118460-005	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118460-005	SW846-6020B
	Uranium	0.00152	0.000067	0.0002	0.030			118460-005	SW846-6020B
	Vanadium	0.00649	0.0033	0.020	NE	J		118460-005	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118460-005	SW846-6020B

Refer to Notes on page 6C-51.

Table 6C-5 *(Continued)*
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		118450-005	SW846-6020B
13-Sep-22	Antimony	ND	0.001	0.003	0.006	U		118450-005	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	U		118450-005	SW846-6020B
	Barium	0.0411	0.00067	0.004	2.00			118450-005	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118450-005	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118450-005	SW846-6020B
	Calcium	87.9	0.800	2.00	NE			118450-005	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		118450-005	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118450-005	SW846-6020B
	Copper	ND	0.0003	0.002	NE	U		118450-005	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118450-005	SW846-6020B
	Lead	ND	0.0005	0.002	NE	U		118450-005	SW846-6020B
	Magnesium	15.2	0.010	0.030	NE			118450-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118450-005	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118450-005	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		118450-005	SW846-6020B
	Potassium	2.26	0.080	0.300	NE			118450-005	SW846-6020B
	Selenium	0.00574	0.0015	0.005	0.050			118450-005	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118450-005	SW846-6020B
	Sodium	30.2	0.080	0.250	NE		J	118450-005	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118450-005	SW846-6020B
	Uranium	0.00212	0.000067	0.0002	0.030			118450-005	SW846-6020B
	Vanadium	0.00585	0.0033	0.020	NE	J		118450-005	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118450-005	SW846-6020B

Refer to Notes on page 6C-51.

Table 6C-5 *(Continued)*
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		118462-005	SW846-6020B
21-Sep-22	Antimony	ND	0.001	0.003	0.006	U		118462-005	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	U		118462-005	SW846-6020B
	Barium	0.0605	0.00067	0.004	2.00			118462-005	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118462-005	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118462-005	SW846-6020B
	Calcium	87.2	0.800	2.00	NE			118462-005	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		118462-005	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118462-005	SW846-6020B
	Copper	ND	0.0003	0.002	NE	U		118462-005	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118462-005	SW846-6020B
	Lead	ND	0.0005	0.002	NE	U		118462-005	SW846-6020B
	Magnesium	12.4	0.010	0.030	NE			118462-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118462-005	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118462-005	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		118462-005	SW846-6020B
	Potassium	1.75	0.080	0.300	NE			118462-005	SW846-6020B
	Selenium	0.00649	0.0015	0.005	0.050			118462-005	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118462-005	SW846-6020B
	Sodium	21.0	0.080	0.250	NE			118462-005	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118462-005	SW846-6020B
	Uranium	0.00103	0.000067	0.0002	0.030			118462-005	SW846-6020B
	Vanadium	0.00462	0.0033	0.020	NE	J		118462-005	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118462-005	SW846-6020B

Refer to Notes on page 6C-51.

Table 6C-5 *(Continued)*
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		118410-005	SW846-6020B
19-Aug-22	Antimony	ND	0.001	0.003	0.006	U		118410-005	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	U		118410-005	SW846-6020B
	Barium	0.0511	0.00067	0.004	2.00			118410-005	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118410-005	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118410-005	SW846-6020B
	Calcium	73.6	0.800	2.00	NE			118410-005	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		118410-005	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118410-005	SW846-6020B
	Copper	ND	0.0003	0.002	NE	U		118410-005	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118410-005	SW846-6020B
	Lead	ND	0.0005	0.002	NE	U		118410-005	SW846-6020B
	Magnesium	11.8	0.010	0.030	NE			118410-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118410-005	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118410-005	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		118410-005	SW846-6020B
	Potassium	1.88	0.080	0.300	NE			118410-005	SW846-6020B
	Selenium	0.00457	0.0015	0.005	0.050	J		118410-005	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118410-005	SW846-6020B
	Sodium	21.8	0.080	0.250	NE			118410-005	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118410-005	SW846-6020B
	Uranium	0.00132	0.000067	0.0002	0.030			118410-005	SW846-6020B
	Vanadium	0.00578	0.0033	0.020	NE	J		118410-005	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118410-005	SW846-6020B

Refer to Notes on page 6C-51.

Table 6C-5 *(Continued)*
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		118426-005	SW846-6020B
24-Aug-22	Antimony	ND	0.001	0.003	0.006	U		118426-005	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	U		118426-005	SW846-6020B
	Barium	0.0899	0.00067	0.004	2.00			118426-005	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118426-005	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118426-005	SW846-6020B
	Calcium	56.5	0.800	2.00	NE			118426-005	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		118426-005	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118426-005	SW846-6020B
	Copper	ND	0.0003	0.002	NE	U		118426-005	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118426-005	SW846-6020B
	Lead	ND	0.0005	0.002	NE	U		118426-005	SW846-6020B
	Magnesium	10.6	0.010	0.030	NE			118426-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118426-005	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118426-005	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		118426-005	SW846-6020B
	Potassium	3.44	0.080	0.300	NE			118426-005	SW846-6020B
	Selenium	ND	0.0015	0.005	0.050	U		118426-005	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118426-005	SW846-6020B
	Sodium	23.3	0.080	0.250	NE			118426-005	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118426-005	SW846-6020B
	Uranium	0.00274	0.000067	0.0002	0.030			118426-005	SW846-6020B
	Vanadium	0.00519	0.0033	0.020	NE	J		118426-005	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118426-005	SW846-6020B

Refer to Notes on page 6C-51.

Table 6C-5 *(Continued)*
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		118446-005	SW846-6020B
12-Sep-22	Antimony	ND	0.001	0.003	0.006	N, U		118446-005	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	U		118446-005	SW846-6020B
	Barium	0.0382	0.00067	0.004	2.00			118446-005	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118446-005	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118446-005	SW846-6020B
	Calcium	73.9	0.800	2.00	NE			118446-005	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		118446-005	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118446-005	SW846-6020B
	Copper	ND	0.0003	0.002	NE	U		118446-005	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118446-005	SW846-6020B
	Lead	ND	0.0005	0.002	NE	U		118446-005	SW846-6020B
	Magnesium	10.9	0.010	0.030	NE			118446-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118446-005	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118446-005	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		118446-005	SW846-6020B
	Potassium	1.69	0.080	0.300	NE			118446-005	SW846-6020B
	Selenium	0.00205	0.0015	0.005	0.050	J		118446-005	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118446-005	SW846-6020B
	Sodium	26.7	0.080	0.250	NE			118446-005	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118446-005	SW846-6020B
	Uranium	0.00238	0.000067	0.0002	0.030			118446-005	SW846-6020B
	Vanadium	0.00398	0.0033	0.020	NE	J		118446-005	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118446-005	SW846-6020B

Refer to Notes on page 6C-51.

Table 6C-5 *(Continued)*
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.423	0.0193	0.050	NE			118439-005	SW846-6020B
29-Aug-22	Antimony	ND	0.001	0.003	0.006	U		118439-005	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	U		118439-005	SW846-6020B
	Barium	0.0503	0.00067	0.004	2.00			118439-005	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118439-005	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118439-005	SW846-6020B
	Calcium	82.4	0.800	2.00	NE			118439-005	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		118439-005	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118439-005	SW846-6020B
	Copper	0.000403	0.0003	0.002	NE	J	0.002U	118439-005	SW846-6020B
	Iron	0.299	0.033	0.100	NE			118439-005	SW846-6020B
	Lead	ND	0.0005	0.002	NE	U		118439-005	SW846-6020B
	Magnesium	12.1	0.010	0.030	NE			118439-005	SW846-6020B
	Manganese	0.00598	0.001	0.005	NE			118439-005	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118439-005	SW846-7470A
	Nickel	0.000728	0.0006	0.002	NE	J		118439-005	SW846-6020B
	Potassium	1.77	0.080	0.300	NE			118439-005	SW846-6020B
	Selenium	0.00369	0.0015	0.005	0.050	J		118439-005	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118439-005	SW846-6020B
	Sodium	25.0	0.080	0.250	NE		J	118439-005	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118439-005	SW846-6020B
	Uranium	0.00181	0.000067	0.0002	0.030			118439-005	SW846-6020B
	Vanadium	0.00569	0.0033	0.020	NE	J		118439-005	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118439-005	SW846-6020B

Refer to Notes on page 6C-51.

Table 6C-5 *(Continued)*
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		118453-005	SW846-6020B
14-Sep-22	Antimony	ND	0.001	0.003	0.006	U		118453-005	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	U		118453-005	SW846-6020B
	Barium	0.0571	0.00067	0.004	2.00			118453-005	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118453-005	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118453-005	SW846-6020B
	Calcium	116	0.800	2.00	NE			118453-005	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		118453-005	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118453-005	SW846-6020B
	Copper	ND	0.0003	0.002	NE	U	UJ	118453-005	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118453-005	SW846-6020B
	Lead	ND	0.0005	0.002	NE	U		118453-005	SW846-6020B
	Magnesium	16.3	0.010	0.030	NE			118453-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118453-005	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118453-005	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		118453-005	SW846-6020B
	Potassium	2.07	0.080	0.300	NE			118453-005	SW846-6020B
	Selenium	0.00824	0.0015	0.005	0.050			118453-005	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118453-005	SW846-6020B
	Sodium	29.9	0.080	0.250	NE		J	118453-005	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118453-005	SW846-6020B
	Uranium	0.00114	0.000067	0.0002	0.030			118453-005	SW846-6020B
	Vanadium	0.00591	0.0033	0.020	NE	J		118453-005	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118453-005	SW846-6020B

Refer to Notes on page 6C-51.

Table 6C-5 *(Continued)*
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		118418-005	SW846-6020B
23-Aug-22	Antimony	ND	0.001	0.003	0.006	U		118418-005	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	U		118418-005	SW846-6020B
	Barium	0.185	0.00067	0.004	2.00			118418-005	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118418-005	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118418-005	SW846-6020B
	Calcium	65.7	0.800	2.00	NE			118418-005	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		118418-005	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118418-005	SW846-6020B
	Copper	ND	0.0003	0.002	NE	U		118418-005	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118418-005	SW846-6020B
	Lead	ND	0.0005	0.002	NE	U		118418-005	SW846-6020B
	Magnesium	12.1	0.010	0.030	NE			118418-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118418-005	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118418-005	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		118418-005	SW846-6020B
	Potassium	2.01	0.080	0.300	NE			118418-005	SW846-6020B
	Selenium	0.00319	0.0015	0.005	0.050	J		118418-005	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118418-005	SW846-6020B
	Sodium	19.5	0.080	0.250	NE			118418-005	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118418-005	SW846-6020B
	Uranium	0.00144	0.000067	0.0002	0.030			118418-005	SW846-6020B
	Vanadium	0.00567	0.0033	0.020	NE	J		118418-005	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118418-005	SW846-6020B

Refer to Notes on page 6C-51.

Table 6C-5 *(Continued)*
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		118413-005	SW846-6020B
22-Aug-22	Antimony	ND	0.001	0.003	0.006	U		118413-005	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	U		118413-005	SW846-6020B
	Barium	0.0488	0.00067	0.004	2.00			118413-005	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118413-005	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118413-005	SW846-6020B
	Calcium	77.4	0.800	2.00	NE			118413-005	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		118413-005	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118413-005	SW846-6020B
	Copper	ND	0.0003	0.002	NE	U		118413-005	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118413-005	SW846-6020B
	Lead	ND	0.0005	0.002	NE	U		118413-005	SW846-6020B
	Magnesium	11.5	0.010	0.030	NE			118413-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118413-005	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118413-005	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		118413-005	SW846-6020B
	Potassium	1.83	0.080	0.300	NE			118413-005	SW846-6020B
	Selenium	0.00434	0.0015	0.005	0.050	J		118413-005	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118413-005	SW846-6020B
	Sodium	21.5	0.080	0.250	NE			118413-005	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118413-005	SW846-6020B
	Uranium	0.00130	0.000067	0.0002	0.030			118413-005	SW846-6020B
	Vanadium	0.00561	0.0033	0.020	NE	J		118413-005	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118413-005	SW846-6020B

Refer to Notes on page 6C-51.

Table 6C-5 *(Continued)*
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		118455-005	SW846-6020B
15-Sep-22	Antimony	ND	0.001	0.003	0.006	U		118455-005	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	U		118455-005	SW846-6020B
	Barium	0.0448	0.00067	0.004	2.00			118455-005	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118455-005	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118455-005	SW846-6020B
	Calcium	69.0	0.800	2.00	NE			118455-005	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		118455-005	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118455-005	SW846-6020B
	Copper	ND	0.0003	0.002	NE	U		118455-005	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118455-005	SW846-6020B
	Lead	ND	0.0005	0.002	NE	U		118455-005	SW846-6020B
	Magnesium	12.1	0.010	0.030	NE			118455-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118455-005	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118455-005	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		118455-005	SW846-6020B
	Potassium	1.90	0.080	0.300	NE			118455-005	SW846-6020B
	Selenium	ND	0.0015	0.005	0.050	U		118455-005	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118455-005	SW846-6020B
	Sodium	27.4	0.080	0.250	NE		J	118455-005	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118455-005	SW846-6020B
	Uranium	0.00248	0.000067	0.0002	0.030			118455-005	SW846-6020B
	Vanadium	0.00616	0.0033	0.020	NE	J		118455-005	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118455-005	SW846-6020B

Refer to Notes on page 6C-51.

Table 6C-5 *(Continued)*
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		118424-005	SW846-6020B
24-Aug-22	Antimony	ND	0.001	0.003	0.006	U		118424-005	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	U		118424-005	SW846-6020B
	Barium	0.179	0.00067	0.004	2.00			118424-005	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118424-005	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118424-005	SW846-6020B
	Calcium	69.2	0.800	2.00	NE			118424-005	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		118424-005	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118424-005	SW846-6020B
	Copper	ND	0.0003	0.002	NE	U		118424-005	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118424-005	SW846-6020B
	Lead	ND	0.0005	0.002	NE	U		118424-005	SW846-6020B
	Magnesium	13.9	0.010	0.030	NE			118424-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118424-005	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118424-005	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		118424-005	SW846-6020B
	Potassium	3.15	0.080	0.300	NE			118424-005	SW846-6020B
	Selenium	0.00290	0.0015	0.005	0.050	J		118424-005	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118424-005	SW846-6020B
	Sodium	25.8	0.080	0.250	NE			118424-005	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118424-005	SW846-6020B
	Uranium	0.00278	0.000067	0.0002	0.030			118424-005	SW846-6020B
	Vanadium	0.00567	0.0033	0.020	NE	J		118424-005	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118424-005	SW846-6020B

Refer to Notes on page 6C-51.

Table 6C-5 *(Continued)*
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		118405-005	SW846-6020B
18-Aug-22	Antimony	ND	0.001	0.003	0.006	U		118405-005	SW846-6020B
	Arsenic	0.00245	0.002	0.005	0.010	J		118405-005	SW846-6020B
	Barium	0.0520	0.00067	0.004	2.00			118405-005	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118405-005	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118405-005	SW846-6020B
	Calcium	78.1	0.800	2.00	NE			118405-005	SW846-6020B
	Chromium	0.00344	0.003	0.010	0.100	J		118405-005	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118405-005	SW846-6020B
	Copper	ND	0.0003	0.002	NE	U		118405-005	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118405-005	SW846-6020B
	Lead	ND	0.0005	0.002	NE	U		118405-005	SW846-6020B
	Magnesium	15.5	0.010	0.030	NE			118405-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118405-005	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118405-005	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		118405-005	SW846-6020B
	Potassium	1.84	0.080	0.300	NE			118405-005	SW846-6020B
	Selenium	0.00507	0.0015	0.005	0.050			118405-005	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118405-005	SW846-6020B
	Sodium	23.2	0.080	0.250	NE			118405-005	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118405-005	SW846-6020B
	Uranium	0.00210	0.000067	0.0002	0.030			118405-005	SW846-6020B
	Vanadium	0.00677	0.0033	0.020	NE	J		118405-005	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118405-005	SW846-6020B

Refer to Notes on page 6C-51.

Table 6C-5 *(Continued)*
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.0476	0.0193	0.050	NE	J		118435-005	SW846-6020B
25-Aug-22	Antimony	ND	0.001	0.003	0.006	U		118435-005	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	U		118435-005	SW846-6020B
	Barium	0.0631	0.00067	0.004	2.00			118435-005	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118435-005	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118435-005	SW846-6020B
	Calcium	59.5	0.800	2.00	NE			118435-005	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		118435-005	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118435-005	SW846-6020B
	Copper	ND	0.0003	0.002	NE	U		118435-005	SW846-6020B
	Iron	0.0373	0.033	0.100	NE	J		118435-005	SW846-6020B
	Lead	ND	0.0005	0.002	NE	U		118435-005	SW846-6020B
	Magnesium	11.4	0.010	0.030	NE			118435-005	SW846-6020B
	Manganese	0.00139	0.001	0.005	NE	J		118435-005	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118435-005	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		118435-005	SW846-6020B
	Potassium	2.16	0.080	0.300	NE			118435-005	SW846-6020B
	Selenium	ND	0.0015	0.005	0.050	U		118435-005	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118435-005	SW846-6020B
	Sodium	22.2	0.080	0.250	NE			118435-005	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118435-005	SW846-6020B
	Uranium	0.00286	0.000067	0.0002	0.030			118435-005	SW846-6020B
	Vanadium	0.00622	0.0033	0.020	NE	J		118435-005	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118435-005	SW846-6020B

Refer to Notes on page 6C-51.

Table 6C-5 *(Continued)*
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		118429-005	SW846-6020B
25-Aug-22	Antimony	ND	0.001	0.003	0.006	U		118429-005	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	U		118429-005	SW846-6020B
	Barium	0.231	0.00067	0.004	2.00			118429-005	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118429-005	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118429-005	SW846-6020B
	Calcium	65.1	0.800	2.00	NE			118429-005	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		118429-005	SW846-6020B
	Cobalt	0.00111	0.0003	0.001	NE			118429-005	SW846-6020B
	Copper	ND	0.0003	0.002	NE	U		118429-005	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118429-005	SW846-6020B
	Lead	ND	0.0005	0.002	NE	U		118429-005	SW846-6020B
	Magnesium	12.6	0.010	0.030	NE			118429-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118429-005	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118429-005	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		118429-005	SW846-6020B
	Potassium	1.97	0.080	0.300	NE			118429-005	SW846-6020B
	Selenium	0.00462	0.0015	0.005	0.050	J		118429-005	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118429-005	SW846-6020B
	Sodium	19.2	0.080	0.250	NE			118429-005	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118429-005	SW846-6020B
	Uranium	0.00181	0.000067	0.0002	0.030			118429-005	SW846-6020B
	Vanadium	0.00598	0.0033	0.020	NE	J		118429-005	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118429-005	SW846-6020B

Refer to Notes on page 6C-51.

Table 6C-5 *(Concluded)*
Summary of TAL Metals plus Uranium Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		118420-005	SW846-6020B
23-Aug-22	Antimony	ND	0.001	0.003	0.006	U		118420-005	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	U		118420-005	SW846-6020B
	Barium	0.0503	0.00067	0.004	2.00			118420-005	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		118420-005	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		118420-005	SW846-6020B
	Calcium	68.2	0.800	2.00	NE			118420-005	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		118420-005	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		118420-005	SW846-6020B
	Copper	ND	0.0003	0.002	NE	U		118420-005	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		118420-005	SW846-6020B
	Lead	ND	0.0005	0.002	NE	U		118420-005	SW846-6020B
	Magnesium	13.5	0.010	0.030	NE			118420-005	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		118420-005	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		118420-005	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		118420-005	SW846-6020B
	Potassium	2.37	0.080	0.300	NE			118420-005	SW846-6020B
	Selenium	ND	0.0015	0.005	0.050	U		118420-005	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		118420-005	SW846-6020B
	Sodium	27.2	0.080	0.250	NE			118420-005	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		118420-005	SW846-6020B
	Uranium	0.00390	0.000067	0.0002	0.030			118420-005	SW846-6020B
	Vanadium	0.00634	0.0033	0.020	NE	J		118420-005	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		118420-005	SW846-6020B

Refer to Notes on page 6C-51.

Table 6C-6
Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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]
TA1-W-01 30-Aug-22	Americium-241	-10.5 ± 25.0	28.8	13.9	NE	U	BD	118443-006	EPA 901.1
	Cesium-137	2.48 ± 2.44	4.08	1.94	NE	U	BD	118443-006	EPA 901.1
	Cobalt-60	0.161 ± 2.31	4.28	1.97	NE	U	BD	118443-006	EPA 901.1
	Potassium-40	-53.5 ± 56.6	61.0	28.8	NE	U	BD	118443-006	EPA 901.1
	Gross Alpha	2.33	NA	NA	15 pCi/L	NA	None	118443-007	EPA 900.0
	Gross Beta	3.89 ± 0.742	1.02	0.488	4 mrem/yr	*		118443-007	EPA 900.0
	Tritium	34.8 ± 77.3	135	61.7	NE	U	BD	118443-008	EPA 906.0 M
TA1-W-02 18-Aug-22	Americium-241	-5.71 ± 15.7	23.3	11.3	NE	U	BD	118394-006	EPA 901.1
	Cesium-137	0.412 ± 3.15	2.95	1.41	NE	U	BD	118394-006	EPA 901.1
	Cobalt-60	0.0455 ± 1.69	3.12	1.45	NE	U	BD	118394-006	EPA 901.1
	Potassium-40	41.5 ± 55.4	31.9	14.9	NE	X	R	118394-006	EPA 901.1
	Gross Alpha	2.70	NA	NA	15 pCi/L	NA	None	118394-007	EPA 900.0
	Gross Beta	3.62 ± 0.832	1.25	0.609	4 mrem/yr	*	J	118394-007	EPA 900.0
	Tritium	73.0 ± 89.7	150	67.8	NE	U	BD	118394-008	EPA 906.0 M
TA1-W-04 22-Aug-22	Americium-241	-1.63 ± 9.21	14.8	7.19	NE	U	BD	118415-006	EPA 901.1
	Cesium-137	-0.0795 ± 1.74	3.05	1.44	NE	U	BD	118415-006	EPA 901.1
	Cobalt-60	1.26 ± 1.71	3.21	1.48	NE	U	BD	118415-006	EPA 901.1
	Potassium-40	-33.0 ± 44.8	44.6	21.0	NE	U	BD	118415-006	EPA 901.1
	Gross Alpha	2.04	NA	NA	15 pCi/L	NA	None	118415-007	EPA 900.0
	Gross Beta	3.92 ± 1.05	1.61	0.785	4 mrem/yr	*	J	118415-007	EPA 900.0
	Tritium	42.1 ± 83.5	146	65.9	NE	U	BD	118415-008	EPA 906.0 M
TA1-W-05 19-Aug-22	Americium-241	-0.735 ± 7.45	13.0	6.28	NE	U	BD	118407-006	EPA 901.1
	Cesium-137	-0.191 ± 1.93	2.98	1.40	NE	U	BD	118407-006	EPA 901.1
	Cobalt-60	-0.305 ± 1.74	3.12	1.42	NE	U	BD	118407-006	EPA 901.1
	Potassium-40	26.4 ± 58.2	26.5	11.9	NE	U	BD	118407-006	EPA 901.1
	Gross Alpha	1.12	NA	NA	15 pCi/L	NA	None	118407-007	EPA 900.0
	Gross Beta	2.05 ± 0.829	1.31	0.637	4 mrem/yr	*	J	118407-007	EPA 900.0
	Tritium	19.8 ± 82.1	148	67.0	NE	U	BD	118407-008	EPA 906.0 M
TA1-W-06 20-Sep-22	Americium-241	4.01 ± 10.2	17.1	8.23	NE	U	BD	118457-006	EPA 901.1
	Cesium-137	1.73 ± 1.84	3.21	1.51	NE	U	BD	118457-006	EPA 901.1
	Cobalt-60	1.81 ± 2.05	3.82	1.76	NE	U	BD	118457-006	EPA 901.1
	Potassium-40	-39.6 ± 47.9	54.2	25.6	NE	U	BD	118457-006	EPA 901.1
	Gross Alpha	1.41	NA	NA	15 pCi/L	NA	None	118457-007	EPA 900.0
	Gross Beta	1.46 ± 1.66	2.79	1.36	4 mrem/yr	U	BD	118457-007	EPA 900.0
	Tritium	33.1 ± 83.1	147	66.4	NE	U	BD	118457-008	EPA 906.0 M

Refer to Notes on page 6C-51.

Table 6C-6 *(Continued)*
Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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]
TA1-W-08	Americium-241	9.78 ± 15.1	15.4	7.40	NE	U	BD	118460-006	EPA 901.1
19-Sep-19	Cesium-137	-0.135 ± 1.99	3.45	1.62	NE	U	BD	118460-006	EPA 901.1
	Cobalt-60	-0.119 ± 2.14	3.39	1.53	NE	U	BD	118460-006	EPA 901.1
	Potassium-40	16.3 ± 55.5	35.0	15.8	NE	U	BD	118460-006	EPA 901.1
	Gross Alpha	-3.04	NA	NA	15 pCi/L	NA	None	118460-007	EPA 900.0
	Gross Beta	4.10 ± 2.39	3.91	1.89	4 mrem/yr		J	118460-007	EPA 900.0
	Tritium	50.0 ± 80.6	138	62.6	NE	U	BD	118460-008	EPA 906.0 M
TA2-NW1-595	Americium-241	-5.59 ± 15.9	23.8	11.5	NE	U	BD	118450-006	EPA 901.1
13-Sep-22	Cesium-137	1.91 ± 2.32	4.08	1.94	NE	U	BD	118450-006	EPA 901.1
	Cobalt-60	0.239 ± 2.06	3.89	1.78	NE	U	BD	118450-006	EPA 901.1
	Potassium-40	-39.9 ± 53.3	55.3	26.0	NE	U	BD	118450-006	EPA 901.1
	Gross Alpha	0.32	NA	NA	15 pCi/L	NA	None	118450-007	EPA 900.0
	Gross Beta	3.20 ± 1.36	2.17	1.06	4 mrem/yr		J	118450-007	EPA 900.0
	Tritium	19.9 ± 81.0	146	66.0	NE	U	BD	118451-008	EPA 906.0 M
TA2-W-01	Americium-241	4.88 ± 8.55	14.4	6.94	NE	U	BD	118462-006	EPA 901.1
21-Sep-22	Cesium-137	-0.181 ± 2.90	3.28	1.55	NE	U	BD	118462-006	EPA 901.1
	Cobalt-60	1.11 ± 2.00	3.62	1.67	NE	U	BD	118462-006	EPA 901.1
	Potassium-40	31.3 ± 49.9	31.3	14.3	NE	X	R	118462-006	EPA 901.1
	Gross Alpha	-0.17	NA	NA	15 pCi/L	NA	None	118462-007	EPA 900.0
	Gross Beta	2.07 ± 1.47	2.43	1.19	4 mrem/yr	U	BD	118462-007	EPA 900.0
	Tritium	19.6 ± 80.2	145	65.4	NE	U	BD	118462-008	EPA 906.0 M
TA2-W-19	Americium-241	-1.50 ± 13.7	21.0	10.2	NE	U	BD	118410-006	EPA 901.1
19-Aug-22	Cesium-137	2.11 ± 2.26	3.89	1.85	NE	U	BD	118410-006	EPA 901.1
	Cobalt-60	0.628 ± 1.91	3.64	1.67	NE	U	BD	118410-006	EPA 901.1
	Potassium-40	-19.7 ± 41.7	52.1	24.5	NE	U	BD	118410-006	EPA 901.1
	Gross Alpha	2.06	NA	NA	15 pCi/L	NA	None	118410-007	EPA 900.0
	Gross Beta	2.33 ± 0.707	1.06	0.512	4 mrem/yr	*	J	118410-007	EPA 900.0
	Tritium	56.5 ± 82.8	141	63.7	NE	U	BD	118410-008	EPA 906.0 M
TA2-W-24	Americium-241	-16.6 ± 30.3	29.5	14.3	NE	U	BD	118426-006	EPA 901.1
24-Aug-22	Cesium-137	0.305 ± 2.17	3.69	1.74	NE	U	BD	118426-006	EPA 901.1
	Cobalt-60	6.28 ± 4.50	3.93	1.80	NE	X	R	118426-006	EPA 901.1
	Potassium-40	-33.9 ± 45.0	64.1	30.4	NE	U	BD	118426-006	EPA 901.1
	Gross Alpha	1.61	NA	NA	15 pCi/L	NA	None	118426-007	EPA 900.0
	Gross Beta	4.06 ± 0.658	0.890	0.429	4 mrem/yr			118426-007	EPA 900.0
	Tritium	15.8 ± 77.1	140	63.2	NE	U	BD	118426-008	EPA 906.0 M

Refer to Notes on page 6C-51.

Table 6C-6 *(Continued)*
Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	2.67 ± 9.80	17.8	8.58	NE	U	BD	118446-006	EPA 901.1
12-Sep-22	Cesium-137	0.223 ± 1.95	3.43	1.61	NE	U	BD	118446-006	EPA 901.1
	Cobalt-60	1.93 ± 2.36	4.29	1.98	NE	U	BD	118446-006	EPA 901.1
	Potassium-40	1.69 ± 42.4	50.6	23.6	NE	U	BD	118446-006	EPA 901.1
	Gross Alpha	1.02	NA	NA	15 pCi/L	NA	None	118446-007	EPA 900.0
	Gross Beta	-0.347 ± 0.843	1.47	0.715	4 mrem/yr	*, U	J	118446-007	EPA 900.0
	Tritium	87.1 ± 88.4	144	64.9	NE	U	BD	118446-008	EPA 906.0 M
TA2-W-26	Americium-241	14.9 ± 17.2	25.2	12.2	NE	U	BD	118439-006	EPA 901.1
29-Aug-22	Cesium-137	1.49 ± 2.04	3.59	1.71	NE	U	BD	118439-006	EPA 901.1
	Cobalt-60	0.633 ± 1.89	3.56	1.65	NE	U	BD	118439-006	EPA 901.1
	Potassium-40	10.8 ± 39.0	53.7	25.5	NE	U	BD	118439-006	EPA 901.1
	Gross Alpha	1.93	NA	NA	15 pCi/L	NA	None	118439-007	EPA 900.0
	Gross Beta	3.39 ± 0.882	1.34	0.650	4 mrem/yr		J	118439-007	EPA 900.0
	Tritium	-19.3 ± 83.7	157	71.8	NE	U	BD	118439-008	EPA 906.0 M
TA2-W-27	Americium-241	3.32 ± 18.8	29.4	14.3	NE	U	BD	118453-006	EPA 901.1
14-Sep-22	Cesium-137	1.73 ± 2.31	4.03	1.93	NE	U	BD	118453-006	EPA 901.1
	Cobalt-60	1.46 ± 2.40	4.28	2.01	NE	U	BD	118453-006	EPA 901.1
	Potassium-40	35.9 ± 41.4	38.0	17.6	NE	U	BD	118453-006	EPA 901.1
	Gross Alpha	1.02	NA	NA	15 pCi/L	NA	None	118453-007	EPA 900.0
	Gross Beta	1.74 ± 1.62	2.71	1.32	4 mrem/yr	U	BD	118453-007	EPA 900.0
	Tritium	110 ± 93.9	148	67.0	NE	U	BD	118453-008	EPA 906.0 M
TA2-W-28	Americium-241	-4.67 ± 8.78	14.5	7.04	NE	U	BD	118418-006	EPA 901.1
23-Aug-22	Cesium-137	0.0972 ± 1.74	2.74	1.30	NE	U	BD	118418-006	EPA 901.1
	Cobalt-60	-0.228 ± 1.51	2.74	1.26	NE	U	BD	118418-006	EPA 901.1
	Potassium-40	-22.2 ± 36.5	48.6	23.2	NE	U	BD	118418-006	EPA 901.1
	Gross Alpha	1.72	NA	NA	15 pCi/L	NA	None	118418-007	EPA 900.0
	Gross Beta	2.91 ± 0.815	1.24	0.602	4 mrem/yr	*	J	118418-007	EPA 900.0
	Tritium	6.62 ± 79.6	146	66.2	NE	U	BD	118418-008	EPA 906.0 M
TJA-2	Americium-241	-0.635 ± 9.24	16.5	7.95	NE	U	BD	118413-006	EPA 901.1
22-Aug-22	Cesium-137	2.23 ± 3.15	2.75	1.29	NE	U	BD	118413-006	EPA 901.1
	Cobalt-60	0.677 ± 1.84	3.50	1.62	NE	U	BD	118413-006	EPA 901.1
	Potassium-40	-21.8 ± 39.9	49.7	23.5	NE	U	BD	118413-006	EPA 901.1
	Gross Alpha	2.31	NA	NA	15 pCi/L	NA	None	118413-007	EPA 900.0
	Gross Beta	2.89 ± 1.14	1.84	0.898	4 mrem/yr	*	J	118413-007	EPA 900.0
	Tritium	62.5 ± 87.6	148	67.2	NE	U	BD	118413-008	EPA 906.0 M

Refer to Notes on page 6C-51.

Table 6C-6 *(Continued)*
Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	Americium-241	1.13 ± 5.67	9.05	4.40	NE	U	BD	118455-006	EPA 901.1
15-Sep-22	Cesium-137	-1.70 ± 3.03	3.09	1.47	NE	U	BD	118455-006	EPA 901.1
	Cobalt-60	1.07 ± 1.96	3.54	1.66	NE	U	BD	118455-006	EPA 901.1
	Potassium-40	-11.3 ± 38.3	49.1	23.4	NE	U	BD	118455-006	EPA 901.1
	Gross Alpha	0.92	NA	NA	15 pCi/L	NA	None	118455-007	EPA 900.0
	Gross Beta	1.55 ± 1.40	2.34	1.14	4 mrem/yr	U	BD	118455-007	EPA 900.0
	Tritium	23.1 ± 81.5	146	66.1	NE	U	BD	118455-008	EPA 906.0 M
TJA-4	Americium-241	4.81 ± 7.26	11.7	5.65	NE	U	BD	118424-006	EPA 901.1
24-Aug-22	Cesium-137	-3.88 ± 4.78	4.98	2.40	NE	U	BD	118424-006	EPA 901.1
	Cobalt-60	1.77 ± 4.94	3.21	1.47	NE	U	BD	118424-006	EPA 901.1
	Potassium-40	12.7 ± 50.9	30.7	14.0	NE	U	BD	118424-006	EPA 901.1
	Gross Alpha	1.24	NA	NA	15 pCi/L	NA	None	118424-007	EPA 900.0
	Gross Beta	3.68 ± 0.655	0.897	0.432	4 mrem/yr			118424-007	EPA 900.0
	Tritium	84.0 ± 88.9	146	65.9	NE	U	BD	118424-008	EPA 906.0 M
TJA-5	Americium-241	2.05 ± 16.8	26.0	12.6	NE	U	BD	118405-006	EPA 901.1
18-Aug-22	Cesium-137	2.32 ± 2.66	4.17	1.98	NE	U	BD	118405-006	EPA 901.1
	Cobalt-60	-0.105 ± 2.32	4.28	1.98	NE	U	BD	118405-006	EPA 901.1
	Potassium-40	-0.546 ± 45.2	59.1	27.9	NE	U	BD	118405-006	EPA 901.1
	Gross Alpha	0.93	NA	NA	15 pCi/L	NA	None	118405-007	EPA 900.0
	Gross Beta	2.54 ± 0.859	1.34	0.653	4 mrem/yr	*	J	118405-007	EPA 900.0
	Tritium	20.1 ± 83.9	151	68.5	NE	U	BD	118405-008	EPA 906.0 M
TJA-6	Americium-241	-6.15 ± 12.4	21.2	10.2	NE	U	BD	118435-006	EPA 901.1
25-Aug-22	Cesium-137	3.02 ± 2.76	3.02	1.41	NE	X	R	118435-006	EPA 901.1
	Cobalt-60	1.33 ± 3.03	3.86	1.77	NE	U	BD	118435-006	EPA 901.1
	Potassium-40	6.85 ± 61.3	34.7	15.8	NE	U	BD	118435-006	EPA 901.1
	Gross Alpha	1.32	NA	NA	15 pCi/L	NA	None	118435-007	EPA 900.0
	Gross Beta	2.91 ± 0.791	1.18	0.569	4 mrem/yr		J	118435-007	EPA 900.0
	Tritium	47.6 ± 87.8	152	69.5	NE	U	BD	118435-008	EPA 906.0 M
TJA-7	Americium-241	-3.58 ± 3.28	4.73	2.28	NE	U	BD	118429-006	EPA 901.1
25-Aug-22	Cesium-137	-0.279 ± 2.17	3.75	1.76	NE	U	BD	118429-006	EPA 901.1
	Cobalt-60	5.13 ± 3.75	5.13	2.16	NE	U	BD	118429-006	EPA 901.1
	Potassium-40	2.12 ± 47.4	55.5	25.8	NE	U	BD	118429-006	EPA 901.1
	Gross Alpha	1.98	NA	NA	15 pCi/L	NA	None	118429-007	EPA 900.0
	Gross Beta	2.77 ± 0.596	0.847	0.407	4 mrem/yr			118429-007	EPA 900.0
	Tritium	22.9 ± 88.8	158	72.6	NE	U	BD	118429-008	EPA 906.0 M

Refer to Notes on page 6C-51.

