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Date: MAY 24 2018
Refer To: N3B-18-0115

John Kieling, Bureau Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303

Subject: Interim Facility-Wide Groundwater Monitoring Plan for the 2019 Monitoring Year, October 2018–September 2019

Dear Mr. Kieling:

Enclosed please find two hard copies with electronic files of the Interim Facility-Wide Groundwater Monitoring Plan for the 2019 Monitoring Year, October 2018–September 2019.

If you have any questions, please contact Steve Veenis at (505) 309-1362 (steve.veenis@em-la.doe.gov) or Hai Shen at (505) 665-5046 (hai.shen@em.doe.gov).

Sincerely,

for Joseph A. Legare
Program Manager
Environmental Remediation Program

Sincerely,

David S. Rhodes, Director
Office of Quality and Regulatory Compliance
Environmental Management
Los Alamos Field Office

JL/DR/SV

Enclosure(s): Two hard copies with electronic files – Interim Facility-Wide Groundwater Monitoring Plan for the 2019 Monitoring Year, October 2018–September 2019 (EM2018-0004)

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Steve Veenis, ER Program

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May 2018
EM2018-0004

Interim Facility-Wide Groundwater Monitoring Plan for the 2019 Monitoring Year, October 2018–September 2019

N3B Los Alamos

EM2018-0004

Interim Facility-Wide Groundwater Monitoring Plan for the 2019 Monitoring Year, October 2018–September 2019

May 2018

Responsible program director:

Printed Name	Signature	Title	Organization	Date
Bruce Robinson	[signature]	Program Director	Water Program	5/21/2018

Responsible N3B representative:

Printed Name	Signature	Title	Organization	Date
for Joe Legare	[signature]	Program Manager	N3B Environmental Remediation Program	5/21/18

Responsible DOE-EM-LA representative:

Printed Name	Signature	Title	Organization	Date
David S. Rhodes	[signature]	Office Director	Quality and Regulatory Compliance	5-23-2018

EXECUTIVE SUMMARY

This Interim Facility-Wide Groundwater Monitoring Plan (IFGMP) fulfills a requirement of the Compliance Order on Consent (hereafter, the Consent Order). Newport News Nuclear BWXT – Los Alamos, LLC (N3B) will collect and analyze groundwater and surface water samples at specific locations and for specific constituents to fulfill the requirements of the Consent Order. Groundwater-level data will also be collected because they are critical to understanding the occurrence and movement of groundwater. Four types of water are monitored: base flow (persistent surface water), alluvial groundwater, intermediate-perched groundwater, and regional aquifer groundwater. This IFGMP is updated annually and submitted to the New Mexico Environment Department (NMED) for approval. The 2019 IFGMP applies to the 2019 monitoring year from October 1, 2018, to September 30, 2019. The monitoring conducted under this plan is designed to enhance the understanding of groundwater within and beneath Los Alamos National Laboratory (LANL or the Laboratory). These data are used for characterization purposes to support corrective measures work conducted at numerous sites around the Laboratory and to support ongoing operations. The monitoring is conducted both inside and outside current Laboratory boundaries. Monitoring within current Laboratory boundaries takes place in seven major watershed groupings: Los Alamos Canyon/ Pueblo Canyon, Sandia Canyon, Mortandad Canyon, Pajarito Canyon, Water Canyon/Cañon de Valle, Ancho/Chaquehui/Frijoles Canyons, and White Rock Canyon/Rio Grande.

Most of the monitoring wells discussed in the IFGMP are assigned to area-specific monitoring groups related to project areas that may be located in more than one watershed. Area-specific monitoring groups are defined for Technical Area 21 (TA-21), Chromium Investigation, Material Disposal Area (MDA) C, TA-54, TA-16 260, and MDA AB. Locations not included within one of these six area-specific monitoring groups are assigned to the General Surveillance monitoring group.

Monitoring outside the Laboratory boundaries is conducted in areas (1) where Laboratory operations have occurred in the past (e.g., Guaje and Rendija Canyons) or (2) that historically have not been affected by Laboratory operations. To ensure water leaving the Laboratory does not pose an unacceptable risk to human and ecological receptors, this plan also includes monitoring downgradient of and outside Laboratory boundaries (e.g., the Rio Grande and springs in White Rock Canyon).

Monitoring locations were initially derived from Table XII-5 of the 2005 Consent Order, but the current list of monitoring locations represents the most recent annual updates to the 2019 IFGMP. The locations, analytical suites, and frequency of monitoring reflect the technical and regulatory status of each area-specific monitoring group.

The monitoring data collected under this plan are published in periodic monitoring reports submitted to NMED, and analytical results are made available to the public in the Intellus New Mexico database (available at www.intellusnm.com). In addition, groundwater data collected by N3B are reviewed monthly, and constituents exceeding any of the five screening criteria in Section XXVI of the 2016 Consent Order are reported monthly to the NMED Hazardous Waste Bureau.

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1.0 INTRODUCTION

The monitoring year (MY) 2019 Interim Facility-Wide Groundwater Monitoring Plan (IFGMP) fulfills the groundwater monitoring requirement in Section XII of the 2016 Compliance Order on Consent (the Consent Order). Section XII requires the IFGMP to be updated annually and anticipates that monitoring plans for specific areas will change as the groundwater investigation objectives in Section XII are met. This IFGMP applies to MY2019, from October 1, 2018, to September 30, 2019.

Groundwater monitoring has been conducted at Los Alamos National Laboratory (LANL or the Laboratory) for over 60 yr, starting with U.S. Geological Survey (USGS) water-supply studies in 1945 and Laboratory groundwater-quality monitoring in 1949. The first groundwater monitoring network consisted of water-supply wells, several observation wells, and springs. The monitoring network continued to evolve through the years as additional wells were installed during various environmental investigations, primarily in the shallow alluvial systems, as potential monitoring points.

Between 1997 and 2005, the Laboratory implemented a sitewide hydrogeologic characterization program, described in the Laboratory's "Hydrogeologic Workplan" (LANL 1998, 059599). The primary objective of this characterization program was to refine the Laboratory's understanding of the area's hydrogeologic systems and to improve its ability to design and implement an integrated sitewide groundwater monitoring plan. Building upon information obtained from this and other programs, the Laboratory subsequently refined the monitoring network design and implementation through a series of monitoring-well network evaluation reports and the delineation of area-specific monitoring groups. The original 2005 Consent Order was modified in April 2012 to provide the option for a site-specific groundwater monitoring plan in place of a watershed-specific monitoring plan, where appropriate. During the third quarter of fiscal year 2018, this work transitioned from the Laboratory, under the U.S. Department of Energy (DOE) National Nuclear Security Administration (NNSA), to Newport News Nuclear BWXT – Los Alamos, LLC (N3B), under the DOE Office of Environmental Management (EM).

This plan consists of nine sections, including this introduction, with supporting appendixes. Sections 2 through 7 describe the monitoring and site activities conducted in six area-specific monitoring groups: Technical Area 21 (TA-21); Chromium Investigation; Material Disposal Area (MDA) C; TA-54; TA-16 260; and MDA AB. Section 8 describes general surveillance monitoring in seven major watersheds or watershed groupings: Los Alamos/Pueblo Canyons, Sandia Canyon, Mortandad Canyon, Pajarito Canyon, Water Canyon/Cañon de Valle, the combined watersheds of Ancho/Chaquehui/Frijoles Canyons, and White Rock Canyon/Rio Grande. Section 9 includes a list of references cited in this report and the map data sources.

Appendix A is the list of acronyms and abbreviations used in the report, a metric conversion table, and the definitions of data qualifiers. Appendix B summarizes the methods and procedures used to conduct monitoring and the management of investigation-derived waste (IDW). Appendix C summarizes the objectives of the monitoring performed and the sampling frequencies and analytical suites for each monitoring group. Appendix D summarizes how field quality assurance (QA)/quality control (QC) results are used and the types of corrective actions that may be taken to address exceedances of target measures for each QA/QC sample type. Appendix E assesses the reliability of water-quality data collected from specific monitoring-network wells. Appendix F presents geologic cross-sections of the watersheds. Appendix G presents a map of the water table for the regional aquifer incorporating water-level data updated in November 2017 and a map illustrating the geology at the water table. Appendix H includes sampling and analysis crosswalks by monitoring group for the MY2018 versus MY2019 IFGMPs.

Information on radioactive materials and radionuclides, including the results of sampling and analysis of radioactive constituents, is voluntarily provided to the New Mexico Environment Department (NMED) in accordance with U.S. Department of Energy (DOE) policy.

1.1 Purpose

The IFGMP will address monitoring to

- determine the fate and transport of known legacy-waste contaminants,
- detect the arrival of potential contaminants in groundwater from previous releases,
- evaluate efficacies of corrective action remedies,
- support proposed corrective measures, and
- meet monitoring requirements of DOE Orders 436.1 and 458.1.

These objectives collectively assist N3B in identifying any adverse effects to surface water and groundwater resulting from historical Laboratory operations.

In addition, monitoring produces data required to evaluate risk and to assess regulatory compliance. Although the IFGMP does not specifically address how the data collected will be used in those evaluations, the design of the monitoring network is based on conceptual models of potential sources, hydrogeologic pathways, and receptors. The data collected are intended to meet the reporting requirements under the Consent Order.

This IFGMP focuses on monitoring activities at the area-specific monitoring groups for TA-21, Chromium Investigation, MDA C, TA-54, TA-16 260, and MDA AB. Monitoring of alluvial wells and springs that show a history of nondetects, that are located near other springs being monitored, or that are located in outlying areas away from Laboratory operations has been significantly reduced in recent years under the focused monitoring approach introduced in the 2011 IFGMP, Revision 1 (LANL 2011, 208811).

The current monitoring approach includes the following key elements to ensure groundwater protection.

- The spatial coverage of the current monitoring program will be maintained. The monitoring footprint in perched-intermediate and regional wells at all monitoring groups is retained.
- The selection of monitoring frequency and appropriate analytes is tailored to each specific area. The monitoring frequency for each monitoring group is determined based on the contamination status at each site, the rate of change in contaminant concentrations, the historical monitoring data, and the hydrogeological conditions governing contaminant fate and transport for the area.
- The groundwater monitoring program incorporates the use of sentinel wells to identify potential contaminant releases before they reach water-supply wells.
- Monitoring of key alluvial monitoring wells and springs will continue. The alluvial wells were selected at locations downgradient of ongoing Laboratory operations. Continued monitoring of these alluvial wells will allow detection of contaminant releases, should any occur.

Section 1.7 addresses key elements of monitoring network design, including sampling frequencies and analytical suites for locations assigned to area-specific and general surveillance monitoring groups.

Updates to monitoring within each watershed or monitoring group, including changes in monitoring frequency, analytical suites, and monitoring locations, are based on the following:

- Conceptual models in watershed investigation reports (IRs)
- Changes to the monitoring-well networks over time, including the addition of newly installed monitoring wells, the rehabilitation and conversion of multiscreen wells, and the removal of wells recently plugged and abandoned or planned for plugging and abandonment in the near-term
- Changes in well performance
- Monitoring objectives for the area-specific monitoring groups
- Programmatic data requirements to support decisions regarding corrective actions
- Regulatory direction specified in NMED approval letters related to earlier IFGMPs

1.2 Hydrogeologic Setting

Background information on the hydrology and geohydrology of the Pajarito Plateau is presented below. This information may provide useful context for reviewing the base flow and groundwater monitoring strategies presented in this IFGMP.

1.2.1 Hydrology of the Pajarito Plateau

Surface water hydrology on the Pajarito Plateau is generally characterized by short-duration storm runoff that predominantly occurs during the summer monsoon season and can sometimes occur during the fall. Storm runoff events typically last only several hours, but larger events or those that occur during wet antecedent conditions may have longer recessional flow that can last for a day or more. Except in very rare conditions, storm runoff is the only surface water that crosses the downgradient Laboratory boundary.

The conditions that are associated with persistent surface water (i.e., base flow) uniquely occur in the western portion of the Laboratory near the mountain front. The mountain-front setting is where seasonally persistent surface water is present in watersheds that head in the Jemez uplands. Persistent surface water occurs where canyon-bottom alluvium is saturated and limits transmission loss along the stream channel. Suballuvium geology is a major factor in where alluvial saturation can persist and can also affect where infiltration of alluvial groundwater occurs and thus where persistent surface water occurs.

Infiltration into fault-related fractures located along the Jemez Mountain front is known to daylight as springs that discharge along the western portion of the Pajarito Plateau, typically within canyons. Loss of the tree canopy during the Cerro Grande and Las Conchas fires and subsequent stripping of much of the mountain-front forest duff layer and soil appears to have resulted in significantly less water-storage capacity along the mountain front and an overall reduction in the occurrences and duration of persistent base-flow conditions. The effect of the fires on spring discharges is less apparent.

The various types of surface water, base flow, and storm water are generally in close hydrologic connection with alluvial groundwater that is present in limited sections of canyons. Alluvial saturation is generally from several feet to tens of feet thick, with water tables ranging from just below the ground surface to tens of feet below ground surface. Surface water and storm water may recharge alluvial aquifers, and alluvial aquifers sometimes daylight where alluvium thins or where channels are topographically lower than an upgradient alluvial groundwater table. These recharge/discharge conditions have been observed in Water Canyon, Cañon de Valle, Pajarito Canyon, Mortandad Canyon, Cañada del Buey, Sandia Canyon, and Los Alamos and Pueblo Canyons (including DP and Acid Canyons).

1.2.2 Geohydrology of the Pajarito Plateau

Stratigraphic units of the Pajarito Plateau include thick Quaternary ash-flow tuff sheets erupted from calderas located in the central part of the Jemez Mountain volcanic field, Pliocene alluvial fan deposits shed from the mountain block west of the Pajarito fault system, Pliocene basaltic and dacitic rocks erupted from the Jemez Mountains and Cerros del Rio volcanic fields, and Miocene alluvial fan and basin floor sedimentary deposits. The distribution of rock units is shown in cross-sections in Appendix F of this IFGMP. Major rock units are described in descending stratigraphic order below.

The Quaternary Tshirege Member of the Bandelier Tuff was erupted from the Valles Caldera and dominates the surface geology of the Pajarito Plateau, an east-dipping ignimbrite sheet that overlies the western part of the Española basin. It is a compound cooling unit that resulted from emplacement of successive rhyolite ash-flow tuffs separated by periods of inactivity that allowed for partial cooling before subsequent flows were deposited (Smith and Bailey 1966, 021584; Broxton and Reneau 1995, 049726). Because of the episodic nature of deposition, physical properties such as density, porosity, degree of welding, fracture density, and mineralogy vary as a function of stratigraphic position. Vertical variations in tuff properties were used to subdivide the Tshirege Member into mappable subunits that reflect localized emplacement temperature, thickness, gas content, and composition of the tuff deposits (Broxton and Reneau 1995, 049726; Lewis et al. 2002, 073785). The Tsankawi Pumice Bed forms a thin (~1 m) but widespread fall deposit at the base of the Tshirege Member. The upper Tshirege Member hosts numerous springs in the western part of the Laboratory. Discharge locations and well data suggest these springs are part of ribbon-like groundwater bodies that are associated with geologic contacts between subunits of the Tshirege Member (LANL 2011, 207069).

The Quaternary Cerro Toledo Formation (Gardner et al. 2010, 204421) is a sequence of epiclastic sedimentary rocks and tephras that records deposition of fluvial deposits during the time interval between eruptions of the Tshirege and Otowi Members of the Bandelier Tuff. It consists of tuffaceous gravels, sandstone, and siltstone derived from erosion of Cerro Toledo and Otowi Member tuffs from the east slopes of the Jemez Mountains. It also includes localized dacite-rich fluvial deposits eroded from the Tschicoma Formation in the eastern Jemez Mountains. The Cerro Toledo Formation was deposited by streams eroded into the top of the Otowi Member; consequently, these deposits have variable thicknesses and are absent in some areas. Perched groundwater at least 50 ft thick occurs in the lower part of the Cerro Toledo Formation in the western part of the Laboratory.

The Otowi Member is an ignimbrite sheet made up of nonwelded vitric ash-flow tuffs and thin beds of intercalated ash and pumice falls. The ash-flow tuffs contain abundant pumice supported by a matrix of poorly sorted glass shards, broken pumice fragments, phenocrysts (primarily sanidine and quartz), and volcanic lithics. The unit lacks the welding and crystallization zones that characterize the Tshirege Member. The Guaje Pumice Bed is the basal fall deposit of the Otowi Member and consists of fines-depleted gravel-sized vitric pumice, quartz and sanidine phenocrysts, and subordinate volcanic lithics. Perched groundwater is associated with the Guaje Pumice Bed and lower Otowi ash-flow tuffs in Los Alamos Canyon and Cañon de Valle.

The Pliocene Puye Formation was deposited as broad, coalescing alluvial fans shed eastward from the Jemez Mountain volcanic field into the western Española basin (Griggs and Hem 1964, 092516; Bailey et al. 1969, 021498). It is a heterogeneous assemblage of clast- to matrix-supported dacitic conglomerates, gravels, and lithic sandstones. The deposits are commonly poorly sorted and lack cementation and clay minerals. The Tschicoma Formation, which is exposed in the eastern

Jemez Mountains, was the primary source for these deposits. Puye alluvial fan deposits are intercalated with ancestral Rio Grande deposits of the Totavi Lentil beneath the eastern Pajarito Plateau. The Puye Formation is an important component of deep perched groundwater zones beneath Cañon de Valle and is the primary rock unit of the regional aquifer in the western and central part of the Laboratory.

Rocks of the Cerros del Rio volcanic field make up a significant portion of the stratigraphic sequence in the eastern part of the Laboratory where they interfinger with the upper part of the Puye Formation. The Pliocene Cerros del Rio volcanic series is a thick sequence of stacked mafic lava flows that are separated by interflow breccias, cinder or scoria zones, volcaniclastic and riverine sediments, phreatomagmatic deposits, and lake-bed deposits. The lava flows generally have massive interiors made up of dense, variably fractured basalt. These volcanic rocks generally occur in the vadose zone where they play important roles as host rocks for perched groundwater. However, the formation thickens southward where it becomes part of the regional aquifer.

Thick lobes of Pliocene Tschicoma Formation dacite lava flowed eastward into the western part of the Española basin from the Jemez Mountain volcanic field. These lavas were subsequently down-faulted and buried by Puye Formation alluvial fans in the western part of the Laboratory. Additional small-volume dacite lavas were erupted from volcanic vents in the region between the Jemez Mountain volcanic field and the Cerros del Rio volcanic field (Samuels et al. 2007, 204422). These small-volume dacites occur at scattered locations beneath the Pajarito Plateau and are similar in composition to Tschicoma lavas exposed in the Jemez Mountain volcanic field, but they more closely overlap the distribution and ages of mafic lavas of the Cerros del Rio volcanic field. The small-volume dacites are intercalated with alluvial fan deposits of the upper Puye Formation.

A sequence of unnamed Miocene pumiceous sediments underlies the Puye Formation throughout much of the Pajarito Plateau. Deposits are generally dominated by sand with subordinate silt and gravel and typically contain abundant vitric rhyolite pumice admixed with ash and lithic sands. Pumice clasts are similar in age and petrology to the late Miocene Bearhead Rhyolite (Justet and Spell 2001, 093391). These epiclastic sediments are interpreted as alluvial fans shed eastward from the Jemez Mountain volcanic field into the western Española basin (Broxton and Vaniman 2005, 090038). They make up part of the regional aquifer in the north-central part of the Laboratory.

The Miocene Chamita Formation of the Santa Fe Group is made up of axial river deposits consisting of the Hernandez and Vallito Members that were deposited on the floor of the Española basin. The Hernandez Member represents ancestral Rio Chama deposits, and the Vallito Member represents ancestral Rio Grande deposits. These south-flowing river systems merged in the vicinity of Buckman Mesa (Koning et al. 2007, 106122), and the separate members are grouped at the formation level beneath the Laboratory. The Chamita Formation consists of fine- to coarse-grained quartz sands and silty sands with minor microcline and felsic to intermediate volcanics; fine- to coarse-grained volcanic lithic sands; and sandy and silty gravels dominated by well-rounded felsic to intermediate volcanics and 1%–3% Precambrian quartzite. Some gravel deposits also contain subangular to subrounded intermediate volcanic clasts that probably represent input of sediment from tributary streams draining the Jemez Mountain volcanic field. These stratified deposits are variably cemented by calcite with poorly to non-cemented sands and gravels intercalated with cemented sandstones. Most water-supply wells on the Pajarito Plateau are completed in this formation. The upper part of the formation overlaps in age with Miocene Jemez Mountain volcanic field alluvial fan deposits, and it is likely that alluvial fan and axial river sediments interfinger along the western margin of the basin floor. Miocene basaltic lava flows are intercalated with Chamita Formation deposits beneath the eastern Pajarito Plateau.

1.3 Scope

The IFGMP describes the objectives for monitoring, the locations of sampling stations, the frequency of sampling, the field measurements taken at each location, and the analytical suites included in the monitoring plan for each watershed or monitoring group.

Four occurrences of water are monitored in this plan:

- *Base flow*—persistent surface water that is maintained by precipitation, snowmelt, effluent, and other sources
- *Alluvial groundwater*—water within the alluvium in the bottom of the canyons
- *Perched-intermediate groundwater*—localized saturated zones within the unsaturated zone
- *Regional groundwater*—deep, laterally continuous groundwater beneath the Pajarito Plateau

Groundwater is monitored routinely by collecting samples at wells and springs and by analyzing them for specific constituents. Groundwater monitoring refers to collecting data not only for water-quality analysis but also for water-level measurements. Water-level data are critical to understanding the occurrence and movement of groundwater and the responses of groundwater levels to recharge and water-supply-well pumping.

Surface water at the Laboratory is divided into the following three flow types:

- *Base flow*—persistent, but not necessarily perennial, stream flow. This stream flow is present for periods of weeks or longer. The water source may be effluent, springs, or shallow groundwater in canyons.
- *Snowmelt*—flowing water that is present because of melting snow. This type of water often may be present for several weeks or more (persistent) but may not be present at all in some years.
- *Storm runoff*—flowing water that is present in response to rainfall. These flow events are generally short-lived, with flows lasting from less than an hour to several days.

In some cases, depending on weather conditions, each flow type may be collected at a single location within a time span of a few days. At other times, the flow may represent a combination of these types.

Storm runoff and snowmelt monitoring is not addressed in this plan but through the National Pollutant Discharge Elimination System (NPDES) Individual Permit and Multi-Sector General Permit and under DOE Orders 436.1 and 458.1 for surveillance. Base flow (persistent water) and, in some cases, persistent flow derived from snowmelt are monitored under the IFGMP.

Monitoring under the IFGMP will take place in area-specific monitoring groups within seven major watershed groupings: Los Alamos/Pueblo Canyons, Sandia Canyon, Mortandad Canyon, Pajarito Canyon, Water Canyon/Cañon de Valle, the combined watersheds of Ancho/Chaquehui/ Frijoles Canyons, and White Rock Canyon. Monitoring outside the Laboratory boundary is conducted to collect baseline data in areas that have been affected by past Laboratory operations (e.g., Guaje and Rendija Canyons) or that have not been affected by Laboratory operations. This plan also includes monitoring in off-site areas that could potentially be impacted by the Laboratory (e.g., the Rio Grande and springs in White Rock Canyon). Figure 1.3-1 shows the areas addressed in this IFGMP.

The IFGMP is updated annually to incorporate new information collected during the previous year. Sampling locations, analytes, and sampling frequencies are evaluated and updated, as appropriate, to ensure adequate monitoring and monitoring objectives for the individual monitoring groups continue to be met. Information gained through characterization efforts, aquifer test results, water-level monitoring, network assessments, and water-quality data may be used to refine the monitoring plan for each monitoring group. In addition, the need to sample for analytes previously eliminated from sampling in various monitoring groups may be reevaluated during the development of the annual updates to the IFGMP. Regulatory input from NMED is also considered.

1.4 Reporting

Analytical results obtained from groundwater, base-flow, and spring samples collected under this IFGMP are provided in periodic monitoring reports (PMRs) prepared in accordance with Appendix E, Part IV, of the 2016 Consent Order. PMRs will be submitted quarterly on February 28, May 31, August 31, and November 30. Seven PMRs are prepared and submitted annually to fulfill reporting requirements under the Consent Order: one for each of the six area-specific monitoring groups and one for the General Surveillance monitoring group. Table 1.4-1 presents the anticipated PMR submittal schedule for MY2019. The PMR submittal dates presented in Table 1.4-1 are subject to change based on the actual completion dates of the quarterly sampling events that are reported in the PMRs.

N3B reviews analytical data from all groundwater monitoring conducted under the Consent Order that were received during the previous month and notifies NMED monthly of any exceedances of five criteria in accordance with Section XXVI of the 2016 Consent Order.

Analytical results provided in PMRs and monthly notifications are also made available to the public in the Intellus New Mexico database (available at www.intellusnm.com). The results are subject to the Protocol for Protecting Confidential Pueblo Information included in the Memorandum of Agreement dated June 18, 2015, agreed upon by DOE's NNSA Los Alamos Field Office, DOE's EM Los Alamos Field Office, and the Pueblo de San Ildefonso regarding the release of analytical data collected from groundwater and base-flow samples at locations within the Pueblo de San Ildefonso boundary.

1.5 Regulatory Context

This IFGMP fulfills groundwater monitoring requirements of the Consent Order as described in section 1.0. In addition to the Consent Order, groundwater monitoring is performed to satisfy other regulatory requirements, as summarized below. N3B has an integrated approach to monitoring groundwater, and many of the other regulatory requirements discussed below are fulfilled through the implementation of the monitoring performed under the IFGMP.

1.5.1 U.S. Department of Energy Environmental Protection Programs

Groundwater monitoring has been conducted in compliance with DOE orders related to environmental protection. DOE Order 436.1 requires an environmental management system at DOE facilities that includes surveillance and reporting. Surveillance monitoring has been conducted at the Laboratory since 1949; the Laboratory took over the surveillance monitoring program in 1970. Currently, N3B conducts groundwater-surveillance monitoring at wells located within the Laboratory boundary and also at off-site locations. These wells include alluvial, perched-intermediate, and regional aquifer wells. Some off-site monitoring is performed under cooperative agreements with Los Alamos County, which owns and operates water-supply wells within and near the Laboratory, and with the City of Santa Fe. Additional monitoring is performed under the annually updated Appendix A of the Memorandum of Understanding for Environmental Monitoring that is agreed upon by DOE, the Bureau of Indian Affairs, and the Pueblo de San Ildefonso. The results of surveillance monitoring are reported in annual environmental reports and in the Intellus New Mexico database. The environmental reports contain descriptions of the surveillance monitoring network, key results and trends, and the QA/QC program.

1.5.2 Resource Conservation and Recovery Act Hazardous Waste Facility Permit

Section VII of the Consent Order describes the integration of the current and any future Resource Conservation and Recovery Act (RCRA) Hazardous Waste Facility Permits with the Consent Order. Parallel supporting language is contained in Part 11.1 of the current permit. Groundwater monitoring for solid waste management units (SWMUs) and areas of concern (AOCs) and the regulated units at TA-54 are addressed through the monitoring requirements of this IFGMP.

1.6 Integration of Groundwater Monitoring

All groundwater monitoring under the IFGMP is conducted as an integrated activity that uses the same operating procedures, field sampling and analytical contracts, and data-management systems. For chemical analysis of water samples, N3B uses commonly accepted analytical methods called for under federal statutes (such as the Clean Water Act) and approved by the U.S. Environmental Protection Agency (EPA). N3B is responsible for obtaining analytical services that support monitoring activities. Samples for laboratory analysis are submitted to accredited contract laboratories. The analytical laboratory statement of work provides accredited contract laboratories the general QA guidelines and includes specific requirements and guidelines for analyzing water samples. The accredited contract laboratories are required to establish method detection limits (MDLs) and practical quantitation limits (PQLs) for target analytes.

Appendix B includes summaries of the procedures followed to measure water levels and collect water samples (sections B-1 and B-2) and to measure field parameters (section B-3). Field procedures follow guidelines from USGS water sample collection methods and industrial standards common to environmental sample collection and field measurements. The analytical methods, PQLs, and applicable background or screening levels used for each analyte are listed in section B-4. The management of IDW is discussed in section B-5.

1.7 Approach to Monitoring Network Design

The interim nature of this monitoring plan reflects an evolving monitoring network. The groundwater data collected under this plan are used for subsurface characterization, groundwater monitoring network evaluation, and supporting corrective measures. A Consent Order modification, approved by NMED on April 20, 2012, allows periodic groundwater monitoring to be conducted on an area-specific basis instead of a watershed basis, where appropriate.

Monitoring groups have been established to address monitoring requirements for locations within specific project areas (LANL 2010, 109830). These monitoring groups are shown on Plate 1 and include the following:

- TA-21
- Chromium Investigation
- MDA C
- TA-54
- TA-16 260
- MDA AB

Monitoring locations outside of the six area-specific monitoring groups delineated above are included in the General Surveillance monitoring group.

The analytical suites and frequency of monitoring for each monitoring group reflect the state of knowledge for a given project area, including what contaminants have been released and the nature and extent of the contaminants released. Recommendations for the analytical suites were determined by evaluating past Laboratory operations, past monitoring results, and direction from NMED. New wells are sampled for all analytical suites for at least four sampling rounds.

Table 1.7-1 presents applicable standards for surface water and groundwater quality, which are used as screening levels for evaluating monitoring results. Table 1.7-2 lists analytes, field preparation (filtered or unfiltered samples), and analytical methods used by accredited contract laboratories for samples collected under the IFGMP.

Appendix C summarizes the sampling frequencies and analytical suites for each monitoring group and explains how the monitoring objectives are protective of groundwater.

1.8 Sampling Frequency and Schedule

The IFGMP proposes sampling frequencies for each monitoring group location as described in the sampling tables in sections 2 through 8 (Tables 2.4-1 through 8.3-1). The sampling frequency for the current monitoring year is designated as M for monthly, Q for quarterly, S for semiannually, and A for annually. Some suites may be sampled less frequently than annually based on limited mobility of the contaminants (for example, polychlorinated biphenyls [PCBs] and dioxins/furans) or based on historical data indicating the contaminants are not present in a given monitoring group. In these cases, the sampling frequency may be designated B for biennially (every 2 yr), T for triennially (every 3 yr), or V for quinquennially (every 5 yr). The monitoring year during which the samples will be collected is listed in superscripted text following the B, T, or V sampling frequency designator.

Sampling under this IFGMP will be conducted in MY2019, from October 2018 to September 2019. Table 1.8-1 presents a proposed sampling schedule. Following submittal of this IFGMP to NMED, a finalized sampling schedule for each monitoring group or watershed will be developed to ensure the monitoring frequency is met during the implementation year of the plan. The Consent Order requires all monitoring wells within a watershed to be sampled within 21 d of the start of the groundwater sampling event. For this IFGMP, monitoring groups for project areas are the primary organizational structure for sampling, and sampling campaigns for project area monitoring groups will be completed within 21 d. Monitoring of White Rock Canyon locations within the General Surveillance monitoring group will be completed within 21 d, while other General Surveillance locations will be sampled throughout the year during sampling campaigns for nearby monitoring groups.

1.9 Water-Level Monitoring

Water levels are measured in groundwater monitoring wells immediately before each purge and sampling event. As such, all required water-level data for groundwater wells in a sampling event are collected within the 21-d sampling event period.

For most groundwater monitoring wells, water-level measurements are obtained from installed pressure transducers. In wells not equipped with pressure transducers, or in instances when the pressure transducer is not functioning properly, portable instrumentation is used to measure the water level (i.e., a “manual” measurement). The configuration of some wells does not permit manual water-level measurements to be taken (e.g., the well does not include an extra tube to accommodate a manual water-level probe). In these cases, historical water-level data are substituted for a measurement before purging and sampling.

Spring discharge and base-flow discharge are measured during sampling using installed or portable flumes. In cases where surface water flow is below the range of flume equipment, calculated estimates of flow are recorded based on field measurements of flow channel cross-section and flow velocity.

The pressure transducers discussed above allow water-level data to be recorded every 1 to 2 h. These data are used in conjunction with water-level data collected during the sampling events and from wells and/or well screens not sampled under the IFGMP (Table 1.9-1) to develop and validate the conceptual models.

Groundwater levels are also monitored in Los Alamos County water-supply wells in cooperation with Los Alamos County utilities personnel and in the Buckman well field in cooperation with the City of Santa Fe.

1.10 Wells That Are Historically Dry

Generally, historically dry wells are no longer monitored for water levels, except for a few wells in key locations (Table 1.9-1). Wells that intermittently show water (in response to large snowmelt years or precipitation events) may continue to be monitored for water levels using transducers and may be sampled if sufficient water is present during their respective watershed's sampling campaign and if the wells are included within the sampling tables in the IFGMP. New wells that do not yield sufficient water for sampling may still be retained in the monitoring plan to evaluate potential wetting responses and temporal changes in water levels.

1.11 Deviations to the Sampling Requirements

Occasionally, monitoring locations scheduled for a sampling campaign cannot be sampled for various reasons. In these cases, NMED is notified of deviations from the IFGMP in the PMRs, in accordance with the requirements of Appendix E, Part IV, of the 2016 Consent Order.

The following approach will be implemented when samples cannot be collected per the requirements of the IFGMP.