Table 6C-6 *(Concluded)*
Summary of Tritium, Gross Alpha, Gross Beta, and Gamma Spectroscopy Results, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	-3.67 ± 12.6	21.0	10.2	NE	U	BD	118420-006	EPA 901.1
23-Aug-22	Cesium-137	0.985 ± 1.89	3.29	1.56	NE	U	BD	118420-006	EPA 901.1
	Cobalt-60	-0.624 ± 1.80	3.13	1.44	NE	U	BD	118420-006	EPA 901.1
	Potassium-40	-29.4 ± 36.3	48.6	23.0	NE	U	BD	118420-006	EPA 901.1
	Gross Alpha	3.26	NA	NA	15 pCi/L	NA	None	118420-007	EPA 900.0
	Gross Beta	3.36 ± 0.920	1.38	3.36	4 mrem/yr	*	J	118420-007	EPA 900.0
	Tritium	0.0990 ± 79.4	147	66.7	NE	U	BD	118420-008	EPA 906.0 M

Refer to Notes on page 6C-51.

Table 6C-7
Summary of Field Water Quality Measurements[h], Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	21-Feb-22	17.36	787.84	192.9	7.51	0.97	94.50	8.24
TA2-W-01	23-Feb-22	10.07	480.74	190.3	7.21	1.03	86.20	8.85
TA2-W-19	24-Feb-22	14.74	472.02	100.9	7.66	0.40	107.65	9.80
TA2-W-26	04-Mar-22	17.57	698.11	203.9	7.40	6.98	97.60	8.78
TA2-W-27	22-Feb-22	17.40	736.48	154.1	7.47	0.93	99.88	8.72
TA2-W-28	28-Feb-22	16.79	461.48	136.2	7.65	1.27	98.31	8.95
TJA-2	25-Feb-22	16.27	513.08	116.5	7.64	0.26	96.50	8.94
TJA-3	18-Feb-22	19.14	470.84	108.4	7.46	0.25	93.29	7.84
TJA-4	01-Mar-22	18.93	547.45	144.9	7.50	0.45	74.49	6.46
TJA-6	17-Feb-22	16.88	413.41	99.9	7.53	23.3	78.83	6.86
TJA-7	02-Mar-22	17.88	481.28	192.2	7.60	0.67	98.43	8.71
TA2-W-19	22-Jul-22	20.37	537.75	66.8	7.90	0.48	101.35	8.22
TA2-W-26	01-Aug-22	22.19	632.79	101.0	7.56	4.98	89.05	7.18
TA2-W-28	26-Jul-22	19.91	480.96	76.0	7.92	0.66	88.22	7.49
TJA-2	25-Jul-22	19.54	540.82	55.5	8.06	0.13	88.50	7.56
TJA-3	21-Jul-22	22.05	497.63	86.6	7.66	1.99	91.03	6.47
TJA-4	27-Jul-22	21.22	545.90	86.9	7.56	0.28	61.13	5.08
TJA-7	28-Jul-22	21.98	503.54	94.2	7.70	0.47	86.24	7.07
TA1-W-01	30-Aug-22	21.36	500.90	193.8	7.50	0.40	78.77	6.14
TA1-W-02	18-Aug-22	21.14	528.32	186.6	7.50	4.05	70.49	5.18
TA1-W-04	22-Aug-22	19.70	454.37	177.9	7.53	0.34	70.00	5.64
TA1-W-05	19-Aug-22	21.01	574.50	165.6	7.43	0.78	81.74	6.50
TA1-W-06	20-Sep-22	20.60	836.12	205.9	7.60	0.42	83.80	6.64
TA1-W-08	19-Sep-22	19.07	1818.3	207.7	7.43	0.15	86.10	6.88
TA2-NW1-595	13-Sep-22	20.38	622.89	208.3	7.43	0.29	94.54	7.50
TA2-W-01	21-Sep-22	22.05	624.77	196.8	7.60	0.19	88.37	6.75
TA2-W-19	19-Aug-22	20.60	538.16	104.9	7.91	0.08	103.47	8.32
TA2-W-24	24-Aug-22	20.31	413.78	210.4	7.57	0.44	48.13	3.82
TA2-W-25	12-Sep-22	20.52	478.26	177.1	7.50	0.51	90.95	7.10
TA2-W-26	29-Aug-22	21.33	647.81	147.8	7.49	3.25	89.12	7.17
TA2-W-27	14-Sep-22	18.77	744.76	206.2	7.60	0.51	86.44	7.01
TA2-W-28	23-Aug-22	19.68	469.75	106.8	8.06	0.53	90.83	7.47
TJA-2	22-Aug-22	18.67	532.21	118.4	7.98	0.42	90.82	7.62

Refer to Notes on page 6C-51.

Table 6C-7 *(Concluded)*
Summary of Field Water Quality Measurements[h], Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

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-3	15-Sep-22	21.64	490.40	204.7	7.49	0.37	84.14	6.40
TJA-4	24-Aug-22	19.92	528.15	116.5	7.96	0.11	67.83	5.22
TJA-5	18-Aug-22	19.60	570.99	129.5	7.93	0.26	108.69	8.35
TJA-6	25-Aug-22	21.37	441.71	235.9	7.56	1.61	70.00	5.40
TJA-7	25-Aug-22	19.90	482.51	174.9	7.59	0.39	92.02	7.02
WYO-3	23-Aug-22	21.46	506.51	172.5	7.69	0.25	102.74	7.94
TA2-W-19	01-Dec-22	17.80	492.20	229.9	7.69	0.73	104.79	8.34
TA2-W-26	16-Dec-22	16.32	610.68	207.6	7.50	3.39	89.79	7.45
TA2-W-28	12-Dec-22	16.01	435.48	181.5	7.75	0.95	91.50	7.65
TJA-2	02-Dec-22	17.70	510.00	206.8	7.68	0.62	95.89	7.66
TJA-3	30-Nov-22	19.16	454.56	213.2	7.49	0.64	85.72	6.65
TJA-4	13-Dec-22	16.12	479.44	190.8	7.64	0.90	67.53	5.64
TJA-7	14-Dec-22	15.95	427.33	203.2	7.63	1.01	86.24	7.24

Refer to Notes on page 6C-51.

Table 6C-8
Summary of Detected Duplicate Results and Calculated Relative Percent Differences, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

February/March 2022 Samples

Well ID / Parameter	Environmental Sample (R1)	Duplicate Sample (R2)	RPD[i]
	mg/L unless otherwise noted		
TA2-W-01			
Tetrachloroethene (μg/L)	0.550	0.460	18
Trichloroethene (μg/L)	1.27	1.27	< 1
Nitrate plus nitrite	3.96	3.97	< 1
TA2-W-26			
1,1-Dichloroethane (μg/L)	4.80	5.20	8
1,1-Dichloroethene (μg/L)	1.90	2.05	8
Chloroform (μg/L)	0.620	0.680	9
Tetrachloroethene (μg/L)	7.44	8.05	8
Trichloroethene (μg/L)	15.0	16.0	6
cis-1,2-Dichloroethene (μg/L)	4.47	4.67	4
Nitrate plus nitrite	5.56	5.54	< 1
TJA-6			
Nitrate plus nitrite	2.63	2.62	< 1

Refer to Notes on page 6C-51.

Table 6C-8 *(Continued)*
Summary of Detected Duplicate Results and Calculated Relative Percent Differences, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

July/August 2022 Samples

Well ID / Parameter	Environmental Sample (R1)	Duplicate Sample (R2)	RPD[i]
	mg/L unless otherwise noted		
TA2-W-26			
1,1-Dichloroethane (µg/L)	5.72	5.59	2
1,1-Dichloroethene (µg/L)	2.15	2.14	< 1
Chloroform (µg/L)	0.660	0.680	3
Tetrachloroethene (µg/L)	7.18	7.43	3
Trichloroethene (µg/L)	16.3	16.2	1
cis-1,2-Dichloroethene (µg/L)	5.01	4.92	2
Nitrate plus nitrite	5.33	5.27	1
TA2-W-28			
Nitrate plus nitrite	15.5	15.4	1

Refer to Notes on page 6C-51.

Table 6C-8 *(Continued)*,
Summary of Detected Duplicate Results and Calculated Relative Percent Differences, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

August/September 2022 Samples

Well ID / Parameter	Environmental Sample (R1)	Duplicate Sample (R2)	RPD[i]
	mg/L unless otherwise noted		
TA1-W-01			
Nitrate plus Nitrite	3.01	2.99	1
TA1-W-05			
Nitrate plus Nitrite	1.38	1.42	3
TA2-NW1-595			
Nitrate plus Nitrite	3.92	3.90	1
TA2-W-24			
Nitrate plus Nitrite	2.64	2.61	1
TA2-W-26			
Chloroform (μg/L)	0.670	0.630	6
1,1-Dichloroethane (μg/L)	7.06	6.36	10
1,1-Dichloroethene (μg/L)	3.02	2.80	8
Tetrachloroethene (μg/L)	10.4	9.37	10
Trichloroethene (μg/L)	19.7	18.1	8
cis-1,2-Dichloroethene (μg/L)	6.22	5.84	6
Nitrate plus Nitrite	5.45	5.50	1

Refer to Notes on page 6C-51.

Table 6C-8 *(Concluded)*
Summary of Detected Duplicate Results and Calculated Relative Percent Differences, Tijeras Arroyo Groundwater, Sandia National Laboratories, New Mexico, Calendar Year 2022

November/December 2022 Samples

Well ID / Parameter	Environmental Sample (R1)	Duplicate Sample (R2)	RPD[i]
	mg/L unless otherwise noted		
TA2-W-26			
1,1-Dichloroethane (µg/L)	5.85	5.28	10
1,1-Dichloroethene (µg/L)	2.73	2.23	20
Chloroform (µg/L)	0.710	0.670	6
Tetrachloroethene (µg/L)	8.10	7.48	8
Trichloroethene (µg/L)	17.7	15.1	16
cis-1,2-Dichloroethene (µg/L)	4.68	4.47	5
Nitrate plus nitrite	5.60	5.45	3
TJA-2			
1,1-Dichloroethane (µg/L)	0.390	0.400	3
Trichloroethene (µg/L)	4.29	4.35	1
cis-1,2-Dichloroethene (µg/L)	0.350	0.380	8
Nitrate plus nitrite	13.2	12.9	2

Refer to Notes on page 6C-51.

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 well is screened in the Merging Zone (below the Perching Horizon and above the Regional Aquifer). 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
RPD	= relative percent difference

a Result or Activity

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

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 exceed the established MCL.
ND	= not detected (at method detection limit)

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 the total uranium activity.

c PQL or Critical Level

The PQL applies to Tables 6C-1 and 6C-3 through 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.
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

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 mg/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

[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 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.

Notes for Tijeras Arroyo Groundwater Analytical Results Tables *(Concluded)*

[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.

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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.

^{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)

[i] RPD

RPD = Relative percent difference is calculated with the following equation and rounded to nearest whole number.

$$RPD = \frac{\left| R_1 - R_2 \right|}{[(R_1 + R_2)/2]} \ x\ 100$$

R_1	= analysis result
R_2	= duplicate analysis result

Attachment 6D
Tijeras Arroyo Groundwater Plots

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Attachment 6D Plots

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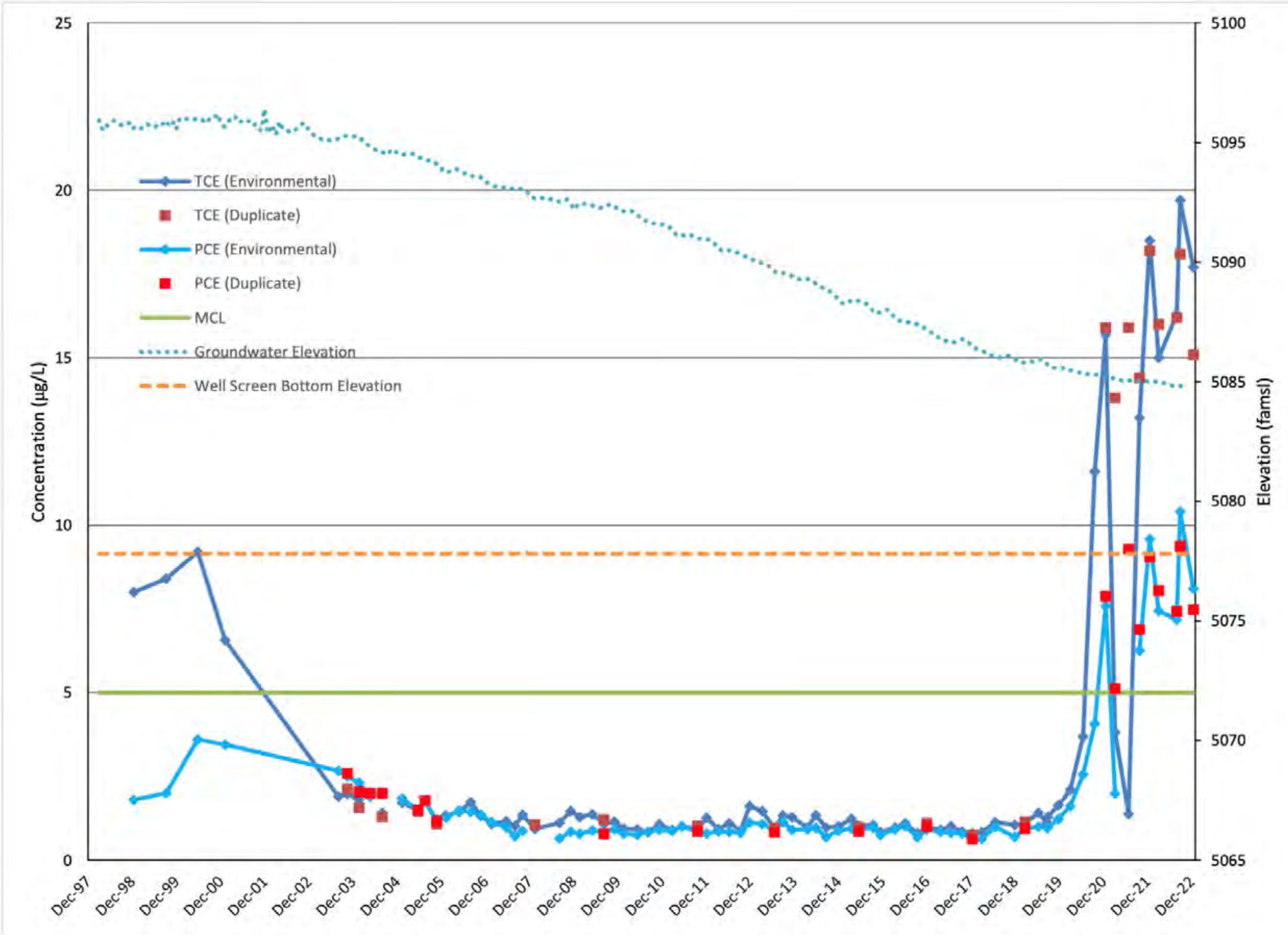

Figure 6D-1
Trichloroethene and Tetrachloroethene Concentrations, TA2-W-26

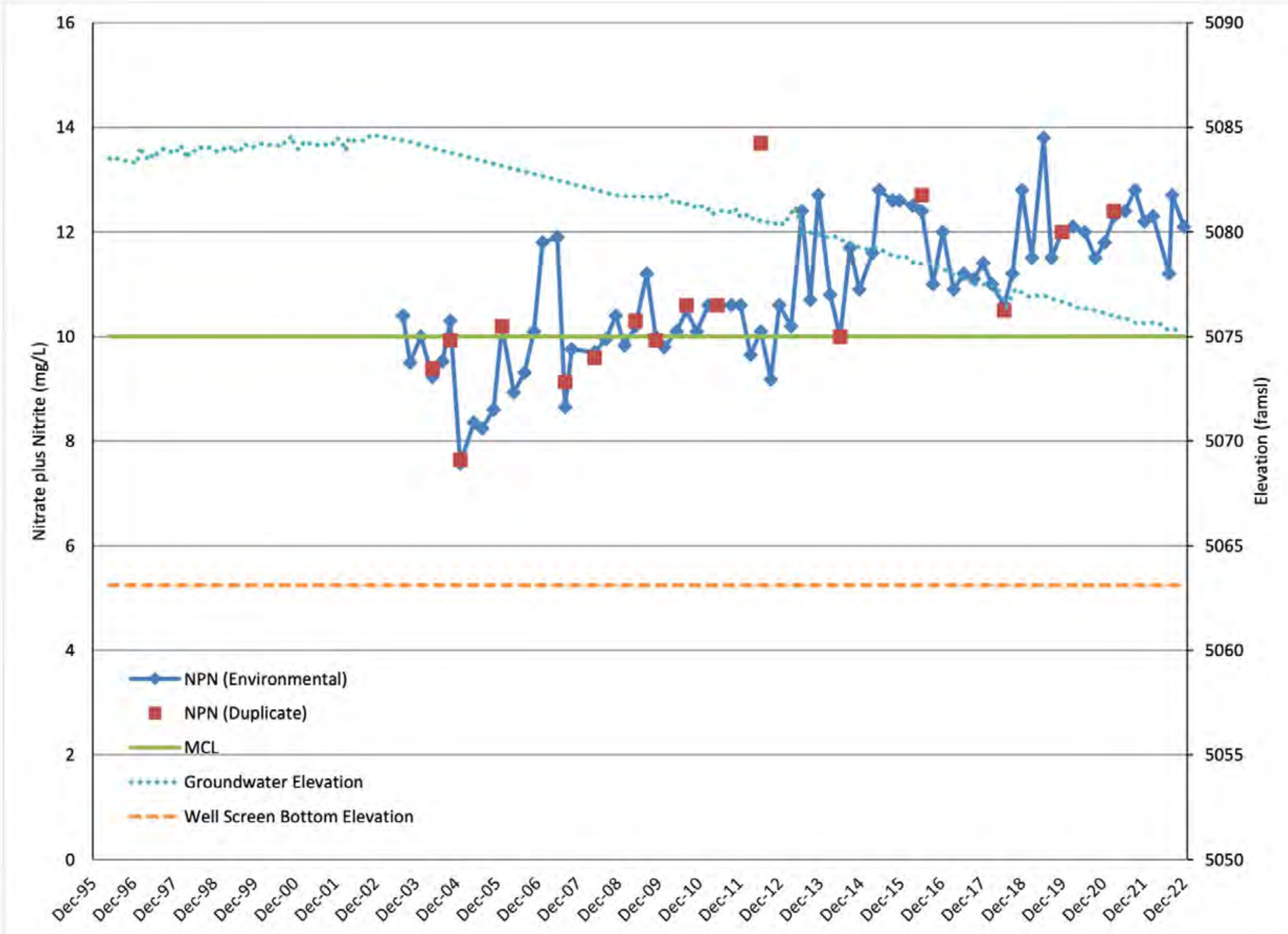

Figure 6D-2
Nitrate plus Nitrite Concentrations, TA2-W-19

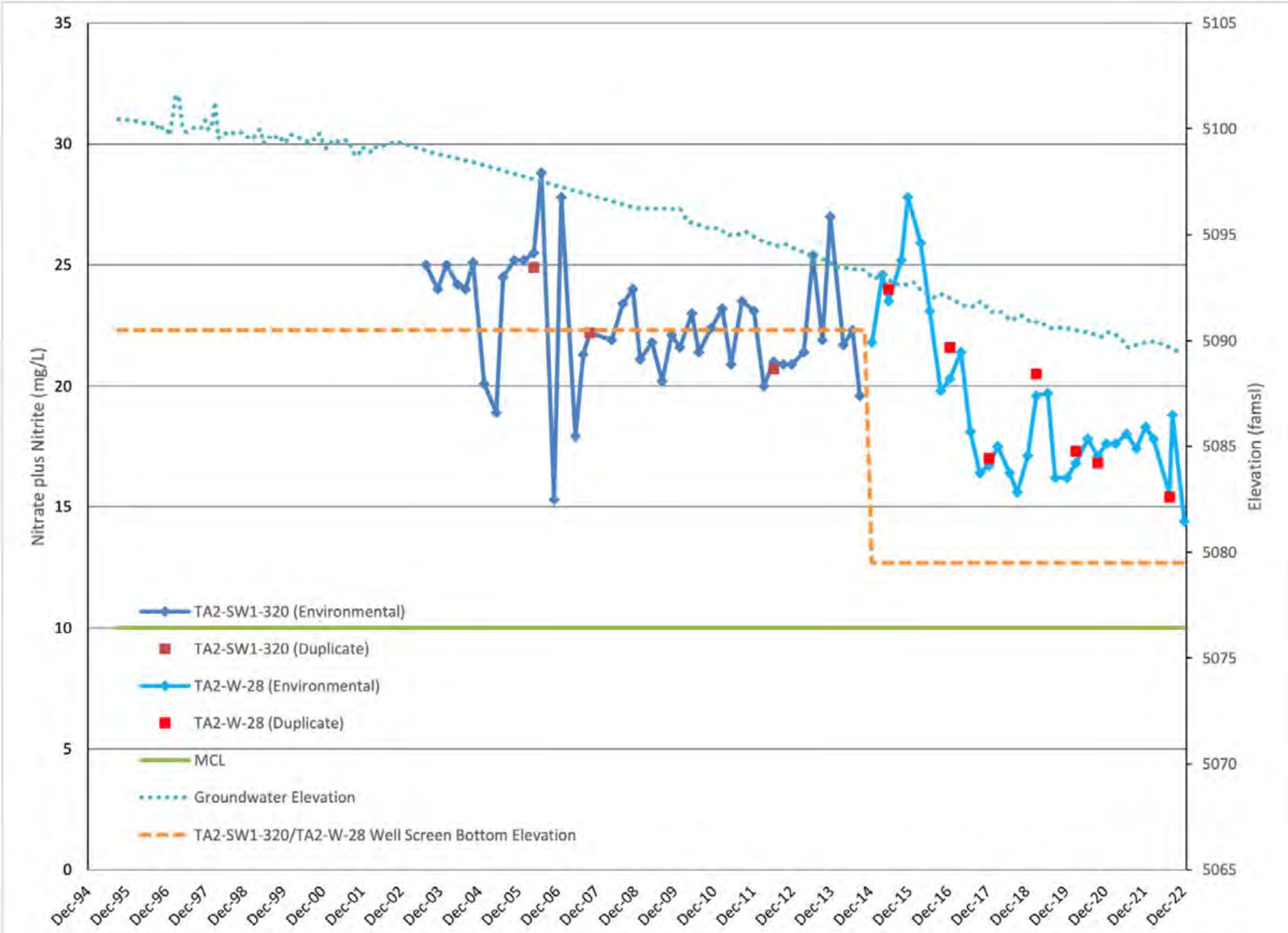

Figure 6D-3
Nitrate plus Nitrite Concentrations, TA2-W-28 and TA2-SW1-320

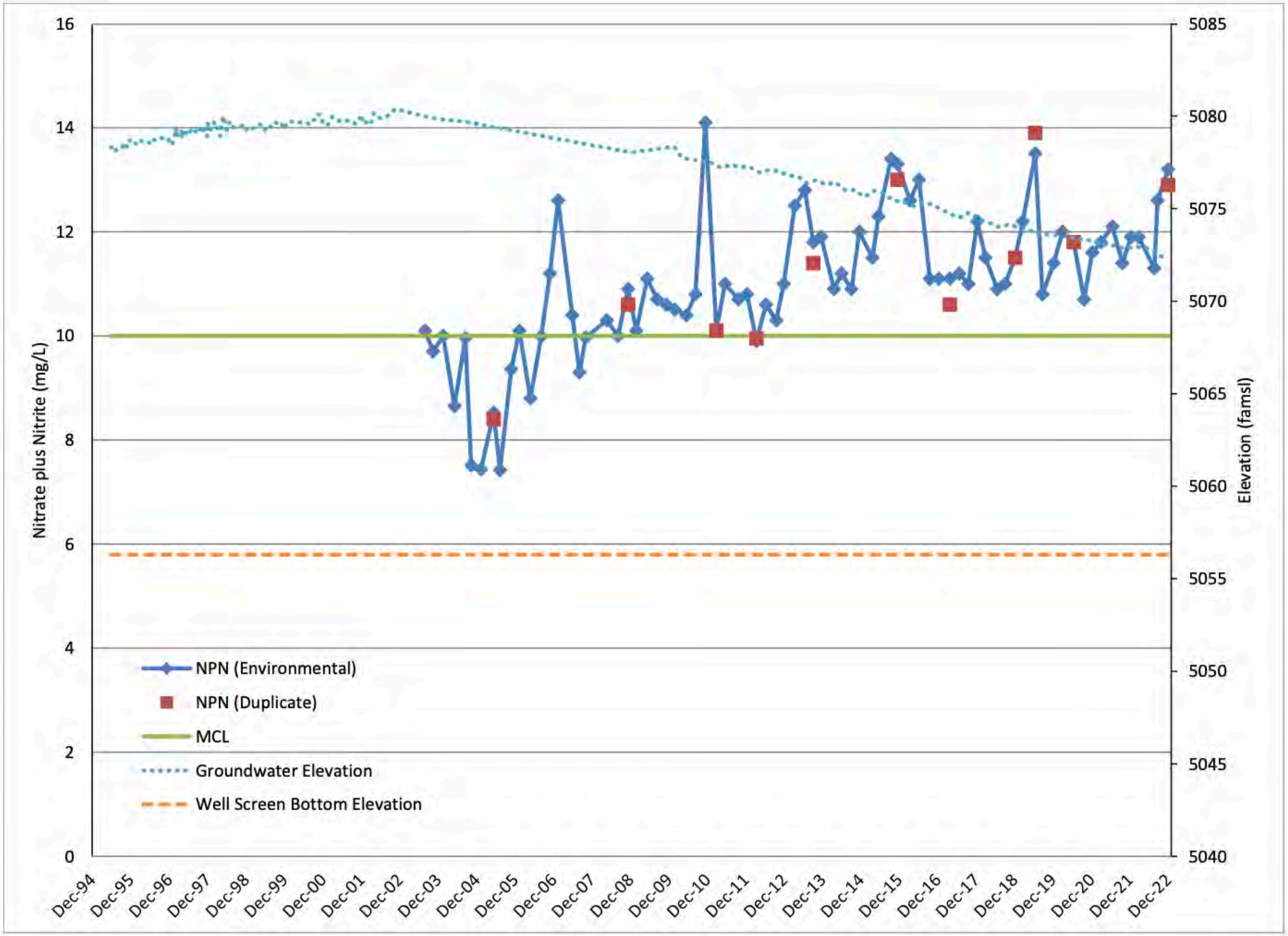

Figure 6D-4
Nitrate plus Nitrite Concentrations, TJA-2

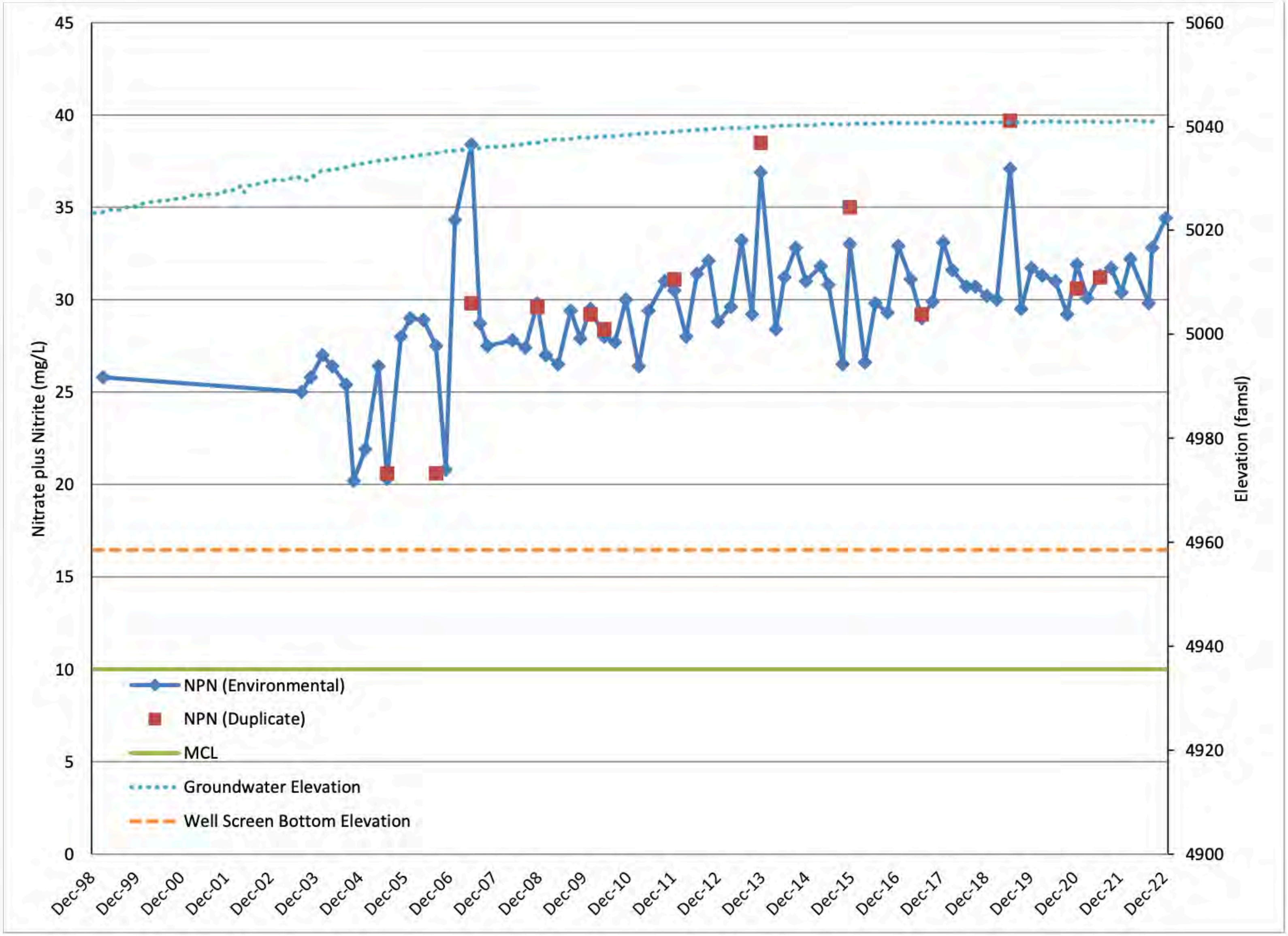

Figure 6D-5
Nitrate plus Nitrite Concentrations, TJA-4

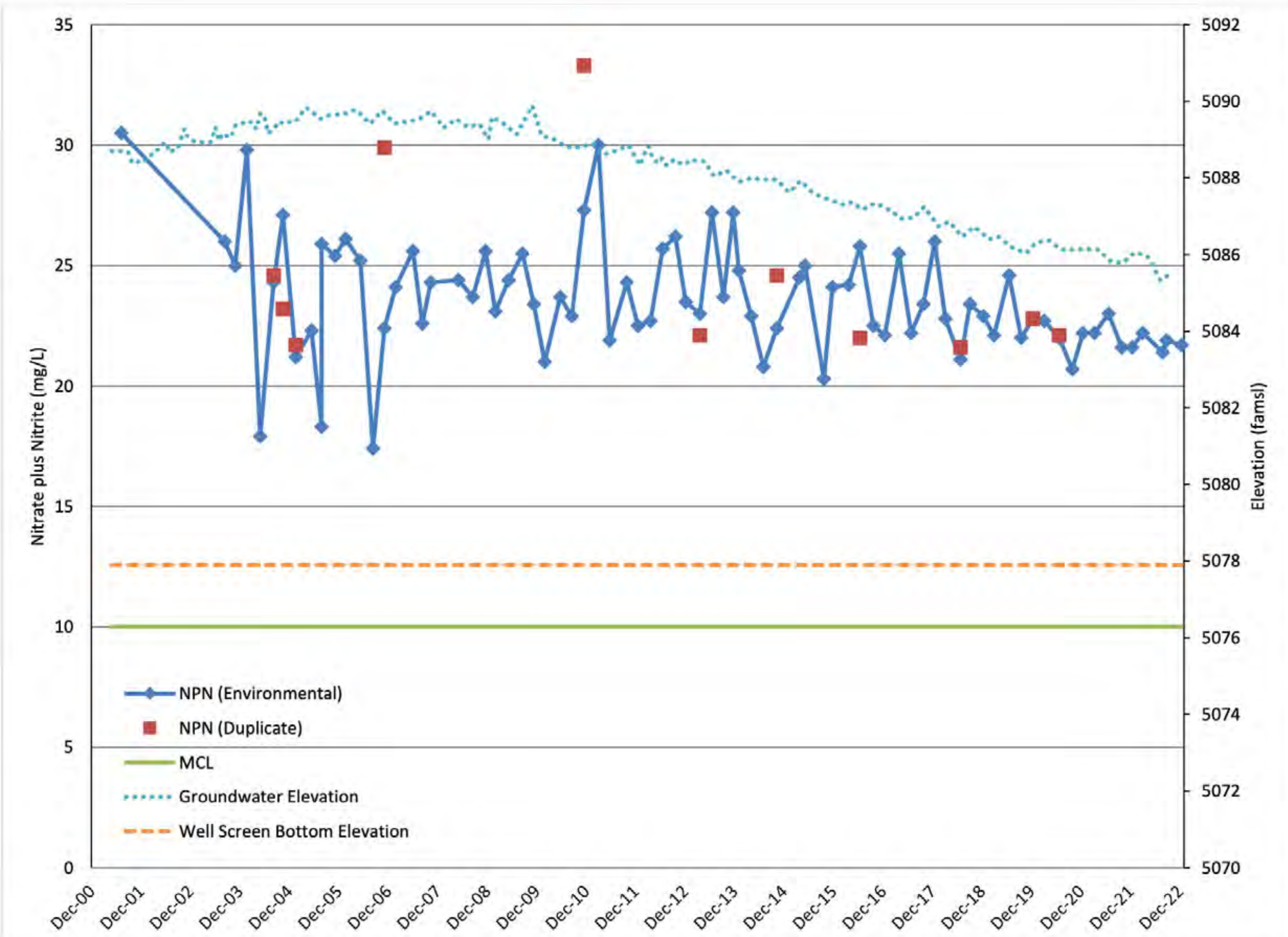

Figure 6D-6
Nitrate plus Nitrite Concentrations, TJA-7

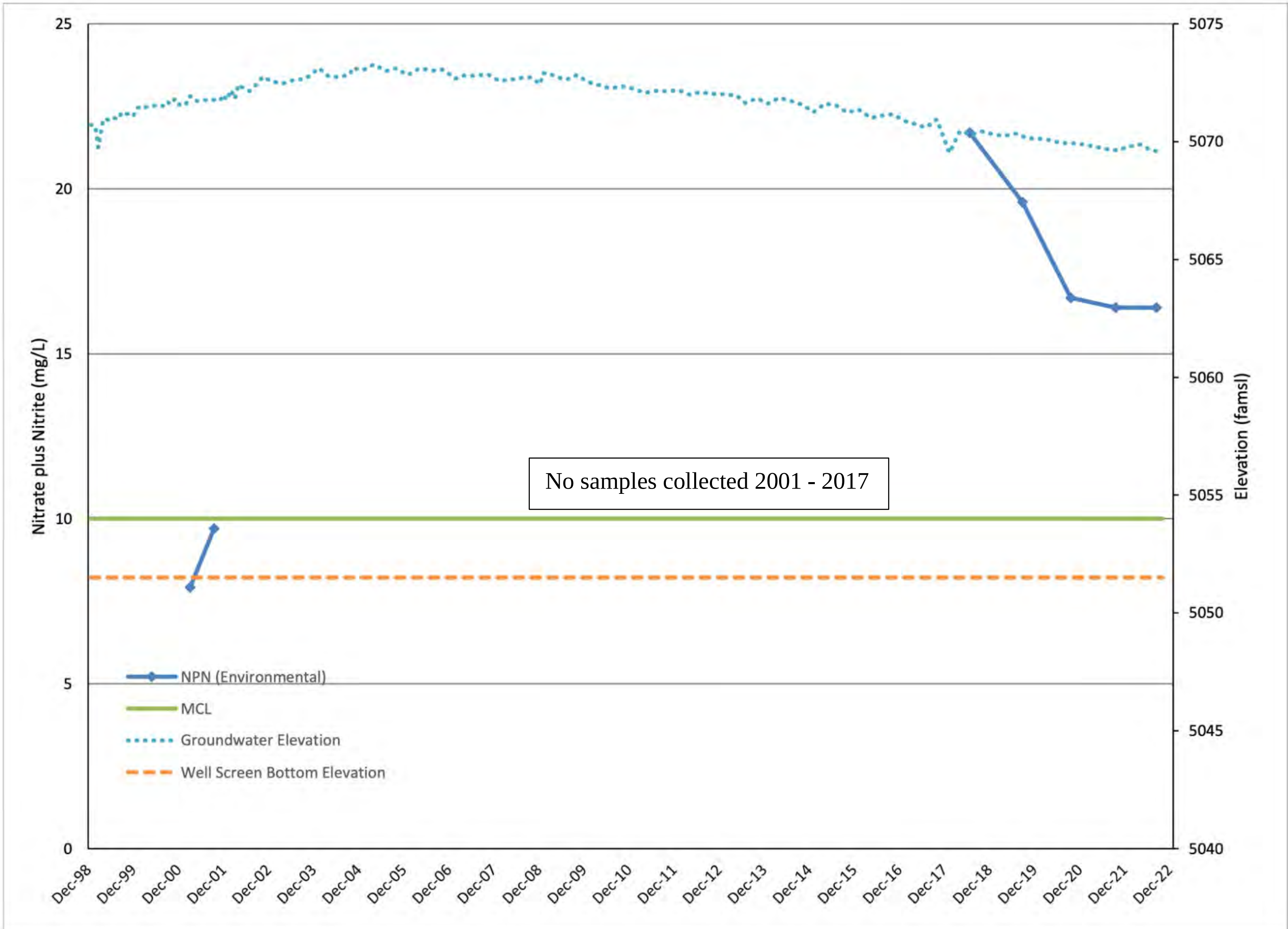

Figure 6D-7
Nitrate plus Nitrite Concentrations, TJA-5

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Chapter 6.0
Tijeras Arroyo Groundwater References

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7.0 Burn Site Groundwater Area of Concern

7.1 Introduction

The Burn Site Groundwater (BSG) Area of Concern (AOC), located in the Manzanita Mountains (Figure 7-1), 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 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 portion of Kirtland Air Force Base (KAFB). The Burn Site is in Lurance Canyon, one of three canyons that are located on the eastern edge of the Coyote Canyon Test Area and within 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 Facility, which includes the Burn Site, began in 1967.

The BSG AOC is located along the eastern margin of the Albuquerque Basin, and 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). 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 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 the 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. 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.

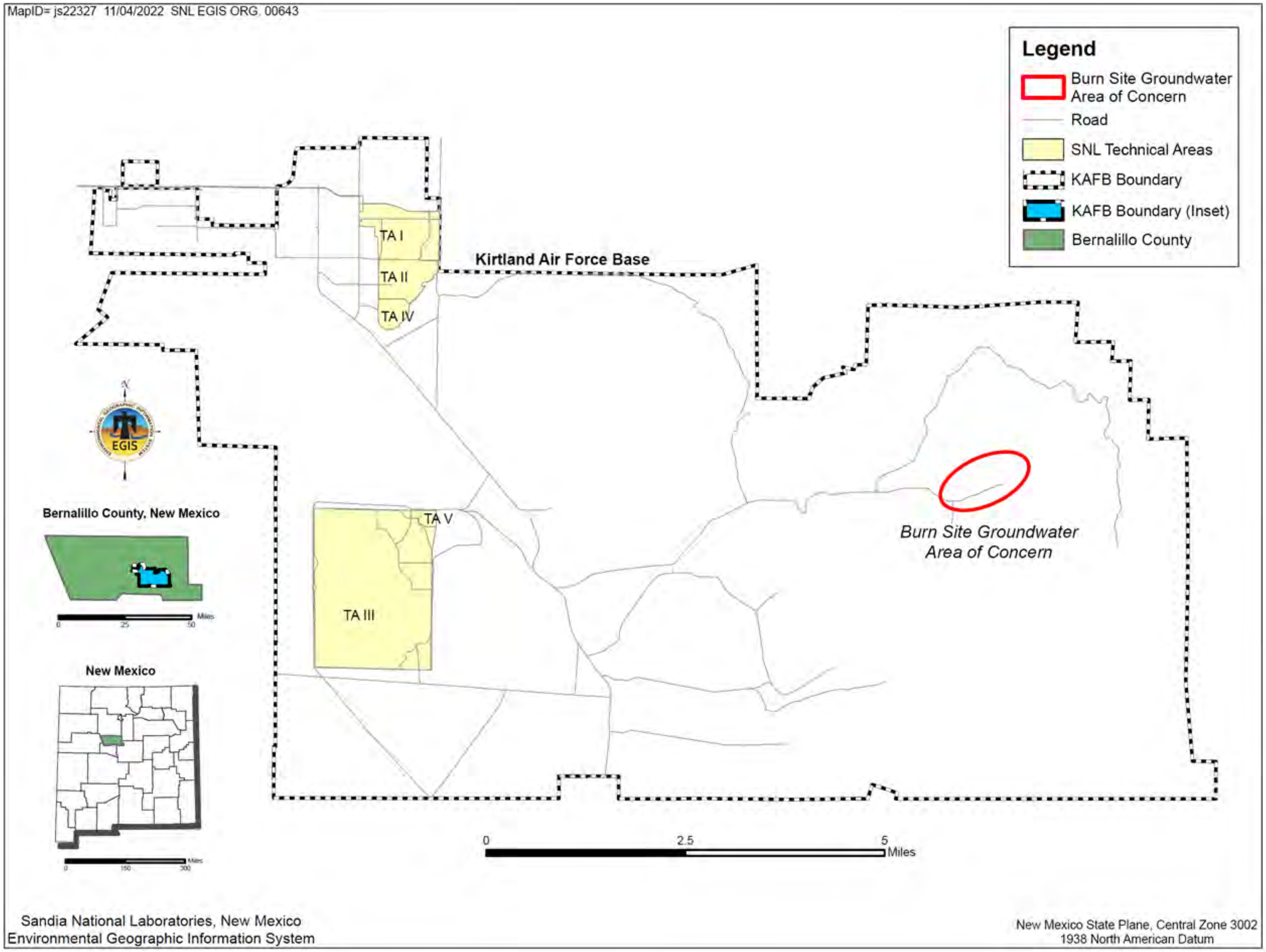

Figure 7-1
Location of the Burn Site Groundwater Area of Concern

7.1.3 Monitoring History

Groundwater samples collected during 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, the New Mexico Environment Department (NMED) Hazardous Waste Bureau (HWB), 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 monitoring well 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. Groundwater monitoring well CYN-MW5 was installed at SWMU 49 in 2001 as part of the investigation of drain and septic system sites. This monitoring well 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 its February 2005 letter, the NMED stated that it "will not consider monitoring well CYN-MW5 as a downgradient well because it is located over two miles away from the Burn Site" (NMED February 2005). Based on the NMED determination, monitoring well CYN-MW5 has not been sampled as part of the BSG AOC investigation since the third quarter of Fiscal Year 2005. Monitoring well CYN-MW5 was added to the Groundwater Monitoring Program annual groundwater monitoring sampling event in calendar year (CY) 2019 and current monitoring data from this well is discussed in Chapter 2.

Since the initial discovery of nitrate at the BSG AOC, numerous characterization activities have been conducted and are summarized in a timeline (Attachment 7A, Table 7A-1). The results of these characterization activities are summarized in the *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Burn Site* (SNL June 2004a) and subsequent update (SNL April 2008a) that report provides a comprehensive list of groundwater monitoring data sources used to support the 2004 summary of investigations.

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) became effective, which specified the Burn Site as an area of groundwater contamination. In response to the Consent Order, the *Corrective Measures Evaluation Work Plan for Sandia National Laboratories/New Mexico Burn Site* (CME Work Plan) was submitted to the NMED in June 2004 (SNL June 2004b). Based on requirements stipulated by the NMED (discussed in Section 7.2), the *Interim Measures Work Plan, Burn Site Groundwater* (IMWP) was submitted on May 30, 2005 (SNL May 2005). As required in the IMWP, three monitoring wells (CYN-MW6, CYN-MW7, and CYN-MW8) were installed near the Burn Site during December 2005 and January 2006. Quarterly sampling for eight quarters began for these three monitoring wells in March 2006 and was completed in December 2007. Samples from the two monitoring wells (CYN-MW7 and CYN-MW8) located downgradient of well CYN-MW1D were analyzed for nitrate and other analytes. Groundwater samples from monitoring well 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
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	----	14	17	Total for AGMR reporting

Notes:
Check marks in the WQ and WL columns indicate sampling and measurements were obtained.
AGMR = annual groundwater monitoring report
CYN = Canyons
ID = identifier
MW = Monitoring Well
WL = water level
WQ = water quality

Based on a letter received 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. 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; SNL November 2009) was submitted and conditionally approved by the NMED (February 2010). In July 2010, the requirements of the work plan were implemented and four groundwater 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.

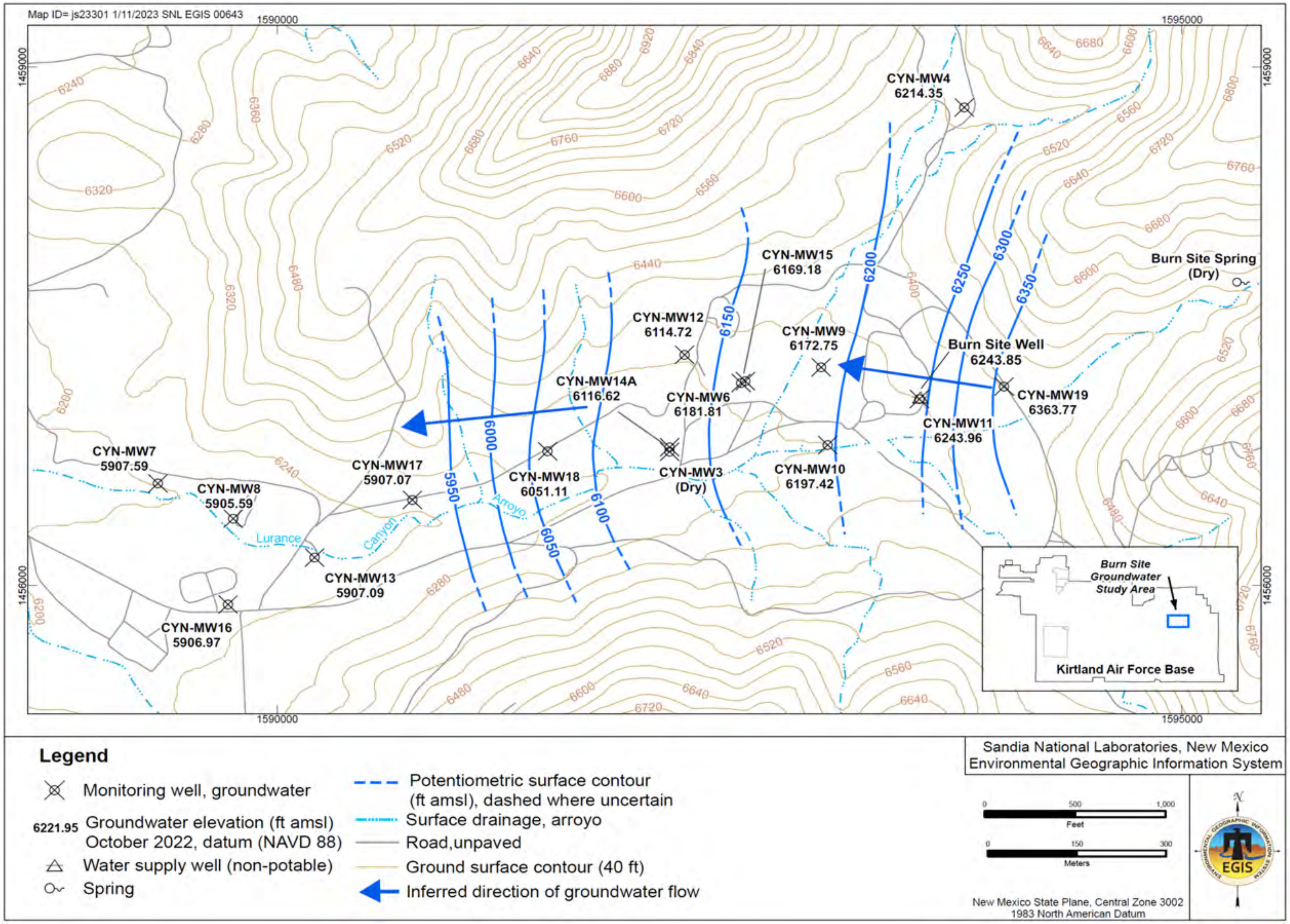

Figure 7-2
Localized Potentiometric Surface of the Burn Site Groundwater Area of Concern (October 2021)

In February 2012, a work plan was submitted by DOE/NNSA and SNL/NM personnel to decommission three obsolete groundwater monitoring wells (12AUP01, CYN-MW1D, and CYN-MW2S); and install a replacement groundwater monitoring well, CYN-MW13 (SNL February 2012). Monitoring wells 12AUP01 and CYN-MW2S were screened at the contact of unconsolidated coarse sand and gravel (alluvium) and the underlying bedrock. Although alluvium at this contact was dry during drilling, these monitoring wells were installed in anticipation of recharge occurring after rainfall events. However, these wells were consistently dry. Monitoring well 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 the monitoring well was heavily corroded. In April 2012, the NMED approved the work plan (NMED April 2012); the three monitoring wells (12AUP01, CYN-MW1D, and CYN-MW2S) were decommissioned in November 2012, and replacement monitoring well CYN-MW13 was installed in December 2012 near well 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) to be submitted by March 31, 2014 (DOE August 2013). DOE/NNSA and SNL/NM personnel requested the extension for consideration of recently collected groundwater sample analytical results from replacement monitoring well CYN-MW13 that could impact the BSG CME Report.

In October 2013, 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 could be prepared. The Internal Remedy Review recommended a weight of evidence approach to determine the source(s) of nitrate contamination.

In September 2013, a work plan for the installation of two groundwater monitoring wells was submitted (SNL September 2013a), and in June 2014 the work plan was approved by the NMED (June 2014a). The work plan discussed the need for installing two replacement monitoring wells (CYN-MW14 and CYN-MW15) because of declining water levels at the Burn Site. Monitoring well CYN-MW14 was planned to replace CYN-MW3, whereas monitoring well CYN-MW15 was planned to replace CYN-MW6. In December 2014, monitoring wells CYN-MW14A (note the ‘A’ suffix, as multiple boreholes were needed to complete this well) and CYN-MW15 were installed (SNL April 2015). The installation of a direct replacement for monitoring well 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. The replacement monitoring well CYN-MW15 was installed as planned (at a similar water-bearing fracture depth) near well CYN-MW6.

A work plan for the installation of up to eight groundwater monitoring wells was submitted in January 2019 (SNL January 2019), and in February 2019 the work plan was approved by the NMED (February 2019). Based on NMED requirements (NMED June 2018), the work plan discussed the need for installing four monitoring wells (CYN-MW16, CYN-MW17, CYN-MW18, and CYN-MW19) to help define the extent of nitrate concentrations in 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 wells CYN-MW3 and CYN-MW13. Groundwater monitoring wells CYN- MW16, CYN-MW17, CYN-MW18, and CYN-MW19 were installed during CY 2019; the potential installation of up to four additional monitoring wells (SNL 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 Network

Currently a non-potable production well (Burn Site Well) and 16 monitoring wells in the BSG AOC are in place to monitor for water levels and water quality, including: 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). However, during CY 2022 sampling events monitoring well CYN-MW3 was dry and CYN-MW6 did not produce adequate water volume.

7.1.5 Summary of Calendar Year 2022 Activities

The following activities were performed for the BSG AOC during CY 2022:

- Conducted semiannual groundwater sampling at monitoring wells CYN-MW4, CYN-MW7, CYN-MW8, CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12, CYN-MW13, CYN- MW14A, CYN-MW15, CYN-MW16, CYN-MW17, CYN-MW18, and CYN-MW19 in April/May and October/November 2022.
- Started preparing the BSG AOC Current Conceptual Model (CCM)/CME Report.
- Prepared tables of analytical results (Attachment 7B), concentration versus time graphs (Attachment 7C), and hydrographs (Attachment 7D) in support of this annual groundwater monitoring report (AGMR*).*

7.1.6 Conceptual Site Model

The BSG AOC groundwater flow is controlled by the local geologic framework and structural features described in the following sections and as 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 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 April 2008a).

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. 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.

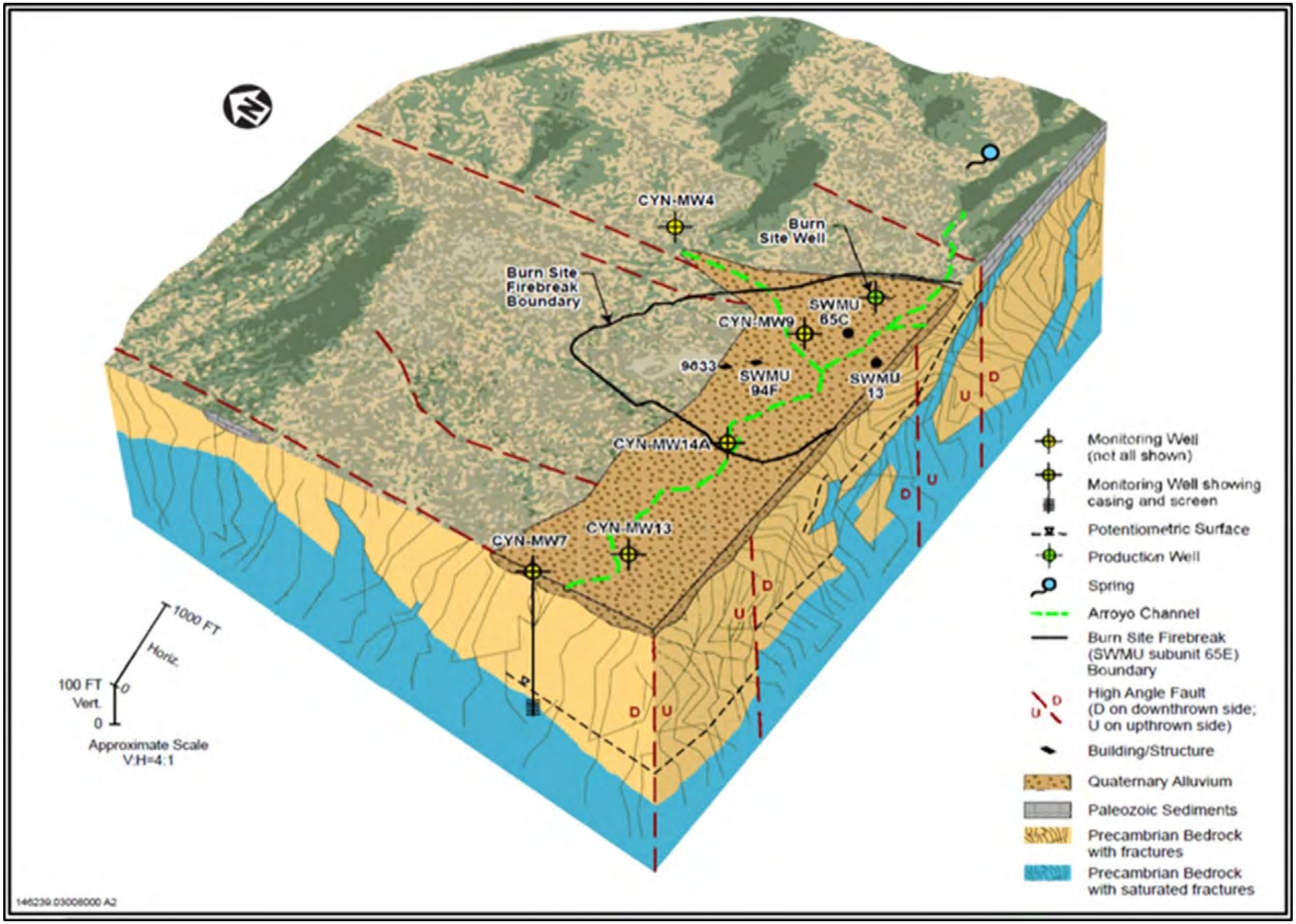

Figure 7-3
Conceptual Site Model for the Burn Site Groundwater Area of Concern

The matrix permeability of the fractured bedrock units is low, and most groundwater is produced from discontinuous water-bearing fracture zones. 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 system of faults, 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 June 2004a). Based upon water levels measured at the monitoring wells installed in 2019, current interpretations suggest that faults between wells CYN-MW17 and CYN-MW18 have a significant control upon 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. These unconsolidated deposits range in thickness from 21 to 55 ft in boreholes drilled at the BSG AOC. The unconsolidated deposits 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 on 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 flows generally 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 showers. The average annual precipitation in this drainage basin is estimated to range between 12 and 16 inches (SNL 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 15.79 inches of precipitation was measured at LC1 in CY 2022 (Table 2-3), with June, July, August, and October being the wettest months of the year at this meteorological observation tower (Figure 2B-11). There are no annual precipitation data available for LC1 prior to CY 2020, but 10 years of data from other meteorological observation towers in the vicinity show that CY 2022 was a wetter 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 monitoring well 12AUP01. The water level remained constant for about one month. However, no water has been measured in monitoring well 12AUP01 since 2005 and no groundwater had ever been measured in monitoring well CYN-MW2S. Both monitoring wells were plugged and abandoned in 2012 (SNL 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 2022 potentiometric surface for the BSG AOC monitoring well network, and Table 7-2 presents the data used to construct the potentiometric surface 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 new 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 2022 potentiometric surface (Figure 7-2) depicts a steep groundwater gradient from easternmost monitoring well CYN-MW19 to well CYN-MW17 in the west, with nearly 456 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 monitoring wells 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 well CYN-MW7 is slightly higher than that at well CYN-MW17. Of the five western monitoring wells, well 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 2022 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	03-Oct-2022	130.81	6243.85
CYN-MW3	6313.26	03-Oct-2022	--	--
CYN-MW4	6455.48	03-Oct-2022	241.13	6214.35
CYN-MW6	6343.37	03-Oct-2022	161.56	6181.81
CYN-MW7	6216.35	03-Oct-2022	308.76	5907.59
CYN-MW8	6230.11	03-Oct-2022	324.52	5905.59
CYN-MW9	6360.67	03-Oct-2022	187.92	6172.75
CYN-MW10	6345.45	03-Oct-2022	148.03	6197.42
CYN-MW11	6374.41	03-Oct-2022	130.45	6243.96
CYN-MW12	6345.16	03-Oct-2022	230.44	6114.72
CYN-MW13	6237.79	03-Oct-2022	330.70	5907.09
CYN-MW14A	6315.85	03-Oct-2022	199.23	6116.62
CYN-MW15	6344.44	03-Oct-2022	175.26	6169.18
CYN-MW16	6249.60	03-Oct-2022	342.63	5906.97
CYN-MW17	6268.95	03-Oct-2022	361.88	5907.07
CYN-MW18	6304.02	03-Oct-2022	252.91	6051.11
CYN-MW19	6410.43	03-Oct-2022	46.66	6363.77

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 portion 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 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 for the Burn Site Well that was only rarely used for non-potable applications, such as for fire suppression in testing structures and for 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 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 that showed there is significant compartmentalization of groundwater into distinct hydraulic domains, such that portions of the bedrock aquifer are unconfined and respond to precipitation infiltration, whereas other portions are semiconfined to confined. Some faults and fractures are sealed and act as barriers to groundwater flow (SNL December 2017).

Water levels have been routinely monitored in BSG monitoring wells since 1999. Attachment 7D, Figures 7D-1 through 7D-9 (hydrographs) show water levels in BSG monitoring wells that are completed in bedrock. There are no active production wells in the area and there are no substantial seasonal variations in water levels in these monitoring wells. 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 a result of local heterogeneities in hydraulic properties related to the water-bearing fracture zones.

The five BSG monitoring wells in the lower (western) portion of the canyon (CYN-MW7, CYN-MW8, CYN-MW13, CYN-MW16, and CYN-MW17) exhibit little variability over time with a steady decline of approximately 0.75 ft/yr (Figure 7D-4). The BSG monitoring wells in the upper portion of the canyon, most notably at monitoring wells 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. 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 BSG monitoring wells, currently show declining groundwater elevations of three or more ft/yr (Figures 7D-1 through 7D-3, 7D-6 through 7D-8).

7.1.6.4 Contaminant Sources

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 (Dinwiddie September 1997). This value was based upon 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 the weathering of rocks, atmospheric deposition, and the 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 in 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 groundwater beneath these drainages and a chloride to nitrate ratio in 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 contains 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 was first detected above the EPA MCL of 10 mg/L in groundwater samples from the Burn Site Well. Since the installation of the monitoring wells shown 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 for 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 to the west-northwest of the BSG AOC. Numerical simulations predict nitrate concentrations in groundwater would decrease to below the EPA MCL at the Coyote Springs ecological receptor, and to below 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 exceed 600 years from the BSG AOC to the ABCWUA and KAFB well fields (SNL 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	21.8	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 = naximum contaminant level
mg/L = milligrams per liter
MW = Monitoring Well
NPN = nitrate plus nitrite (as nitrogen)

7.2 Regulatory Criteria

The NMED HWB 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 are listed in the *Resource Conservation and Recovery Act Facility Operating Permit, EPA ID# NM5890110518* (RCRA Permit) (NMED January 2015).

All BSG AOC corrective action requirements are contained in the Consent Order. The BSG groundwater monitoring activities are not associated with a single SWMU but are more regional in nature. Before the Consent Order became effective in April 2004, BSG AOC groundwater investigations had been conducted voluntarily by SNL/NM personnel.

Initially, BSG groundwater monitoring was initiated to satisfy the requirements of the RCRA Permit for characterization of SWMUs. The Consent Order transferred regulatory authority for corrective action requirements from the RCRA Permit to the Consent Order. The BSG investigation must comply with requirements set forth in the Consent Order for site characterization and the development of a CME.

In response to the Consent Order, the *Current Conceptual Model of Groundwater Flow and Contaminant Transport at Sandia National Laboratories/New Mexico Burn Site* and CME Work Plan (SNL April 2008a and 2008b) were submitted to the NMED. The CCM provides site-specific characteristics by which remedial alternatives were evaluated. The CME Work Plan provides a description and justification of the remedial alternatives considered and the methods and criteria to be used in the evaluation. The CME Work Plan was completed to comply with requirements set forth in the Consent Order and with the guidance of the *RCRA Corrective Action Plan* (EPA 1994).

On March 1, 2005, a letter was received from the NMED that disapproved the 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 the 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 CME Work Plan (SNL April 2008b) 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."

In May 2005, the IMWP was submitted to the NMED that 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 May 2005). The selected interim measures described in the IMWP 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) becomes 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 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 were 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 in BSG and potential human and ecological receptors.

Data collected as part of additional characterization required by the IMWP were incorporated into an updated version of the Conceptual Site Model that provides the basis for a technically defensible remediation program that was developed and documented in the CME Work Plan (SNL April 2008b), the results of which will eventually be documented in the 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 requirements of the Consent Order. The CME Work Plan provides information and data gathered during interim measures, and performance and compliance goals and objectives for the possible remediation of BSG.

On April 30, 2009, a letter was received from the NMED entitled, *Perchlorate Contamination in Groundwater, Sandia National Laboratories, EPA ID #NM5890110518* (NMED April 2009). The letter 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 letter also stated 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 and submitted a letter requesting an extension to the November 30, 2009 due date (DOE July 2009). The results of the discussions have been incorporated into the BSG Characterization Work Plan (SNL November 2009), which included such items as number and locations of wells and boreholes.

In February 2010, a notice of conditional approval for the November 2009 BSG Characterization Work Plan was received. In July 2010, the requirements of the work plan were implemented, and subsurface soil sampling was completed at 10 deep soil borehole locations to determine contaminant sources, and four groundwater monitoring wells were installed to determine the extent of groundwater contamination. Due to an outstanding schedule commitment, an extension request was submitted for the BSG CME Report in September 2010 (SNL September 2010), which was approved by the NMED (October 2010) with a revised submittal date of March 31, 2014. In January 2014, the DOE/NNSA and SNL/NM personnel requested an additional extension to the delivery date of the BSG CME Report to March 31, 2016 (DOE January 2014). In June 2014, the NMED approved the DOE/NNSA's proposed extension request (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 June 2016a), and this plan was quickly approved by the NMED (June 2016). Field work associated with the aquifer pumping test was performed in 2017, and in December 2017, the *Aquifer Pumping Test Report for the Burn Site Groundwater Area of Concern* (*Aquifer Test Report*) was submitted to the NMED (SNL December 2017). Early in 2018, the NMED approved the *Aquifer Test Report* (NMED January 2018).

Based on the findings of the 2017 *Aquifer Test Report*, 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 the 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* (SNL January 2019) that was subsequently approved by the NMED (February 2019). Based on the approved 2019 work plan, four monitoring wells were installed in the fall 2019. The well installation activities were documented in the *Monitoring Well Installation Report, Burn Site Groundwater Monitoring Wells CYN-MW16 through CYN-MW19* (SNL May 2020) that was subsequently approved by the 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 in 2022 to begin preparing a CCM/CME Report for the BSG AOC with a planned submittal date to NMED of January of 2023.

In this AGMR, BSG monitoring data are presented for both hazardous and radioactive constituents; however, the monitoring data for radionuclides (i.e., gamma spectroscopy, gross alpha/beta activity, and tritium) are provided voluntarily by the 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. Additional information on radionuclides and the scope of the Consent Order is available in Section III.A of the Consent Order.

7.3 Scope of Activities

Section 7.1.5 lists the BSG investigation activities conducted during CY 2022. Table 7-4 summarizes the two groundwater sampling events with the corresponding monitoring wells sampled and procedures used. Table 7-5 lists the analytical parameters and the monitoring wells sampled during each event.

Quality control (QC) samples are collected in the field at the time of environmental sample collection. Field QC samples include environmental duplicate samples, equipment blank (EB), field blank (FB), and trip blank (TB) samples. Sections 1.3.3 and 1.3.4 discuss the utility of QC samples.

7.4 Field Methods and Measurements

Groundwater samples were collected using a submersible Bennett piston pump. Section 1.3 describes in detail the procedures conducted for the BSG groundwater monitoring. Figure 7-2 and Table 7-2 present the water level information used to create the potentiometric surface map, and Attachment 7D (Figures 7D-1 through 7D-9) presents the hydrographs for groundwater elevation measurements at the BSG AOC.

7.5 Analytical Methods

Section 1.3.2 describes EPA-specified protocols utilized for groundwater samples analyzed by the off-site laboratories (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 2022

Date of Sampling Event	Wells Sampled		SAP
April/May 2022	CYN-MW4 CYN-MW7 CYN-MW8 CYN-MW9 CYN-MW10 CYN-MW11 CYN-MW12	CYN-MW13 CYN-MW14A CYN-MW15 CYN-MW16 CYN-MW17 CYN-MW18 CYN-MW19	*Burn Site Groundwater Monitoring, Mini-SAP for Third Quarter, Fiscal Year 2022* (SNL March 2022)
October/November 2022	CYN-MW4 CYN-MW7 CYN-MW8 CYN-MW9 CYN-MW10 CYN-MW11 CYN-MW12	CYN-MW13 CYN-MW14A CYN-MW15 CYN-MW16 CYN-MW17 CYN-MW18 CYN-MW19	*Burn Site Groundwater Monitoring, Mini-SAP for First Quarter, Fiscal Year 2023* (SNL September 2022)

Notes:
CYN = Canyons
ER = Environmental Restoration (Operations)
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 2022

Parameter	April/May 2022	
Alkalinity Anions DRO Gamma Spectroscopy (short list[a]) GRO Gross Alpha/Beta Activity HE Compounds Isotopic Uranium NPN TAL Metals Tritium VOCs	CYN-MW4 CYN-MW7 CYN-MW8 CYN-MW8 (Duplicate) CYN-MW9 CYN-MW9 CYN-MW10 CYN-MW11 CYN-MW12 CYN-MW13	CYN-MW14A CYN-MW14A (Duplicate) CYN-MW15 CYN-MW16 CYN-MW16 (Duplicate) CYN-MW17 CYN-MW17 (Duplicate) CYN-MW18 CYN-MW19
Parameter	**October/November 2022**	
DRO GRO NPN	CYN-MW4 CYN-MW4 (Duplicate) CYN-MW7 CYN-MW8 CYN-MW9 CYN-MW10 CYN-MW10 (Duplicate) CYN-MW11 CYN-MW12	CYN-MW12 (Duplicate) CYN-MW13 CYN-MW14A CYN-MW15 CYN-MW16 CYN-MW17 CYN-MW18 CYN-MW19 CYN-MW19 (Duplicate)

Notes:
[a]Gamma spectroscopy short list (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 Analytical Results

This section discusses CY 2022 analytical results, exceedances of regulatory standards, and trends in COC concentrations. Attachment 7B (Tables 7B-1 through 7B-9) present the analytical results and field measurements for the CY 2022 BSG sampling events. Data qualifiers assigned by the analytical laboratory and the data validation process are presented with the associated results in Attachment 7B tables. Attachment 7C (Figures 7C-1 through 7C-6) presents the nitrate plus nitrite (NPN) (reported as nitrogen) concentration trend plots for groundwater monitoring wells that currently have NPN concentrations exceeding the EPA MCL.

Table 7B-1 presents a summary of the volatile organic compound (VOC) results detected above MDLs for BSG AOC groundwater samples collected in CY 2022. During the April/May 2022 sampling event, acetone and methylene chloride were detected (J qualified) in samples from seven monitoring wells (Table 7B-1) and were qualified as non-detect during data validation. No other VOCs or HE compounds were detected. Table 7B-2 lists the MDLs for all analyzed VOCs and Table 7B-3 lists the MDLs for all analyzed HE compounds.

Table 7B-4 presents the analytical results for NPN and Figure 7-4 presents the BSG AOC NPN concentration contours for the October/November 2022 sampling event. CY 2022 NPN results exceeded the EPA MCL of 10 mg/L in samples from six monitoring wells (CYN-MW9, CYN-MW10, CYN-MW12, CYN-MW13, CYN-MW14A, and CYN-MW15). NPN concentrations in samples from the other BSG monitoring wells were less than 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 2022 (Figure 7-4) there are two distinct plumes with elevated NPN concentrations; it is unknown if the plumes were derived from the same source. NPN concentrations below the EPA MCL in two new groundwater monitoring wells (CYN-MW17 and CYN-MW18) demonstrate 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 concentrations are currently below the EPA MCL in the new groundwater monitoring well CYN-MW16 that delineates the western extent of the NPN plume. NPN concentrations below the EPA MCL in new groundwater monitoring well CYN-MW19 delineate the eastern extent of the NPN plume.