- Locations that are dry or that do not have adequate water for sampling during the scheduled sampling campaign will be sampled during the next scheduled sampling event for those locations. Locations that are consistently dry from year to year will be removed from the IFGMP.
- Locations that have limited water will be sampled according to a prioritized sampling suite prepared for the monitoring group or sampling location.
- If a location cannot be sampled because of pump or equipment failure, every effort will be made to repair the equipment, and the location will be sampled during the next scheduled sampling event for the location.
- If a location cannot be safely sampled because of changes in field conditions, the situation will be discussed with NMED personnel, and alternative sampling arrangements will be considered to ensure sampling can be conducted safely.
- If a location cannot be sampled within the 21-d sampling window because of access issues (for example, as a result of road damage from flooding or inaccessibility because of snow), N3B will work to reestablish access and to sample the location during the sampling campaign. If access cannot be reestablished during the campaign, the location will be sampled during the next scheduled sampling event for the location.

2.0 TECHNICAL AREA 21 MONITORING GROUP

2.1 Introduction

The TA-21 monitoring group is located in and around TA-21 and is primarily located in upper Los Alamos Canyon (Figure 2.1-1). The group includes monitoring wells completed in perched-intermediate groundwater and in the regional aquifer.

TA-21 is located on the mesa north of Los Alamos Canyon, which is joined by DP Canyon, east of TA-21. TA-21 consists of two historical operating areas, DP West and DP East, both of which produced liquid and solid radioactive wastes. The operations at DP West included plutonium processing, while the operations at DP East included the production of weapon initiators and tritium research. A total of 155 SWMUs and AOCs are located in TA-21. Immediately adjacent to the west end of TA-21, to the south in Los Alamos Canyon, is TA-02, the location of the former Omega West nuclear reactor. A total of 38 SWMUs and AOCs are located in TA-02.

2.2 Background

The occurrence of surface water and alluvial, perched-intermediate, and regional groundwater in Los Alamos Canyon is discussed in detail in section 7.2 of the Los Alamos and Pueblo Canyons IR (LANL 2004, 087390).

In upper Los Alamos Canyon, perennial flow originates from springs and interflow through hillslope soils. The downgradient extent of perennial flow varies but generally terminates in the upper portions of Los Alamos Canyon west of TA-41. The remainder of upper Los Alamos Canyon down to the confluence with Pueblo Canyon is characterized by ephemeral surface-water flow that is storm water–dependent. Within the vicinity of TA-21, surface water occurs predominantly as ephemeral flow in Los Alamos and DP Canyons. Ephemeral surface-water flows generally occur during runoff associated with thunderstorms.

In the vicinity of TA-21, alluvial groundwater occurs in Los Alamos Canyon and in stretches of DP Canyon. DP Canyon is typical of other dry canyons (Birdsell et al. 2005, 092048) based on its small drainage area and low-elevation headwaters. However, it previously received effluent discharges from operations at TA-21 [SWMU 21-011(k)]. It currently receives surface runoff from paved parking lots and roadways from within the Los Alamos townsite. These townsite runoff sources contribute to locally persistent alluvial groundwater beneath parts of the canyon floor, specifically the portion next to TA-21. There, alluvial deposits are thin (approximately 2 m [6 ft]) and are periodically recharged by surface-water flows that reach this part of the canyon. Surface water infiltrates the canyon bottom alluvial sediments until its downward movement is impeded by strata of lower-permeability, typically welded tuff at the top of unit Qbt 2 of the Tshirege Member. Despite the episodic nature of surface-water flow and thin nature of the alluvial deposits, transducer readings at alluvial well LAUZ-1 indicate the alluvium in this part of the canyon was continuously saturated from January 2008 to January 2010 (Koch and Schmeer 2010, 108926), suggesting the underlying welded tuffs are an effective perching horizon that inhibits deeper percolation.

Appendix D of the report titled “Technical Area 21 Groundwater and Vadose-Zone Monitoring Well Network Evaluation and Recommendations” (LANL 2010, 109947) describes known occurrences of perched-intermediate water beneath Los Alamos and Pueblo Canyons. Perched-intermediate zones nearest TA-21 are shown on the geologic cross-sections presented in Appendix F.

Perched-intermediate groundwater beneath Los Alamos and Pueblo Canyons results from percolation of surface water and alluvial groundwater derived from snowmelt and seasonal rainfall. Surface water in Pueblo Canyon was previously augmented by effluent released from the Pueblo Canyon wastewater treatment plant (WWTP) from 1951 to 1991 and the Central WWTP from 1947 to 1961. Perched-intermediate groundwater beneath lower Pueblo Canyon includes contributions of canyon-floor effluent percolation from the Bayo WWTP that operated from 1963 to 2007 and the Los Alamos WWTP that began to operate in 2007.

The most significant perched-intermediate groundwater in the vicinity of TA-21 occurs within the Guaje Pumice Bed and the underlying Puye Formation beneath Los Alamos Canyon. Near TA-21, saturated thicknesses for these occurrences range from about 9 ft at LADP-3 to more than 31 ft at LAOI-3.2a. The depth to perched-intermediate groundwater ranges from 124 ft to 746 ft below ground surface (bgs). These perched groundwater occurrences are probably part of a larger integrated system that extends over 3.5 mi along the axis of Los Alamos Canyon from H-19 to LAOI-3.2 and LAOI-3.2a and may extend locally to the south (Appendix F).

Based on these observations, it appears an important control of intermediate-zone groundwater flow in the vicinity of TA-21 is the contact between the Guaje Pumice Bed and the underlying Puye Formation. Structure contours indicate the downdip direction for the base of the Guaje Pumice Bed is towards the south, southeast, and southwest in the vicinity of TA-21. The control exerted on groundwater flow by the Guaje Pumice Bed suggests perched water beneath Los Alamos Canyon should move generally southward away from TA-21.

The occurrence of thicker perched-intermediate zones in the eastern part of Los Alamos Canyon may be the result of enhanced percolation where the canyon floor is underlain by Cerros del Rio basalts rather than by the Bandelier Tuff. Because the Cerros del Rio basalt does not extend as far west as the developed portion of TA-21, it is unlikely the eastern perched zones of Los Alamos Canyon extend beneath the TA-21 area. To date, no perched-intermediate groundwater has been encountered during drilling on DP Mesa.

The regional aquifer includes confined and unconfined zones. The shallow portion of the regional aquifer is predominantly unconfined, and the deeper portion of the aquifer is predominantly confined. Groundwater flow in the shallow portion of the regional aquifer generally follows the gradient of the water table. The deep portion of the regional aquifer is predominantly under confined conditions that are affected by water-supply pumping on the Pajarito Plateau.

Near TA-21, the upper surface of the regional aquifer is located in the Puye Formation and in the Santa Fe Group. The depths to water range from 707 ft to 1159 ft bgs (Koch and Schmeer 2011, 201566). The regional aquifer beneath the east end of DP Mesa occurs at a depth of 1159 ft bgs, based on water levels measured in well R-6. Shallow regional groundwater in the vicinity of TA-21 generally flows to the east-northeast.

Contaminant Sources and Distributions

The primary sources of contaminants near the TA-21 monitoring group include the SWMU 21-011(k) outfall, the adsorption beds and disposal shafts at MDA T, the adsorption beds at MDA U, the former Omega West Reactor cooling tower (SWMU 02-005) and outfall, DP West, and waste lines and sumps. Other potential sources include DP East and leakage from an underground diesel fuel line as well as past releases from the former Omega West Reactor.

Mobile contaminants such as tritium, nitrate, and perchlorate released at the SWMU 21-011(k) outfall have been dispersed by surface water and alluvial groundwater down DP and Los Alamos Canyons. Contaminants are present in perched-intermediate groundwater near the north boundary of TA-21 and DP Canyon (at well R-6i), near the confluence of DP and Los Alamos Canyons (at wells LAOI-3.2, and

LAOI-3.2a), farther down Los Alamos Canyon (at LAOI-7 and R-9i), and beneath Mesita de Los Alamos (at R-53i).

The lower reach of DP Canyon is the likely location of percolation for mobile contaminants such as tritium, nitrate, and perchlorate detected in perched groundwater at wells R-6i, LAOI-3.2, and LAOI-3.2a. Percolation at the confluence with DP Canyon (near wells LAOI-3.2/LAOI-3.2a) may be further enhanced by surface water runoff and alluvial groundwater in Los Alamos Canyon, contributing to the deeper perched-intermediate zones observed beneath the confluence of the two canyons. The zones of perched-intermediate groundwater occur within the Guaje Pumice Bed and the underlying Puye Formation near the confluence of the two canyons.

Contaminant concentrations are at background levels in regional groundwater monitoring wells near TA-21 (e.g., R-6, R-8, and R-64), suggesting that deep percolation through the vadose zone, including migration from perched groundwater, does not reach the regional aquifer near TA-21. This observation is also supported by the absence of tritium activity in the regional screen in R-7, although the absence of nitrate and perchlorate detections at this location is not conclusive because of reducing conditions in the screened interval that may be attributed to residual organic drilling products. The regional aquifer near former Test Well (TW) 3 shows levels of contamination above background, but this may be related to leakage around the well casing from the absence of annular seal in this older well. TW-3 was plugged and abandoned in early 2012. Tritium and perchlorate are slightly elevated in the regional aquifer at R-9, located farther down Los Alamos Canyon. These far-field contaminants may have originated at SWMU 21-011(k).

2.3 Monitoring Objectives

The monitoring objectives for the TA-21 monitoring group presented in this IFGMP are based in part on the results and conclusions presented in the Los Alamos and Pueblo Canyons IR (LANL 2004, 087390) as well as on the NMED-approved “Los Alamos and Pueblo Canyons Groundwater Monitoring Well Network Evaluation and Recommendations, Revision 1” (LANL 2008, 101330).

Sampling over the last few years has generated a substantial data set from perched-intermediate and regional groundwater wells located in and next to Los Alamos Canyon. Data from these wells indicate the importance of lateral migration of perched-intermediate groundwater and regional groundwater flow directions. This information can lead to a groundwater monitoring domain that may extend beyond the footprint of a watershed where the initial release occurred.

Monitoring for TA-21 is focused on perched-intermediate and regional wells surrounding TA-21 that monitor for potential releases from mesa-top sites and the fate of mobile constituents historically released into DP Canyon from SWMU 21-011(k). The key constituents detected in nearby perched-intermediate and regional groundwater wells include nitrate, perchlorate, and tritium. Base-flow and alluvial groundwater wells near and downgradient of TA-21 are not part of the TA-21 monitoring group because the source(s) of constituents detected in these wells is terminated or controlled, and residual concentrations are stable, declining, or no longer present.

2.4 Scope of Activities

All active monitoring locations in the TA-21 monitoring group are located in the Los Alamos Canyon/ Pueblo Canyon watershed. Monitoring locations include intermediate-perched groundwater wells and regional groundwater wells, which are shown in Figure 2.1-1.

Table 2.4-1 presents sampling locations, analytical suites, and monitoring frequencies for the TA-21 monitoring group. The analytical suites and frequencies specified are based on the results of applicable IRs, previous reviews of monitoring data, and direction from NMED as stated in its approval with modifications for the 2011 IFGMP, Revision 1 (NMED 2012, 520410).

The majority of the wells in the TA-21 monitoring group are sampled annually. The objectives for the sampling frequencies and analytical suites are presented in Table C-1.

3.0 CHROMIUM INVESTIGATION MONITORING GROUP

3.1 Introduction

The Chromium Investigation monitoring group is located in Sandia and Mortandad Canyons (Figure 3.1-1). To date, the primary focus of groundwater monitoring in this group has been characterization and fate and transport of chromium and related contaminants in perched-intermediate groundwater and within the regional aquifer. The objective for MY2019 incorporates performance monitoring for an interim measure (IM) that is underway to control contaminant migration along the periphery of the plume in the regional aquifer, and for plume-center characterization activities (LANL 2015, 600458; LANL 2015, 600615). The monitoring objectives are described in more detail in section 3.3.

Sandia Canyon heads on Laboratory property within TA-03 at an elevation of approximately 7300 ft and trends east-southeast across the Laboratory, Bandelier National Monument, and Pueblo de San Ildefonso. Sandia Canyon empties into the Rio Grande in White Rock Canyon at an elevation of 5450 ft. The area of Sandia Canyon watershed is approximately 5.5 mi^2. The head of the canyon is located on the Pajarito Plateau at TA-03. Perennial stream flow and saturated alluvial groundwater conditions occur in the upper and middle portions of the canyon system because sanitary wastewater and cooling tower effluent discharge to the canyon from operating facilities. A wetland of approximately 7 acres has developed as a result of the wastewater and cooling tower effluent discharge. Sandia Spring is located in lower Sandia Canyon near the Rio Grande. TAs located in the Sandia Canyon watershed include TA-03, TA-53, TA-60, TA-61, TA-72, and former TA-20. A total of 264 SWMUs and AOCs are located within the portions of these TAs in the Sandia Canyon watershed.

Wells in the monitoring group also address historical releases from Outfall 051, which discharged from the Radioactive Liquid Waste Treatment Facility (RLWTF) in Mortandad Canyon. No effluent has been released at Outfall 051 since November 2010.

Mortandad Canyon is an east-to-southeast trending canyon that heads on the Pajarito Plateau near the main Laboratory complex at TA-03 at an elevation of 7380 ft (Figure 1.2-1). The drainage extends about 9.6 mi from its headwaters to its confluence with the Rio Grande at an elevation of 5440 ft. The canyon crosses Pueblo de San Ildefonso land for several miles before joining the Rio Grande (LANL 1997, 056835). The Mortandad Canyon watershed is located in the central portion of the Laboratory and covers approximately 10 mi^2. Pueblo de San Ildefonso lies immediately next to a portion of the Laboratory’s eastern boundary and includes the eastern end of Mortandad Canyon. The Mortandad Canyon watershed contains several tributary canyons that have received contaminants released during Laboratory operations. The most prominent tributary canyons include Ten Site Canyon, Pratt Canyon, Effluent Canyon, and Cañada del Buey. TAs located in the Mortandad Canyon watershed include TA-03, TA-05, TA-35, TA-48, TA-50, TA-52, TA-55, TA-60, TA-63, former TA-04, and former TA-42. A total of 257 SWMUs and AOCs are located within the portions of these TAs in the Mortandad Canyon watershed.

3.2 Background

Sources of surface water in the Sandia watershed are currently dominated by effluent releases. Effluent water releases to Sandia Canyon have occurred since the early 1950s and continue today, with the primary source being treated sanitary wastewater and steam plant discharges at Outfall 001 and lesser sources being cooling tower blowdown. Data from 2007 and 2008 indicate the NPDES outfalls contribute approximately 75% of the total surface-water flow in Sandia Canyon, with storm water runoff and snowmelt contributing the remainder (LANL 2008, 102996, Appendix C).

The Sanitary Effluent Reclamation Facility (SERF) began further treating the sanitary wastewater stream in July 2012 to meet two goals: (1) to reduce PCB levels to meet stricter effluent limits and (2) to increase the number of cooling water circulation loops for cooling towers at the Strategic Computing Complex (SCC). These changes were implemented in 2012 and 2013. The long-term discharges and runoff support a wetland near the head of Sandia Canyon. Persistent surface flow occurs through the wetland and into the narrow bedrock portion of the upper canyon.

Surface water in Mortandad Canyon is ephemeral and occurs infrequently in lower Mortandad Canyon. Effluent releases from the RLWTF have historically supported surface water in middle Mortandad Canyon, but those contributions have ceased. The lower canyon is characterized by a broad flat canyon floor with a decreasingly defined channel towards the Laboratory boundary. It contains thick alluvial deposits (up to 30 m [100 ft]) that rapidly accommodate the rare storm water flows that extend into this part of the canyon.

Alluvial groundwater in Sandia Canyon is recharged daily by surface-water flow, largely supplied by effluent from NPDES Outfall 001 and periodically by storm water. This groundwater generally accumulates in the lower part of the alluvial deposits that fill the canyon bottom, most often perching on or within underlying bedrock units. Effluent volume has been significantly reduced in recent years because of reuse occurring at the SCC. Alluvial saturation was historically present between alluvial wells SCA-2 and SCA-5, with the most persistent perched alluvial groundwater occurring between alluvial wells SCA-2 and SCA-4. New alluvial piezometers were installed in this area in 2016 (LANL 2017, 602134). Water-level data from these piezometers will provide new insights into the extent of alluvial saturation under the reduced effluent volume currently being released from NPDES Outfall 001.

In Mortandad Canyon, alluvial groundwater storage is limited in the upper reaches but increases downcanyon in wider, thicker alluvial deposits (LANL 2006, 094161). Small outfall and runoff sources in upper Effluent Canyon create localized areas of surface water and possibly minor alluvial groundwater. The extent of alluvial saturation in Mortandad Canyon is historically variable and depends primarily on variations in runoff and effluent volume; the extent has decreased recently with the decrease of effluent from RLWTF.

A zone of perched-intermediate groundwater occurs within the Puye Formation on top of the Cerros del Rio basalt between well SCI-1 and borehole SCC-4, where it ranged from approximately 1 ft to 25 ft thick and generally thinned to the west. This perched zone in Sandia Canyon is probably recharged by percolation of alluvial groundwater through the underlying bedrock units before perching on top of the basalt. The perching layer for this perched-intermediate groundwater is the top of the Cerros del Rio basalt. The top of the Cerros del Rio basalt also acts as a perching horizon at perched-intermediate well MCOI-4 in Mortandad Canyon, indicating this contact has favorable characteristics for perching groundwater.

A second perched-intermediate zone is penetrated by well SCI-2 within fractured lavas and interflow breccias in the lower part of the Cerros del Rio basalt. The thickness of the perched zone is uncertain but ranges between 45 ft and 100 ft. The lava flows hosting the perched groundwater at well SCI-2 were deposited over a south- to south-southeast-dipping surface that developed on top of the Puye Formation.

Perched-intermediate groundwater was not encountered at regional wells R-11, R-35a, R-35b, R-36, R-28, R-44, R-45, R-61, or R-62, suggesting the perched zones at wells SCI-1 and SCI-2 are connected to the regional aquifer over a limited area beneath Sandia and Mortandad Canyons.

The shallow portion of the regional aquifer beneath Sandia and Mortandad Canyons is predominantly unconfined. Groundwater flow in the shallow portion of the regional aquifer generally follows the gradient of the water table. Groundwater flow and water levels within the deeper portion of the regional aquifer are impacted by water-supply pumping, with the largest fluctuations in water levels observed at well R-35a, located close to water supply well PM-3.

In the vicinity of the Chromium Investigation monitoring group, the water table is located within the Miocene Pumiceous unit and the Puye Formation.

Contaminant Sources and Distributions

Chromium concentrations exceed the NMED groundwater standard in the regional aquifer at monitoring wells R-28, R-42, R-45 screen 1, and R-50, located in Mortandad Canyon; R-43, located in Sandia Canyon; and R-62, located on the mesa between Sandia and Mortandad Canyons. The primary source of chromium is blowdown water discharged from the TA-03 power plant cooling tower from 1956 to 1972. Other constituents detected above background in wells in the monitoring group include sulfate, nitrate, and tritium. A conceptual model for the sources and distributions of these contaminants is presented in the 2009 “Investigation Report for Sandia Canyon” (hereafter, the Sandia Canyon IR) (LANL 2009, 107453) and updated in the “Phase II Investigation Report for Sandia Canyon” (hereafter, the Sandia Canyon Phase II IR) (LANL 2012, 228624). These two IRs present the results of the chromium and related studies conducted to date to address the nature and extent and the fate and transport of chromium and other contaminants originating in the Sandia Canyon watershed. A more recent update to the conceptual model is included in multiple appendixes of the “Compendium of Technical Reports Conducted Under the Work Plan for Chromium Plume Center Characterization” (LANL 2018, 602964).

The conceptual model hypothesizes chromium and other contaminants originate from releases into Sandia Canyon with lateral migration pathways that move contamination to locations beneath Mortandad Canyon. For this reason, perched-intermediate and regional wells beneath Mortandad Canyon are included in the Chromium Investigation monitoring group. Other sources of contamination beneath Sandia and Mortandad Canyons are from Mortandad Canyon sources, particularly historical releases from the RLWTF outfall (LANL 2006, 094161; LANL 2018, 602964). Lateral migration from Los Alamos Canyon sources [including SWMU 21-011(k), which discharged to DP Canyon] appears also to be detected. These sources and the migration pathways are discussed in the Sandia Canyon IR (LANL 2009, 107453; LANL 2018, 602964).

3.3 Monitoring Objectives

Historically, the key objective of the Chromium Investigation monitoring group was to characterize the fate and transport behavior of chromium and related contaminants originating from various sources principally within Sandia and Mortandad Canyons. Monitoring in and beneath Sandia Canyon and adjacent canyons focused on acquiring a fundamental understanding of the nature and extent of contaminants originating in the Sandia Canyon watershed, with an emphasis on chromium contamination because chromium concentrations exceed groundwater standards in the regional aquifer. The objective for the Chromium Investigation monitoring group in MY2019 addresses a shift from monitoring constituent fate and transport within the plume to performance monitoring associated with the IM and plume-center characterization activities.

Localized pumping and injection under the IM was conducted in the first half of 2017 before being paused for construction of additional infrastructure. The IM involves pumping contaminated groundwater from extraction wells, treating water at the surface using ion exchange, and reinjecting the water through a series of injection wells located along the plume periphery. Several of the monitoring wells are ideally located for monitoring the performance of the IM. The IM performance monitoring wells currently include R-50 screens 1 and 2, R-45 screens 1 and 2, R-44 screens 1 and 2, R-35a, R-35b, R-11, R-61 screen 1, and SIMR-2. This set of wells was selected because their locations are in areas that provide insights into the efficacy of IM actions. To monitor performance of the IM and to optimize understanding of the plume response to the IM actions, these wells will be monitored monthly (see section 3.4 and Table 3.4-1). Field pilot tests at R-28 and R-42 using amendments to assess potential in situ remediation strategies will continue in MY2019. Monitoring at these wells is being conducted under a separate sampling and analysis plan that is periodically adjusted based on evolving results of the pilot study. Revisions to this sampling plan will be provided to NMED. Sampling of the regional aquifer piezometers in the Chromium Investigation monitoring group area will also be conducted as part of an IM performance monitoring plan that is pending submittal to NMED.

Base-flow locations and alluvial wells in Sandia Canyon are excluded from the Chromium Investigation monitoring group because the primary contaminants of concern are at low and very stable concentrations in these media (LANL 2009, 107453). In Mortandad Canyon, contaminants in the surface water and alluvial groundwater have shown a marked decrease in concentration as a result of improvements in the treatment processes at the TA-50 RLWTF (see Figures 7.2-17, 7.2-18, and 7.2-25 of the Mortandad Canyon IR [LANL 2006, 094161]). The steadily decreasing trend of the contaminant concentrations in surface water and alluvial groundwater supports the inclusion of base-flow and alluvial well monitoring locations in the General Surveillance monitoring group (section 8). Data from these monitoring locations should provide sufficient information to continue verifying decreasing trends in contaminant concentrations in alluvial groundwater.

3.4 Scope of Activities

The Chromium Investigation monitoring group includes monitoring well locations in Sandia and Mortandad Canyons. Active monitoring locations in this group include perched-intermediate and regional aquifer wells, which are shown in Figure 3.1-1.

Table 3.4-1 specifies sampling frequencies and analytical suites for Chromium Investigation monitoring group monitoring locations. The specified analytical suites and frequencies are based on the results of applicable IRs, previous reviews of monitoring data, and performance monitoring objectives.

4.0 MATERIAL DISPOSAL AREA C MONITORING GROUP

4.1 Introduction

The MDA C monitoring group includes nearby regional monitoring wells on the mesa top and in Mortandad Canyon (Figure 4.1-1). MDA C is located on Mesita del Buey in TA-50, at the head of Ten Site Canyon. TA-50 is bounded on the north by Effluent and Mortandad Canyons, on the east by the upper reaches of Ten Site Canyon, on the south by Twomile Canyon, and on the west by TA-55.

MDA C (SWMU 50-009) is an inactive 11.8-acre landfill consisting of 7 disposal pits and 108 shafts. Between 1948 and 1974, solid low-level radioactive wastes and chemical wastes were disposed of in the landfill. The depths of the 7 pits at MDA C range from 12 ft to 25 ft below the original ground surface. The depths of the 108 shafts range from 10 ft to 25 ft below the original ground surface. The original ground surface is defined as beneath the cover that was placed over the site in 1984. The pits and shafts are constructed in the Tshirege Member of the Bandelier Tuff. The regional aquifer is estimated to be approximately 1330 ft deep based on the water level in well R-46 (LANL 2009, 105592). The topography of MDA C is relatively flat, although the slope steepens to the north where the northeast corner of MDA C abuts the south wall of Ten Site Canyon.

4.2 Background

MDA C is located on a mesa top, so no shallow alluvial groundwater is present in the immediate vicinity. The nearest surface water is found in Effluent Canyon to the north and in Pajarito Canyon and Twomile Canyon to the south.

No perched groundwater or intermediate-depth saturated horizons were encountered during previous investigations at MDA C (LANL 1998, 059599; LANL 2005, 091493, p. 6) or in any of the boreholes drilled during the Phase III investigation at MDA C (LANL 2011, 204370). No perched groundwater was encountered during the drilling of regional wells R-46 or R-60.

Regional monitoring wells R-46 and R-60 are located downgradient of MDA C (Figure 4.1-1) (LANL 2009, 105592; LANL 2011, 111798). The upper surface of the regional aquifer is located within the lower Puye Formation or the upper pumiceous deposits of the Santa Fe Group, and the depths to water range from approximately 1320 ft to 1330 ft bgs (Koch and Schmeer 2011, 201566). Near MDA C, the direction of shallow groundwater flow in the regional aquifer is to the east-southeast.

Contaminant Sources and Distributions

Vapor-phase volatile organic compounds (VOCs) and tritium are present in the upper 500 ft of the unsaturated zone beneath MDA C (LANL 2011, 204370). The primary vapor-phase contaminants beneath MDA C are trichloroethene (TCE) and tritium. No evidence has been found of groundwater contamination in the regional aquifer. MDA C is located on a mesa top above thick, unsaturated units of the Bandelier Tuff, and therefore, present-day aqueous-phase transport is generally assumed to be minimal.

4.3 Monitoring Objectives

Monitoring objectives for the MDA C monitoring group are to supplement existing vadose zone pore-gas monitoring to refine the nature and extent of contamination and to assess the fate and transport of the current vadose zone contaminant distribution. The monitoring will also support the remedy selection process for MDA C.

4.4 Scope of Activities

The MDA C monitoring group consists of three regional groundwater monitoring wells, R-14, R-46, and R-60, as shown in Figure 4.1-1. Table 4.4-1 presents sampling locations, analytical suites, and monitoring frequencies for the MDA C monitoring group. The specified analytical suites and frequencies are based on the results of applicable IRs, previous reviews of monitoring data, and direction from NMED as stated in its approval with modifications for the 2011 IFGMP, Revision 1 (LANL 2011, 208811; NMED 2012, 520410).

The wells in the MDA C monitoring group are sampled semiannually. The objectives for the sampling frequencies and analytical suites are presented in Table C-1.

5.0 TECHNICAL AREA 54 MONITORING GROUP

5.1 Introduction

At TA-54, groundwater monitoring is conducted to support both the corrective measures process for SWMUs and AOCs (particularly MDAs G, H, and L) under the Consent Order and in support of the RCRA permit. The TA-54 monitoring group was established to address the monitoring requirements for all portions and aspects of TA-54 (Figure 5.1-1). The TA-54 monitoring group includes both perched-intermediate and regional wells in the near vicinity. Other downgradient wells have general relevance to TA-54 and other upgradient sources but are not considered part of the TA-54 monitoring network and are not discussed in this section.

TA-54 is situated in the east-central portion of the Laboratory on Mesita del Buey. TA-54 includes four MDAs designated as G, H, J, and L; a waste characterization, container storage, and transfer facility (TA-54 West); active radioactive waste storage and disposal operations at Area G; hazardous and mixed-waste storage operations at Area L; and administrative and support areas. The transfer facility is located at the western end of TA-54. MDAs H and J are located approximately 150 m and 305 m (500 ft and 1000 ft) southeast of the transfer facility, respectively. MDA L is located approximately 1.6 km (1 mi) southeast of the transfer facility. MDA G subsurface units are located within Area G approximately 0.8 km (0.5 mi) southeast of MDA L. A total of 47 SWMUs and AOCs are located within TA-54.

Mesita del Buey is a 100-ft- to 140-ft-high finger-shaped mesa that trends southeast. The elevation of Mesita del Buey ranges from 6750 ft to 6670 ft at Area G. The mesa is approximately 500 ft wide and is bounded by the basin of Cañada del Buey (450 ft to the north) and the basin of Pajarito Canyon (360 ft to the south) (Figure 5.1-1).

5.2 Background

The TA-54 monitoring group is located in the Pajarito and Mortandad Canyon watersheds, and the occurrence of surface water, alluvial groundwater, and perched-intermediate and regional groundwater is discussed in detail in section 7.2 of the “Pajarito Canyon Investigation Report, Revision 1” (hereafter, Pajarito Canyon IR) (LANL 2009, 106939). The Mortandad Canyon setting is discussed in section 3.

Sources of surface water in the Pajarito watershed currently include snowmelt, storm water runoff, and discharges at several springs. Ephemeral-intermittent surface-water flow within the TA-54 monitoring group area occurs in Pajarito Canyon.

The primary alluvial groundwater body in Pajarito Canyon extends east from below the confluence with Twomile Canyon to approximately regional well R-23, a distance of 7 km (4.4 mi). Spatially restricted bodies of alluvial groundwater are also present west of the Twomile Canyon confluence and extend upcanyon to springs in the south fork of Pajarito Canyon (Upper Starmer Spring) and Pajarito Canyon above the south fork confluence (Homestead Spring). The alluvial groundwater is recharged by stream flow and some local precipitation. It accumulates in the alluvial deposits that fill the canyon bottom, often perching on shallow bedrock units. The alluvial groundwater extends farther downcanyon than stream flow does because some downcanyon lateral flow occurs within the alluvium. Alluvial groundwater acts as a source of water percolating into the deeper tuff units above the Cerros del Rio basalt, which is very near the surface at well R-23. The extent of this groundwater helps to define deeper percolation zones within the canyon. Overall, lateral flow within the alluvium and deeper percolation of alluvial groundwater into underlying bedrock may provide a driving force for subsurface transport of soluble contaminants along the length of the canyon and into the deeper subsurface.

Perched-intermediate groundwater occurs in a variety of settings beneath the Pajarito watershed. Occurrences are known from deep groundwater investigations and from more localized site investigations. Perched-intermediate horizons are present in the Bandelier Tuff in the upper portion of the watershed and in the Cerro Toledo interval, Puye Formation, dacitic lavas, and Cerros del Rio lavas in the middle and lower portions of Pajarito Canyon. The location and nature of most of these occurrences are consistent with, and indicative of, known or suspected canyon reaches with higher percolation, such as nearby wells R-17 and R-23. No indication was found that the perched-intermediate zones are laterally continuous over large areas.

In the vicinity of TA-54, perched-intermediate groundwater occurs in wells R-55/R-55i and R-23/R-23i (LANL 2003, 079601; Kleinfelder 2006, 092495; LANL 2011, 111611) at depths ranging from 406 ft to 498 ft bgs. Perched-intermediate groundwater also occurs in wells R-40/R-40i and R-37 (LANL 2009, 106432; LANL 2009, 107116) at depths ranging from 639 ft to 909 ft. This water is thought to be localized beneath the canyon floor and to result from localized canyon floor percolation.

The regional aquifer in the vicinity of TA-54 includes confined and unconfined zones. The shallow portion of the regional aquifer is predominantly unconfined, and the deeper portion of the aquifer is predominantly confined. Groundwater flow in the shallow portion of the regional aquifer is generally eastward beneath the western section of Pajarito watershed and southeastward beneath the eastern section of Pajarito watershed. In the vicinity of TA-54, the upper surface of the regional aquifer is located within the Cerros del Rio basalts and the underlying sediments of the Puye Formation, and the depths to water range from 785 ft to 1020 ft bgs (Koch and Schmeer 2011, 201566).

Groundwater flow in the upper part of the regional aquifer beneath TA-54 appears to be substantially impacted by the Cerros del Rio lavas (LANL 2010, 111362). These lavas are more than 150 ft thick beneath the regional water table. Groundwater flow in the regional aquifer beneath TA-54 is impacted by (1) water-supply pumping, (2) the local-scale recharge along Pajarito Canyon, (3) the lateral propagation of large-scale mountain-front aquifer recharge occurring to the west of TA-54, and (4) the discharge of the regional aquifer to the southwest towards the White Rock Canyon springs and the Rio Grande.

Contaminant Sources and Distributions

Pore-gas monitoring data show that vapor-phase transport of contaminants occurs in the upper portion of the unsaturated zone and vapor-phase VOCs are present beneath MDAs G and L. The primary contaminants in the vapor phase at TA-54 are 1,1,1-trichloroethane; TCE; and tritium (LANL 2005, 090513; LANL 2006, 091888; LANL 2007, 096409).

Historical data from the groundwater monitoring network around TA-54 showed sporadic detections of several organic compounds. Data show minimal detections for these constituents and only consistently at two wells, specifically trichloroethene at R-40 screen 1 and R-20 screen 2, and are all below applicable Consent Order groundwater cleanup levels. Further evaluations of existing groundwater data near TA-54 and detailed descriptions of organic and inorganic contaminants detected in perched-intermediate and regional groundwater at TA-54 are presented in the corrective measures evaluations (CMEs) for MDAs G, H, and L (LANL 2011, 205756; LANL 2011, 206319; LANL 2011, 206324). Although DOE withdrew the three CMEs in 2016 (DOE 2016, 601899), the references are included herein because the data and evaluations they present are useful for understanding groundwater contamination at TA-54.