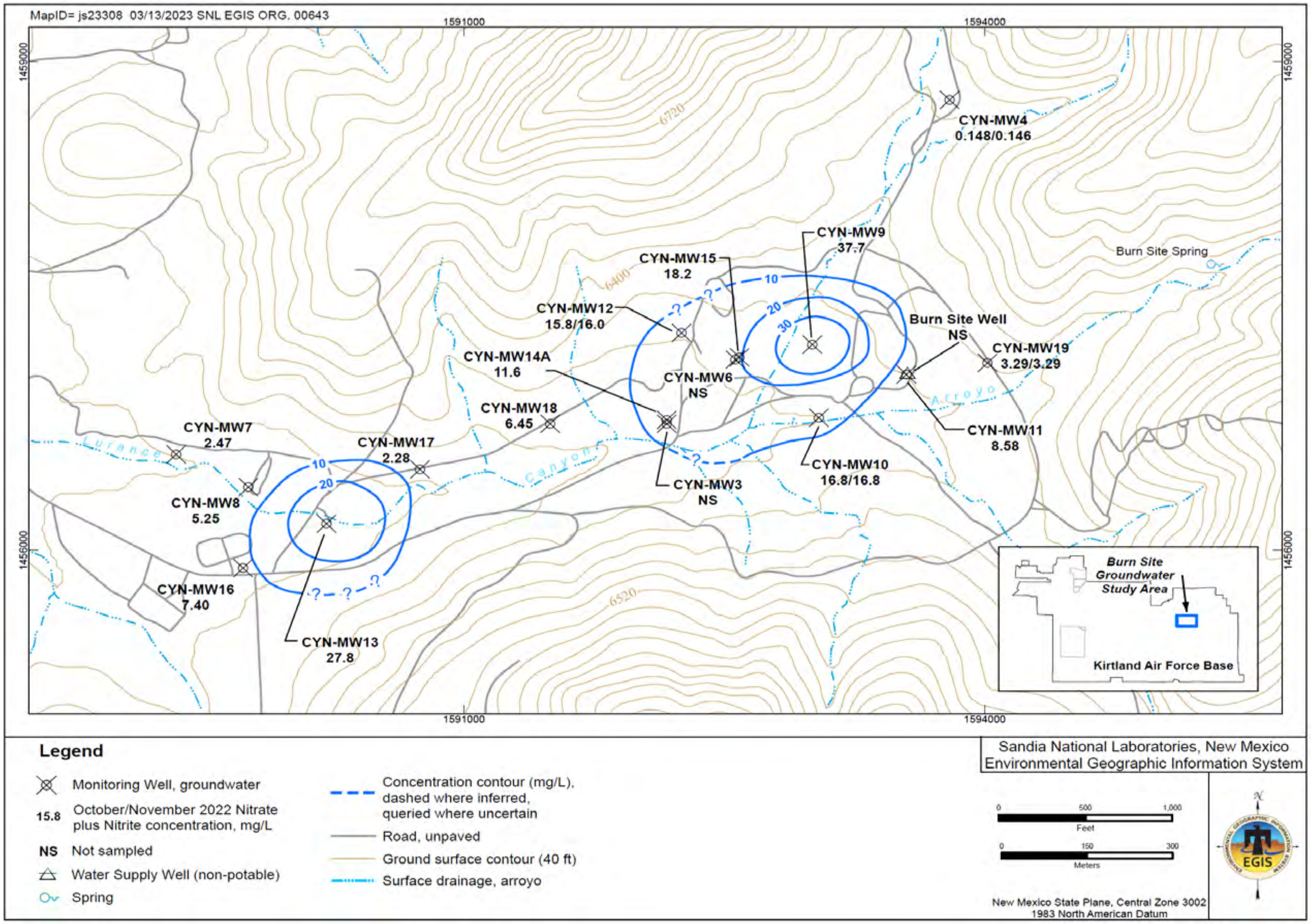

Figure 7-4
Nitrate Plus Nitrite Concentration Contour Map for the Burn Site Groundwater Area of Concern, October 2021

For CY 2022, the NPN concentrations for monitoring wells exceeding the EPA MCL are summarized as follows:

- Monitoring well CYN-MW9 had reported concentrations of 38.1 mg/L (April 2022) and 37.7 mg/L (November 2022). The historical levels of NPN concentrations for monitoring well CYN-MW9 are all above the 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 10.2 mg/L (April 2022), 16.8 mg/L (October 2022), and 16.8 mg/L (October 2022, environmental duplicate sample). The historical range of NPN concentrations for monitoring well CYN-MW10 is approximately 4 to 22 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 15.9 mg/L (May 2022), 15.8 mg/L (November 2022), and 16.0 mg/L (November 2022, environmental duplicate sample). The historical levels of NPN concentrations for monitoring well CYN-MW12 are all above the 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 29.5 mg/L (May 2022) and 27.8 mg/L (November 2022). The historical levels of NPN concentrations for monitoring well CYN-MW13 are all above the MCL and the range is approximately 28 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 11.0 mg/L (May 2022), 10.9 mg/L (May 2022, environmental duplicate sample), and 11.6 mg/L (November 2022). The historical levels of NPN concentrations for monitoring well CYN-MW14A are all at or above the 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).
- Monitoring well CYN-MW15 had reported concentrations of 17.6 mg/L (May 2022) and 18.2 mg/L (November 2022). Monitoring well CYN-MW15 replaced well CYN-MW6 in December 2014; Figure 7C-5 displays all NPN concentrations for monitoring well CYN-MW6 and the replacement monitoring well CYN-MW15. The historical levels of NPN concentrations for monitoring wells CYN-MW6 and CYN-MW15 are all above the MCL and the range is approximately 18 to 40 mg/L with a slightly decreasing trend with high variability over the life of the wells (Figure 7C-6).

Table 7B-5 presents the analytical results for DRO and GRO. EPA MCLs for DRO or GRO have not been established. No detections of DRO and GRO were reported for any of the samples collected during the CY 2022 sampling events except for DRO in monitoring well CYN-MW18 during the November 2022 sampling event at a concentration of 91.2 µg/L (J qualified).

Table 7B-6 presents the analytical results for anions (bromide, chloride, fluoride, and sulfate) and total alkalinity. None of the analytes exceeded EPA MCLs.

Table 7B-7 presents the analytical results for total metal results. No metals exceeded EPA MCLs.

Table 7B-8 presents the results of groundwater samples analyzed for gamma spectroscopy short list (americium-241, cesium-137, cobalt-60, and potassium-40), gross alpha/beta activity, isotopic uranium, and tritium. All radionuclide activity results were below EPA MCLs. Gross alpha activity is measured as a radiological screening tool and in accordance with 40 Code of Federal Regulations Part 141. Radiological results are reviewed by an SNL/NM Health Physicist to assure that samples are nonradioactive. Gross alpha activity results were below the EPA MCL of 15 picocuries per liter for all samples.

Field water quality parameters are measured during purging of each monitoring well prior to sampling and include temperature, specific conductivity, oxidation-reduction potential, potential of hydrogen (pH), turbidity, and dissolved oxygen. Table 7B-9 presents the field water quality parameter measurements obtained immediately prior to sample collection at each monitoring well for the CY 2022 sampling events.

7.7 Quality Control Results

Section 1.3 describes how the field and laboratory QC samples were collected and prepared. Attachment 7B provides data validation qualifiers with the analytical results. The results of QC samples and the impact on data quality for the BSG sampling events are discussed below.

During the laboratory QC review process the gross beta results in monitoring wells CYN-MW10 and CYN-MW16 were qualified as not usable during data validation because the reported activity was a negative value and greater than the MDA. Also, the cesium-137 activity and the potassium-40 activity in the April 2022 environmental sample for monitoring well CYN-MW17 were rejected by the contract laboratory (GEL Laboratories, LLC) due to the peak not meeting identification criteria.

Environmental duplicate results from all CY 2022 sampling events show good correlation (relative percent difference values of 1 or less) for all calculated parameters.

The results of the EB sample analyses are as follows:

- **April/May 2022 Sampling Event at Monitoring Wells CYN-MW8, CYN-MW14A, CYN-MW16, and CYN-MW17**—The EB samples were collected prior to sampling monitoring wells CYN-MW8, CYN-MW14A, CYN-MW16, and CYN-MW17 and analyzed for all parameters. Acetone, alkalinity, bromodichloromethane, bromoform, 2-butanone, calcium, chloride, chloroform, copper, dibromochloromethane, DRO, magnesium, manganese, and sodium were detected above the MDLs. No corrective action was necessary for acetone, alkalinity, bromodichloromethane, bromoform, 2-butanone, calcium, chloride, chloroform, dibromochloromethane, DRO, magnesium, manganese, or sodium because these analytes were not detected in environmental samples or were detected at concentrations less than 10 times the associated environmental sample result. Copper concentrations for monitoring wells CYN-MW8 and CYN-MW14A were qualified as not detected at the PQL during data validation because copper was reported less than the PQL in both the environmental and associated EB samples.
- **October/November 2022 Sampling Event at Monitoring Wells CYN-MW4, CYN-MW10, CYN-MW12, and CYN-MW19**—The EB sample was collected prior to sampling monitoring wells CYN-MW4, CYN-MW10, CYN-MW12, and CYN-MW19 and analyzed for same parameters as the environmental parent sample. No concentrations of DRO, GRO, or NPN were detected above the MDLs in any EB sample.

FB samples were collected for VOCs and GRO to assess whether contamination of the samples could have resulted from ambient field conditions. The results of the FB sample analyses are as follows:

- **April/May 2022 Sampling Event at Monitoring Wells CYN-MW8, CYN-MW11, and CYN-MW15**—No GRO was detected above MDLs in any FB sample. Bromodichloromethane, bromoform, chloroform, and dibromochloromethane were detected in VOC FB samples. No corrective action was necessary because these compounds were not detected in associated environmental samples.
- **October/November 2022 Sampling Event at Monitoring Wells CYN-MW10, CYN-MW11, and CYN-MW12**—No parameters were detected above MDLs in the FB samples.

TB samples were submitted whenever samples were collected for VOC and GRO analyses to assess whether contamination of the samples could have occurred during shipment and storage. The results of the TB sample analyses are as follows:

- **April/May 2022 Sampling Event**—A total of 19 VOC and GRO TBs were submitted during this sampling event. GRO was not detected in any TB sample. Acetone and methylene chloride were detected in nine TB samples. No corrective action was required for acetone because this compound was found in a laboratory method blank and was not detected above MDLs in associated environmental samples. Methylene chloride concentrations for monitoring wells CYN-MW4, CYN-MW9, CYN-MW12, CYN-MW13, CYN-MW14A, and CYN-MW15 were qualified as not detected during data validation because methylene chloride was reported at concentrations less than the PQL in both associated environmental and TB samples.
- **October/November 2022 Sampling Event**—A total of 19 GRO TBs were submitted during this sampling event. GRO was not reported above MDLs in any TB samples.

7.8 Variances and Non-Conformances

During the October/November 2022 sampling event, monitoring was delayed at several wells due to poor field conditions (winter weather and wet/muddy roads). Also, turbidity stability requirements were not met prior to sampling monitoring well CYN-MW15 (Table 7B-9). On November 16, 2022, the turbidity values increased to greater than 500 Nephelometric turbidity units (NTUs) at 29-gallons and purging was discontinued. A subsequent camera survey observed turbid conditions throughout the water column and silt on the equipment. On November 29, 2022, a sample was collected after purging a total of 43-gallons with turbidity values that ranged from 1.64 NTU to 944 NTU. The final turbidity measurement prior to sample collection was 439 NTU, and greater than 1,000 NTU immediately after sample collection. Turbidity values at monitoring well CYN-MW15 will continue to be monitored during future sampling events and this well will be evaluated for redevelopment.

No other variances or issues from requirements in the BSG mini-sampling and analysis plans (Table 7- 4) were identified during for the CY 2022 sampling events.

7.9 Summary and Conclusions

This section provides a summary of the following: field activities, COC concentrations, trends of concentrations versus time, and plans for studies to be completed during CY 2022 at the BSG AOC.

The BSG AOC is located around the vicinity of the active Lurance Canyon Burn Site facility. Groundwater investigations were initiated in 1997 at the request of the NMED after elevated nitrate levels were discovered in the Burn Site Well (non-potable production well).

Monitoring wells were sampled during April/May and October/November 2022. The samples were analyzed for VOCs, HE compounds, DRO, GRO, NPN, Target Analyte List metals, anions, alkalinity, gamma spectroscopy (short list), gross alpha/beta activity, isotopic uranium, and tritium. Analytical results were compared to EPA MCLs for drinking water (EPA March 2018), where established.

In CY 2022, NPN was the only COC that exceeded EPA MCLs. NPN was detected at concentrations exceeding the EPA MCL of 10 mg/L in samples from six BSG AOC monitoring wells: CYN-MW9, CYN-MW10, CYN-MW12, CYN-MW13, CYN-MW14A, and CYN-MW15. The maximum concentration reported in CY 2022 was 38.1 mg/L in the sample collected from monitoring well CYN-MW9 during the April 2022 sampling event. As shown on Figure 7-4, two distinct NPN plumes exceeding the EPA MCL of 10 mg/L have now 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

Ongoing environmental studies of the BSG AOC include the following:

- Continue semiannual collection of groundwater samples at 14 monitoring wells (CYN-MW4, CYN-MW7, CYN-MW8, CYN-MW9, CYN-MW10, CYN-MW11, CYN-MW12, CYN- MW13, CYN-MW14A, CYN-MW15, CYN-MW16, CYN-MW17, CYN-MW18, and CYN-MW19) during the second and fourth quarters of CY 2023. At a minimum, the analytes will consist of NPN, DRO, and GRO.
- Continue quarterly measurements of groundwater elevations in 16 monitoring wells and the Burn Site Well.
- Report future BSG investigation results in the CY 2023 AGMR.
- Continue preparing a CCM/CME Report for nitrate-impacted groundwater at the BSG AOC and submit to the NMED in January of 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 November 2001
	1987	Eighteen potential SWMUs were identified 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 April 2008a
November	1996	Groundwater sample from Burn Site Well yielded nitrate concentration of 25 mg/L.	SNL 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 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 June 1998
December	1997	Monitoring well CYN-MW1D installed.	SNL June 1998
February	1998	Site-Wide Hydrogeologic Characterization Project, Calendar Year 1995 Annual Report containing description of BSG hydrogeology submitted.	SNL February 1998
March	1999	GWPP Fiscal Year 1998 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL March 1999
June	1999	Monitoring wells CYN-MW3 and CYN-MW4 installed.	SNL November 2001
	Various (e.g., 1994)	BSG AOC SWMUs 94 and 65 proposed and approved for NFA/CAC.	Numerous references, for example: SNL February 2004
March	2000	GWPP Fiscal Year 1999 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL March 2000
April	2001	GWPP Fiscal Year 2000 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL April 2001
August	2001	Monitoring well CYN-MW5 installed 1.7 miles west of the BSG AOC.	SNL June 2005
November	2001	Comprehensive BSG Investigation Report documenting hydrogeologic characteristics of the study area prepared.	SNL November 2001
March	2002	GWPP Fiscal Year 2001 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL March 2002
March	2003	GWPP Fiscal Year 2002 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL 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 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 June 2004a
June	2004	A CME Work Plan for the BSG AOC prepared.	SNL June 2004b
January	2005	Nitrate source evaluation of deep soil in the BSG AOC performed.	SNL January 2005
February	2005	NMED required additional site characterization and the preparation of an Interim Measures Work Plan.	NMED February 2005

Refer to Notes on page 7A-6.

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.	SNL 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 August 2005
October	2005	GWPP Fiscal Year 2004 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL October 2005
December	2005	Monitoring wells CYN-MW6 and CYN-MW7 installed.	SNL October 2006
January	2006	Monitoring well CYN-MW8 installed.	SNL October 2006
March	2007	GWPP Fiscal Year 2006 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL March 2007
March	2008	GWPP Fiscal Year 2007 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL March 2008
April	2008	BSG CCM resubmitted.	SNL April 2008a
April	2008	BSG CME Work Plan resubmitted.	SNL 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 June 2009
November	2009	BSG Characterization Work Plan submitted.	SNL 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 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 January 2012
September	2010	An extension request for the BSG CME Report submitted.	SNL 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 October 2010
August	2011	Received approval of the March 2008 CME Work Plan.	NMED August 2011
September	2011	GWPP Calendar Year 2010 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL September 2011
January	2012	Summary Report for BSG Characterization Field Program submitted.	SNL January 2012
February	2012	Monitoring Well Plug and Abandonment Plan and Well Construction Plan for BSG wells and status of CYN-MW3 submitted.	SNL 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 BSG Characterization Field Program.	NMED June 2012
September	2012	GWPP Calendar Year 2011 Annual Groundwater Monitoring Report provided BSG analytical data.	SNL September 2012
December	2012	Completed field program to decommission BSG monitoring wells 12AUP01, CYN-MW1D, CYN-MW2S, and install monitoring well CYN-MW13.	SNL March 2013
August	2013	Submitted an Extension Request to the NMED for the BSG CME Report to March 31, 2013.	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 September 2013b

Refer to Notes on page 7A-6.

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.	SNL 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 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 April 2015
April	2015	Summary Report for Installation of Groundwater Monitoring Wells CYN-MW14A and CYN-MW15 submitted.	SNL 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 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.	SNL June 2016a
June	2016	Groundwater sampling analytical results for BSG wells reported in the Calendar Year 2015 SNL/NM Annual Groundwater Monitoring Report.	SNL June 2016b
June	2016	Aquifer Pumping Test Work Plan approved.	NMED June 2016
July	2016	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 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 December 2017
June	2017	Groundwater sampling analytical results for BSG wells reported in the Calendar Year 2016 SNL/NM Annual Groundwater Monitoring Report.	SNL 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.	SNL December 2017

Refer to Notes on page 7A-6.

Table 7A-1 *(Concluded)*
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 June 2018
January	2019	Monitoring Well Installation Work Plan for CYN-MW16 through CYN-MW23 submitted.	SNL 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 June 2019
September	2019	Monitoring well field program started.	SNL 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 May 2020
May	2020	Monitoring Well Installation Report for CYN-MW16 through CYN-MW19 submitted.	SNL May 2020
June	2020	Extension request for CCM/CME submitted.	SNL June 2020a
June	2020	Groundwater sampling analytical results for BSG wells reported in the Calendar Year 2019 SNL/NM Annual Groundwater Monitoring Report.	SNL 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 June 2021
November	2020	Final perchlorate sampling event at CYN-MW15 based on four consecutive non detects.	SNL 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 October 2021
June	2021	Groundwater sampling analytical results for BSG wells reported in the Calendar Year 2020 SNL/NM Annual Groundwater Monitoring Report.	SNL 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 June 2022

Notes:

AOC = Area of Concern
BSG = Burn Site Groundwater
CAC = Corrective Action Complete
CCM = Current Conceptual Model
CME = Corrective Measures Evaluation
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

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 2022

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 18-Apr-22	Methylene chloride	2.16	0.500	5.00	5.00	J	5.0UJ	117505-001	SW846-8260D
CYN-MW7 20-Apr-22	Acetone	2.25	1.74	5.00	NE	B, J	5.0U	117512-001	SW846-8260D
CYN-MW9 10-May-22	Methylene chloride	0.510	0.500	5.00	5.00	J	5.0UJ	117569-001	SW846-8260D
CYN-MW12 03-May-22	Methylene chloride	0.620	0.500	5.00	5.00	J	5.0U	117557-001	SW846-8260D
CYN-MW13 09-May-22	Methylene chloride	0.530	0.500	5.00	5.00	J	5.0UJ	117567-001	SW846-8260D
CYN-MW14A 04-May-22	Methylene chloride	0.570	0.500	5.00	5.00	J	5.0U	117561-001	SW846-8260D
CYN-MW15 05-May-22	Methylene chloride	0.530	0.500	5.00	5.00	J	5.0UJ	117565-001	SW846-8260D

Refer to Notes on page 7B-34.

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 2022

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-34.

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 2022

Analyte	MDL[b] (µg/L)
1,3,5-Trinitrobenzene	0.0768 – 0.0885
1,3-Dinitrobenzene	0.0768 – 0.0885
2,4,6-Trinitrotoluene	0.0768 – 0.0885
2,4-Dinitrotoluene	0.0768 – 0.0885
2,6-Dinitrotoluene	0.0768 – 0.0885
2-Amino-4,6-dinitrotoluene	0.0768 – 0.0885
2-Nitrotoluene	0.0787 – 0.0907
3-Nitrotoluene	0.0768 – 0.0885
4-Amino-2,6-dinitrotoluene	0.0768 – 0.0885
4-Nitrotoluene	0.144 – 0.166
HMX	0.0768 – 0.0885
Nitro-benzene	0.0768 – 0.0885
Pentaerythritol tetranitrate	0.0960 – 0.111
RDX	0.0768 – 0.0885
Tetryl	0.0768 – 0.0885

Refer to Notes on page 7B-34.

Table 7B-4
Summary of Nitrate plus Nitrite Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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 18-Apr-22	Nitrate plus nitrite	ND	0.170	0.500	10.0	U		117505-005	EPA 353.2
CYN-MW7 20-Apr-22	Nitrate plus nitrite	2.39	0.0850	0.250	10.0			117512-005	EPA 353.2
CYN-MW8 25-Apr-22	Nitrate plus nitrite	5.07	0.170	0.500	10.0			117542-005	EPA 353.2
CYN-MW8 (Duplicate) 25-Apr-22	Nitrate plus nitrite	5.10	0.170	0.500	10.0			117543-003	EPA 353.2
CYN-MW9 10-May-22	Nitrate plus nitrite	**38.1**	0.850	2.50	10.0			117569-005	EPA 353.2
CYN-MW10 27-Apr-22	Nitrate plus nitrite	**10.2**	0.170	0.500	10.0			117547-005	EPA 353.2
CYN-MW11 02-May-22	Nitrate plus nitrite	8.15	0.170	0.500	10.0			117555-005	EPA 353.2
CYN-MW12 03-May-22	Nitrate plus nitrite	**15.9**	0.425	1.25	10.0			117557-005	EPA 353.2
CYN-MW13 09-May-22	Nitrate plus nitrite	**29.5**	0.850	2.50	10.0			117567-005	EPA 353.2
CYN-MW14A 04-May-22	Nitrate plus nitrite	**11.0**	0.425	1.25	10.0			117561-005	EPA 353.2
CYN-MW14A (Duplicate) 04-May-22	Nitrate plus nitrite	**10.9**	0.425	1.25	10.0			117562-003	EPA 353.2
CYN-MW15 05-May-22	Nitrate plus nitrite	**17.6**	0.850	2.50	10.0			117565-005	EPA 353.2
CYN-MW16 28-Apr-22	Nitrate plus nitrite	7.46	0.170	0.500	10.0			117551-005	EPA 353.2
CYN-MW16 (Duplicate) 28-Apr-22	Nitrate plus nitrite	7.46	0.170	0.500	10.0			117552-003	EPA 353.2
CYN-MW17 19-Apr-22	Nitrate plus nitrite	2.21	0.0850	0.250	10.0			117509-005	EPA 353.2
CYN-MW17 (Duplicate) 19-Apr-22	Nitrate plus nitrite	2.20	0.0850	0.250	10.0			117510-003	EPA 353.2
CYN-MW18 26-Apr-22	Nitrate plus nitrite	5.75	0.0850	0.250	10.0			117545-005	EPA 353.2
CYN-MW19 21-Apr-22	Nitrate plus nitrite	3.26	0.0850	0.250	10.0			117537-005	EPA 353.2

Refer to Notes on page 7B-34.

Table 7B-4 *(Concluded)*
Summary of Nitrate plus Nitrite Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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 11-Oct-22	Nitrate plus nitrite	0.148	0.0170	0.0500	10.0			118823-003	EPA 353.2
CYN-MW4 (Duplicate) 11-Oct-22	Nitrate plus nitrite	0.146	0.0170	0.0500	10.0			118824-003	EPA 353.2
CYN-MW7 11-Oct-22	Nitrate plus nitrite	2.47	0.170	0.500	10.0		J	118826-003	EPA 353.2
CYN-MW8 12-Oct-22	Nitrate plus nitrite	5.25	0.170	0.500	10.0		J	118832-003	EPA 353.2
CYN-MW9 28-Nov-22	Nitrate plus nitrite	**37.7**	1.70	5.00	10.0			118863-003	EPA 353.2
CYN-MW10 13-Oct-22	Nitrate plus nitrite	**16.8**	0.425	1.25	10.0		J	118840-003	EPA 353.2
CYN-MW10 (Duplicate) 13-Oct-22	Nitrate plus nitrite	**16.8**	0.425	1.25	10.0		J	118841-003	EPA 353.2
CYN-MW11 17-Nov-22	Nitrate plus nitrite	8.58	0.170	0.500	10.0			118846-003	EPA 353.2
CYN-MW12 15-Nov-22	Nitrate plus nitrite	**15.8**	0.850	2.50	10.0			118853-003	EPA 353.2
CYN-MW12 (Duplicate) 15-Nov-22	Nitrate plus nitrite	**16.0**	0.850	2.50	10.0			118854-003	EPA 353.2
CYN-MW13 21-Nov-22	Nitrate plus nitrite	**27.8**	1.70	5.00	10.0			118857-003	EPA 353.2
CYN-MW14A 21-Nov-22	Nitrate plus nitrite	**11.6**	0.850	2.50	10.0			118855-003	EPA 353.2
CYN-MW15 29-Nov-22	Nitrate plus nitrite	**18.2**	1.70	5.00	10.0			118859-003	EPA 353.2
CYN-MW16 12-Oct-22	Nitrate plus nitrite	7.40	0.170	0.500	10.0		J	118850-003	EPA 353.2
CYN-MW17 15-Nov-22	Nitrate plus nitrite	2.28	0.0850	0.250	10.0			118828-003	EPA 353.2
CYN-MW18 16-Nov-22	Nitrate plus nitrite	6.45	0.425	1.25	10.0			118843-003	EPA 353.2
CYN-MW19 13-Oct-22	Nitrate plus nitrite	3.29	0.170	0.500	10.0		J	118836-003	EPA 353.2
CYN-MW19 (Duplicate) 13-Oct-22	Nitrate plus nitrite	3.29	0.170	0.500	10.0		J	118837-003	EPA 353.2

Refer to Notes on page 7B-34.

Table 7B-5
Summary of Diesel Range Organics and Gasoline Range Organics Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	ND	75.0	200	NE	U		117505-003	SW846-8015D
18-Apr-22	Gasoline Range Organics	ND	16.7	100	NE	U		117505-004	SW846-8015A/B
CYN-MW7	Diesel Range Organics	ND	75.0	200	NE	U		117512-003	SW846-8015D
20-Apr-22	Gasoline Range Organics	ND	16.7	100	NE	U		117512-004	SW846-8015A/B
CYN-MW8	Diesel Range Organics	ND	80.6	215	NE	U		117542-003	SW846-8015D
25-Apr-22	Gasoline Range Organics	ND	16.7	100	NE	U		117542-004	SW846-8015A/B
CYN-MW8 (Duplicate)	Diesel Range Organics	ND	81.7	218	NE	U		117543-001	SW846-8015D
25-Apr-22	Gasoline Range Organics	ND	16.7	100	NE	U		117543-002	SW846-8015A/B
CYN-MW9	Diesel Range Organics	ND	80.6	215	NE	U, *	215UJ	117569-003	SW846-8015D
10-May-22	Gasoline Range Organics	ND	16.7	100	NE	U		117569-004	SW846-8015A/B
CYN-MW10	Diesel Range Organics	ND	75.0	200	NE	U		117547-003	SW846-8015D
27-Apr-22	Gasoline Range Organics	ND	16.7	100	NE	U		117547-004	SW846-8015A/B
CYN-MW11	Diesel Range Organics	ND	77.2	206	NE	U		117555-003	SW846-8015D
02-May-22	Gasoline Range Organics	ND	16.7	100	NE	U	100UJ	117555-004	SW846-8015A/B
CYN-MW12	Diesel Range Organics	ND	81.2	216	NE	U		117557-003	SW846-8015D
03-May-22	Gasoline Range Organics	ND	16.7	100	NE	U		117557-004	SW846-8015A/B
CYN-MW13	Diesel Range Organics	ND	80.3	214	NE	U, *	214UJ	117567-003	SW846-8015D
09-May-22	Gasoline Range Organics	ND	16.7	100	NE	U		117567-004	SW846-8015A/B
CYN-MW14A	Diesel Range Organics	ND	75.0	200	NE	U		117561-003	SW846-8015D
04-May-22	Gasoline Range Organics	ND	16.7	100	NE	U		117561-004	SW846-8015A/B
CYN-MW14A (Duplicate)	Diesel Range Organics	ND	82.3	219	NE	U		117562-001	SW846-8015D
04-May-22	Gasoline Range Organics	ND	16.7	100	NE	U		117562-002	SW846-8015A/B
CYN-MW15	Diesel Range Organics	ND	75.0	200	NE	U, *	200UJ	117565-003	SW846-8015D
05-May-22	Gasoline Range Organics	ND	16.7	100	NE	U		117565-004	SW846-8015A/B
CYN-MW16	Diesel Range Organics	ND	82.9	221	NE	U		117551-003	SW846-8015D
28-Apr-22	Gasoline Range Organics	ND	16.7	100	NE	U		117551-004	SW846-8015A/B
CYN-MW16 (Duplicate)	Diesel Range Organics	ND	82.5	220	NE	U		117552-001	SW846-8015D
28-Apr-22	Gasoline Range Organics	ND	16.7	100	NE	U		117552-002	SW846-8015A/B
CYN-MW17	Diesel Range Organics	ND	75.0	200	NE	U		117509-003	SW846-8015D
19-Apr-22	Gasoline Range Organics	ND	16.7	100	NE	U		117509-004	SW846-8015A/B
CYN-MW17 (Duplicate)	Diesel Range Organics	ND	77.3	206	NE	U		117510-001	SW846-8015D
19-Apr-22	Gasoline Range Organics	ND	16.7	100	NE	U		117510-002	SW846-8015A/B
CYN-MW18	Diesel Range Organics	ND	75.0	200	NE	U		117545-003	SW846-8015D
26-Apr-22	Gasoline Range Organics	ND	16.7	100	NE	U		117545-004	SW846-8015A/B
CYN-MW19	Diesel Range Organics	ND	84.0	224	NE	U		117537-003	SW846-8015D
21-Apr-22	Gasoline Range Organics	ND	16.7	100	NE	U		117537-004	SW846-8015A/B

Refer to Notes on page 7B-34.

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 2022

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	ND	75.0	200	NE	U		118823-001	SW846-8015A/B
11-Oct-22	Gasoline Range Organics	ND	16.7	100	NE	U		118823-002	SW846-8015D
CYN-MW4 (Duplicate)	Diesel Range Organics	ND	84.2	225	NE	U		118824-001	SW846-8015A/B
11-Oct-22	Gasoline Range Organics	ND	16.7	100	NE	U		118824-002	SW846-8015D
CYN-MW7	Diesel Range Organics	ND	81.2	216	NE	U		118826-001	SW846-8015A/B
11-Oct-22	Gasoline Range Organics	ND	16.7	100	NE	U		118826-002	SW846-8015D
CYN-MW8	Diesel Range Organics	ND	79.7	212	NE	U		118832-001	SW846-8015A/B
12-Oct-22	Gasoline Range Organics	ND	16.7	100	NE	U		118832-002	SW846-8015D
CYN-MW9	Diesel Range Organics	ND	75.0	200	NE	U		118863-001	SW846-8015A/B
28-Nov-22	Gasoline Range Organics	ND	16.7	100	NE	U		118863-002	SW846-8015D
CYN-MW10	Diesel Range Organics	ND	84.6	226	NE	U		118840-001	SW846-8015A/B
13-Oct-22	Gasoline Range Organics	ND	16.7	100	NE	U		118840-002	SW846-8015D
CYN-MW10 (Duplicate)	Diesel Range Organics	ND	79.7	212	NE	U		118841-001	SW846-8015A/B
13-Oct-22	Gasoline Range Organics	ND	16.7	100	NE	U		118841-002	SW846-8015D
CYN-MW11	Diesel Range Organics	ND	82.4	220	NE	U, *	220UJ	118846-001	SW846-8015A/B
17-Nov-22	Gasoline Range Organics	ND	16.7	100	NE	U		118846-002	SW846-8015D
CYN-MW12	Diesel Range Organics	ND	80.6	215	NE	U, *	215UJ	118853-001	SW846-8015A/B
15-Nov-22	Gasoline Range Organics	ND	16.7	100	NE	U		118853-002	SW846-8015D
CYN-MW12 (Duplicate)	Diesel Range Organics	ND	77.5	207	NE	U, *	207UJ	118854-001	SW846-8015A/B
15-Nov-22	Gasoline Range Organics	ND	16.7	100	NE	U		118854-002	SW846-8015D
CYN-MW13	Diesel Range Organics	ND	75.0	200	NE	U, *	200UJ	118857-001	SW846-8015A/B
21-Nov-22	Gasoline Range Organics	ND	16.7	100	NE	U		118857-002	SW846-8015D
CYN-MW14A	Diesel Range Organics	ND	75.0	200	NE	U, *	200UJ	118855-001	SW846-8015A/B
21-Nov-22	Gasoline Range Organics	ND	16.7	100	NE	U		118855-002	SW846-8015D
CYN-MW15	Diesel Range Organics	ND	90.8	242	NE	U		118859-001	SW846-8015A/B
29-Nov-22	Gasoline Range Organics	ND	16.7	100	NE	U		118859-002	SW846-8015D
CYN-MW16	Diesel Range Organics	ND	80.5	215	NE	U		118850-001	SW846-8015A/B
12-Oct-22	Gasoline Range Organics	ND	16.7	100	NE	U		118850-002	SW846-8015A/B
CYN-MW17	Diesel Range Organics	ND	75.0	200	NE	U, *	200UJ	118828-001	SW846-8015D
15-Nov-22	Gasoline Range Organics	ND	16.7	100	NE	U		118828-002	SW846-8015A/B
CYN-MW18	Diesel Range Organics	91.2	78.3	209	NE	J, *	J	118843-001	SW846-8015D
16-Nov-22	Gasoline Range Organics	ND	16.7	100	NE	U		118843-002	SW846-8015A/B
CYN-MW19	Diesel Range Organics	ND	75.0	200	NE	U		118836-001	SW846-8015D
13-Oct-22	Gasoline Range Organics	ND	16.7	100	NE	U		118836-002	SW846-8015A/B
CYN-MW19 (Duplicate)	Diesel Range Organics	ND	81.0	216	NE	U		118837-001	SW846-8015D
13-Oct-22	Gasoline Range Organics	ND	16.7	100	NE	U		118837-002	SW846-8015A/B

Refer to Notes on page 7B-34.

Table 7B-6
Summary of Anion Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.385	0.0670	0.200	NE			117505-006	SW846-9056A
18-Apr-22	Chloride	24.8	0.670	2.00	NE			117505-006	SW846-9056A
	Fluoride	0.726	0.0330	0.100	4.0			117505-006	SW846-9056A
	Sulfate	144	1.33	4.00	NE			117505-006	SW846-9056A
	Total Alkalinity as CaCO3	238	1.45	4.00	NE			117505-007	SM 2320B
CYN-MW7	Bromide	0.620	0.0670	0.200	NE			117512-006	SW846-9056A
20-Apr-22	Chloride	43.4	0.670	2.00	NE			117512-006	SW846-9056A
	Fluoride	1.25	0.0330	0.100	4.0			117512-006	SW846-9056A
	Sulfate	88.7	1.33	4.00	NE			117512-006	SW846-9056A
	Total Alkalinity as CaCO3	267	1.45	4.00	NE			117512-007	SM 2320B
CYN-MW8	Bromide	0.820	0.0670	0.200	NE			117542-006	SW846-9056A
25-Apr-22	Chloride	61.2	0.670	2.00	NE			117542-006	SW846-9056A
	Fluoride	1.43	0.0330	0.100	4.0			117542-006	SW846-9056A
	Sulfate	134	1.33	4.00	NE			117542-006	SW846-9056A
	Total Alkalinity as CaCO3	249	1.45	4.00	NE			117542-007	SM 2320B
CYN-MW9	Bromide	0.725	0.0670	0.200	NE			117569-006	SW846-9056A
10-May-22	Chloride	48.3	0.670	2.00	NE			117569-006	SW846-9056A
	Fluoride	0.594	0.0330	0.100	4.0			117569-006	SW846-9056A
	Sulfate	124	1.33	4.00	NE			117569-006	SW846-9056A
	Total Alkalinity as CaCO3	275	1.45	4.00	NE			117569-007	SM 2320B
CYN-MW10	Bromide	0.695	0.0670	0.200	NE			117547-006	SW846-9056A
27-Apr-22	Chloride	46.6	1.34	4.00	NE			117547-006	SW846-9056A
	Fluoride	0.633	0.0330	0.100	4.0			117547-006	SW846-9056A
	Sulfate	159	2.66	8.00	NE			117547-006	SW846-9056A
	Total Alkalinity as CaCO3	254	1.45	4.00	NE			117547-007	SM 2320B
CYN-MW11	Bromide	1.22	0.067	0.200	NE			117555-006	SW846-9056A
02-May-22	Chloride	94.0	1.34	4.00	NE			117555-006	SW846-9056A
	Fluoride	0.742	0.033	0.100	4.0			117555-006	SW846-9056A
	Sulfate	203	2.66	8.00	NE			117555-006	SW846-9056A
	Total Alkalinity as CaCO3	229	1.45	4.00	NE			117555-007	SM 2320B
CYN-MW12	Bromide	1.26	0.067	0.200	NE			117557-006	SW846-9056A
03-May-22	Chloride	112	1.68	5.00	NE			117557-006	SW846-9056A
	Fluoride	1.02	0.033	0.100	4.0			117557-006	SW846-9056A
	Sulfate	305	3.33	10.0	NE			117557-006	SW846-9056A
	Total Alkalinity as CaCO3	232	1.45	4.00	NE			117557-007	SM 2320B

Refer to Notes on page 7B-34.