5.3 Monitoring Objectives

Monitoring at TA-54 focuses on perched-intermediate and regional groundwater zones beneath TA-54 (Figure 5.1-1). The monitoring suite for perched-intermediate and regional groundwater addresses RCRA monitoring requirements and also reflects the data collected to date from wells in the TA-54 network.

Characterization of groundwater under MDAs G, H, and L is underway as data are collected from the completed network of new and existing wells. Groundwater monitoring for TA-54 is conducted with perched-intermediate well screens at R-40i, R-40 screen 1, R-23i, R-37 screen 1, R-55i, and regional wells R-20, R-21, R-23, R-32, R-37, R-38, R-39, R-40, R-41, R-49, R-51, R-52, R-53, R-54, R-55, R-56, and R-57 (Figure 5.1-1). The actively sampled wells have one or two screens equipped with purgeable sampling systems.

The monitoring at TA-54 provides the basis for accurately describing the groundwater conditions beneath TA-54. Base-flow and alluvial groundwater wells near and downgradient of TA-54 are not included in the TA-54 monitoring group because no evidence was found of a hydrologic connection between the subsurface contamination beneath TA-54 and adjacent canyons, as discussed in the Pajarito Canyon and Cañada del Buey IRs (LANL 2009, 106939; LANL 2009, 107497).

The regional monitoring well network downgradient of the MDAs in TA-54 is a system that includes redundancy and is designed to provide reliable detection of contaminants reaching the regional aquifer. The wells are located both near the facility boundary and at more distal locations along the dominant regional flow direction as well as along potential local flow directions to the northeast. The locations of wells also address potential complex pathways for contaminants in the vadose zone. Because of the difficulties associated with monitoring groundwater that occurs in lavas beneath TA-54, the network is made up of two-screen wells with an upper well screen placed as close to the water table as possible to monitor the first arrival of contaminants in the aquifer and a lower screen placed in permeable aquifer sediments to monitor the primary groundwater pathways downgradient of the facility.

5.4 Scope of Activities

The TA-54 monitoring group consists of intermediate-perched and regional groundwater wells, many of which are dual-screened wells with Baski sampling systems. The TA-54 monitoring wells are shown in Figure 5.1-1.

Table 5.4-1 presents sampling locations, analytical suites, and monitoring frequencies for the TA-54 monitoring group. The specified analytical suites and frequencies are based on the results of previous investigations, CMEs, reviews of monitoring data, and direction from NMED, as stated in its approval with modifications for the 2011 IFGMP, Revision 1 (LANL 2011, 208811; NMED 2012, 520410).

The wells in the TA-54 monitoring group are sampled quarterly or semiannually, with higher sampling frequencies for mobile constituents known to be present beneath MDAs at TA-54 (e.g., tritium and VOCs), and lower sampling frequencies for less mobile constituents or constituents not known to be present in significant quantities within the inventories of the TA-54 MDAs. The objectives for the sampling frequencies and analytical suites are presented in Table C-1.

Well screen R-40 Si shows impacts from drilling foam and is sampled only for metals, general inorganics, and low-level tritium.

Samples from monitoring well R-55i and the R-54 screen 1 show impacts from residual organic material introduced during drilling; collection of samples from these screens is limited to low-level tritium.

Regional well R-57 screen 1 and screen 2 have additional annual sampling requirements to meet a 1996 EPA authorization/agreement related to the disposal of PCBs at Area G. The 1996 agreement requires sampling for PCBs, pH, specific conductance, and chlorinated organics.

6.0 TECHNICAL AREA 16 260 MONITORING GROUP

6.1 Introduction

The TA-16 260 monitoring group (Figure 6.1-1) was established for the upper Water Canyon/ Cañon de Valle watershed to detect and monitor contaminants released from Consolidated Unit 16-021(c)-99, the TA-16 260 Outfall (hereafter, the 260 Outfall), and other sites at TA-16. The 260 Outfall is a former high explosives– (HE-) machining outfall that discharged HE-bearing water to Cañon de Valle from 1951 to 1996 and is the predominant source of contaminants detected in groundwater in the Water Canyon/Cañon de Valle area. These discharges contaminated the soils, sediments, surface waters, spring waters, and deep-perched and regional groundwater at TA-16.

The TA-16 260 monitoring group includes springs, alluvial wells, and wells completed in several deep perched-intermediate groundwater zones and in the regional aquifer. Shallow monitoring locations such as the springs and alluvial wells are included in this monitoring group because they contain HE, barium, and VOC contamination related to past activities at the 260 Outfall and other sites in the area.

TA-16 is located in the southwest corner of the Laboratory and was established to develop explosive formulations, cast and machine explosive charges, and assemble and test explosive components for the nuclear weapons program. A total of 410 SWMUs and AOCs are located within TA-16. TA-16 is bordered by Bandelier National Monument along NM 4 to the south and by the Santa Fe National Forest along NM 501 to the west. To the north and east, it is bordered by TA-08, TA-09, TA-11, TA-14, TA-15, TA-37, and TA-49. Water Canyon, a 200-ft-deep ravine with steep walls, separates NM 4 from active sites at TA-16. Cañon de Valle forms the northern border of TA-16.

6.2 Background

Surface water in the area is ephemeral, intermittent, and perennial. Perennial water is derived from springs, storm water, and snowmelt runoff that flows in canyon drainages, including Cañon de Valle, Fishladder Canyon, and Martin Spring (S-Site) Canyon. Fishladder Canyon also receives snowmelt and storm water runoff. Alluvial groundwater occasionally discharges at Fishladder Spring. The surface flow in Fishladder Canyon decreased significantly once the TA-16 340 Outfall was deactivated.

The TA-16 260 monitoring group includes alluvial monitoring wells in Cañon de Valle (e.g., CdV-16-02659), in Fishladder Canyon (FLC-16-25280), and in Martin Spring Canyon (MSC-16-06294). Groundwater in these alluvial systems is shallow, and water levels generally show responses to snowmelt runoff.

The vadose zone at TA-16 is approximately 600 ft to 1300 ft thick and is recharged by mountain-front precipitation and subsequent percolation along the Pajarito fault zone west of TA-16 and along canyons (e.g., percolation along upper Cañon de Valle). The vadose zone contains shallow perched groundwater water zones (typically less than 200 ft in depth from the mesa top) and two deep perched-intermediate groundwater zones between approximately 650 ft and 1200 ft bgs. The shallow perched zones are heterogeneous and controlled by fractures and surge beds near the contact of units 3 and 4 of the Tshirege Member. They manifest as three springs (SWSC, Burning Ground, and Martin), as intermittently saturated zones in several boreholes in the northern portions of TA-16, and in a continuously saturated zone in a borehole near the 90s Line Pond. The primary, uppermost deep perched-intermediate groundwater zones are believed to extend from west to east for 8600 ft and from north to south for 2700 ft.

Perched-intermediate groundwater was encountered at R-26 screen 1; R-25b, R-25 screens 1, 2, and 4; CdV-9-1(i); CdV-9-1(i) PZ-1; CdV-9-1(i) PZ-2; CdV-16-1(i); CdV-16-2(i)r; CdV-16-4ip; R-47i; and R-63i as well as in new regional well R-68. No perched groundwater was observed at R-18, R-47, R-48, and R-58, limiting its north-south and east-west extent. The low-permeability Tschicoma dacite observed in R-48 (approximately 2000 ft south of Cañon de Valle) may impede the southward flow of water in the deep-perched system. The perched zones are present both within the Otowi Member of the Bandelier Tuff [R-25, R-25b, CdV-9-1(i) PZ-1, and CdV-16-1(i)] and within the Puye Formation [CdV-9-1(i) PZ-2, CdV-9-1(i), CdV-16-4ip, CdV-16-2(i)r] and R-63i. In the vicinity of CdV-16-4ip, the two perched zones are separated by 100 ft to 150 ft of Puye sediments under variable saturation (LANL 2011, 203711).

Water-level data indicate groundwater within the perched horizons generally flows from west to east. Water-level data from multiple screens in R-25, from the two screens of CdV-16-4ip, from CdV-9-1(i), and from R-63 and R-63i indicate water levels within the deep-perched systems are lower with depth. Cross-borehole aquifer test results (LANL 2017, 602288) showed hydraulic communication between screens relatively proximal to each other and completed in the upper Puye Formation. The primary area of hydraulic communication is a laterally continuous saturated zone within the upper Puye Formation that is at least as large as the triangle formed by CdV-9-1(i), CdV-16-4ip, and R-25 screen 2. The preferential communication across the upper Puye Formation is likely driven by stratification (i.e., high anisotropy) within Puye strata.

The regional aquifer in the vicinity of northern TA-16 is predominantly unconfined, with the water table located within the Puye Formation at a depth of approximately 1108 ft to 1353 ft bgs. Groundwater flow in the upper portion of the regional aquifer is generally eastward, with apparent mounding beneath Cañon de Valle, perhaps reflecting local recharge. Water levels in regional wells near TA-16 show little influence from transient effects of deeper water-supply pumping (LANL 2006, 091450).

Contaminant Sources and Distributions

Discharge from the former 260 Outfall at Consolidated Unit 16-021(c)-99 from 1951 to 1996 served as a primary source of HE and inorganic contamination found throughout the site (LANL 1998, 059891; LANL 2003, 085531; LANL 2011, 207069). The drainage channel below the outfall and the canyon bottom and surface water, alluvial groundwater, and deep-perched groundwater are contaminated with explosive compounds, including RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine), HMX (octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine), TNT (2,4,6-trinitrotoluene), and barium. In addition, the VOCs tetrachloroethene, TCE, methyl tert butyl ether (MTBE), and toluene have been detected in a number of locations, including perched-intermediate groundwater and regional groundwater. RDX has also been detected in regional groundwater in wells R-18, R-25 (in screens 5 and 6), R-63, and R-68.

The primary migration pathway for these contaminants is thought to consist of (1) discharge as effluent from the 260 Outfall, (2) surface flow to Cañon de Valle via a small tributary drainage, (3) downcanyon transport by surface-water flow and alluvial groundwater, and (4) percolation through the vadose zone as recharge to the deep-perched groundwater zones and potentially into the regional aquifer.

In addition, there is some evidence of a possible source for HE from historical releases at TA-09. Increasing concentrations of RDX in R-18 may have originated from the 260 Outfall, migrating down from Cañon de Valle through the vadose zone to the regional aquifer, or may have potentially originated from an alternate source, possibly from historical releases at TA-09.

Groundwater in the perched horizons contains the largest inventory of HE in the environment on a mass basis, with estimates ranging from hundreds to thousands of kilograms of RDX (LANL 2006, 093798; LANL 2018, 602963).

Recent data for deep groundwater show elevated RDX concentrations in both perched-intermediate and regional groundwater. Monitoring wells CdV-16-4ip and CdV-16-2(i)r, completed in perched-intermediate groundwater, show the highest RDX concentrations, at approximately 150 µg/L and approximately 130 µg/L, respectively. RDX has been detected in perched-intermediate groundwater north of Cañon de Valle, with concentrations in CdV-9-1(i) screen 1 on the order of approximately 25 µg/L.

Recently installed regional monitoring well R-68 shows RDX concentrations in the regional aquifer above the New Mexico tap water screening level of 7.02 µg/L, with RDX at approximately 14 to 17.1 µg/L. RDX concentrations at R-18 have gradually increased from nondetect to around 3 µg/L.

6.3 Monitoring Objectives

The monitoring objectives for the TA-16 260 monitoring group are to assess the nature and extent of contamination, to refine the conceptual site model for the area, to collect data to assess potential corrective action alternatives for RDX in groundwater, and to collect long-term monitoring data. Monitoring activities focus on sampling for HE and VOCs in the upper Cañon de Valle watershed.

Activities in recent years have focused on collecting data to refine the site conceptual model for identification of corrective action alternatives and evaluating the nature and extent of contamination. These activities include the deployment of tracers in 2015 in three monitoring wells, ongoing tracer monitoring in intermediate and regional groundwater (LANL 2015, 600535), completion of cross-well pumping tests in three monitoring wells completed in perched-intermediate groundwater at TA-09 and TA-16 (LANL 2015, 600686; LANL 2017, 602288), and installation of regional monitoring well R-68.

In September 2017, the Laboratory submitted the remedy completion report for Consolidated Unit 16-021(c)-99 to NMED, which was approved by NMED in February 2018 (LANL 2017, 602597; NMED 2018, 602893). The report recommended long-term monitoring of springs, base flow, and alluvial groundwater to monitor trends in RDX and barium in Cañon de Valle and Martin Spring Canyons. A long-term monitoring and maintenance plan was included as Appendix A to the remedy completion report.

6.4 Scope of Activities

Active monitoring locations in the TA-16 260 monitoring group include alluvial groundwater wells, perched-intermediate groundwater wells, regional groundwater wells, and springs. These locations are shown in Figure 6.1-1. Sampling locations, analytical suites, and monitoring frequencies for the TA-16 260 monitoring group are presented in Table 6.4-1. The long-term monitoring requirements specified in the remedy completion report have been incorporated into Table 6.4-1, with long-term monitoring locations highlighted in blue.

Monitoring of deep groundwater from the perched-intermediate and regional aquifers represents a long-term data set that indicates what constituents are present and their trends and variability. Additional samples are collected for some constituents as early-detection samples to assess potential migration of those constituents from secondary sources in the vadose zone.

The sampling frequency for most locations in the TA-16 260 monitoring group is primarily semiannual, although select locations are sampled quarterly. The objectives for the sampling frequencies and analytical suites are presented in Table C-1.

Samples collected from monitoring well R-25b continue to show the influence of tracers introduced in November 2015 (LANL 2017, 602161) and are not representative. For this reason, R-25b has been included in the “watch list” in Appendix E. Well R-25b will continue to be sampled in MY2019, but the samples will be categorized as screening samples until the geochemistry is more representative. In addition, the frequency of sampling for HEXMOD analytes and tracers at R-25b has been reduced from quarterly to semiannually (see also crosswalk Table H-5).

Long-term monitoring will be conducted in alluvial wells, base flow, and springs in accordance with the requirements of Appendix A to the remedy completion report (LANL 2017, 602597). In addition, the low-permeability cap above the settling pond at the 260 Outfall will be inspected and maintained as necessary. Water levels in the Surge Bed Monitoring Well (location 16-612309) near the settling pond will be monitored to ensure that the low-permeability cap remains protective of the underlying surge bed, which still has residual contamination. The requirements for the inspections of the low-permeability cap and water level monitoring in location 16-612309 are specified in the remedy completion report.

Samples will be collected from the Surge Bed Monitoring Well in accordance with Table 6.4-1 when sufficient water is available. The well is typically dry and was therefore equipped with a water-level transducer to better understand the timing associated with the presence of water in the well. The Surge Bed Monitoring Well was added to the TA-16 260 monitoring group in December 2017 to support the long-term groundwater monitoring program.

Regional monitoring well R-69 is planned for installation in summer 2018, and quarterly full-suite monitoring is planned for MY2019.

7.0 MATERIAL DISPOSAL AREA AB MONITORING GROUP

7.1 Introduction

The MDA AB monitoring group is located in TA-49 and includes one monitoring well completed in perched-intermediate groundwater and three wells completed in the regional aquifer. TA-49, also known as the Frijoles Mesa Site, is located on a mesa in the upper part of the Ancho Canyon drainage, and part of the area drains into Water Canyon. The MDA AB monitoring group is shown in Figure 7.1-1.

TA-49 was used for underground hydronuclear testing in the early 1960s. The testing consisted of criticality, equation-of-state, and calibration experiments involving special nuclear materials and produced large inventories of radioactive and hazardous materials: isotopes of uranium and plutonium, lead, and beryllium; explosives such as TNT, RDX, and HMX; and barium nitrate. Much of this material remains in shafts on the mesa top. Further information about activities and SWMUs and AOCs at TA-49 is presented in Laboratory reports (LANL 2010, 109318; LANL 2010, 109319). A total of 20 SWMUs and AOCs are located within TA-49.

7.2 Background

Both Ancho Canyon and the north fork of Ancho Canyon head on the Pajarito Plateau in the south-central part of the Laboratory. Approximately 2.2 mi^2 (5.6 km^2) is drained by the north fork of Ancho Canyon and approximately 2.3 mi^2 (5.8 km^2) is drained by Ancho Canyon. Surface-water flow is ephemeral and occurs as runoff, primarily following infrequent, intense thunderstorms or during snowmelt. Its source is direct precipitation and runoff from surrounding mesa tops. No perennial sources of surface water exist at TA-49.

In 1960, the USGS drilled three deep wells (test wells DT-5A, DT-9, and DT-10) to monitor the water quality in the regional aquifer. No contaminants were found in these wells at concentrations near or above standards. As with other wells installed around the Laboratory during that period using mild carbon steel, samples from these three test wells have shown elevated metals concentrations related to corrosion or flaking of well components. In 2010, the total lead concentration in a sample from test well DT-9 of 20.1 µg/L was above the EPA drinking water system action level of 15 µg/L. Another sample collected during the year had a total lead result of less than 2 µg/L. Some results during the 1990s were above 50 µg/L. The source of lead was believed to be galvanized piping used for pump or transducer installation.

Several deep mesa-top boreholes and wells have been drilled to intermediate depths of 300 ft to 700 ft bgs (49-CH-1 through 49-CH-4, 49-2-700-1) and to the regional aquifer (DT-5A, DT-9, DT-10, R-29, and R-30). No perched-intermediate groundwater zones were encountered when these wells were drilled (LANL 2006, 093714; LANL 2010, 110478; LANL 2010, 110518). A moisture profile for the 700-ft-deep mesa-top borehole 49-2-700-1 shows low moisture content (<17% by weight) throughout the profile; the profile is similar to that beneath other dry mesas and indicates percolation along neighboring canyons does not impact moisture beneath the mesa at TA-49. In addition, 49-Gamma was drilled to 54 ft bgs in upper Ancho Canyon, and wells 49-9M-2 through 49-9M-4 were drilled in the drainage of the upper north fork of Ancho Canyon; these boreholes were dry when drilled. These observations show a lack of shallow perched groundwater in the upper portions of the Ancho watershed.

Perched-intermediate groundwater was encountered in Water Canyon, approximately 3500 ft northeast of MDA AB during the drilling of R-27 in 2005. The perched zone was detected at 628 ft bgs in the Puye Formation immediately above the Cerros del Rio basalt. Monitoring well R-27i was subsequently installed in September 2009 with a single screen to evaluate water quality and measure water levels in the perched zone.

Springs and seeps are known to occur in the lower reaches of Water and Ancho Canyons, far downgradient of TA-49 (near the Rio Grande), but none have been identified within the boundaries of TA-49 (LANL 2007, 098492; LANL 2007, 098523).

The top of the regional aquifer occurs approximately 1126 ft to 1153 ft bgs, based on water levels in monitoring wells R-29 and R-30. The potentiometric surface of the regional aquifer beneath TA-49 lies completely within the Puye Formation and the Cerros del Rio basalt. Groundwater flow in the upper portion of the regional aquifer at TA-49 is generally eastward.

Contaminant Sources and Distributions

The primary contaminants at MDA AB and other disposal areas in TA-49 include tritium, radionuclides (plutonium-238, plutonium-239/240, americium-241, and cesium-137), arsenic, chromium, copper, lead, and perchlorate. Radionuclides have been detected in canyon sediments, but no elevated levels of contaminants have been detected in groundwater in the wells that compose the MDA AB monitoring group. Three decades of water-quality records from regional wells in this area (test wells DT-5A, DT-9, and DT-10) show no substantial changes in water chemistry or the presence of Laboratory contaminants in the regional aquifer. Perchlorate has been detected slightly above background in well R-27i.

7.3 Monitoring Objectives

The monitoring objectives for the MDA AB monitoring group are to characterize the groundwater beneath MDA AB and ultimately to support the MDA AB CME process. Regional aquifer wells R-29 and R-30 have been drilled immediately downgradient of MDA AB at TA-49. The older test wells, DT-5A, DT-9, and DT-10, have been plugged and abandoned because of their potential for producing nonrepresentative data associated with well casing and screen material and their long well screen intervals (617 ft, 681 ft, and 329.6 ft bgs, respectively); these wells have been replaced by wells R-29 and R-30.

7.4 Scope of Activities

Groundwater monitoring for MDA AB has historically been conducted primarily at the DT-series regional aquifer wells. Recently installed wells R-29 and R-30 have been incorporated into the monitoring network for MDA AB and will be monitored annually to support the corrective action process for MDA AB.

Table 7.4-1 presents the sampling locations, analytical suites, and monitoring frequencies for the MDA AB monitoring group. The objectives for the sampling frequencies and analytical suites are presented in Table C-1. The specified analytical suites and frequencies are based on the results of applicable IRs, previous reviews of monitoring data, and direction from NMED as stated in its approval with modifications for the 2011 IFGMP, Revision 1 (LANL 2011, 208811; NMED 2012, 520410).

8.0 GENERAL SURVEILLANCE MONITORING GROUP

8.1 Overview

Monitoring locations not associated with project-specific monitoring groups are included in the General Surveillance monitoring group. This group includes most base-flow locations, alluvial monitoring wells, and springs, except for those assigned to the TA-16 260 monitoring group. The General Surveillance monitoring group also includes some wells completed in perched-intermediate zones or in the regional aquifer that are not associated with area-specific monitoring groups.

General Surveillance monitoring group locations are sited across the Pajarito Plateau in all the major watersheds. Some are upgradient of project-specific areas or are in areas where contamination was historically present but where concentrations have since decreased and are stable and below standards. General surveillance monitoring locations for Los Alamos/Pueblo Canyons, Sandia Canyon, Mortandad Canyon, Pajarito Canyon, Water Canyon/Cañon de Valle, and Ancho Canyons are shown in Figure 8.1-1. The locations for White Rock Canyon within the General Surveillance monitoring group are shown in Figure 8.1-2.

Most general surveillance locations are well characterized and have a long history of sampling data. Some locations show little or no contamination, while others show residual contamination from past operations or effluent releases. The residual contamination may be present in surface water, alluvial groundwater, and occasionally in perched-intermediate groundwater. In many cases, contaminant concentrations at these locations are fairly steady over time or decrease as a result of reductions in sources over the years.

8.2 Monitoring Objectives

The primary monitoring objectives for the General Surveillance monitoring group locations are to

- continue monitoring long-term water-quality trends;
- continue verifying decreasing contaminant trends at general surveillance locations in some watersheds (Los Alamos, Sandia, and Mortandad);
- monitor for potential impacts from ongoing operations under DOE requirements for environmental surveillance; and
- continue surveillance for potential Laboratory impacts to the groundwater, as expressed at the springs in White Rock Canyon.

8.3 Scope of Activities

The objectives can be met at all General Surveillance monitoring group locations through annual or biennial monitoring at the majority of locations, with a few exceptions. Semiannual monitoring is proposed at a few locations, including at monitoring well 03-B-13 (because of elevated and highly variable VOC and semivolatile organic compound [SVOC] concentrations) and Vine Tree Spring (to meet monitoring requirements under the memorandum of understanding [MOU]). Semiannual monitoring is also proposed at PCI-2 and WCO-1r. Well R-12 screen 1 shows reducing conditions, as indicated by low dissolved oxygen and will be monitored for low-level tritium only annually. Alluvial wells SCA-2 and SCA-4, located in Sandia Canyon, were significantly damaged during the September 2013 flood event and have been removed from the General Surveillance monitoring group. No nearby alluvial wells can serve as replacements for these wells in the IFGMP.

Annual monitoring for mobile contaminants is proposed for all White Rock Canyon springs to improve contaminant detection and monitoring coverage in White Rock Canyon. The exceptions are the biennial or triennial monitoring of HE at La Mesita, upper La Mesita, Sacred, Sandia, lower Sandia, and Spring 2 groundwater springs as stipulated in Appendix A of the MOU.

Spring 9B has been removed from the White Rock Canyon sampling campaign because of safety concerns regarding the poison ivy in the immediate vicinity of the spring. This spring does not show contamination, and three other springs within one-half mile of Spring 9B (Springs 9, 9A, and 8A) are successfully sampled during most years with less risk to the sampling team.

Table 8.3-1 presents sampling locations, analytical suites, and monitoring frequencies for the General Surveillance monitoring group. The objectives for the sampling frequencies and analytical suites are presented in Table C-1.

9.0 REFERENCES AND MAP DATA SOURCES

9.1 References

The following reference list includes documents cited in this plan. Parenthetical information following each reference provides the author(s), publication date, and ERID, ESHID, or EMID. This information is also included in text citations. ERIDs were assigned by the Laboratory's Associate Directorate for Environmental Management (IDs through 599999); ESHIDs were assigned by the Laboratory's Associate Directorate for Environment, Safety, and Health (IDs 600000 through 699999); and EMIDs are assigned by N3B (IDs 700000 and above). IDs are used to locate documents in N3B's Records Management System and in the Master Reference Set. The NMED Hazardous Waste Bureau and N3B maintain copies of the Master Reference Set. The set ensures that NMED has the references to review documents. The set is updated when new references are cited in documents.

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9.2 Map Data Sources

Note that the disclaimers for the plate and maps in this document still indicate Laboratory ownership. Disclaimers will be updated in the next version of this document.

Wells, Springs, and Baseflow locations; ER-ES, As published, GIS projects folder 16-0033;\\slip\gis\GIS\Projects\16-Projects\16-0033\project_data.gdb; wells_ifgmp; 2017.

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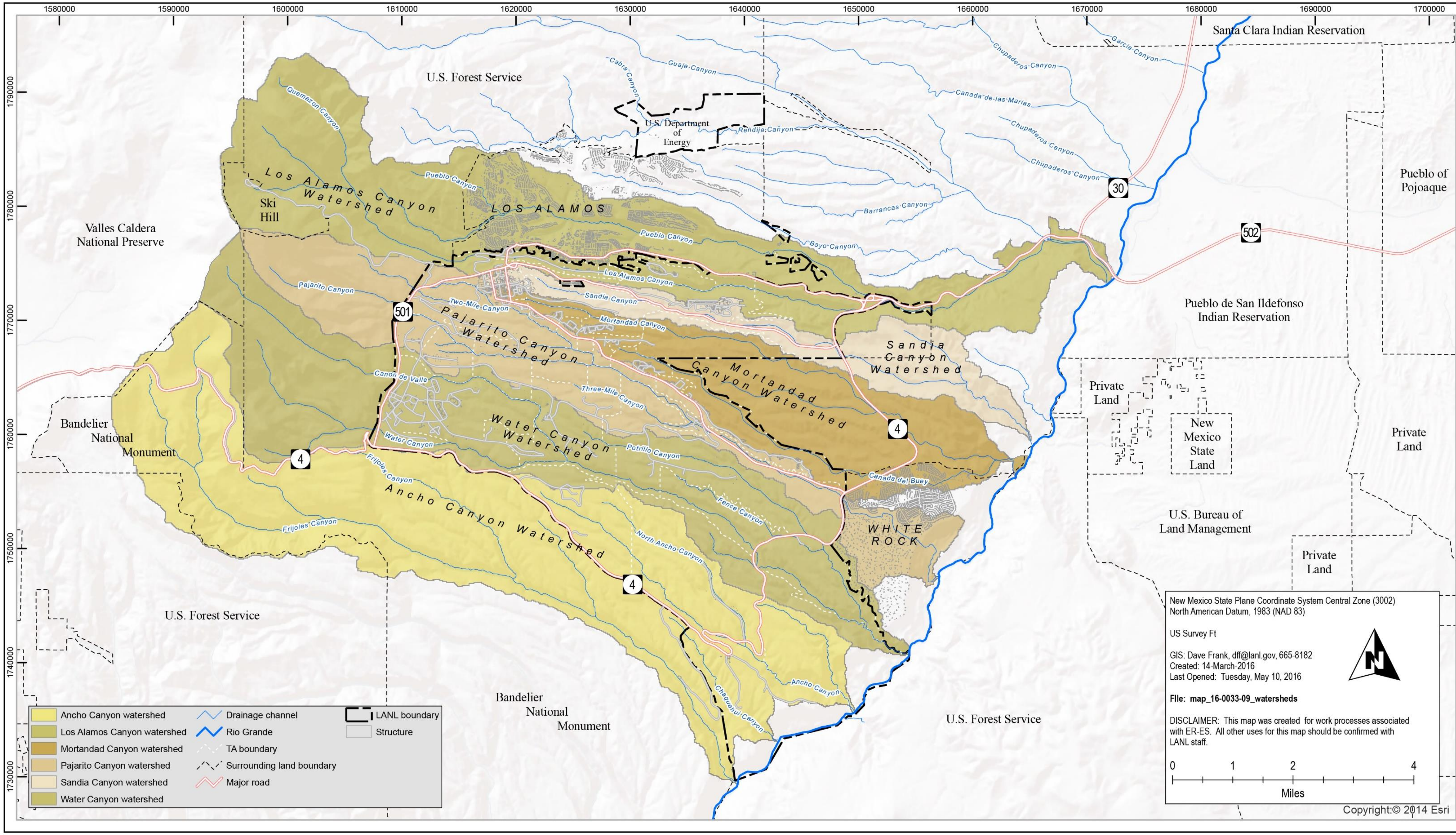