Table 7B-6 *(Concluded)*
Summary of Anion Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.370	0.067	0.200	NE			117567-006	SW846-9056A
09-May-22	Chloride	23.3	0.670	2.00	NE			117567-006	SW846-9056A
	Fluoride	1.78	0.033	0.100	4.0			117567-006	SW846-9056A
	Sulfate	87.6	1.33	4.00	NE			117567-006	SW846-9056A
	Total Alkalinity as CaCO3	171	1.45	4.00	NE			117567-007	SM 2320B
CYN-MW14A	Bromide	0.845	0.067	0.200	NE			117561-006	SW846-9056A
04-May-22	Chloride	64.6	1.34	4.00	NE			117561-006	SW846-9056A
	Fluoride	0.965	0.033	0.100	4.0			117561-006	SW846-9056A
	Sulfate	189	2.66	8.00	NE			117561-006	SW846-9056A
	Total Alkalinity as CaCO3	241	1.45	4.00	NE			117561-007	SM 2320B
CYN-MW15	Bromide	1.16	0.067	0.200	NE			117565-006	SW846-9056A
05-May-22	Chloride	105	1.34	4.00	NE			117565-006	SW846-9056A
	Fluoride	0.720	0.033	0.100	4.0			117565-006	SW846-9056A
	Sulfate	200	2.66	8.00	NE			117565-006	SW846-9056A
	Total Alkalinity as CaCO3	249	1.45	4.00	NE			117565-007	SM 2320B
CYN-MW16	Bromide	0.644	0.067	0.200	NE			117551-006	SW846-9056A
28-Apr-22	Chloride	45.2	0.670	2.00	NE			117551-006	SW846-9056A
	Fluoride	1.54	0.033	0.100	4.0			117551-006	SW846-9056A
	Sulfate	121	1.33	4.00	NE			117551-006	SW846-9056A
	Total Alkalinity as CaCO3	214	1.45	4.00	NE			117551-007	SM 2320B
CYN-MW17	Bromide	0.620	0.067	0.200	NE			117509-006	SW846-9056A
19-Apr-22	Chloride	33.2	0.670	2.00	NE			117509-006	SW846-9056A
	Fluoride	1.78	0.033	0.100	4.0			117509-006	SW846-9056A
	Sulfate	78.5	1.33	4.00	NE			117509-006	SW846-9056A
	Total Alkalinity as CaCO3	181	1.45	4.00	NE			117509-007	SM 2320B
CYN-MW18	Bromide	0.655	0.067	0.200	NE			117545-006	SW846-9056A
26-Apr-22	Chloride	43.8	1.34	4.00	NE			117545-006	SW846-9056A
	Fluoride	2.33	0.033	0.100	4.0			117545-006	SW846-9056A
	Sulfate	205	2.66	8.00	NE			117545-006	SW846-9056A
	Total Alkalinity as CaCO3	196	1.45	4.00	NE			117545-007	SM 2320B
CYN-MW19	Bromide	0.531	0.067	0.200	NE			117537-006	SW846-9056A
21-Apr-22	Chloride	33.2	0.670	2.00	NE			117537-006	SW846-9056A
	Fluoride	0.593	0.033	0.100	4.0			117537-006	SW846-9056A
	Sulfate	135	1.33	4.00	NE			117537-006	SW846-9056A
	Total Alkalinity as CaCO3	252	1.45	4.00	NE			117537-007	SM 2320B

Refer to Notes on page 7B-34.

Table 7B-7
Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		117505-008	SW846-6020B
18-Apr-22	Antimony	ND	0.001	0.003	0.006	U		117505-008	SW846-6020B
	Arsenic	0.00289	0.002	0.005	0.010	J		117505-008	SW846-6020B
	Barium	0.0418	0.00067	0.004	2.00			117505-008	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		117505-008	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		117505-008	SW846-6020B
	Calcium	75.2	0.400	1.00	NE			117505-008	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		117505-008	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		117505-008	SW846-6020B
	Copper	0.000582	0.0003	0.002	1.3	J		117505-008	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		117505-008	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		117505-008	SW846-6020B
	Magnesium	37.5	0.010	0.030	NE			117505-008	SW846-6020B
	Manganese	0.00349	0.001	0.005	NE	J		117505-008	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		117505-008	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		117505-008	SW846-6020B
	Potassium	6.83	0.080	0.300	NE			117505-008	SW846-6020B
	Selenium	0.0146	0.0015	0.005	0.050			117505-008	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		117505-008	SW846-6020B
	Sodium	44.8	0.080	0.250	NE			117505-008	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		117505-008	SW846-6020B
	Vanadium	0.00411	0.0033	0.020	NE	J		117505-008	SW846-6020B
	Zinc	0.00729	0.0033	0.020	NE	J		117505-008	SW846-6020B

Refer to Notes on page 7B-34.

Table 7B-7 *(Continued)*
Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		117512-008	SW846-6020B
20-Apr-20	Antimony	ND	0.001	0.003	0.006	U		117512-008	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	U		117512-008	SW846-6020B
	Barium	0.114	0.00067	0.004	2.00			117512-008	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		117512-008	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		117512-008	SW846-6020B
	Calcium	105	1.60	4.00	NE			117512-008	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		117512-008	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		117512-008	SW846-6020B
	Copper	0.000392	0.0003	0.002	1.3	J	J+	117512-008	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		117512-008	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		117512-008	SW846-6020B
	Magnesium	21.0	0.010	0.030	NE			117512-008	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		117512-008	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		117512-008	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		117512-008	SW846-6020B
	Potassium	2.54	0.080	0.300	NE			117512-008	SW846-6020B
	Selenium	0.00485	0.0015	0.005	0.050	J		117512-008	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		117512-008	SW846-6020B
	Sodium	39.8	0.080	0.250	NE			117512-008	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		117512-008	SW846-6020B
	Vanadium	0.00493	0.0033	0.020	NE	J		117512-008	SW846-6020B
	Zinc	0.00453	0.0033	0.020	NE	J		117512-008	SW846-6020B

Refer to Notes on page 7B-34.

Table 7B-7 *(Continued)*
Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.0468	0.0193	0.050	NE	J		117542-008	SW846-6020B
25-Apr-22	Antimony	0.00182	0.001	0.003	0.006	J		117542-008	SW846-6020B
	Arsenic	0.00277	0.002	0.005	0.010	J		117542-008	SW846-6020B
	Barium	0.0569	0.00067	0.004	2.00			117542-008	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		117542-008	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		117542-008	SW846-6020B
	Calcium	121	0.400	1.00	NE			117542-008	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		117542-008	SW846-6020B
	Cobalt	0.000481	0.0003	0.001	NE	J		117542-008	SW846-6020B
	Copper	0.000972	0.0003	0.002	1.3	J	0.002UJ	117542-008	SW846-6020B
	Iron	0.0623	0.033	0.100	NE	J		117542-008	SW846-6020B
	Lead	0.000731	0.0005	0.002	0.015	J		117542-008	SW846-6020B
	Magnesium	26.4	0.010	0.030	NE			117542-008	SW846-6020B
	Manganese	0.00456	0.001	0.005	NE	J		117542-008	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		117542-008	SW846-7470A
	Nickel	0.000817	0.0006	0.002	NE	J		117542-008	SW846-6020B
	Potassium	2.46	0.080	0.300	NE			117542-008	SW846-6020B
	Selenium	0.00645	0.0015	0.005	0.050			117542-008	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		117542-008	SW846-6020B
	Sodium	48.4	0.080	0.250	NE			117542-008	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		117542-008	SW846-6020B
	Vanadium	0.00595	0.0033	0.020	NE	J		117542-008	SW846-6020B
	Zinc	0.00672	0.0033	0.020	NE	J		117542-008	SW846-6020B

Refer to Notes on page 7B-34.

Table 7B-7 *(Continued)*
Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.0239	0.0193	0.050	NE	J		117569-008	SW846-6020B
10-May-22	Antimony	ND	0.001	0.003	0.006	U		117569-008	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	U		117569-008	SW846-6020B
	Barium	0.0621	0.00067	0.004	2.00			117569-008	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		117569-008	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		117569-008	SW846-6020B
	Calcium	143	1.60	4.00	NE			117569-008	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		117569-008	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		117569-008	SW846-6020B
	Copper	0.000402	0.0003	0.002	1.3	J	J+	117569-008	SW846-6020B
	Iron	0.0473	0.033	0.100	NE	J		117569-008	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		117569-008	SW846-6020B
	Magnesium	42.3	0.010	0.030	NE			117569-008	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		117569-008	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		117569-008	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		117569-008	SW846-6020B
	Potassium	2.45	0.080	0.300	NE			117569-008	SW846-6020B
	Selenium	0.00532	0.0015	0.005	0.050			117569-008	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		117569-008	SW846-6020B
	Sodium	35.1	0.080	0.250	NE			117569-008	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		117569-008	SW846-6020B
	Vanadium	0.00375	0.0033	0.020	NE	B, J	0.02U	117569-008	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		117569-008	SW846-6020B

Refer to Notes on page 7B-34.

Table 7B-7 *(Continued)*
Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		117547-008	SW846-6020B
27-Apr-22	Antimony	ND	0.001	0.003	0.006	U		117547-008	SW846-6020B
	Arsenic	0.00321	0.002	0.005	0.010	J		117547-008	SW846-6020B
	Barium	0.0602	0.00067	0.004	2.00			117547-008	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		117547-008	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		117547-008	SW846-6020B
	Calcium	126	0.400	1.00	NE			117547-008	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		117547-008	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		117547-008	SW846-6020B
	Copper	ND	0.0003	0.002	1.3	U		117547-008	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		117547-008	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		117547-008	SW846-6020B
	Magnesium	34.6	0.010	0.030	NE			117547-008	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U	0.005UJ	117547-008	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		117547-008	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		117547-008	SW846-6020B
	Potassium	2.00	0.080	0.300	NE			117547-008	SW846-6020B
	Selenium	0.00672	0.0015	0.005	0.050			117547-008	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		117547-008	SW846-6020B
	Sodium	40.1	0.080	0.250	NE			117547-008	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		117547-008	SW846-6020B
	Vanadium	0.00630	0.0033	0.020	NE	J		117547-008	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		117547-008	SW846-6020B

Refer to Notes on page 7B-34.

Table 7B-7 *(Continued)*
Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		117555-008	SW846-6020B
02-May-22	Antimony	0.00114	0.001	0.003	0.006	J		117555-008	SW846-6020B
	Arsenic	0.00304	0.002	0.005	0.010	J		117555-008	SW846-6020B
	Barium	0.0758	0.00067	0.004	2.00			117555-008	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		117555-008	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		117555-008	SW846-6020B
	Calcium	141	0.400	1.00	NE			117555-008	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		117555-008	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		117555-008	SW846-6020B
	Copper	0.000336	0.0003	0.002	1.3	J	J+	117555-008	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		117555-008	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		117555-008	SW846-6020B
	Magnesium	47.4	0.010	0.030	NE			117555-008	SW846-6020B
	Manganese	0.00145	0.001	0.005	NE	J		117555-008	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		117555-008	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		117555-008	SW846-6020B
	Potassium	3.53	0.080	0.300	NE			117555-008	SW846-6020B
	Selenium	0.00588	0.0015	0.005	0.050			117555-008	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		117555-008	SW846-6020B
	Sodium	43.2	0.080	0.250	NE			117555-008	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		117555-008	SW846-6020B
	Vanadium	ND	0.0033	0.020	NE	U		117555-008	SW846-6020B
	Zinc	0.00889	0.0033	0.020	NE	B, J	0.02U	117555-008	SW846-6020B

Refer to Notes on page 7B-34.

Table 7B-7 *(Continued)*
Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		117557-008	SW846-6020B
03-May-22	Antimony	ND	0.001	0.003	0.006	U		117557-008	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	U		117557-008	SW846-6020B
	Barium	0.0419	0.00067	0.004	2.00			117557-008	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		117557-008	SW846-6020B
	Cadmium	0.000395	0.0003	0.001	0.005	J		117557-008	SW846-6020B
	Calcium	196	1.60	4.00	NE			117557-008	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		117557-008	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		117557-008	SW846-6020B
	Copper	0.000541	0.0003	0.002	1.3	J	J+	117557-008	SW846-6020B
	Iron	0.0409	0.033	0.100	NE	J		117557-008	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		117557-008	SW846-6020B
	Magnesium	48.6	0.010	0.030	NE			117557-008	SW846-6020B
	Manganese	0.00378	0.001	0.005	NE	J	J+	117557-008	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		117557-008	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		117557-008	SW846-6020B
	Potassium	2.68	0.080	0.300	NE			117557-008	SW846-6020B
	Selenium	0.0132	0.0015	0.005	0.050			117557-008	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		117557-008	SW846-6020B
	Sodium	42.7	0.080	0.250	NE			117557-008	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		117557-008	SW846-6020B
	Vanadium	0.00367	0.0033	0.020	NE	B, J	0.02U	117557-008	SW846-6020B
	Zinc	0.0156	0.0033	0.020	NE	J		117557-008	SW846-6020B

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Table 7B-7 *(Continued)*
Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		117567-008	SW846-6020B
09-May-22	Antimony	0.00159	0.001	0.003	0.006	J		117567-008	SW846-6020B
	Arsenic	0.00319	0.002	0.005	0.010	J		117567-008	SW846-6020B
	Barium	0.0927	0.00067	0.004	2.00		J	117567-008	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		117567-008	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		117567-008	SW846-6020B
	Calcium	107	0.400	1.00	NE			117567-008	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		117567-008	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		117567-008	SW846-6020B
	Copper	ND	0.0003	0.002	1.3	U		117567-008	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		117567-008	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		117567-008	SW846-6020B
	Magnesium	23.1	0.010	0.030	NE		J	117567-008	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U	0.005UJ	117567-008	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		117567-008	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		117567-008	SW846-6020B
	Potassium	2.01	0.080	0.300	NE			117567-008	SW846-6020B
	Selenium	0.00357	0.0015	0.005	0.050	J		117567-008	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		117567-008	SW846-6020B
	Sodium	28.3	0.080	0.250	NE		J	117567-008	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		117567-008	SW846-6020B
	Vanadium	0.00476	0.0033	0.020	NE	J		117567-008	SW846-6020B
	Zinc	0.00521	0.0033	0.020	NE	J		117567-008	SW846-6020B

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Table 7B-7 *(Continued)*
Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		117561-008	SW846-6020B
04-May-22	Antimony	0.00108	0.001	0.003	0.006	J		117561-008	SW846-6020B
	Arsenic	0.00229	0.002	0.005	0.010	J		117561-008	SW846-6020B
	Barium	0.0425	0.00067	0.004	2.00			117561-008	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		117561-008	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		117561-008	SW846-6020B
	Calcium	136	1.60	4.00	NE			117561-008	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		117561-008	SW846-6020B
	Cobalt	0.000313	0.0003	0.001	NE	J		117561-008	SW846-6020B
	Copper	0.000501	0.0003	0.002	1.3	J	0.002UJ	117561-008	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		117561-008	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		117561-008	SW846-6020B
	Magnesium	32.6	0.010	0.030	NE			117561-008	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		117561-008	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		117561-008	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		117561-008	SW846-6020B
	Potassium	2.10	0.080	0.300	NE			117561-008	SW846-6020B
	Selenium	0.00992	0.0015	0.005	0.050			117561-008	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		117561-008	SW846-6020B
	Sodium	36.2	0.080	0.250	NE			117561-008	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		117561-008	SW846-6020B
	Vanadium	0.00426	0.0033	0.020	NE	B, J	0.02U	117561-008	SW846-6020B
	Zinc	0.00417	0.0033	0.020	NE	J		117561-008	SW846-6020B

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Table 7B-7 *(Continued)*
Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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-MW15	Aluminum	ND	0.0193	0.050	NE	U		117565-008	SW846-6020B
05-May-22	Antimony	ND	0.001	0.003	0.006	U		117565-008	SW846-6020B
	Arsenic	0.00272	0.002	0.005	0.010	J		117565-008	SW846-6020B
	Barium	0.0581	0.00067	0.004	2.00			117565-008	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		117565-008	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		117565-008	SW846-6020B
	Calcium	162	0.400	1.00	NE			117565-008	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		117565-008	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		117565-008	SW846-6020B
	Copper	0.00117	0.0003	0.002	1.3	J	J+	117565-008	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		117565-008	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		117565-008	SW846-6020B
	Magnesium	45.8	0.010	0.030	NE			117565-008	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		117565-008	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		117565-008	SW846-7470A
	Nickel	ND	0.0006	0.002	NE	U		117565-008	SW846-6020B
	Potassium	2.66	0.080	0.300	NE			117565-008	SW846-6020B
	Selenium	0.00905	0.0015	0.005	0.050			117565-008	SW846-6020B
	Silver	ND	0.0003	0.001	NE	U		117565-008	SW846-6020B
	Sodium	44.0	0.080	0.250	NE			117565-008	SW846-6020B
	Thallium	ND	0.0006	0.002	0.002	U		117565-008	SW846-6020B
	Vanadium	ND	0.0033	0.020	NE	U		117565-008	SW846-6020B
	Zinc	ND	0.0033	0.020	NE	U		117565-008	SW846-6020B

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Table 7B-7 *(Continued)*
Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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 28-Apr-22	Aluminum	ND	0.0193	0.050	NE	U		117551-008	SW846-6020B
	Antimony	ND	0.001	0.003	0.006	U		117551-008	SW846-6020B
	Arsenic	0.00286	0.002	0.005	0.010	J		117551-008	SW846-6020B
	Barium	0.0731	0.00067	0.004	2.00			117551-008	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		117551-008	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		117551-008	SW846-6020B
	Calcium	106	0.400	1.00	NE			117551-008	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		117551-008	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		117551-008	SW846-6020B
	Copper	ND	0.0003	0.002	1.3	U		117551-008	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		117551-008	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		117551-008	SW846-6020B
	Magnesium	19.8	0.010	0.030	NE			117551-008	SW846-6020B
	Manganese	0.00722	0.001	0.005	NE		J-	117551-008	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		117551-008	SW846-7470A
	Molybdenum	0.00120	0.0006	0.002	NE	J		117551-008	SW846-6020B
	Nickel	2.56	0.080	0.300	NE			117551-008	SW846-6020B
	Potassium	0.00667	0.0015	0.005	0.050			117551-008	SW846-6020B
	Selenium	ND	0.0003	0.001	NE	U		117551-008	SW846-6020B
	Silver	35.6	0.080	0.250	NE			117551-008	SW846-6020B
	Sodium	ND	0.0006	0.002	0.002	U		117551-008	SW846-6020B
	Thallium	0.00686	0.0033	0.020	NE	J		117551-008	SW846-6020B
	Vanadium	ND	0.0033	0.020	NE	U		117551-008	SW846-6020B
	Zinc	ND	0.0193	0.050	NE	U		117551-008	SW846-6020B

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Table 7B-7 *(Continued)*
Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		117509-008	SW846-6020B
19-Apr-22	Antimony	ND	0.001	0.003	0.006	U		117509-008	SW846-6020B
	Arsenic	0.00278	0.002	0.005	0.010	J		117509-008	SW846-6020B
	Barium	0.0789	0.00067	0.004	2.00			117509-008	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		117509-008	SW846-6020B
	Cadmium	0.000352	0.0003	0.001	0.005	J		117509-008	SW846-6020B
	Calcium	77.0	0.400	1.00	NE			117509-008	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		117509-008	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		117509-008	SW846-6020B
	Copper	ND	0.0003	0.002	1.3	U		117509-008	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		117509-008	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		117509-008	SW846-6020B
	Magnesium	16.4	0.010	0.030	NE			117509-008	SW846-6020B
	Manganese	0.00737	0.001	0.005	NE			117509-008	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		117509-008	SW846-7470A
	Molybdenum	ND	0.0006	0.002	NE	U		117509-008	SW846-6020B
	Nickel	1.92	0.080	0.300	NE			117509-008	SW846-6020B
	Potassium	0.00461	0.0015	0.005	0.050	J		117509-008	SW846-6020B
	Selenium	ND	0.0003	0.001	NE	U		117509-008	SW846-6020B
	Silver	33.0	0.080	0.250	NE			117509-008	SW846-6020B
	Sodium	ND	0.0006	0.002	0.002	U		117509-008	SW846-6020B
	Thallium	0.00586	0.0033	0.020	NE	J		117509-008	SW846-6020B
	Vanadium	ND	0.0033	0.020	NE	U		117509-008	SW846-6020B
	Zinc	ND	0.0193	0.050	NE	U		117509-008	SW846-6020B

Refer to Notes on page 7B-34.

Table 7B-7 *(Continued)*
Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		117545-008	SW846-6020B
26-Apr-22	Antimony	ND	0.001	0.003	0.006	U		117545-008	SW846-6020B
	Arsenic	0.00282	0.002	0.005	0.010	J		117545-008	SW846-6020B
	Barium	0.0371	0.00067	0.004	2.00			117545-008	SW846-6020B
	Beryllium	0.00285	0.0002	0.0005	0.004			117545-008	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		117545-008	SW846-6020B
	Calcium	118	0.400	1.00	NE			117545-008	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		117545-008	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		117545-008	SW846-6020B
	Copper	0.000324	0.0003	0.002	1.3	J	J+	117545-008	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		117545-008	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		117545-008	SW846-6020B
	Magnesium	29.4	0.010	0.030	NE			117545-008	SW846-6020B
	Manganese	0.0645	0.001	0.005	NE			117545-008	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		117545-008	SW846-7470A
	Molybdenum	0.000640	0.0006	0.002	NE	J		117545-008	SW846-6020B
	Nickel	1.97	0.080	0.300	NE			117545-008	SW846-6020B
	Potassium	0.00554	0.0015	0.005	0.050			117545-008	SW846-6020B
	Selenium	ND	0.0003	0.001	NE	U		117545-008	SW846-6020B
	Silver	35.4	0.080	0.250	NE			117545-008	SW846-6020B
	Sodium	ND	0.0006	0.002	0.002	U		117545-008	SW846-6020B
	Thallium	0.00416	0.0033	0.020	NE	J		117545-008	SW846-6020B
	Vanadium	ND	0.0033	0.020	NE	U		117545-008	SW846-6020B
	Zinc	ND	0.0193	0.050	NE	U		117545-008	SW846-6020B

Refer to Notes on page 7B-34.

Table 7B-7 *(Concluded)*
Summary of Total Metal Results, Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	0.050	NE	U		117537-008	SW846-6020B
21-Apr-22	Antimony	ND	0.001	0.003	0.006	U		117537-008	SW846-6020B
	Arsenic	ND	0.002	0.005	0.010	U		117537-008	SW846-6020B
	Barium	0.0630	0.00067	0.004	2.00			117537-008	SW846-6020B
	Beryllium	ND	0.0002	0.0005	0.004	U		117537-008	SW846-6020B
	Cadmium	ND	0.0003	0.001	0.005	U		117537-008	SW846-6020B
	Calcium	106	1.60	4.00	NE			117537-008	SW846-6020B
	Chromium	ND	0.003	0.010	0.100	U		117537-008	SW846-6020B
	Cobalt	ND	0.0003	0.001	NE	U		117537-008	SW846-6020B
	Copper	0.000480	0.0003	0.002	1.3	J	J+	117537-008	SW846-6020B
	Iron	ND	0.033	0.100	NE	U		117537-008	SW846-6020B
	Lead	ND	0.0005	0.002	0.015	U		117537-008	SW846-6020B
	Magnesium	31.1	0.010	0.030	NE			117537-008	SW846-6020B
	Manganese	ND	0.001	0.005	NE	U		117537-008	SW846-6020B
	Mercury	ND	0.000067	0.0002	0.002	U		117537-008	SW846-7470A
	Molybdenum	ND	0.0006	0.002	NE	U		117537-008	SW846-6020B
	Nickel	1.96	0.080	0.300	NE			117537-008	SW846-6020B
	Potassium	0.00720	0.0015	0.005	0.050			117537-008	SW846-6020B
	Selenium	ND	0.0003	0.001	NE	U		117537-008	SW846-6020B
	Silver	24.1	0.080	0.250	NE			117537-008	SW846-6020B
	Sodium	ND	0.0006	0.002	0.002	U		117537-008	SW846-6020B
	Thallium	0.00447	0.0033	0.020	NE	J		117537-008	SW846-6020B
	Vanadium	ND	0.0033	0.020	NE	U		117537-008	SW846-6020B
	Zinc	ND	0.0193	0.050	NE	U		117537-008	SW846-6020B

Refer to Notes on page 7B-34.

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 2022

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	Americium-241	-3.18 ± 6.86	9.83	4.79	NE	U	BD	117505-009	EPA 901.1
18-Apr-22	Cesium-137	-1.83 ± 2.09	3.21	1.53	NE	U	BD	117505-009	EPA 901.1
	Cobalt-60	0.159 ± 1.97	3.62	1.69	NE	U	BD	117505-009	EPA 901.1
	Potassium-40	4.20 ± 44.4	33.1	15.4	NE	U	BD	117505-009	EPA 901.1
	Gross Alpha	8.35	NA	NA	15 pCi/L	NA	None	117505-010	EPA 900.0
	Gross Beta	8.20 ± 0.902	1.02	0.492	4 mrem/yr			117505-010	EPA 900.0
	Uranium-233/234	33.5 ± 3.30	0.0666	0.0286	NE			117505-011	HASL-300
	Uranium-235/236	0.272 ± 0.0753	0.0484	0.0184	NE			117505-011	HASL-300
	Uranium-238	4.18 ± 0.467	0.0617	0.0262	NE			117505-011	HASL-300
	Tritium	10.6 ± 90.4	164	74.9	4 mrem/yr	U	BD	117505-012	EPA 906.0M
CYN-MW7	Americium-241	2.06 ± 7.47	12.6	6.13	NE	U	BD	117512-009	EPA 901.1
20-Apr-22	Cesium-137	-0.0125 ± 2.23	3.36	1.60	NE	U	BD	117512-009	EPA 901.1
	Cobalt-60	0.741 ± 2.07	3.75	1.75	NE	U	BD	117512-009	EPA 901.1
	Potassium-40	23.1 ± 36.0	47.3	22.4	NE	U	BD	117512-009	EPA 901.1
	Gross Alpha	-4.72	NA	NA	15 pCi/L	NA	None	117512-010	EPA 900.0
	Gross Beta	5.86 ± 0.911	1.20	0.582	4 mrem/yr			117512-010	EPA 900.0
	Uranium-233/234	18.0 ± 1.68	0.0481	0.0207	NE			117512-011	HASL-300
	Uranium-235/236	0.242 ± 0.0602	0.0349	0.0133	NE			117512-011	HASL-300
	Uranium-238	2.18 ± 0.244	0.0445	0.0189	NE			117512-011	HASL-300
	Tritium	6.50 ± 90.5	165	75.3	4 mrem/yr	U	BD	117512-012	EPA 906.0M
CYN-MW8	Americium-241	2.69 ± 12.7	22.8	11.2	NE	U	BD	117542-009	EPA 901.1
25-Apr-22	Cesium-137	1.66 ± 4.32	7.08	3.37	NE	U	BD	117542-009	EPA 901.1
	Cobalt-60	1.44 ± 4.64	8.16	3.82	NE	U	BD	117542-009	EPA 901.1
	Potassium-40	40.6 ± 108	78.7	36.7	NE	U	BD	117542-009	EPA 901.1
	Gross Alpha	3.73	NA	NA	15 pCi/L	NA	None	117542-010	EPA 900.0
	Gross Beta	5.72 ± 1.27	1.84	0.889	4 mrem/yr	*	J	117542-010	EPA 900.0
	Uranium-233/234	23.7 ± 2.19	0.0452	0.0194	NE			117542-011	HASL-300
	Uranium-235/236	0.329 ± 0.0691	0.0328	0.0125	NE			117542-011	HASL-300
	Uranium-238	2.64 ± 0.284	0.0419	0.0178	NE			117542-011	HASL-300
	Tritium	-0.478 ± 89.8	165	75.4	4 mrem/yr	U	BD	117542-012	EPA 906.0M

Refer to Notes on page 7B-34.

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 2022

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	0.918 ± 7.17	10.8	5.26	NE	U	BD	117569-009	EPA 901.1
10-May-22	Cesium-137	-3.04 ± 3.83	3.51	1.68	NE	U	BD	117569-009	EPA 901.1
	Cobalt-60	0.473 ± 1.89	3.50	1.63	NE	U	BD	117569-009	EPA 901.1
	Potassium-40	26.2 ± 52.6	34.3	15.9	NE	U	BD	117569-009	EPA 901.1
	Gross Alpha	5.22	NA	NA	15 pCi/L	NA	None	117569-010	EPA 900.0
	Gross Beta	5.96 ± 1.36	1.92	0.918	4 mrem/yr			117569-010	EPA 900.0
	Uranium-233/234	9.22 ± 0.929	0.0618	0.0269	NE			117569-011	HASL-300
	Uranium-235/236	0.176 ± 0.0544	0.0505	0.0203	NE			117569-011	HASL-300
	Uranium-238	2.28 ± 0.269	0.0508	0.0214	NE			117569-011	HASL-300
	Tritium	44.8 ± 79.8	138	62.6	4 mrem/yr	U	BD	117569-012	EPA 906.0M
CYN-MW10	Americium-241	-0.189 ± 7.90	12.8	6.17	NE	U	BD	117547-009	EPA 901.1
27-Apr-22	Cesium-137	0.820 ± 1.86	3.03	1.42	NE	U	BD	117547-009	EPA 901.1
	Cobalt-60	1.41 ± 2.02	3.79	1.74	NE	U	BD	117547-009	EPA 901.1
	Potassium-40	15.3 ± 53.9	29.4	13.2	NE	U	BD	117547-009	EPA 901.1
	Gross Alpha	2.69	NA	NA	15 pCi/L	NA	None	117547-010	EPA 900.0
	Gross Beta	-8.85 ± 1.41	2.79	1.36	4 mrem/yr	U, *	R	117547-010	EPA 900.0
	Uranium-233/234	5.76 ± 0.580	0.0503	0.0216	NE			117547-011	HASL-300
	Uranium-235/236	0.109 ± 0.0390	0.0366	0.0139	NE		J	117547-011	HASL-300
	Uranium-238	1.94 ± 0.226	0.0466	0.0198	NE			117547-011	HASL-300
	Tritium	8.53 ± 91.8	167	76.3	4 mrem/yr	U	BD	117547-012	EPA 906.0M
CYN-MW11	Americium-241	3.81 ± 9.08	15.4	7.43	NE	U	BD	117555-009	EPA 901.1
02-May-22	Cesium-137	-2.54 ± 2.74	3.24	1.54	NE	U	BD	117555-009	EPA 901.1
	Cobalt-60	-0.325 ± 1.80	3.14	1.44	NE	U	BD	117555-009	EPA 901.1
	Potassium-40	6.23 ± 41.2	30.2	13.7	NE	U	BD	117555-009	EPA 901.1
	Gross Alpha	-1.76	NA	NA	15 pCi/L	NA	None	117555-010	EPA 900.0
	Gross Beta	2.24 ± 1.20	1.94	0.941	4 mrem/yr	*	J	117555-010	EPA 900.0
	Uranium-233/234	5.36 ± 0.550	0.0524	0.0225	NE			117555-011	HASL-300
	Uranium-235/236	0.164 ± 0.0508	0.0388	0.0145	NE			117555-011	HASL-300
	Uranium-238	1.65 ± 0.201	0.0485	0.0206	NE			117555-011	HASL-300
	Tritium	-6.68 ± 91.3	169	77.2	4 mrem/yr	U	BD	117555-012	EPA 906.0M

Refer to Notes on page 7B-34.

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 2022

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	2.50 ± 4.95	7.48	3.66	NE	U	BD	117557-009	EPA 901.1
03-May-22	Cesium-137	1.07 ± 6.42	4.58	2.17	NE	U	BD	117557-009	EPA 901.1
	Cobalt-60	-1.58 ± 3.44	5.78	2.69	NE	U	BD	117557-009	EPA 901.1
	Potassium-40	5.44 ± 73.6	54.4	25.1	NE	U	BD	117557-009	EPA 901.1
	Gross Alpha	-3.15	NA	NA	15 pCi/L	NA	None	117557-010	EPA 900.0
	Gross Beta	5.63 ± 1.71	2.61	1.26	4 mrem/yr	*	J	117557-010	EPA 900.0
	Uranium-233/234	13.2 ± 1.30	0.0576	0.0248	NE			117557-011	HASL-300
	Uranium-235/236	0.220 ± 0.0603	0.0418	0.0159	NE			117557-011	HASL-300
	Uranium-238	2.83 ± 0.320	0.0533	0.0226	NE			117557-011	HASL-300
	Tritium	-22.8 ± 88.7	168	76.4	4 mrem/yr	U	BD	117557-012	EPA 906.0M
CYN-MW13	Americium-241	-0.465 ± 6.02	7.70	3.75	NE	U	BD	117567-009	EPA 901.1
09-May-22	Cesium-137	1.19 ± 1,90	3.09	1.46	NE	U	BD	117567-009	EPA 901.1
	Cobalt-60	0.214 ± 1.72	3.26	1.50	NE	U	BD	117567-009	EPA 901.1
	Potassium-40	15.8 ± 40.8	29.6	13.5	NE	U	BD	117567-009	EPA 901.1
	Gross Alpha	0.65	NA	NA	15 pCi/L	NA	None	117567-010	EPA 900.0
	Gross Beta	4.62 ± 1.26	1.91	0.928	4 mrem/yr		J	117567-010	EPA 900.0
	Uranium-233/234	10.1 ± 0.994	0.0583	0.0254	NE			117567-011	HASL-300
	Uranium-235/236	0.124 ± 0.0464	0.0477	0.0192	NE		J	117567-011	HASL-300
	Uranium-238	1.63 ± 0.202	0.0479	0.0202	NE			117567-011	HASL-300
	Tritium	38.2 ± 76.4	133	60.4	4 mrem/yr	U	BD	117567-012	EPA 906.0M
CYN-MW14A	Americium-241	1.07 ± 18.7	31.3	15.3	NE	U	BD	117561-009	EPA 901.1
04-May-22	Cesium-137	2.73 ± 5.60	4.35	2.10	NE	U	BD	117561-009	EPA 901.1
	Cobalt-60	0.0463 ± 3.07	5.37	2.56	NE	U	BD	117561-009	EPA 901.1
	Potassium-40	-19.0 ± 53.4	63.5	30.4	NE	U	BD	117561-009	EPA 901.1
	Gross Alpha	-2.33	NA	NA	15 pCi/L	NA	None	117561-010	EPA 900.0
	Gross Beta	3.90 ± 1.24	1.83	0.879	4 mrem/yr	*	J	117561-010	EPA 900.0
	Uranium-233/234	12.0 ± 1.16	0.0527	0.0227	NE			117561-011	HASL-300
	Uranium-235/236	0.185 ± 0.0534	0.0383	0.0146	NE			117561-011	HASL-300
	Uranium-238	2.54 ± 0.287	0.0488	0.0207	NE			117561-011	HASL-300
	Tritium	22.0 ± 93.4	168	76.4	4 mrem/yr	U	BD	117561-012	EPA 906.0M

Refer to Notes on page 7B-34.