Figure 1.3-1 Watersheds at Los Alamos National Laboratory

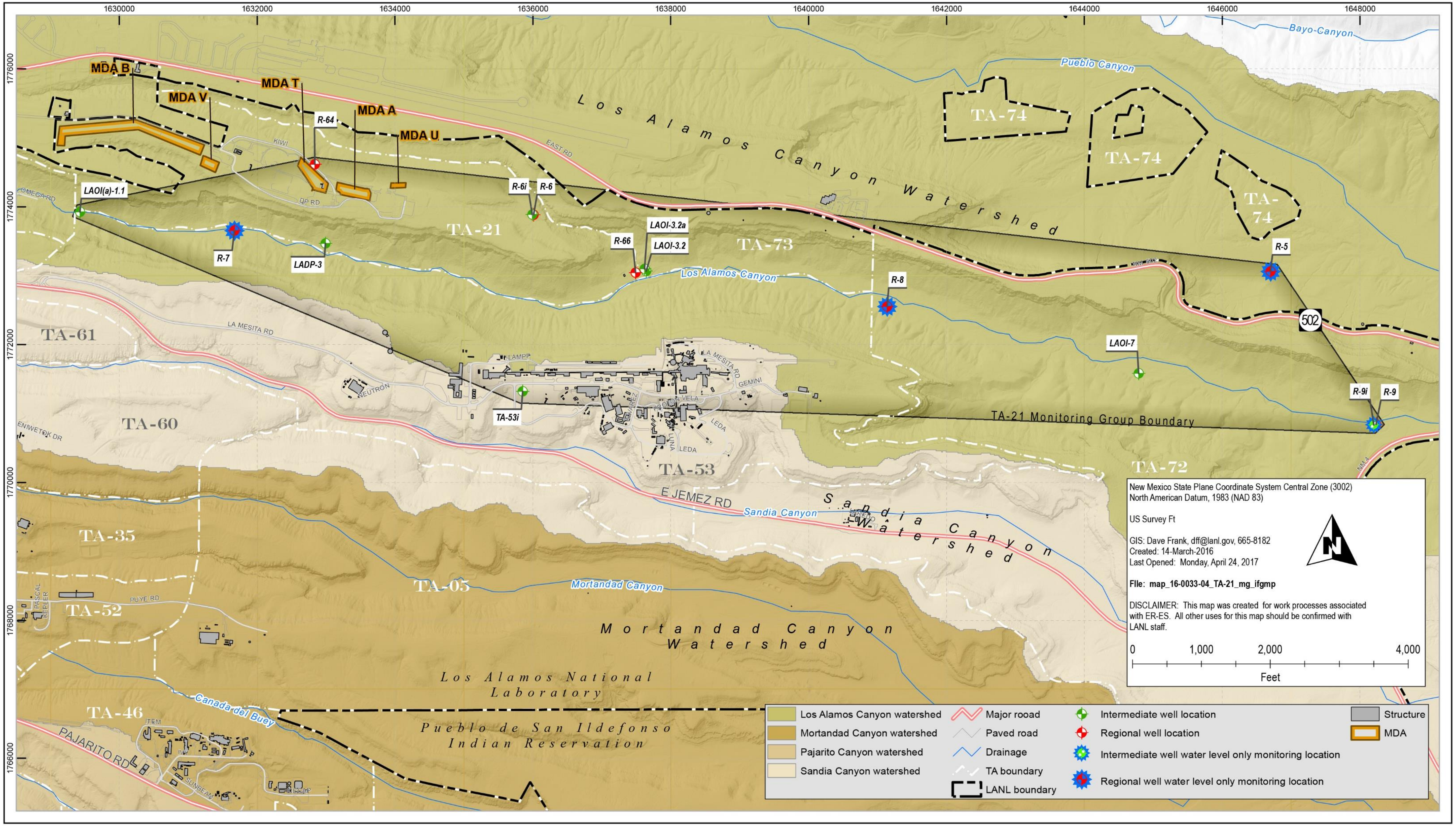

Figure 2.1-1 TA-21 monitoring group

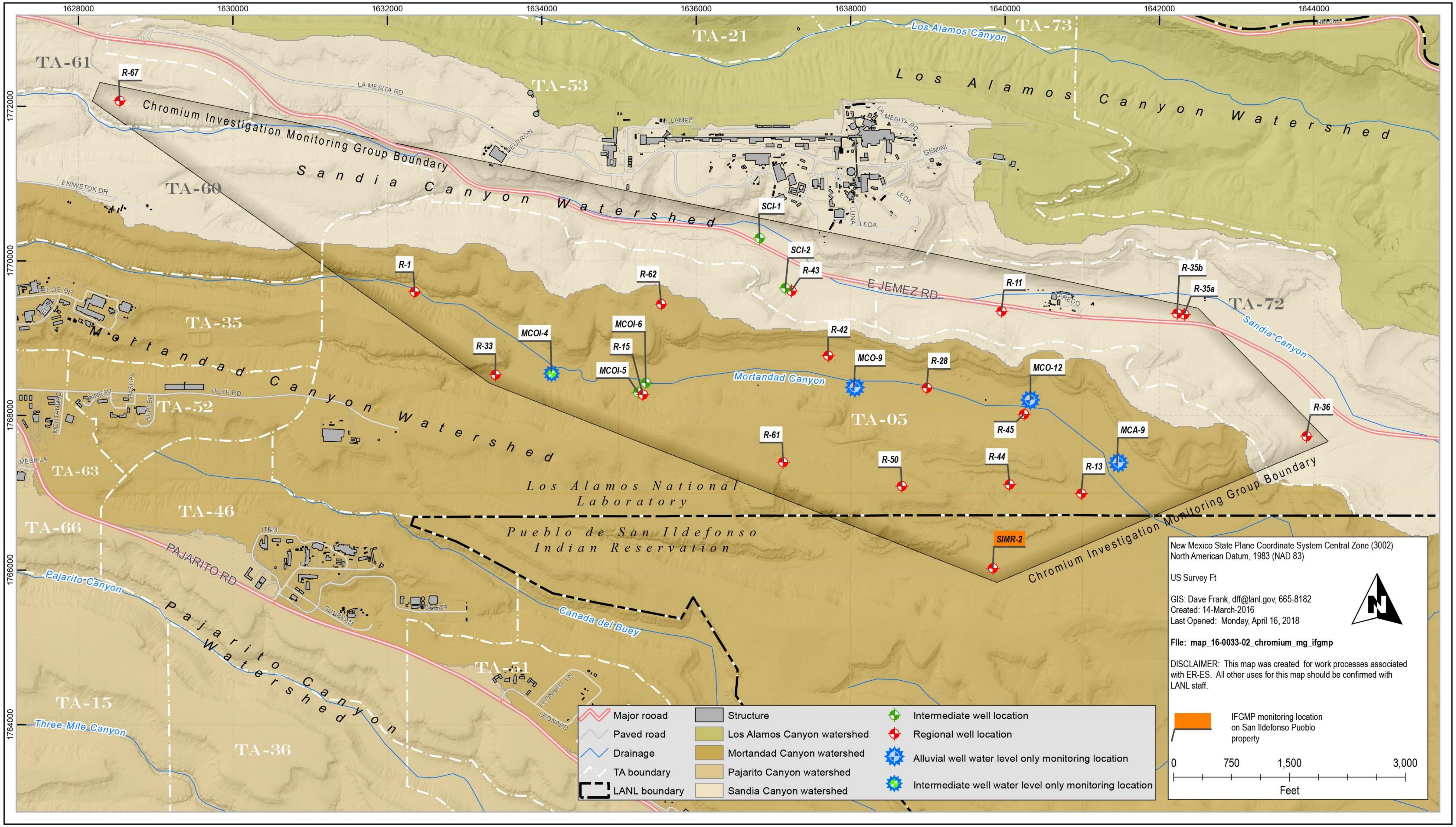

Figure 3.1-1 Chromium Investigation monitoring group

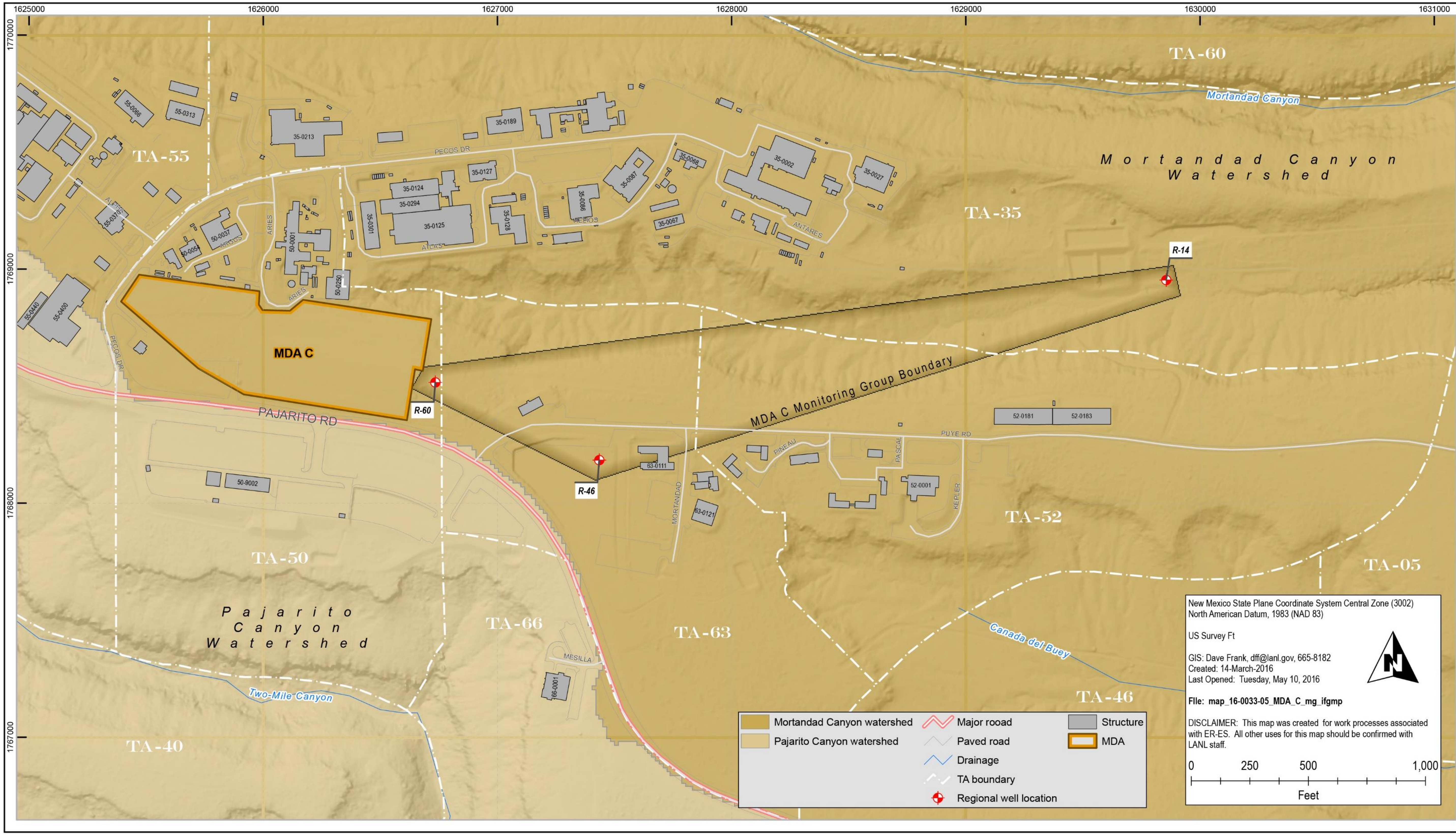

Figure 4.1-1 MDA C monitoring group

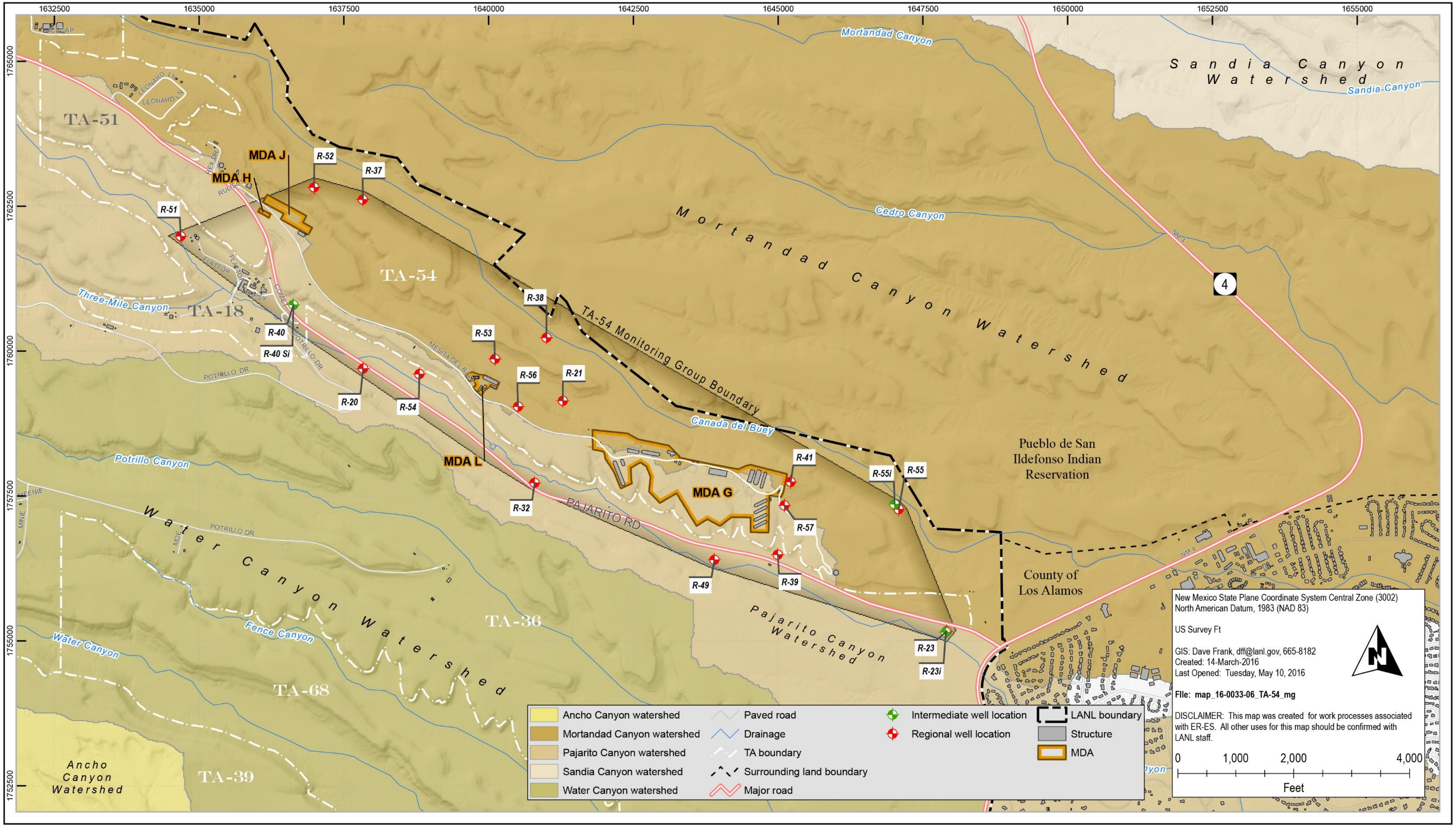

Figure 5.1-1 TA-54 monitoring group

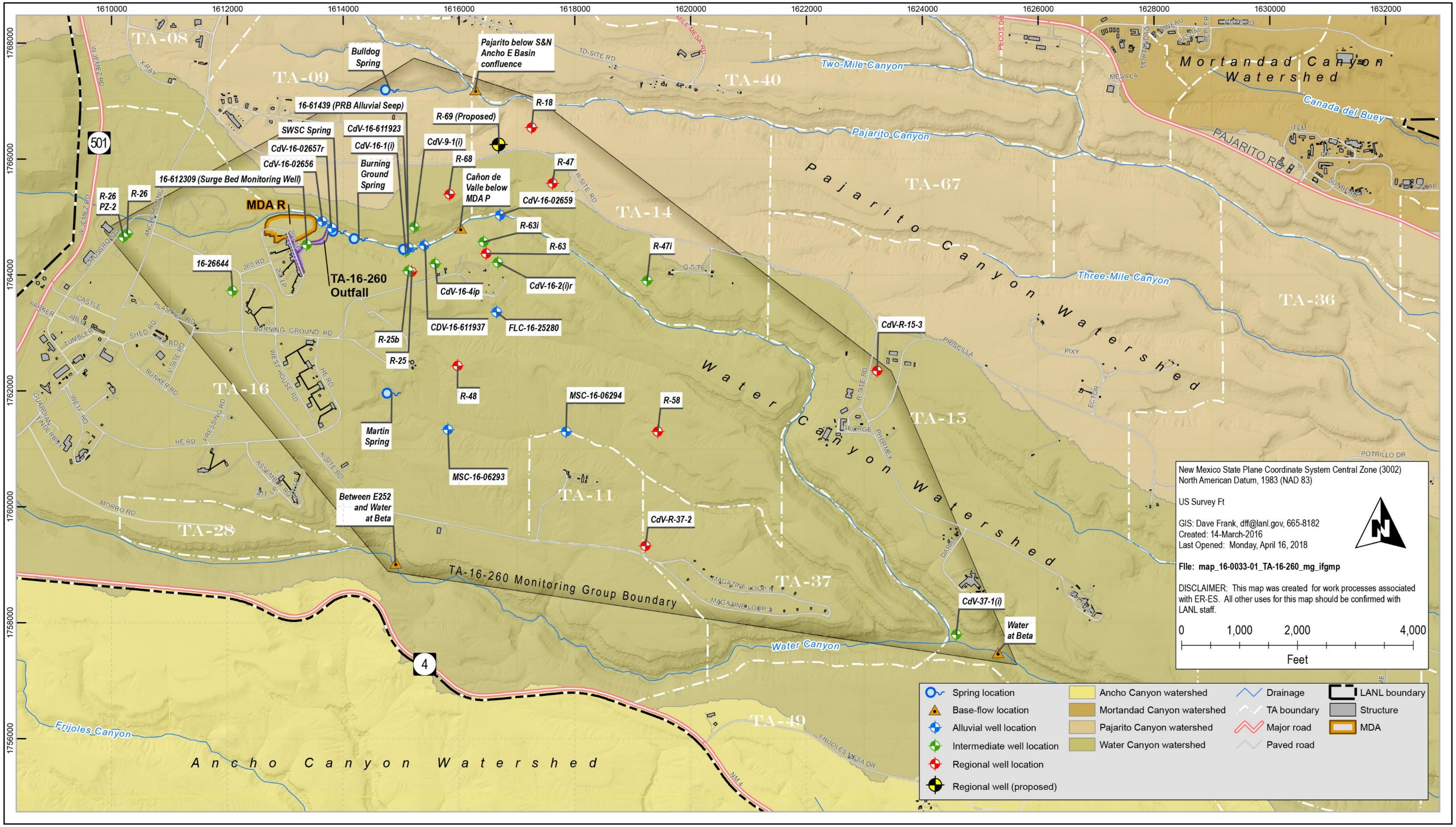

Figure 6.1-1 TA-16 260 monitoring group

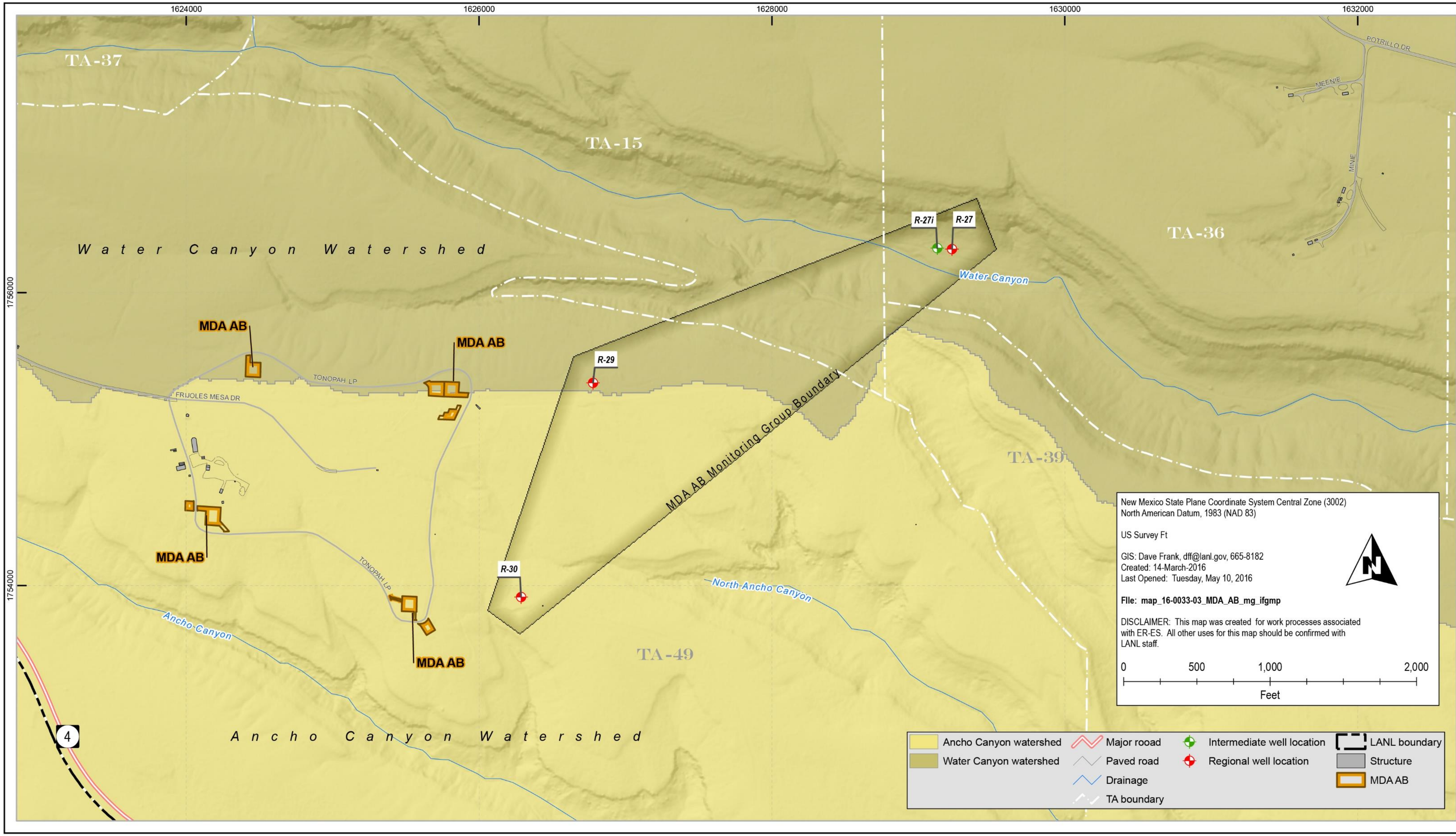

Figure 7.1-1 MDA AB monitoring group

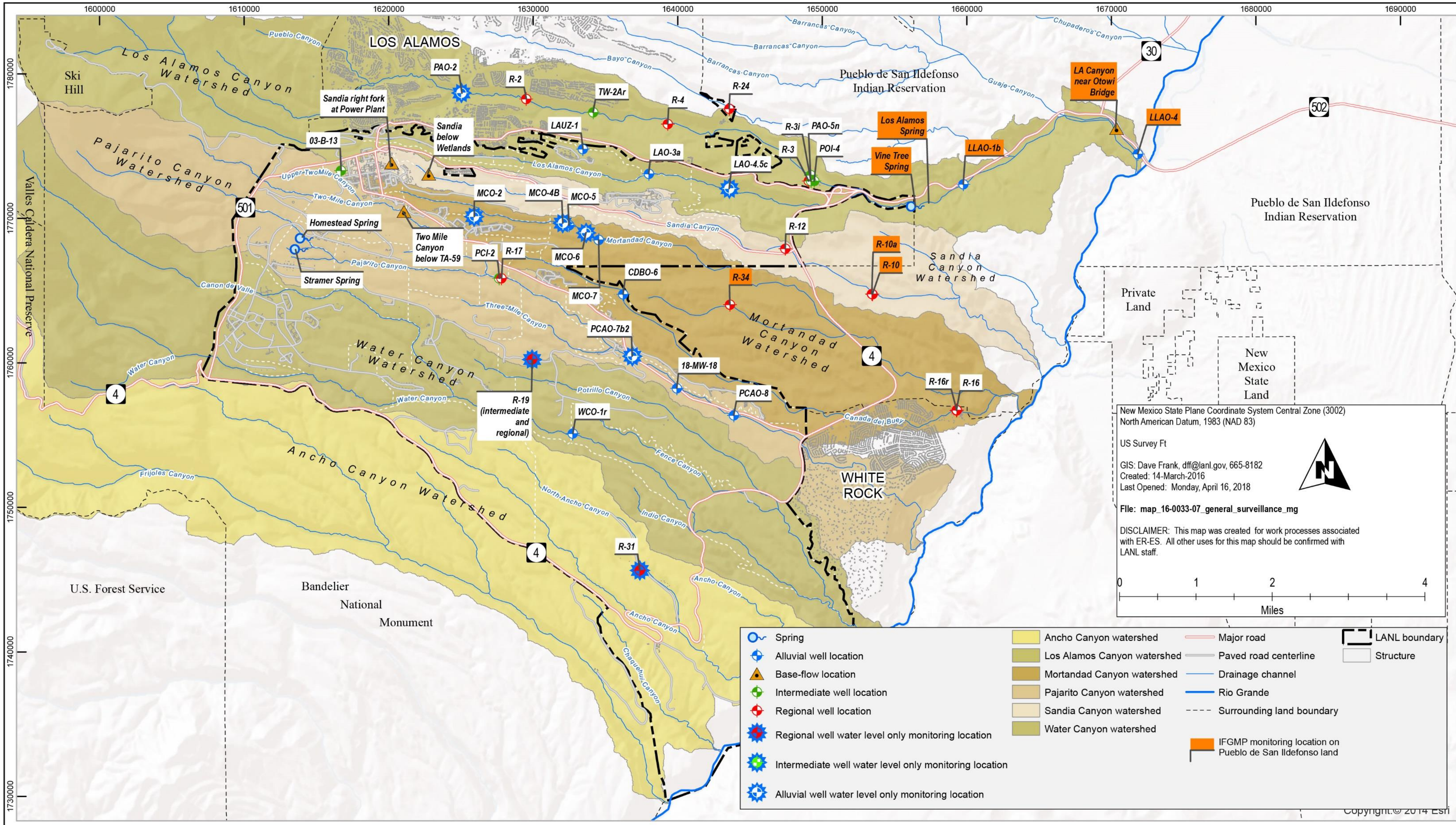

Figure 8.1-1 General Surveillance monitoring group (watersheds within the Laboratory)

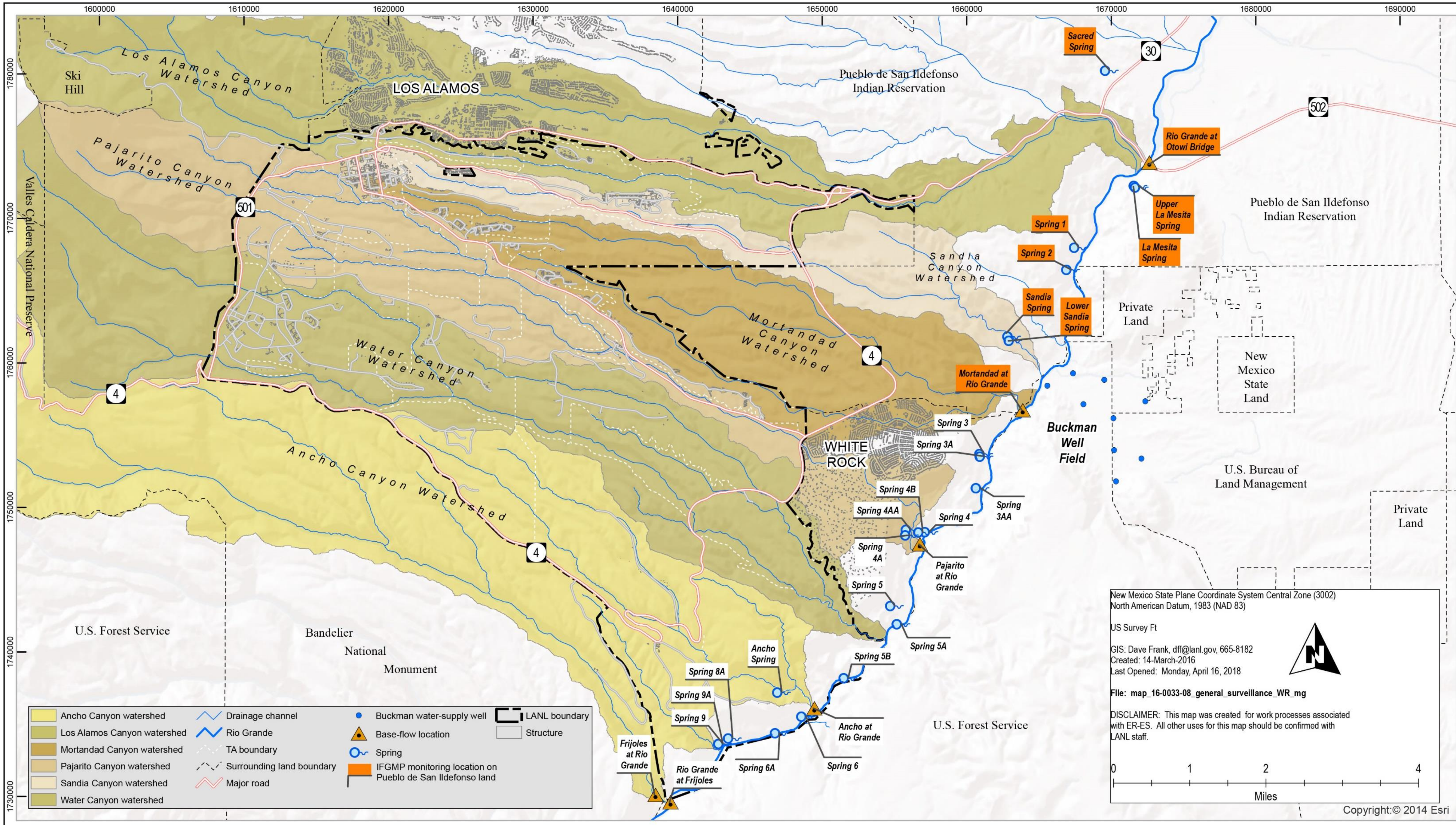

Figure 8.1-2 General Surveillance monitoring group (White Rock Canyon)

Table 1.4-1
Periodic Monitoring Report Submittal Schedule for MY2019

Monitoring Group PMR	Quarterly Sampling Events Reported in PMR	PMR Submittal Date
General Surveillance		November 30, 2018
Watershed sampling events included in PMR:		
• Los Alamos/Pueblo	MY 2018: Q1, Q3	
• Mortandad/Sandia	MY 2017: Q4 MY 2018: Q1, Q3	
• Water	MY 2017: Q4 MY 2018: Q2	
• White Rock Canyon and Rio Grande	MY 2018: Q1	
• Pajarito	MY 2018: Q1, Q3	
TA-21	MY 2018: Q4	February 28, 2019
Chromium Investigation	MY 2018: Q2, Q3, Q4 MY 2019: Q1	May 31, 2019
MDA C	MY 2019: Q1	
TA-54	MY 2018: Q3 MY 2019: Q1	
TA-16 260	MY 2018: Q3, Q4 MY 2019: Q1, Q2	August 30, 2019
MDA AB	MY 2019: Q2	

Note: Orange shading indicates that the PMR must be sent to the Pueblo de San Ildefonso for review at least 60 d before release to the public.

Table 1.7-1
Potentially Applicable Standards and Screening Levels
Used to Select Base-Flow and Groundwater Screening Values

Type	Source	Description	Potential Applicability	
			Surface Water	Groundwater (Includes Springs)
New Mexico				
Standard	20 New Mexico Administrative Code (NMAC) 6.4.900.F	Livestock Watering	X	—[a]
Standard	20 NMAC 6.4.900.C	Irrigation	X	—
Standard	20 NMAC 6.4.900.G	Wildlife Habitat	X	—
Standard	20 NMAC 6.4.900.H	Aquatic Life Acute	X[b,c]	—
Standard	20 NMAC 6.4.900.H	Aquatic Life Chronic	X[b,c]	—
Standard	20 NMAC 6.4.900.H	Aquatic Life Human Health Standard	X	—
Standard	20 NMAC 6.2.3103	Groundwater Human Health Standards, Other Standards for Domestic Water Supply and Standards for Irrigation Use	—	X
Screening Level	NMED	Tap Water Screening Levels[d]	—	X
EPA				
Standard	40 Code of Federal Regulations 141	EPA Maximum Contaminant Levels	—	X
Risk—Human	EPA Generic Screening Levels	EPA Generic Screening Levels for Tap Water[e]	—	X
DOE				
Risk—Ecological	DOE Order 458.1	DOE Biota Concentration Guides	X	
Standard	DOE Order 458.1	DOE 100-mrem Public Dose Derived Concentration Technical Standards	—	X
Standard	DOE Order 458.1	DOE 4-mrem Drinking Water Derived Concentration Technical Standards	—	X

[a] — = Indicates the screening level is not applicable to the water type.

[b] Hardness-based standards for total recoverable aluminum and dissolved trivalent chromium conservatively compared with results for total aluminum and dissolved chromium, respectively.