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 2022

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-MW15	Americium-241	5.66 ± 15.2	27.1	13.1	NE	U	BD	117565-009	EPA 901.1
05-May-22	Cesium-137	-0.262 ± 1.90	3.25	1.53	NE	U	BD	117565-009	EPA 901.1
	Cobalt-60	0.874 ± 2.02	3.72	1.72	NE	U	BD	117565-009	EPA 901.1
	Potassium-40	5.65 ± 51.7	35.3	16.2	NE	U	BD	117565-009	EPA 901.1
	Gross Alpha	0.26	NA	NA	15 pCi/L	NA	None	117565-010	EPA 900.0
	Gross Beta	1.93 ± 2.19	3.64	1.77	4 mrem/yr	U, *	BD	117565-010	EPA 900.0
	Uranium-233/234	12.8 ± 1.27	0.0598	0.0257	NE			117565-011	HASL-300
	Uranium-235/236	0.137 ± 0.0490	0.0434	0.0166	NE			117565-011	HASL-300
	Uranium-238	2.80 ± 0.321	0.0554	0.0235	NE			117565-011	HASL-300
	Tritium	-26.1 ± 90.8	172	78.5	4 mrem/yr	U	BD	117565-012	EPA 906.0M
CYN-MW16	Americium-241	23.8 ± 21.8	31.6	15.4	NE	U	BD	117551-009	EPA 901.1
28-Apr-22	Cesium-137	2.94 ± 2.88	3.33	1.59	NE	U	BD	117551-009	EPA 901.1
	Cobalt-60	-5.22 ± 4.83	4.22	1.99	NE	U	BD	117551-009	EPA 901.1
	Potassium-40	-21.1 ± 54.0	60.2	28.9	NE	U	BD	117551-009	EPA 901.1
	Gross Alpha	0.90	NA	NA	15 pCi/L	NA	None	117551-010	EPA 900.0
	Gross Beta	-6.13 ± 1.60	2.98	1.46	4 mrem/yr	U, *	R	117551-010	EPA 900.0
	Uranium-233/234	8.96 ± 0.847	0.0448	0.0193	NE			117551-011	HASL-300
	Uranium-235/236	0.146 ± 0.0442	0.0325	0.0124	NE			117551-011	HASL-300
	Uranium-238	1.69 ± 0.195	0.0415	0.0176	NE			117551-011	HASL-300
	Tritium	-38.6 ± 86.1	166	75.7	4 mrem/yr	U	BD	117551-012	EPA 906.0M
CYN-MW17	Americium-241	-11.4 ± 16.8	28.1	13.7	NE	U	BD	117509-009	EPA 901.1
19-Apr-22	Cesium-137	4.16 ± 4.44	4.15	1.98	NE	X	R	117509-009	EPA 901.1
	Cobalt-60	-1.99 ± 2.88	4.56	2.13	NE	U	BD	117509-009	EPA 901.1
	Potassium-40	53.9 ± 103	45.0	21.0	NE	X	R	117509-009	EPA 901.1
	Gross Alpha	1.77	NA	NA	15 pCi/L	NA	None	117509-010	EPA 900.0
	Gross Beta	3.08 ± 0.526	0.684	0.327	4 mrem/yr			117509-010	EPA 900.0
	Uranium-233/234	5.31 ± 0.526	0.0460	0.0198	NE			117509-011	HASL-300
	Uranium-235/236	0.111 ± 0.0403	0.0334	0.0127	NE			117509-011	HASL-300
	Uranium-238	1.08 ± 0.140	0.0426	0.0181	NE			117509-011	HASL-300
	Tritium	-55.7 ± 84.2	166	75.7	4 mrem/yr	U	BD	117509-012	EPA 906.0M

Refer to Notes on page 7B-34.

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 2022

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-MW18 26-Apr-22	Americium-241	9.00 ± 14.6	22.9	11.2	NE	U	BD	117545-009	EPA 901.1
	Cesium-137	-1.59 ± 5.23	6.90	3.36	NE	U	BD	117545-009	EPA 901.1
	Cobalt-60	-0.693 ± 2.97	5.06	2.40	NE	U	BD	117545-009	EPA 901.1
	Potassium-40	-25.4 ± 46.7	62.7	30.0	NE	U	BD	117545-009	EPA 901.1
	Gross Alpha	-1.16	NA	NA	15 pCi/L	NA	None	117545-010	EPA 900.0
	Gross Beta	3.41 ± 1.02	1.53	0.738	4 mrem/yr	*	J	117545-010	EPA 900.0
	Uranium-233/234	5.97 ± 0.594	0.0473	0.0203	NE			117545-011	HASL-300
	Uranium-235/236	0.115 ± 0.0397	0.0344	0.0131	NE			117545-011	HASL-300
	Uranium-238	1.43 ± 0.175	0.0438	0.0186	NE			117545-011	HASL-300
	Tritium	18.5 ± 93.2	168	76.5	4 mrem/yr	U	BD	117545-012	EPA 906.0M
CYN-MW19 21-Apr-22	Americium-241	-5.37 ± 16.6	29.1	14.3	NE	U	BD	117537-009	EPA 901.1
	Cesium-137	-1.45 ± 5.37	6.63	3.23	NE	U	BD	117537-009	EPA 901.1
	Cobalt-60	1.51 ± 2.41	4.42	2.07	NE	U	BD	117537-009	EPA 901.1
	Potassium-40	28.0 ± 52.7	40.2	18.7	NE	U	BD	117537-009	EPA 901.1
	Gross Alpha	0.45	NA	NA	15 pCi/L	NA	None	117537-010	EPA 900.0
	Gross Beta	2.62 ± 1.20	1.92	0.933	4 mrem/yr	*	J	117537-010	EPA 900.0
	Uranium-233/234	5.40 ± 0.546	0.0503	0.0216	NE			117537-011	HASL-300
	Uranium-235/236	0.119 ± 0.0407	0.0365	0.0139	NE			117537-011	HASL-300
	Uranium-238	2.28 ± 0.258	0.0466	0.0198	NE			117537-011	HASL-300
	Tritium	-35.0 ± 86.4	166	75.6	4 mrem/yr	U	BD	117537-012	EPA 906.0M

Refer to Notes on page 7B-34.

Table 7B-9
Summary of Field Water Quality Measurements[h], Burn Site Groundwater Monitoring, Sandia National Laboratories, New Mexico, Calendar Year 2022

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	18-Apr-22	17.75	669.13	145.2	7.33	0.50	48.13	3.98
CYN-MW7	20-Apr-22	19.30	732.50	159.9	7.15	0.33	55.58	4.56
CYN-MW8	25-Apr-22	17.16	730.04	108.5	7.25	0.96	59.74	5.13
CYN-MW9	10-May-22	19.86	1024.6	160.2	7.03	0.98	53.43	4.39
CYN-MW10	27-Apr-22	18.06	846.12	133.0	7.37	0.44	73.20	6.23
CYN-MW11	02-May-22	18.34	996.43	144.1	7.31	0.28	7.00	0.59
CYN-MW12	03-May-22	19.13	1257.0	146.3	7.04	0.24	19.50	1.49
CYN-MW13	09-May-22	19.50	708.97	85.6	7.24	0.31	43.11	3.59
CYN-MW14A	04-May-22	17.42	911.64	129.0	7.27	0.16	23.58	1.89
CYN-MW15	05-May-22	16.77	1056.8	140.4	7.09	1.13	22.41	1.94
CYN-MW16	28-Apr-22	19.96	730.26	131.2	7.29	0.28	12.56	1.03
CYN-MW17	19-Apr-22	18.77	547.43	77.3	7.07	0.50	36.79	3.05
CYN-MW18	26-Apr-22	19.69	805.58	133.7	6.82	0.95	7.75	0.63
CYN-MW19	21-Apr-22	17.08	702.66	150.8	7.41	0.31	65.29	5.61
CYN-MW4	11-Oct-22	17.97	655.53	93.6	7.46	0.59	53.47	4.30
CYN-MW7	11-Oct-22	19.44	710.21	134.8	7.16	0.38	63.23	4.76
CYN-MW8	12-Oct-22	19.35	796.94	178.8	7.21	0.36	68.77	5.19
CYN-MW9	28-Nov-22	16.51	811.87	215.5	7.00	0.92	58.28	4.75
CYN-MW10	13-Oct-22	17.00	866.58	181.6	7.38	0.32	75.71	6.09
CYN-MW11	17-Nov-22	15.79	930.58	212.4	7.36	0.16	9.39	0.78
CYN-MW12	15-Nov-22	20.60	1252.9	139.6	7.02	0.30	17.17	1.29
CYN-MW13	21-Nov-22	21.25	697.73	137.5	7.29	0.27	46.59	3.41
CYN-MW14A	21-Nov-22	17.10	867.73	192.3	7.34	0.23	21.80	1.76
CYN-MW15	29-Nov-22	13.09	845.30	221.1	7.14	439	59.90	5.29
CYN-MW16	12-Oct-22	18.80	709.63	89.9	7.40	0.16	13.73	1.09
CYN-MW17	15-Nov-22	17.79	501.70	171.6	7.09	0.16	46.53	3.72
CYN-MW18	16-Nov-22	16.01	742.66	203.5	6.90	0.68	9.44	0.77
CYN-MW19	13-Oct-22	15.65	668.78	126.8	7.56	0.16	66.54	5.67

Refer to Notes on page 7B-34.

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.
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.

fValidation 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.
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)

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Attachment 7C
Burn Site Groundwater Plots

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Attachment 7C Plots

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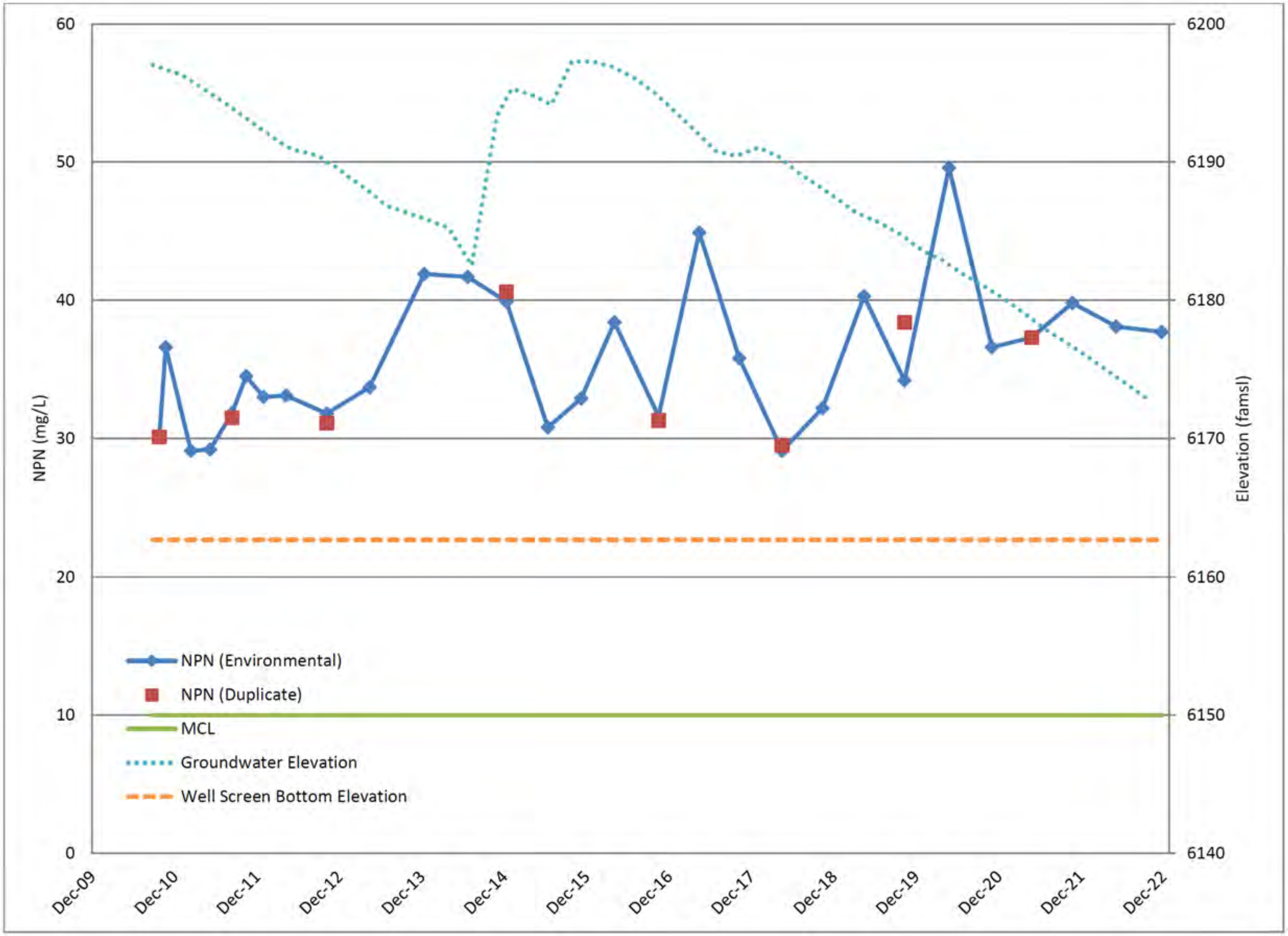

Figure 7C-1
Nitrate plus Nitrite Concentrations, CYN-MW9

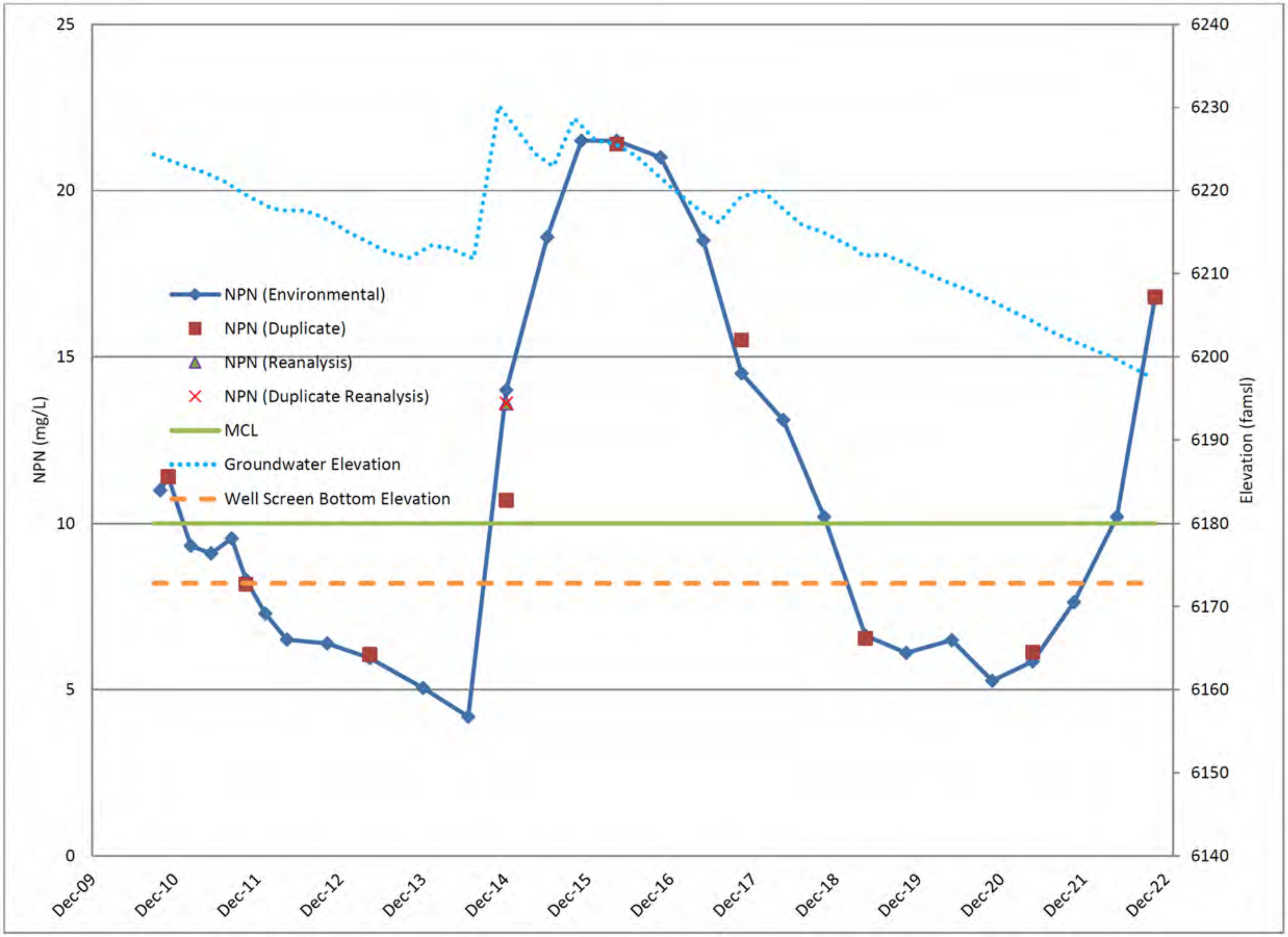

Figure 7C-2
Nitrate plus Nitrite Concentrations, CYN-MW10

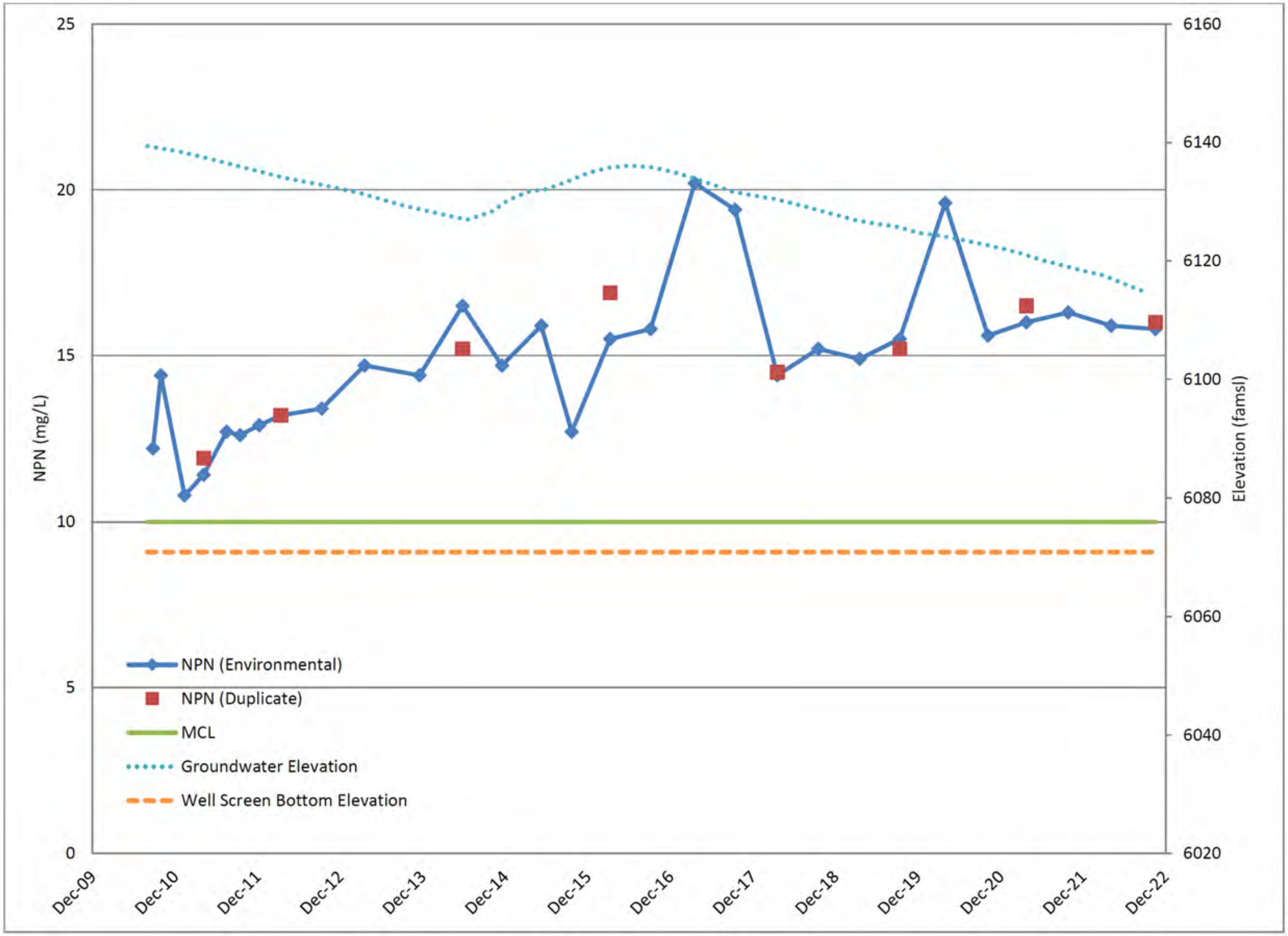

Figure 7C-3
Nitrate plus Nitrite Concentrations, CYN-MW12

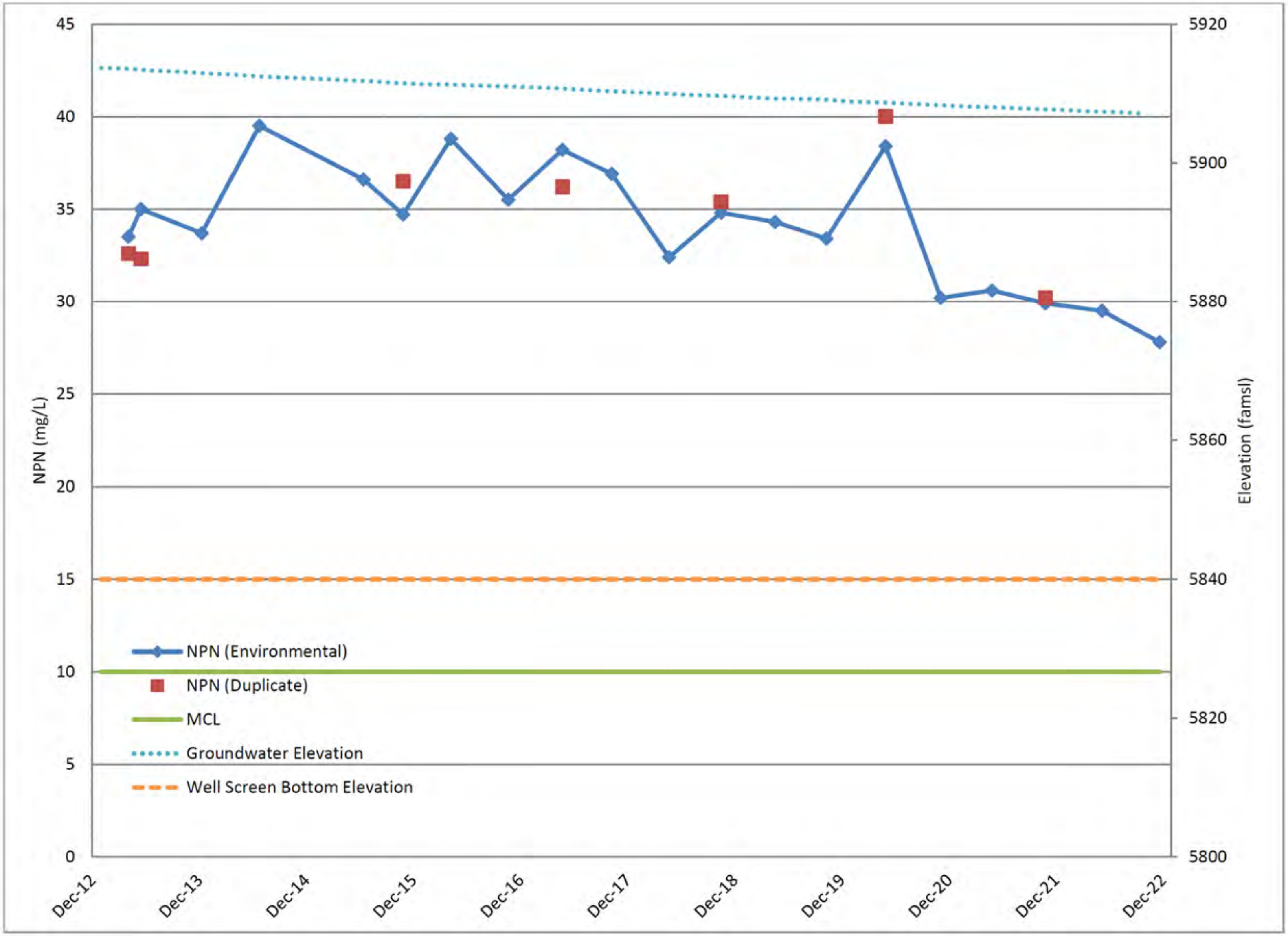

Figure 7C-4
Nitrate plus Nitrite Concentrations, CYN-MW13

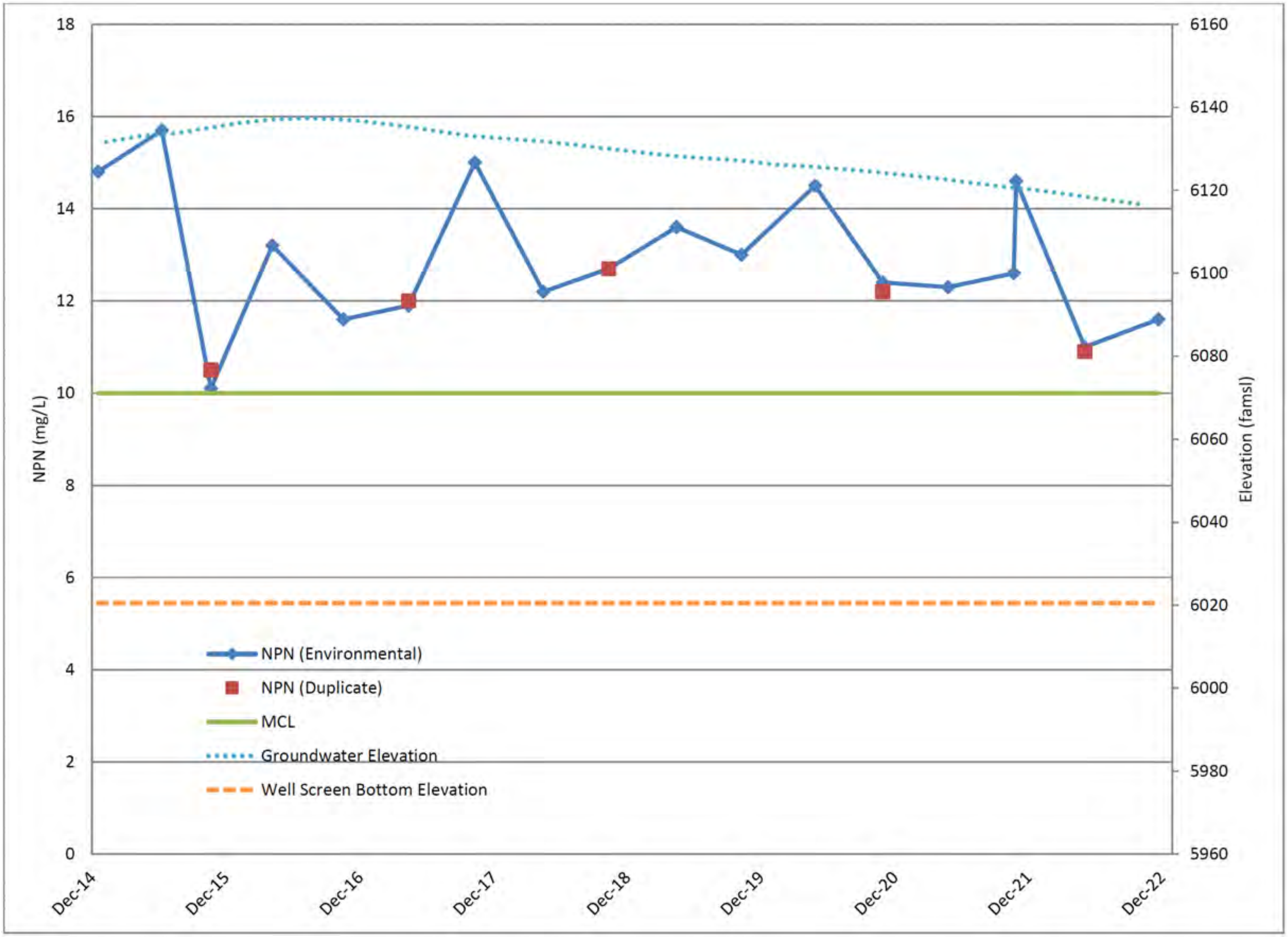

Figure 7C-5
Nitrate plus Nitrite Concentrations, CYN-MW14A

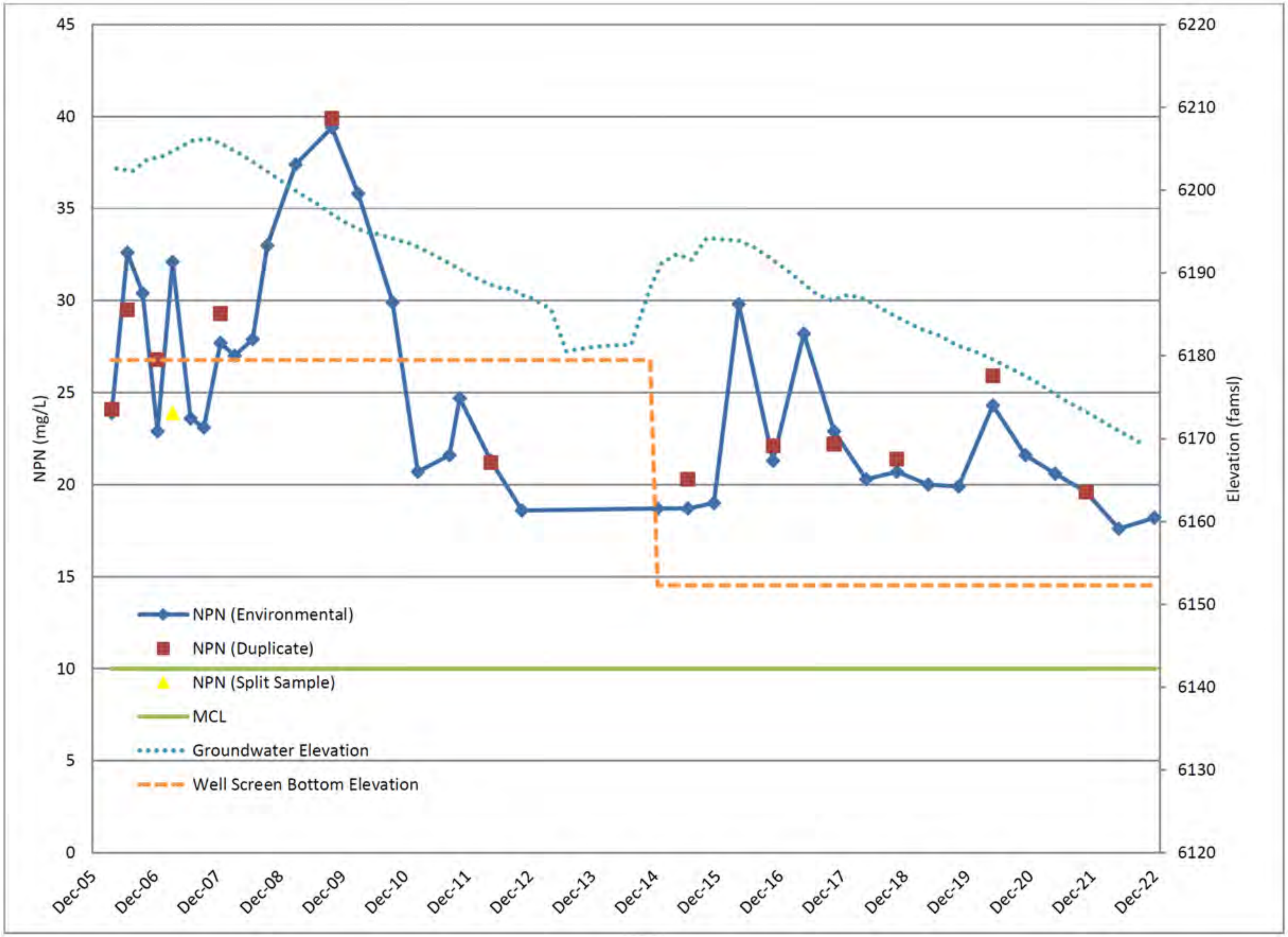

Figure 7C-6
Nitrate plus Nitrite Concentrations, CYN-MW15 (Includes Historical CYN-MW6 Data)

Attachment 7D
Burn Site Groundwater Hydrographs

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Attachment 7D Hydrographs

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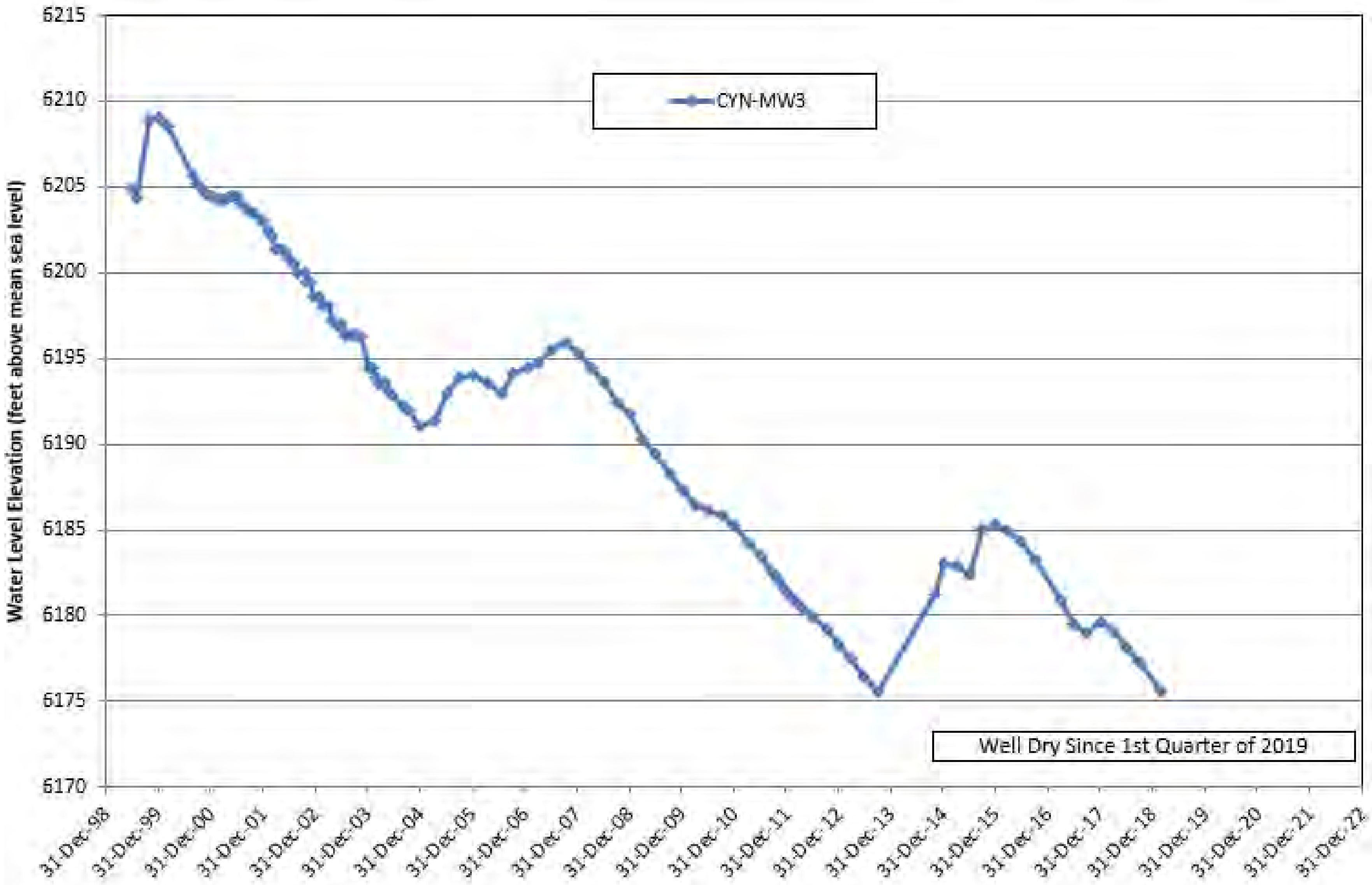

Figure 7D-1
Burn Site Groundwater Area of Concern Wells (1 of 9)

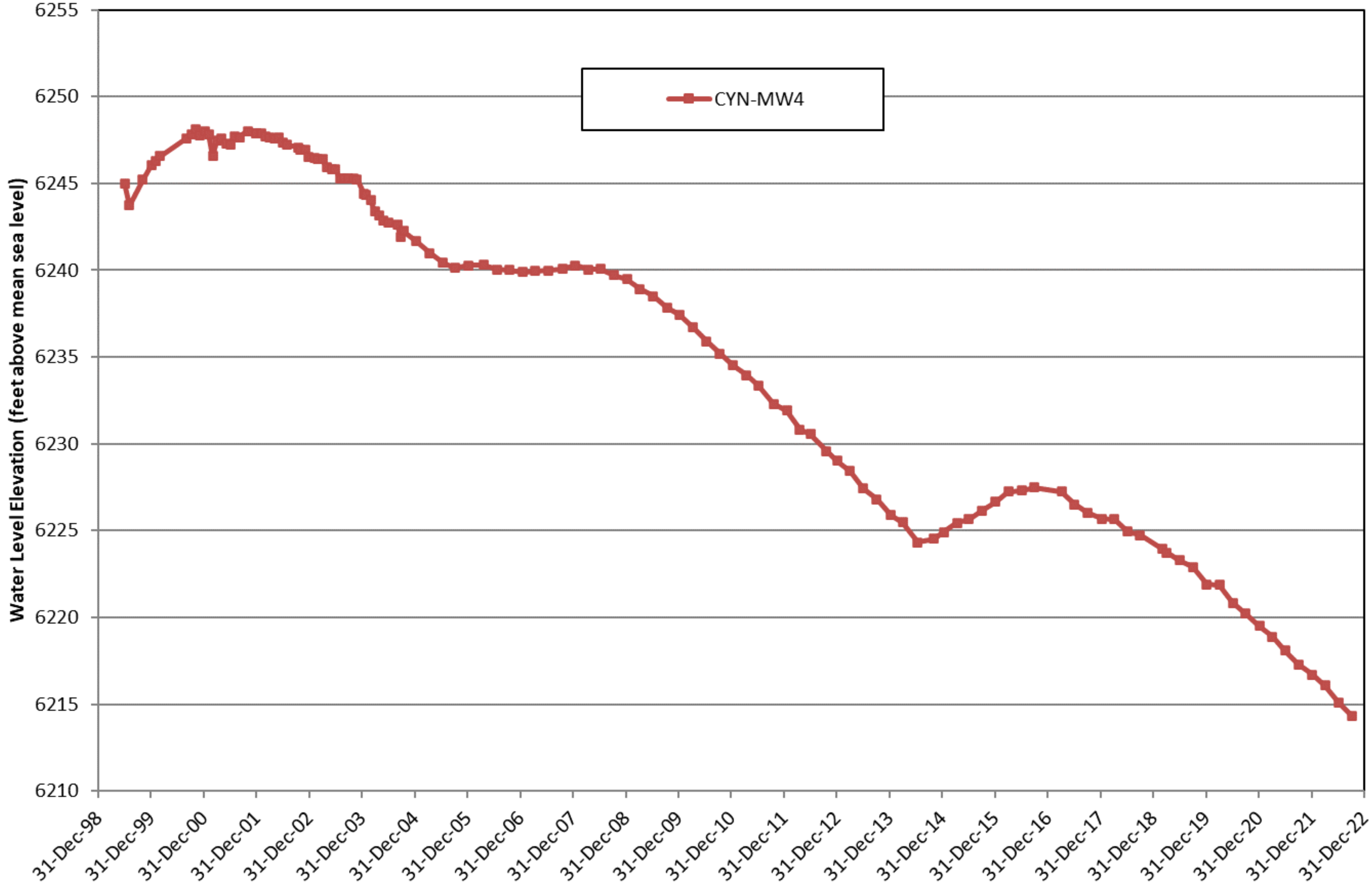

Figure 7D-2
Burn Site Groundwater Area of Concern Wells (2 of 9)

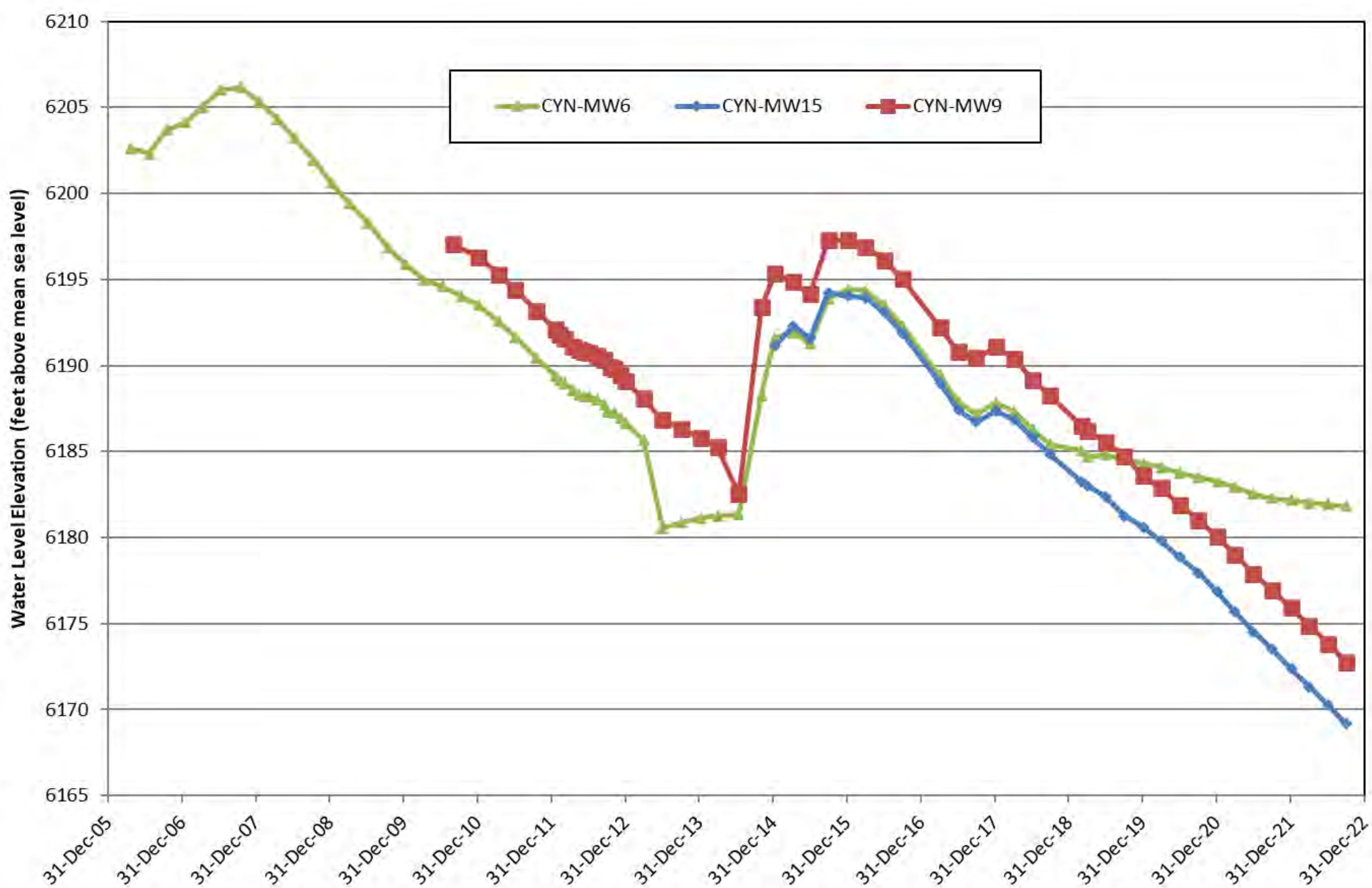

Figure 7D-3
Burn Site Groundwater Area of Concern Wells (3 of 9)

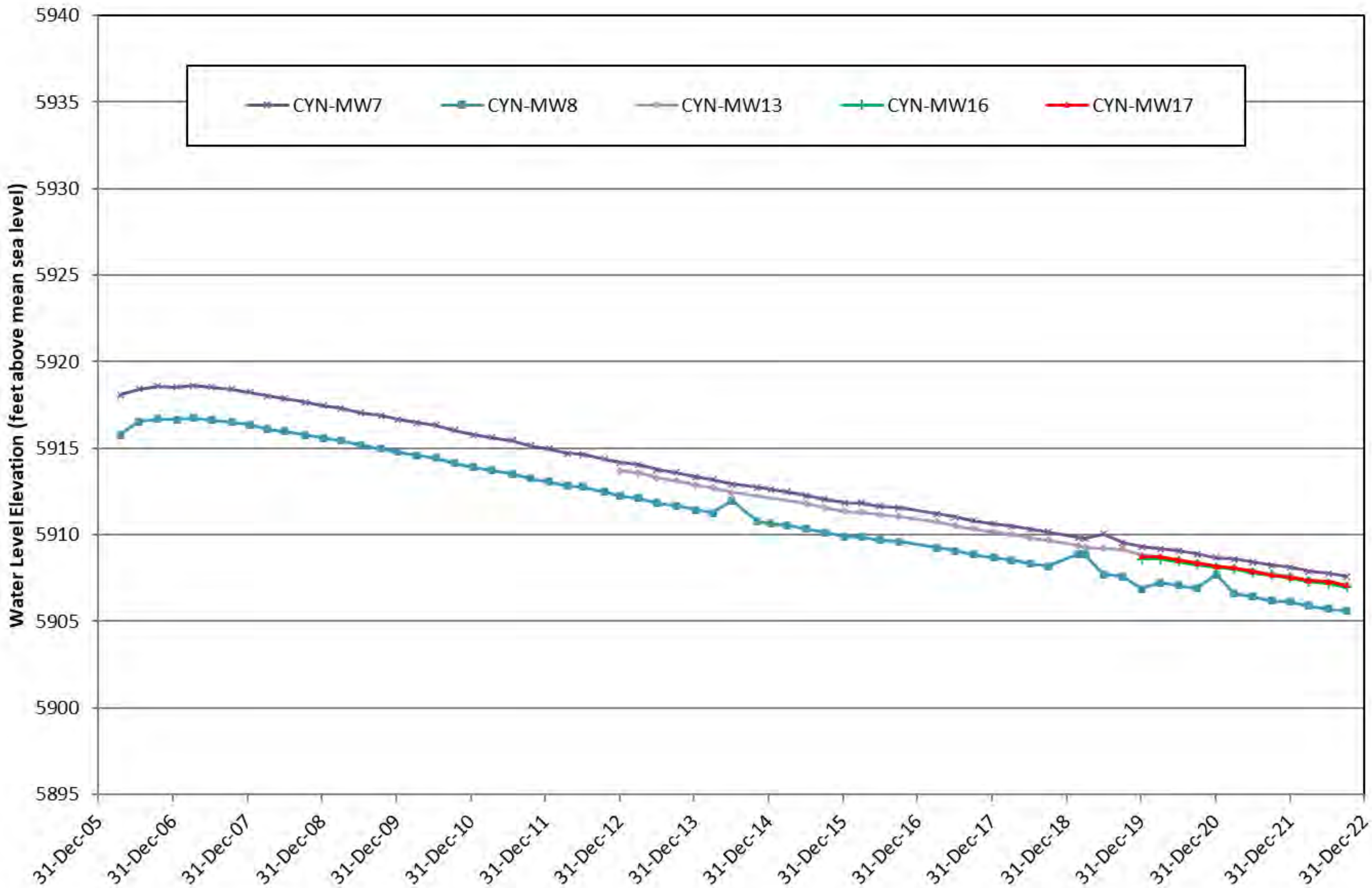

Figure 7D-4
Burn Site Groundwater Area of Concern Wells (4 of 9)

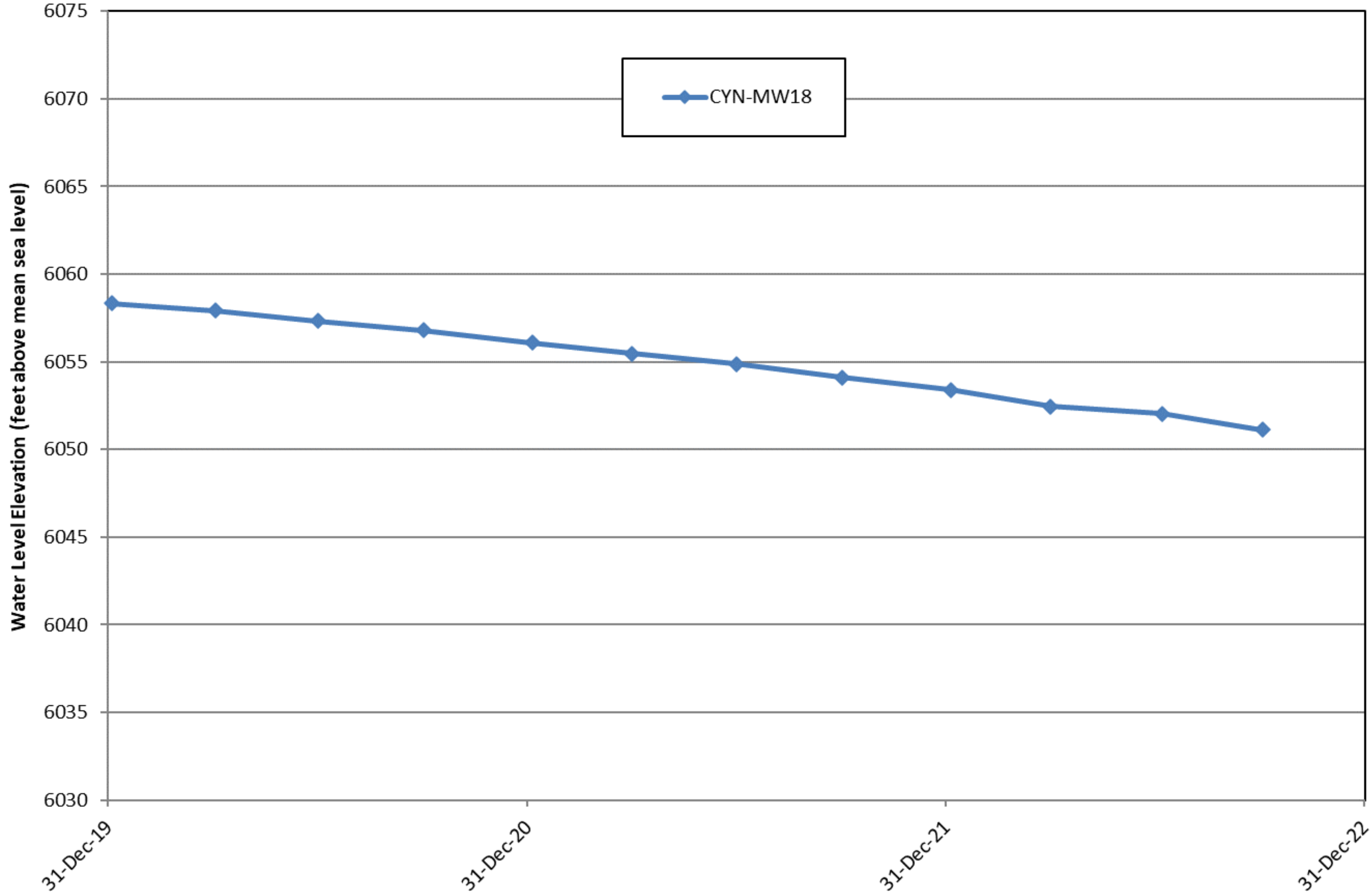

Figure 7D-5
Burn Site Groundwater Area of Concern Wells (5 of 9)

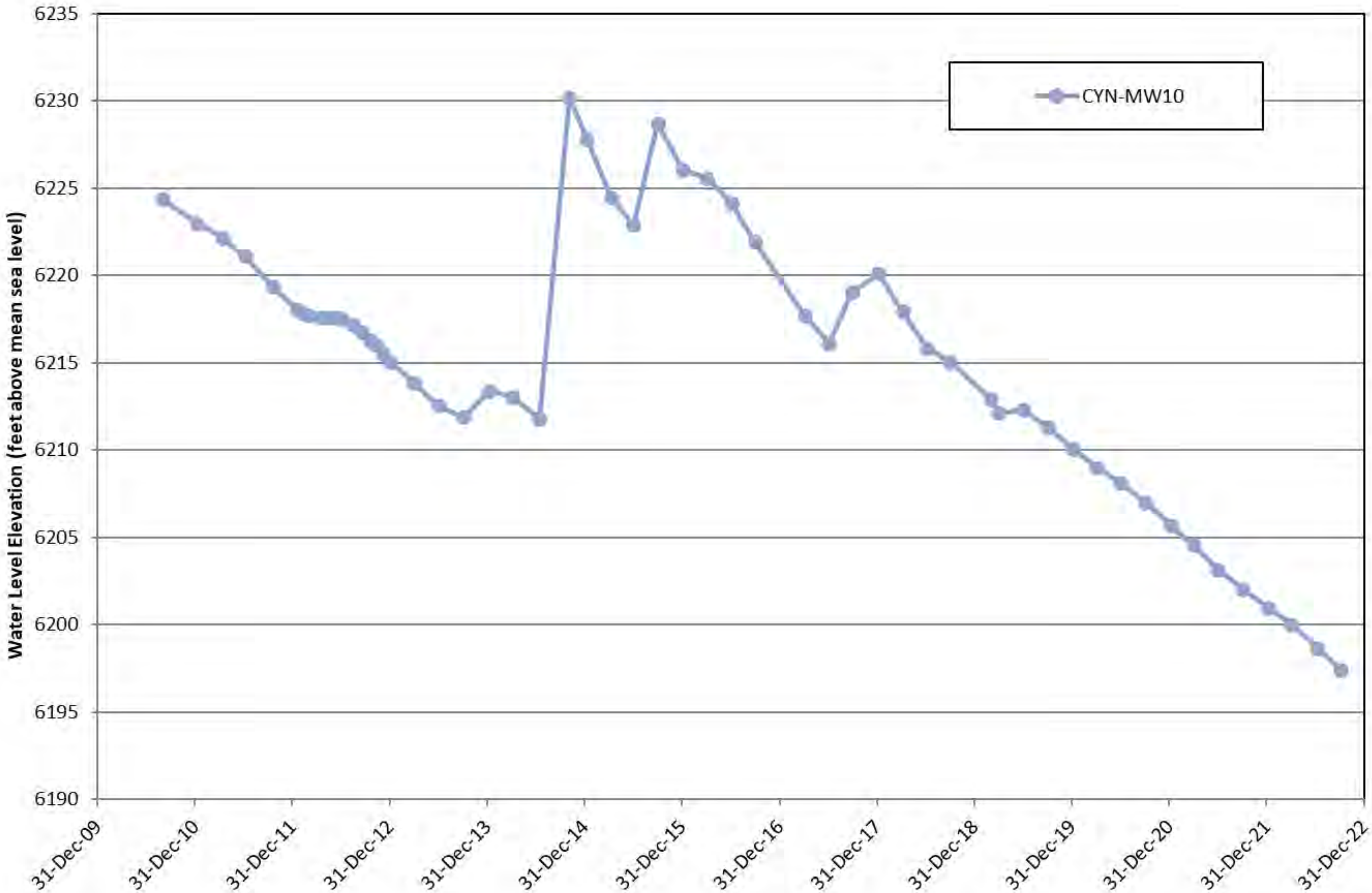

Figure 7D-6
Burn Site Groundwater Area of Concern Wells (6 of 9)

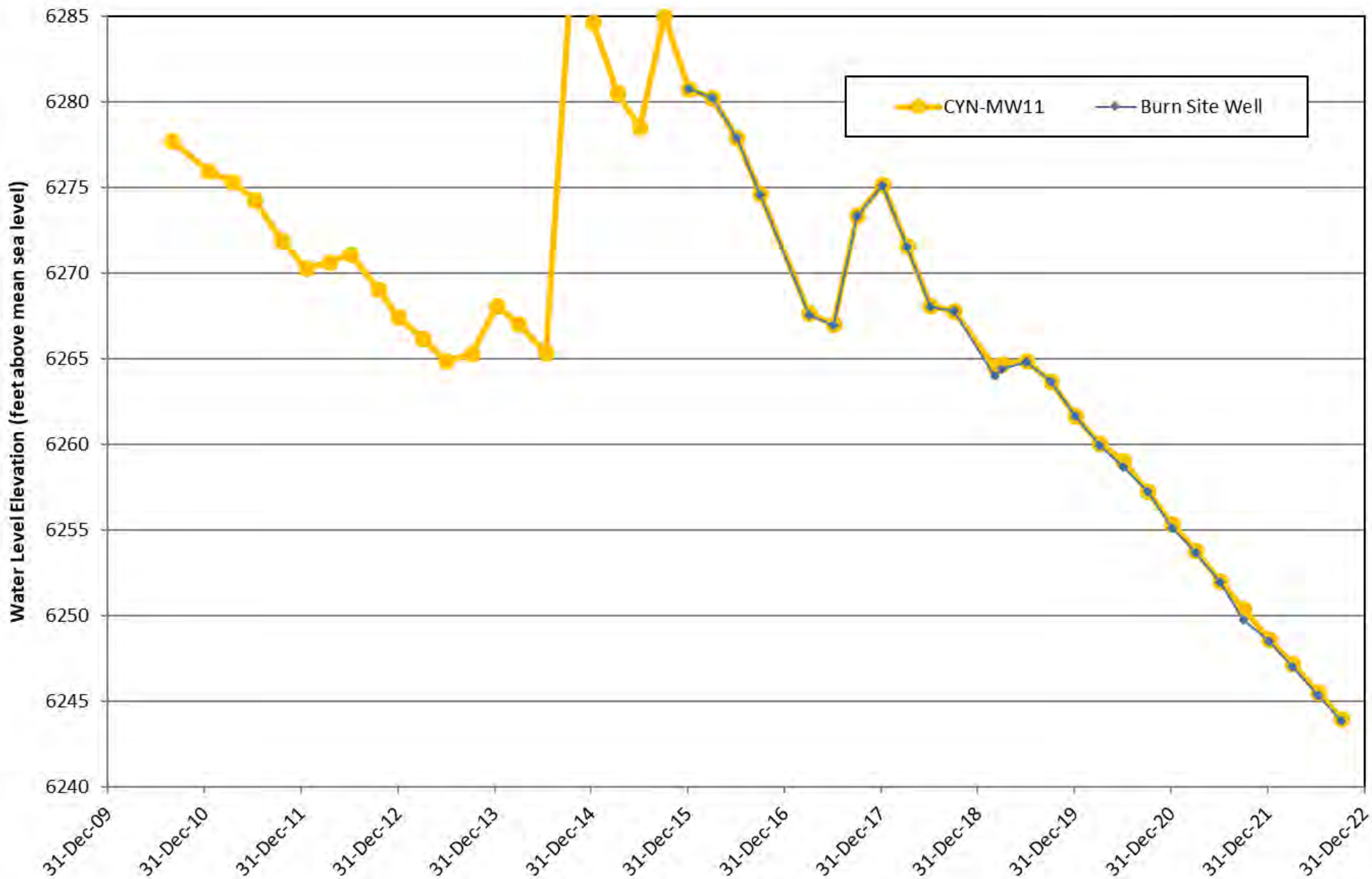

Figure 7D-7
Burn Site Groundwater Area of Concern Wells (7 of 9)

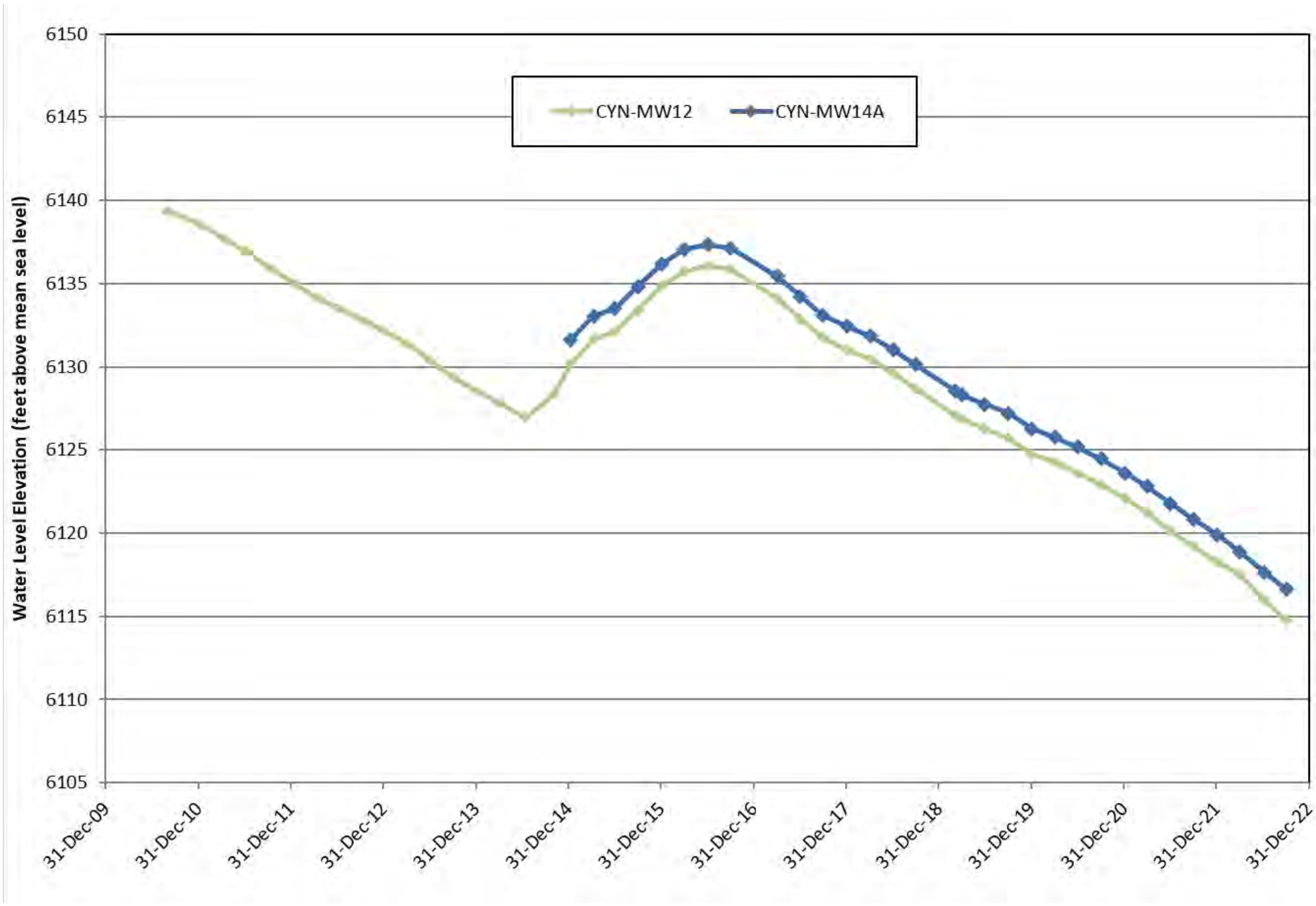

Figure 7D-8
Burn Site Groundwater Area of Concern Wells (8 of 9)

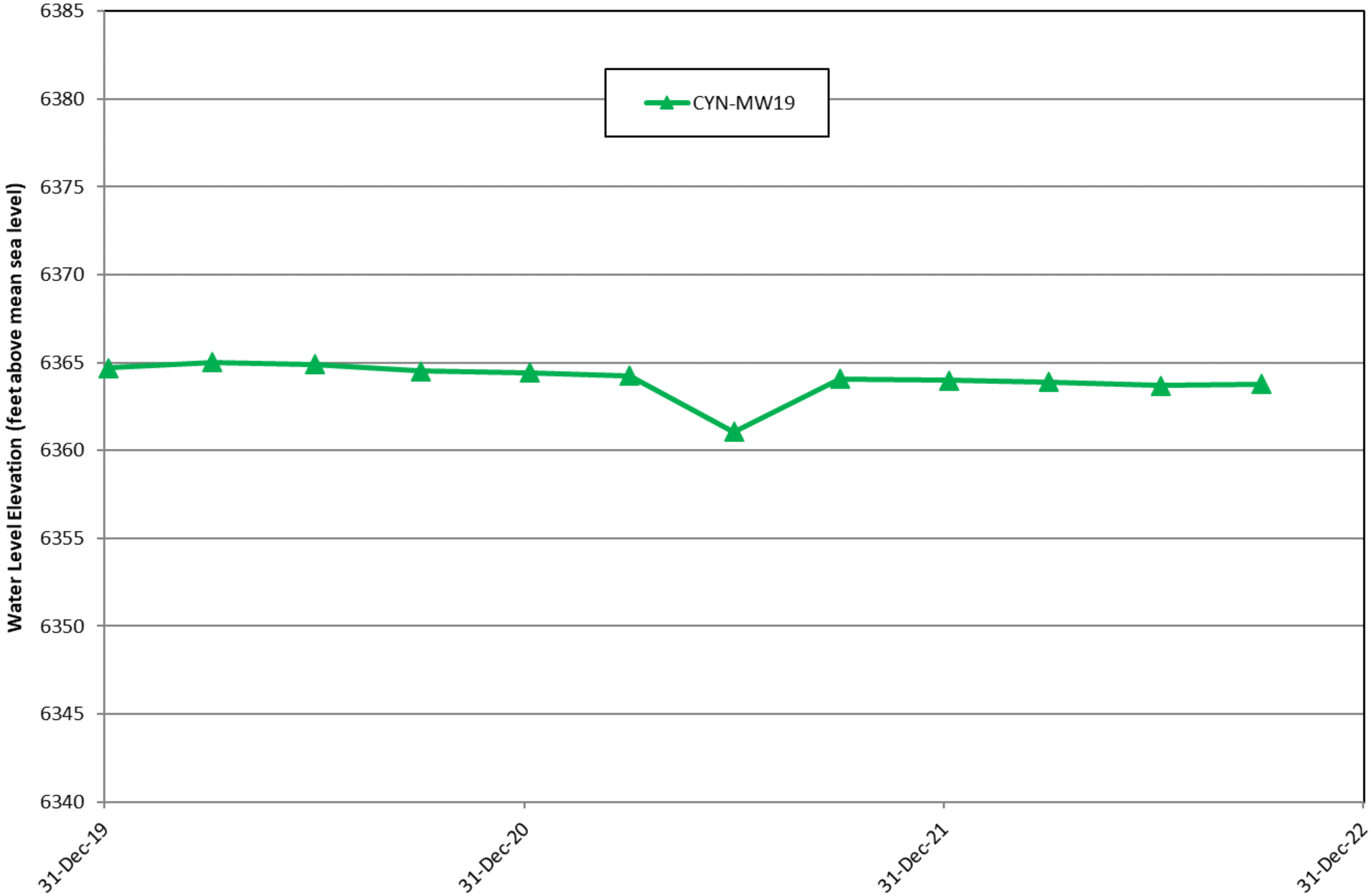

Figure 7D-9
Burn Site Groundwater Area of Concern Wells (9 of 9)

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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)*
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
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)*
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

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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)*
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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	
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	
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	
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	

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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	
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	

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-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	495.0	515.0	4860.7	4840.7	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)[l]	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	5714.8	60.0	72.0	5654.8	5642.8	72.0	6.0	S	SFG sediments or sandstone	before 1990	after 2004
Lomas 1	P	unk	5597.7	unk	unk	unk	unk	1341.0	unk	unk	Regional Aquifer – SFG sediments	1962	
Lomas 2	P	unk	5582.7	unk	unk	unk	unk	1590.0	unk	unk	Regional Aquifer – SFG sediments	1973	
Lomas 5	P	unk	5496.7	830.0	1658.0	4666.7	3838.7	1707.0	18.0	S	Regional Aquifer – SFG sediments	3-Nov-1978	
Lomas 6	P	unk	5532.0	unk	unk	unk	unk	1706.0	unk	unk	Regional Aquifer – SFG sediments	1978	
Love 2	P	unk	5444.0	unk	unk	unk	unk	1224.0	unk	unk	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	unk	unk	unk	unk	1342.0	unk	unk	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 BFF 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
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
WYO	= Wyoming
YALE	= Yale Boulevard 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 2022

Well ID	Measuring Point[a, b, c] (ft amsl, NAVD 88)	Date Measured (2022)[d]	Depth to Water (ft btoc, 2022)	Groundwater Elevation (ft amsl, 2022)	Groundwater Elevation, rounded (ft amsl, 2022)	Screened Unit	Comment, as needed	Groundwater Elevation (ft amsl, 2021)	Data Source	Well Owner
DOE/NNSA Owned Wells										
AVN-1	5443.00	4-Oct-2022	528.44	4914.56	4915	Regional Aquifer – SFG sediments		4914.77	SNL/NM	DOE/NNSA
AVN-2	5442.39	nm	nm	nm	nm	Regional Aquifer – SFG sediments		nm	SNL/NM	DOE/NNSA
Burn Site Well	6374.66	3-Oct-2022	130.81	6243.85	6244	Bedrock (schist and granite)	value not plotted	6249.73	SNL/NM	DOE/NNSA
CCBA-MW1	5902.34	3-Oct-2022	48.14	5854.20	5854	Alluvium and bedrock (granite)		5854.21	SNL/NM	DOE/NNSA
CCBA-MW2	5939.28	3-Oct-2022	72.71	5866.57	5867	Bedrock (granite)		5866.64	SNL/NM	DOE/NNSA
CTF-MW1	6082.63	3-Oct-2022	241.98	5840.65	5841	Bedrock (granite)		5841.05	SNL/NM	DOE/NNSA
CTF-MW2	5578.60	7-Oct-2022	44.05	5534.55	5535	Bedrock (granite)		5534.67	SNL/NM	DOE/NNSA
CTF-MW3	5522.82	7-Oct-2022	311.63	5211.19	5211	Bedrock (granite)		5211.54	SNL/NM	DOE/NNSA
CWL-BW5	5434.79	3-Oct-2022	515.94	4918.85	4919	Regional Aquifer – SFG sediments		4919.27	SNL/NM	DOE/NNSA
CWL-MW9	5426.12	3-Oct-2022	506.94	4919.18	4919	Regional Aquifer – SFG sediments		4919.46	SNL/NM	DOE/NNSA
CWL-MW10	5424.58	3-Oct-2022	504.00	4920.58	4921	Regional Aquifer – SFG sediments		4920.92	SNL/NM	DOE/NNSA
CWL-MW11	5423.24	3-Oct-2022	501.98	4921.26	4921	Regional Aquifer – SFG sediments		4921.46	SNL/NM	DOE/NNSA
CYN-MW3	6313.26	3-Oct-2022	dry	dry	dry	Bedrock (metamorphics)		dry	SNL/NM	DOE/NNSA
CYN-MW4	6455.48	3-Oct-2022	241.13	6214.35	6214	Bedrock (quartzite)		6217.29	SNL/NM	DOE/NNSA
CYN-MW5	5984.23	3-Oct-2022	109.44	5874.79	5875	Bedrock (quartzite)		5874.97	SNL/NM	DOE/NNSA
CYN-MW6	6343.37	3-Oct-2022	161.56	6181.81	6182	Bedrock (metamorphics)		6182.29	SNL/NM	DOE/NNSA
CYN-MW7	6216.35	3-Oct-2022	308.76	5907.59	5908	Bedrock (granitic gneiss)		5908.25	SNL/NM	DOE/NNSA
CYN-MW8	6230.11	3-Oct-2022	324.52	5905.59	5906	Bedrock (granitic gneiss)		5906.20	SNL/NM	DOE/NNSA
CYN-MW9	6360.67	3-Oct-2022	187.92	6172.75	6173	Bedrock (metamorphics)		6176.95	SNL/NM	DOE/NNSA
CYN-MW10	6345.45	3-Oct-2022	148.03	6197.42	6197	Bedrock (metamorphics)		6202.03	SNL/NM	DOE/NNSA
CYN-MW11	6374.41	3-Oct-2022	130.45	6243.96	6244	Bedrock (metamorphics)		6250.41	SNL/NM	DOE/NNSA
CYN-MW12	6345.16	3-Oct-2022	230.44	6114.72	6115	Bedrock (metamorphics)		6119.23	SNL/NM	DOE/NNSA
CYN-MW13	6237.79	3-Oct-2022	330.70	5907.09	5907	Bedrock (granitic gneiss)		5907.74	SNL/NM	DOE/NNSA
CYN-MW14A	6315.85	3-Oct-2022	199.23	6116.62	6117	Bedrock (metamorphics)	NC - deeper fracture	6120.84	SNL/NM	DOE/NNSA
CYN-MW15	6344.44	3-Oct-2022	175.26	6169.18	6169	Bedrock (metamorphics)		6173.53	SNL/NM	DOE/NNSA
CYN-MW16	6249.60	3-Oct-2022	342.63	5906.97	5907	Bedrock (granitic gneiss)		5907.66	SNL/NM	DOE/NNSA
CYN-MW17	6268.95	3-Oct-2022	361.88	5907.07	5907	Bedrock (granitic gneiss)		5907.67	SNL/NM	DOE/NNSA
CYN-MW18	6304.02	3-Oct-2022	252.91	6051.11	6051	Bedrock (metamorphics)		6054.10	SNL/NM	DOE/NNSA
CYN-MW19	6410.43	3-Oct-2022	46.66	6363.77	6364	Bedrock (metamorphics)		6364.07	SNL/NM	DOE/NNSA
Greystone-MW2	5814.20	3-Oct-2022	55.14	5759.06	5759	Alluvium in arroyo, recent	NC - alluvium	5759.01	SNL/NM	DOE/NNSA
LWDS-MW1	5423.83	4-Oct-2022	506.91	4916.92	4917	Regional Aquifer – SFG sediments		4917.29	SNL/NM	DOE/NNSA
LWDS-MW2	5412.41	4-Oct-2022	495.86	4916.55	4917	Regional Aquifer – SFG sediments		4916.95	SNL/NM	DOE/NNSA
MRN-2	5308.18	4-Oct-2022	429.81	4878.37	4878	Regional Aquifer – SFG sediments		4877.90	SNL/NM	DOE/NNSA
MRN-3D	5309.34	4-Oct-2022	430.37	4878.97	4879	Regional Aquifer – SFG sediments		4878.56	SNL/NM	DOE/NNSA
MWL-BW2	5391.02	3-Oct-2022	482.64	4908.38	4908	Regional Aquifer – SFG sediments		4908.64	SNL/NM	DOE/NNSA
MWL-MW4	5391.70	3-Oct-2022	502.31	4892.14	4892	Regional Aquifer – SFG sediments	corrected for slant	4892.19	SNL/NM	DOE/NNSA
MWL-MW5	5382.56	3-Oct-2022	493.46	4889.10	4889	Regional Aquifer – SFG sediments		4889.13	SNL/NM	DOE/NNSA
MWL-MW6	5375.31	3-Oct-2022	486.94	4888.37	4888	Regional Aquifer – SFG sediments		4888.37	SNL/NM	DOE/NNSA
MWL-MW7	5383.30	3-Oct-2022	490.74	4892.56	4893	Regional Aquifer – SFG sediments		4892.68	SNL/NM	DOE/NNSA
MWL-MW8	5384.67	3-Oct-2022	492.31	4892.36	4892	Regional Aquifer – SFG sediments		4892.49	SNL/NM	DOE/NNSA
MWL-MW9	5381.91	3-Oct-2022	491.88	4890.03	4890	Regional Aquifer – SFG sediments		4890.07	SNL/NM	DOE/NNSA
NWTA3-MW2	5337.49	4-Oct-2022	459.69	4877.80	4878	Regional Aquifer – SFG sediments		4877.34	SNL/NM	DOE/NNSA
NWTA3-MW3D	5340.80	4-Oct-2022	458.83	4881.97	4882	Regional Aquifer – SFG sediments		4881.54	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 2022

Well ID	Measuring Point[a, b, c] (ft amsl, NAVD 88)	Date Measured (2022)[d]	Depth to Water (ft btoc, 2022)	Groundwater Elevation (ft amsl, 2022)	Groundwater Elevation, rounded (ft amsl, 2022)	Screened Unit	Comment, as needed	Groundwater Elevation (ft amsl, 2021)	Data Source	Well Owner
OBS-MW1	5871.42	3-Oct-2022	72.69	5798.73	5799	Bedrock (granite)		5798.74	SNL/NM	DOE/NNSA
OBS-MW2	5863.16	3-Oct-2022	172.04	5691.12	5691	Bedrock (granite)		5690.47	SNL/NM	DOE/NNSA
OBS-MW3	5865.50	3-Oct-2022	70.37	5795.13	5795	Bedrock (granite)		5795.47	SNL/NM	DOE/NNSA
PGS-2	5408.29	7-Oct-2022	535.13	4873.16	4873	Regional Aquifer – SFG sediments		4873.45	SNL/NM	DOE/NNSA
PL-2	5336.01	4-Oct-2022	459.20	4876.81	4877	Regional Aquifer – SFG sediments		4876.58	SNL/NM	DOE/NNSA
PL-4	5334.98	4-Oct-2022	458.04	4876.94	4877	Regional Aquifer – SFG sediments		4876.65	SNL/NM	DOE/NNSA
SFR-1D	5399.13	4-Oct-2022	140.43	5258.70	5259	Regional Aquifer – SFG sediments	NC - deeper fracture	5258.81	SNL/NM	DOE/NNSA
SFR-1S	5399.16	4-Oct-2022	90.92	5308.24	5308	Regional Aquifer – SFG sediments		5308.67	SNL/NM	DOE/NNSA
SFR-2S	5432.77	4-Oct-2022	101.82	5330.95	5331	Regional Aquifer – SFG sediments		5331.13	SNL/NM	DOE/NNSA
SFR-3D	5497.94	4-Oct-2022	163.27	5334.67	5335	Regional Aquifer – SFG sediments		5334.75	SNL/NM	DOE/NNSA
SFR-3P	5499.63	4-Oct-2022	163.55	5336.08	5336	Regional Aquifer – SFG sediments		5336.34	SNL/NM	DOE/NNSA
SFR-3S	5498.24	4-Oct-2022	162.48	5335.76	5336	Regional Aquifer – SFG sediments		5335.96	SNL/NM	DOE/NNSA
SFR-3T	5498.66	4-Oct-2022	68.31	5430.35	5430	Bedrock (sandstone)	NC – deeper fracture	5430.29	SNL/NM	DOE/NNSA
SFR-4P	5573.33	4-Oct-2022	152.75	5420.58	5421	Bedrock (sandstone)		5422.50	SNL/NM	DOE/NNSA
SFR-4T	5573.95	4-Oct-2022	151.63	5422.32	5422	Bedrock (sandstone)		5424.38	SNL/NM	DOE/NNSA
SWTA3-MW2	5325.60	4-Oct-2022	445.94	4879.66	4880	Regional Aquifer – SFG sediments		4879.15	SNL/NM	DOE/NNSA
SWTA3-MW3	5323.94	4-Oct-2022	443.92	4880.02	4880	Regional Aquifer – SFG sediments		4879.59	SNL/NM	DOE/NNSA
SWTA3-MW4	5324.81	4-Oct-2022	444.63	4880.18	4880	Regional Aquifer – SFG sediments		4879.69	SNL/NM	DOE/NNSA
TA1-W-01	5403.82	14-Oct-2022	528.37	4875.45	4875	Regional Aquifer – SFG sediments		4875.39	SNL/NM	DOE/NNSA
TA1-W-02	5416.62	14-Oct-2022	517.64	4898.98	4899	Regional Aquifer – SFG sediments		4898.86	SNL/NM	DOE/NNSA
TA1-W-03	5457.03	6-Oct-2022	dry	dry	dry	PGWS - SFG sediments	value not plotted	dry	SNL/NM	DOE/NNSA
TA1-W-04	5460.98	7-Oct-2022	564.70	4896.28	4896	Regional Aquifer – SFG sediments		4896.42	SNL/NM	DOE/NNSA
TA1-W-05	5433.84	7-Oct-2022	560.81	4873.03	4873	Regional Aquifer – SFG sediments		4873.25	SNL/NM	DOE/NNSA
TA1-W-06	5417.10	14-Oct-2022	310.62	5106.48	5106	PGWS - SFG sediments	value not plotted	5106.58	SNL/NM	DOE/NNSA
TA1-W-07	5404.92	14-Oct-2022	287.10	5117.82	5118	PGWS - SFG sediments	value not plotted	5117.88	SNL/NM	DOE/NNSA
TA1-W-08	5434.19	7-Oct-2022	312.81	5121.38	5121	PGWS - SFG sediments	value not plotted	5121.68	SNL/NM	DOE/NNSA
TA2-NW1-325	5421.94	6-Oct-2022	322.84	5099.10	5099	PGWS - SFG sediments	value not plotted	5100.46	SNL/NM	DOE/NNSA
TA2-NW1-595	5421.26	6-Oct-2022	516.85	4904.41	4904	Regional Aquifer – SFG sediments		4904.29	SNL/NM	DOE/NNSA
TA2-W-01	5419.99	6-Oct-2022	332.39	5087.60	5088	PGWS - SFG sediments	value not plotted	5087.96	SNL/NM	DOE/NNSA
TA2-W-19	5351.21	6-Oct-2022	275.88	5075.33	5075	PGWS - SFG sediments	value not plotted	5075.63	SNL/NM	DOE/NNSA
TA2-W-24	5363.66	6-Oct-2022	438.99	4924.67	4925	Regional Aquifer – SFG sediments		4924.45	SNL/NM	DOE/NNSA
TA2-W-25	5374.86	14-Oct-2022	462.83	4912.03	4912	Regional Aquifer – SFG sediments		4911.55	SNL/NM	DOE/NNSA
TA2-W-26	5375.77	14-Oct-2022	290.94	5084.83	5085	PGWS - SFG sediments	value not plotted	5085.03	SNL/NM	DOE/NNSA
TA2-W-27	5362.85	6-Oct-2022	284.04	5078.81	5079	PGWS - SFG sediments	value not plotted	5079.11	SNL/NM	DOE/NNSA
TA2-W-28	5412.41	6-Oct-2022	322.90	5089.51	5090	PGWS - SFG sediments	value not plotted	5089.83	SNL/NM	DOE/NNSA
TAV-MW2	5427.33	4-Oct-2022	511.19	4916.14	4916	Regional Aquifer – SFG sediments		4916.53	SNL/NM	DOE/NNSA
TAV-MW3	5464.30	4-Oct-2022	549.16	4915.14	4915	Regional Aquifer – SFG sediments		4915.19	SNL/NM	DOE/NNSA
TAV-MW4	5427.89	4-Oct-2022	511.17	4916.72	4917	Regional Aquifer – SFG sediments		4916.98	SNL/NM	DOE/NNSA
TAV-MW5	5408.71	4-Oct-2022	495.58	4913.13	4913	Regional Aquifer – SFG sediments		4913.97	SNL/NM	DOE/NNSA
TAV-MW6	5431.17	4-Oct-2022	514.63	4916.54	4917	Regional Aquifer – SFG sediments		4916.90	SNL/NM	DOE/NNSA
TAV-MW7	5430.40	4-Oct-2022	516.74	4913.66	4914	Regional Aquifer – SFG sediments		4914.00	SNL/NM	DOE/NNSA
TAV-MW8	5417.00	19-Oct-2022	499.91	4917.09	4917	Regional Aquifer – SFG sediments		4917.46	SNL/NM	DOE/NNSA
TAV-MW9	5416.27	4-Oct-2022	502.69	4913.58	4914	Regional Aquifer – SFG sediments		4913.85	SNL/NM	DOE/NNSA
TAV-MW10	5437.03	4-Oct-2022	520.91	4916.12	4916	Regional Aquifer – SFG sediments		4916.64	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 2022

Well ID	Measuring Point[a, b, c] (ft amsl, NAVD 88)	Date Measured (2022)[d]	Depth to Water (ft btoc, 2022)	Groundwater Elevation (ft amsl, 2022)	Groundwater Elevation, rounded (ft amsl, 2022)	Screened Unit	Comment, as needed	Groundwater Elevation (ft amsl, 2021)	Data Source	Well Owner
TAV-MW11	5440.12	4-Oct-2022	523.67	4916.45	4916	Regional Aquifer – SFG sediments		4916.89	SNL/NM	DOE/NNSA
TAV-MW12	5435.72	4-Oct-2022	520.39	4915.33	4915	Regional Aquifer – SFG sediments		4915.71	SNL/NM	DOE/NNSA
TAV-MW13	5409.02	4-Oct-2022	498.91	4910.11	4910	Regional Aquifer – SFG sediments		4910.41	SNL/NM	DOE/NNSA
TAV-MW14	5441.52	4-Oct-2022	527.44	4914.08	4914	Regional Aquifer – SFG sediments		4914.45	SNL/NM	DOE/NNSA
TAV-MW15	5437.32	4-Oct-2022	522.14	4915.18	4915	Regional Aquifer – SFG sediments		4915.54	SNL/NM	DOE/NNSA
TAV-MW16	5448.34	4-Oct-2022	533.57	4914.77	4915	Regional Aquifer – SFG sediments		4914.98	SNL/NM	DOE/NNSA
TJA-2	5353.20	6-Oct-2022	280.81	5072.39	5072	PGWS - SFG sediments	value not plotted	5072.85	SNL/NM	DOE/NNSA
TJA-3	5390.56	6-Oct-2022	498.71	4891.85	4892	Regional Aquifer – SFG sediments		4891.84	SNL/NM	DOE/NNSA
TJA-4	5341.16	6-Oct-2022	300.14	5041.02	5041	Merging Zone – SFG sediments	NC - Merging Zone	5040.89	SNL/NM	DOE/NNSA
TJA-5	5341.33	6-Oct-2022	271.77	5069.56	5070	PGWS - SFG sediments	value not plotted	5069.63	SNL/NM	DOE/NNSA
TJA-6	5343.16	6-Oct-2022	450.88	4892.28	4892	Regional Aquifer – SFG sediments		4892.20	SNL/NM	DOE/NNSA
TJA-7	5391.27	6-Oct-2022	305.74	5085.53	5086	PGWS - SFG sediments	value not plotted	5085.78	SNL/NM	DOE/NNSA
TRE-1	5497.25	4-Oct-2022	178.95	5318.30	5318	Regional Aquifer – SFG sediments		5318.49	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	4-Oct-2022	93.29	5642.33	5642	Bedrock (sandstone)		5642.30	SNL/NM	DOE/NNSA
TRS-1D	5779.80	19-Oct-2022	128.91	5650.89	5651	Bedrock (limestone)		5651.84	SNL/NM	DOE/NNSA
TRS-1S	5780.07	4-Oct-2022	135.86	5644.21	5644	Bedrock (limestone)		5644.34	SNL/NM	DOE/NNSA
TRS-2	5780.76	4-Oct-2022	136.43	5644.33	5644	Bedrock (limestone)		5644.47	SNL/NM	DOE/NNSA
WYO-3	5392.09	14-Oct-2022	516.94	4875.15	4875	Regional Aquifer – SFG sediments		4875.38	SNL/NM	DOE/NNSA
WYO-4	5392.57	14-Oct-2022	297.33	5095.24	5095	PGWS - SFG sediments	value not plotted	5095.31	SNL/NM	DOE/NNSA
Wells Owned by Other Entities										
Eubank-1	5460.02	14-Oct-2022	543.48	4916.54	4917	Regional Aquifer – SFG sediments		4916.02	SNL/NM	COA EHD
Eubank-2	5474.39	25-Oct-2022	571.33	4903.06	4903	Regional Aquifer – SFG sediments		4903.25	COA EHD	COA EHD
Eubank-3	5498.73	25-Oct-2022	600.58	4898.15	4898	Regional Aquifer – SFG sediments		4898.80	COA EHD	COA EHD
Eubank-5	5507.40	25-Oct-2022	609.61	4897.79	4898	Regional Aquifer – SFG sediments		4898.41	COA EHD	COA EHD
KAFB-0118	5320.75	20-Apr-2022	442.77	4877.98	4878	Regional Aquifer – SFG sediments		4876.13	KAFB	KAFB
KAFB-0119	5315.82	20-Apr-2022	438.32	4877.50	4878	Regional Aquifer – SFG sediments		4876.66	KAFB	KAFB
KAFB-0120	5292.29	20-Apr-2022	411.13	4881.16	4881	Regional Aquifer – SFG sediments		4880.42	KAFB	KAFB
KAFB-0121	5307.60	20-Apr-2022	430.08	4877.52	4878	Regional Aquifer – SFG sediments		4876.58	KAFB	KAFB
KAFB-0213	5283.29	20-Apr-2022	405.86	4877.43	4877	Regional Aquifer – SFG sediments		4876.24	KAFB	KAFB
KAFB-0219	5263.69	20-Apr-2022	387.34	4876.35	4876	Regional Aquifer – SFG sediments		4875.45	KAFB	KAFB
KAFB-0220	5265.10	20-Apr-2022	388.77	4876.33	4876	Regional Aquifer – SFG sediments		4875.10	KAFB	KAFB
KAFB-0221	5274.36	20-Apr-2022	398.06	4876.30	4876	Regional Aquifer – SFG sediments		4874.94	KAFB	KAFB
KAFB-0222	5247.65	20-Apr-2022	368.35	4879.30	4879	Regional Aquifer – SFG sediments		4878.33	KAFB	KAFB
KAFB-0223	5254.49	20-Apr-2022	375.38	4879.11	4879	Regional Aquifer – SFG sediments		4878.02	KAFB	KAFB
KAFB-0307	5364.53	20-Apr-2022	412.07	4952.46	4952	Regional Aquifer – SFG sediments		4949.83	KAFB	KAFB
KAFB-0308	5381.65	20-Apr-2022	442.71	4938.94	4939	Regional Aquifer – SFG sediments		4938.32	KAFB	KAFB
KAFB-0309	5411.80	20-Apr-2022	471.93	4939.87	4940	Regional Aquifer – SFG sediments		4939.12	KAFB	KAFB
KAFB-0310	5416.48	20-Apr-2022	355.33	5061.15	5061	PGWS - SFG sediments	value not plotted	5061.43	KAFB	KAFB
KAFB-0311	5353.29	20-Apr-2022	416.24	4937.05	4937	Regional Aquifer – SFG sediments		4936.41	KAFB	KAFB
KAFB-0312	5432.17	20-Apr-2022	416.63	5015.54	5016	Regional Aquifer – SFG sediments		5014.99	KAFB	KAFB
KAFB-0313	5418.98	22-Sep-2021	351.50	5067.48	5067	PGWS - SFG sediments	value not plotted	5067.48	KAFB	KAFB
KAFB-0314	5455.75	20-Apr-2022	418.10	5037.65	5038	Regional Aquifer – SFG sediments		5037.38	KAFB	KAFB
KAFB-0315	5466.11	20-Apr-2022	437.88	5028.23	5028	Regional Aquifer – SFG sediments		5027.71	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 2022

Well ID	Measuring Point[a, b, c] (ft amsl, NAVD 88)	Date Measured (2022)[d]	Depth to Water (ft btoc, 2022)	Groundwater Elevation (ft amsl, 2022)	Groundwater Elevation, rounded (ft amsl, 2022)	Screened Unit	Comment, as needed	Groundwater Elevation (ft amsl, 2021)	Data Source	Well Owner
KAFB-0417	5313.07	8-Aug-2022	438.86	4874.21	4874	Regional Aquifer – SFG sediments		4874.12	KAFB	KAFB
KAFB-0504	5357.87	nm	nm	nm	nm	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
KAFB-0505	5362.81	20-Apr-2022	487.54	4875.27	4875	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
KAFB-0506	5363.47	20-Apr-2022	211.27	5152.44	5152	PGWS - SFG sediments	value not plotted	5152.44	KAFB	KAFB
KAFB-0507R	5358.21	7-Oct-2021	484.70	4873.51	4874	Regional Aquifer – SFG sediments		4873.51	KAFB	KAFB
KAFB-0508	5351.88	13-Jun-2022	477.44	4874.44	4874	Regional Aquifer – SFG sediments		4872.77	KAFB	KAFB
KAFB-0509	5441.56	nm	nm	nm	nm	above PGWS – SFG sediments		nm	KAFB	KAFB
KAFB-0510	5367.10	13-Jun-2022	493.67	4873.43	4873	Regional Aquifer – SFG sediments		4871.47	KAFB	KAFB
KAFB-0512R	5302.73	6-Oct-2021	428.44	4874.29	4874	Regional Aquifer – SFG sediments		4874.29	KAFB	KAFB
KAFB-0514	5206.41	6-Oct-2021	332.65	4873.76	4874	Regional Aquifer – SFG sediments		4873.76	KAFB	KAFB
KAFB-0516	5205.64	6-Oct-2021	331.43	4874.21	4874	Regional Aquifer – SFG sediments		4874.21	KAFB	KAFB
KAFB-0517	5197.10	13-Jun-2022	319.69	4877.41	4877	Regional Aquifer – SFG sediments		4875.31	KAFB	KAFB
KAFB-0518	5177.76	13-Jun-2022	299.76	4878.00	4878	Regional Aquifer – SFG sediments		4877.21	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	20-Apr-2022	393.56	4873.92	4874	Regional Aquifer – SFG sediments		nm	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		4875.54	KAFB	KAFB
KAFB-0525	5229.75	6-Oct-2021	354.56	4875.19	4875	Regional Aquifer – SFG sediments		4875.19	KAFB	KAFB
KAFB-0611	5386.09	8-Aug-2023	463.60	4922.49	4922	Regional Aquifer – SFG sediments		4922.99	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	8-Aug-2022	331.60	5059.29	5059	PGWS - SFG sediments	value not plotted	5058.20	KAFB	KAFB
KAFB-0615	5638.43	nm	nm	nm	nm	Bedrock (granite)		nm	KAFB	KAFB
KAFB-0616	5481.07	7-Oct-2021	445.85	5035.22	5035	Regional Aquifer – SFG sediments		5035.22	KAFB	KAFB
KAFB-0617	5505.78	7-Oct-2021	556.55	4949.23	4949	Regional Aquifer – SFG sediments	NC - nearby fault	4949.23	KAFB	KAFB
KAFB-0618	5410.05	13-Jun-2022	484.23	4925.82	4926	Regional Aquifer – SFG sediments		4925.88	KAFB	KAFB
KAFB-0619	5410.78	13-Jun-2022	384.30	5026.48	5026	PGWS - SFG sediments	value not plotted	5026.20	KAFB	KAFB
KAFB-0620	5334.64	13-Jun-2022	442.15	4892.49	4892	Regional Aquifer – SFG sediments		4892.34	KAFB	KAFB
KAFB-0621	5569.89	7-Oct-2021	624.37	4945.52	4946	Regional Aquifer – SFG sediments	NC - 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 not plotted	nm	KAFB	KAFB
KAFB-0624	5673.78	14-Jun-2022	767.58	4906.20	4906	Regional Aquifer – SFG sediments	NC - nearby fault	nm	KAFB	KAFB
KAFB-0625	5390.23?	6-Oct-2021	474.75	4915.48	4915	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	NC - semiconfined?	nm	KAFB	KAFB
KAFB-0904	5291.75	6-Oct-2021	351.51	4940.24	4940	Regional Aquifer – SFG sediments	NC - 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

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 2022

Well ID	Measuring Point[a, b, c] (ft amsl, NAVD 88)	Date Measured (2022)[d]	Depth to Water (ft btoc, 2022)	Groundwater Elevation (ft amsl, 2022)	Groundwater Elevation, rounded (ft amsl, 2022)	Screened Unit	Comment, as needed	Groundwater Elevation (ft amsl, 2021)	Data Source	Well Owner
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		4878.63	KAFB	KAFB
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		4941.93	KAFB	KAFB
KAFB-2009	5655.63	nm	nm	nm	nm	Bedrock (granite)		nm	KAFB	KAFB
KAFB-2622	5358.14	dry	dry	dry	dry	PGWS - SFG sediments	value not plotted	dry	KAFB	KAFB
KAFB-2623	5367.48	nm	nm	nm	nm	PGWS - SFG sediments	value not plotted	nm	KAFB	KAFB
KAFB-2624	5362.27	nm	nm	nm	nm	PGWS - SFG sediments	value not plotted	nm	KAFB	KAFB
KAFB-2625	5359.26	20-Apr-2022	199.44	5159.82	5160	PGWS - SFG sediments	value not plotted	nm	KAFB	KAFB
KAFB-2626	5357.51	nm	nm	nm	nm	PGWS - SFG sediments	value not plotted	nm	KAFB	KAFB
KAFB-2627	5367.47	nm	nm	nm	nm	PGWS - SFG sediments	value not plotted	nm	KAFB	KAFB
KAFB-2628	5369.64	20-Apr-2022	493.49	4876.15	4876	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
KAFB-2629	5361.53	13-Jun-2022	489.91	4871.62	4872	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
KAFB-2630	5361.71	20-Apr-2022	212.22	5149.49	5149	above PGWS – SFG sediments	value not plotted	nm	KAFB	KAFB
KAFB-2631	5335.70	nm	nm	nm	nm	above PGWS – SFG sediments		nm	KAFB	KAFB
KAFB-2632	5329.08	20-Apr-2022	172.48	5156.60	5157	above PGWS – SFG sediments	value not plotted	nm	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 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		4920.91	KAFB	KAFB
KAFB-6301	5459.64	nm	nm	nm	nm	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
KAFB-7001	5322.87	nm	nm	nm	nm	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 not plotted	nm	KAFB	KAFB
KAFB-8351	5325.51	5-May-2022	444.02	4881.49	4881	Regional Aquifer – SFG sediments		4878.33	KAFB	KAFB
KAFB-ST105-EX01	5353.54	nm	nm	nm	nm	Regional Aquifer – SFG sediments		nm	KAFB	KAFB
Mesa del Sol-S	5302.67	3-Nov-2022	419.69	4882.98	4883	Regional Aquifer – SFG sediments		4882.23	USGS	NMOSE
Montessa Park-S	5102.67	3-Nov-2022	211.25	4891.42	4891	Regional Aquifer – SFG sediments		4890.42	USGS	ABCWUA
Site 58 MW-1	5721.74	nm	nm	nm	nm	Colluvium and Bedrock (granite)		nm	KAFB	KAFB
Site 58 MW-2	5715.94	nm	nm	nm	nm	Bedrock (granite)		nm	KAFB	KAFB
Site 58 MW-3	5717.88	nm	nm	nm	nm	Colluvium?		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 2022

Well ID	Measuring Point[a, b, c] (ft amsl, NAVD 88)	Date Measured (2022)[d]	Depth to Water (ft btoc, 2022)	Groundwater Elevation (ft amsl, 2022)	Groundwater Elevation, rounded (ft amsl, 2022)	Screened Unit	Comment, as needed	Groundwater Elevation (ft amsl, 2021)	Data Source	Well Owner
Site 58 MW-4	5722.31	nm	nm	nm	nm	Bedrock (granite)		nm	KAFB	KAFB
Site 58 MW-5	5716.83	nm	nm	nm	nm	Colluvium?		nm	KAFB	KAFB
Site 58 MW-6	5720.30	nm	nm	nm	nm	Colluvium and Bedrock (granite)?		nm	KAFB	KAFB
Site 58 MW-7	5717.76	nm	nm	nm	nm	Colluvium and Bedrock (granite)?		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	13-Jun-2022	358.65	4875.96	4876	Regional Aquifer – SFG sediments		4875.26	KAFB	KAFB
ST105-MW005	5287.57	nm	nm	nm	nm	Regional Aquifer – SFG sediments	NC - semiconfined?	nm	KAFB	KAFB
ST105-MW006	5313.26	13-Jun-2022	236.25	5077.01	5077	PGWS - SFG sediments	value not plotted	5076.82	KAFB	KAFB
ST105-MW007	5311.18	nm	nm	nm	nm	Regional Aquifer – SFG sediments	NC - semiconfined?	nm	KAFB	KAFB
ST105-MW008	5358.94	8-Aug-2022	478.10	4880.84	4881	Regional Aquifer – SFG sediments		4881.18	KAFB	KAFB
ST105-MW009	5519.71	13-Jun-2022	486.31	5033.40	5033	Regional Aquifer – SFG sediments		5032.20	KAFB	KAFB
ST105-MW010	5334.70	6-Oct-2021	445.66	4889.04	4889	Regional Aquifer – SFG sediments		4889.04	KAFB	KAFB
ST105-MW011	5422.66	8-Aug-2022	483.98	4938.68	4939	Regional Aquifer – SFG sediments		4939.01	KAFB	KAFB
ST105-MW012	5419.90	nm	nm	nm	nm	PGWS - SFG sediments	value not plotted	nm	KAFB	KAFB
ST105-MW013	5447.27	8-Aug-2022	436.82	5010.45	5010	Regional Aquifer – SFG sediments		5010.75	KAFB	KAFB
ST105-MW015	5623.95	8-Aug-2022	688.51	4935.44	4935	Regional Aquifer – SFG sediments	NC - nearby fault	4936.19	KAFB	KAFB
ST105-MW017	5621.97	13-Jun-2022	704.65	4917.32	4917	Regional Aquifer – SFG sediments	NC - nearby fault	4915.46	KAFB	KAFB
ST105-MW018	5221.68	13-Jun-2022	345.28	4876.40	4876	Regional Aquifer – SFG sediments		4875.50	KAFB	KAFB
ST105-MW019	5217.94	6-Oct-2021	342.65	4875.29	4875	Regional Aquifer – SFG sediments		4875.29	KAFB	KAFB
ST105-MW020	5383.72	13-Jun-2022	300.05	5083.67	5084	PGWS - SFG sediments	value not plotted	5083.83	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		4916.28	KAFB	KAFB
ST105-MW023	5275.86	6-Oct-2021	401.17	4874.69	4875	Regional Aquifer – SFG sediments		4874.69	KAFB	KAFB
ST105-MW024	5595.67	19-Oct-2020	346.19	5249.48	5249	Bedrock (granite)		5249.48	KAFB	KAFB
YALE-MW1	5308.45	9-Nov-2022	415.43	4893.02	4893	Regional Aquifer – SFG sediments		4892.60	ABCWUA	ABCWUA
YALE-MW9	5271.06	9-Nov-2022	370.65	4900.41	4900	Regional Aquifer – SFG sediments		4899.25	ABCWUA	ABCWUA
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 2022

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 a previous 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 (below the Perching Horizon and above the Regional Aquifer). Wells screened in the Regional Aquifer are not shaded.

ABCWUA = Albuquerque Bernalillo County Water Utility Authority
amsl = above mean sea level
AVN = Area-V (North)
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 (Lurance Canyon area)
D = deeper well completion
DOE/NNSA = 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. 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 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 below the Perching Horizon and above the Regional Aquifer and the PGWS.
NC – nearby fault = A buried (unmapped) fault appears to have a localized effect on groundwater.
NC – semiconfined = The screened unit maybe under semiconfined conditions or is hydraulically isolated.

nm = not measured
NMOSE = New Mexico Office of the State Engineer
NWTA3 = Northwest Technical Area-III
OBS = Old Burn Site
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)
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
USAF = U.S. Air Force
USGS = U.S. Geological Survey
W = Well
WYO = Wyoming
YALE = Yale Landfill area
? = Accuracy of information or interpretation is questionable.

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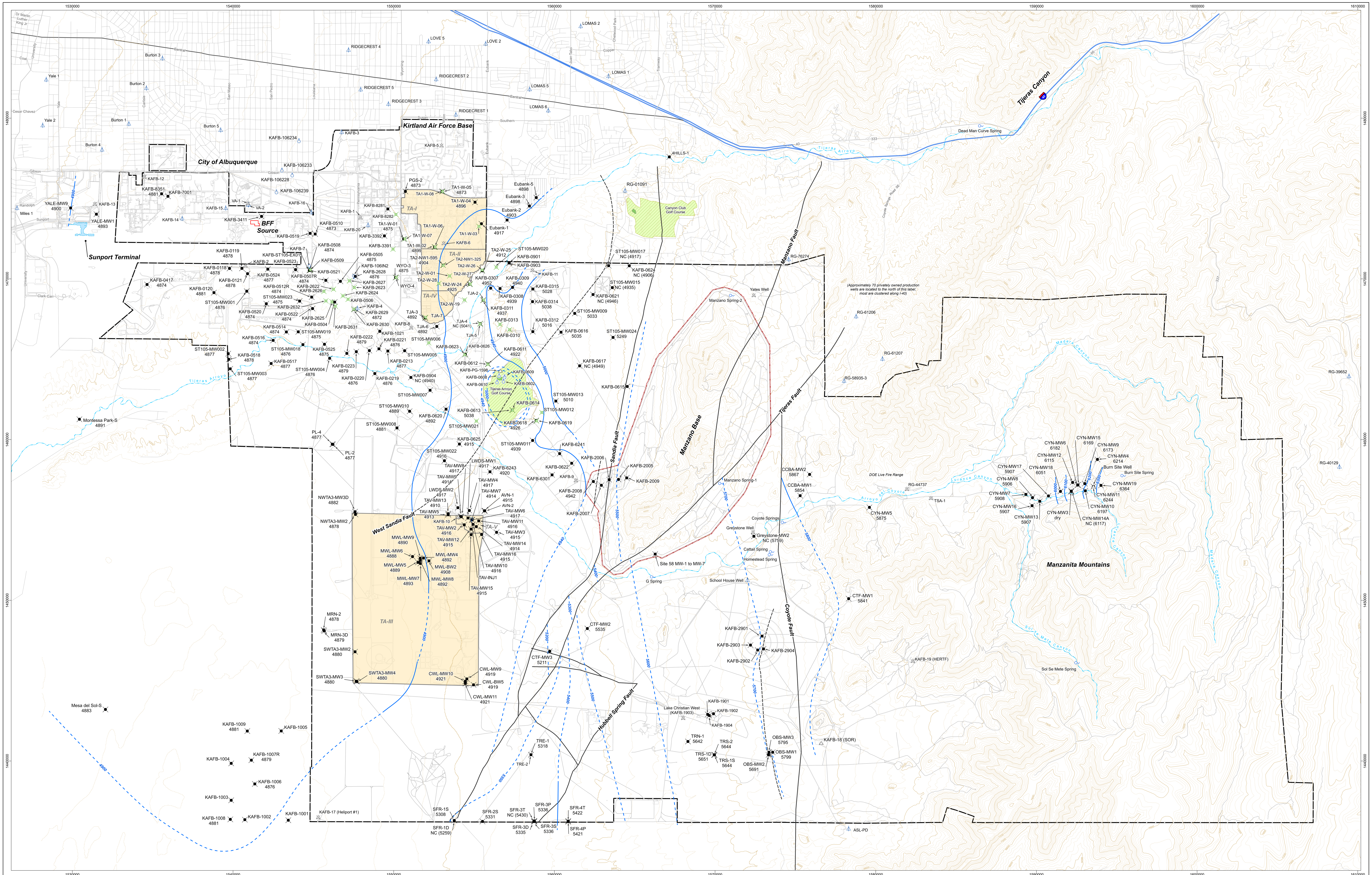

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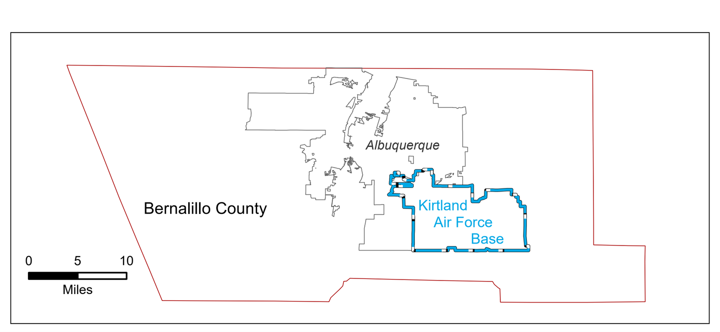
Meters 0 750 1,500

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, 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 3 October and 19 October, 2022. 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 recent 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 2022

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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