[c] Standard for dissolved hexavalent chromium conservatively compared with results for dissolved chromium.

[d] Screening levels derived from NMED guidance (NMED 2017, 602273; NMED 2017, 602274).

[e] EPA generic screening levels (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).

Table 1.7-2
Analytes, Field Preparation, and Analytical Methods Used by Accredited Contract Laboratories for Samples Collected under the IFGMP

Analytical Suite	Analytical Group	Field Preparation	Analytical Method	Analytes
Metals[a,b]	WSP-All Metals	Unfiltered	SW-846:6010	Aluminum
			EPA:245.2	Mercury
			SW-846:6020	Selenium
		Filtered	SM:A2340	Hardness
			SW-846:6010	Aluminum, barium, beryllium, boron, calcium, cobalt, copper, iron, magnesium, manganese, potassium, silicon dioxide, sodium, strontium, tin, vanadium, zinc
			SW-846:6020	Antimony, arsenic, cadmium, chromium, lead, molybdenum, nickel, selenium, silver, thallium, uranium
			EPA:245.2	Mercury
	MSGP-Hg	Unfiltered	EPA:245.2	Mercury
VOCs	WSP-8260B-VOA	Unfiltered	SW-846:8260	See Table B-4.1-1
SVOCs	WSP-8270C-SVOA	Unfiltered	SW-846:8270	See Table B-4.1-1
PCBs	WSP-8082-PCB	Unfiltered	SW-846:8082	See Table B-4.1-1
HEXP[c]	WSP-8330B-NMED HEXP	Unfiltered	SW-846:8330B	See Table B-4.1-1
HEXMOD[d]	WSP-8330B-NMED HEXMOD	Unfiltered	SW-846:8330B	See Table B-4.1-1
Dioxins/Furans	WSP-8290-D/F	Unfiltered	SW-846:8290	See Table B-4.1-1

Table 1.7-2 (continued)

Analytical Suite	Analytical Group	Field Preparation	Analytical Method	Analytes
Radionuclides	WSP-GrossA/B	Unfiltered	EPA:900	Gross alpha, gross beta
	WSP-RAD	Unfiltered	EPA:901.1	Cesium-137, cobalt-60, neptunium-237, potassium-40, sodium-22
			EPA:905.0	Strontium-90
			HASL-300:AM-241	Americium-241
			HASL-300:ISOPU	Plutonium-238, plutonium-239/240
			HASL-300:ISOU	Uranium-234, uranium-235/236, uranium-238
Tritium	WSP-H-3	Unfiltered	EPA:906.0	Tritium
Low-Level Tritium	WSP-LL-H-3	Unfiltered	Generic:Low_Level_Tritium	Tritium
General Inorganics	WSP-GENINORG+PerChlorate	Filtered	EPA:120.1	Specific conductance
			EPA:150.1	Acidity or alkalinity of a solution
			EPA:160.1	Total dissolved solids
			EPA:300.0	Bromide, chloride, fluoride, sulfate
			EPA:310.1	Alkalinity-CO_3, alkalinity-CO_3+HCO_3
			SW-846:6010	Silicon dioxide
			SW-846:6850	Perchlorate
	WSP-NH3+NO3/NO2+PO4	Filtered	EPA:350.1	Ammonia as nitrogen
			EPA:353.2	Nitrate-nitrite as nitrogen
			EPA:365.4	Total phosphate as phosphorus
	WSP-TKN+TOC	Unfiltered	EPA:351.2	Total Kjeldahl nitrogen
			SW-846:9060	Total organic carbon
	WSP-CN(T)	Unfiltered	EPA:335.4	Cyanide (Total)

[a] The following metals suite analytical groups and field preparations apply to groundwater samples (i.e., alluvial, intermediate, regional, and springs): WSP-All Metals (filtered) and MSGP-HG (unfiltered).

[b] The following metals suite analytical groups and field preparations apply to surface water samples (i.e., base flow): WSP-All Metals (unfiltered) and WSP-All Metals (filtered).

[c] HEXP (analytical suite) = Analysis of samples for HE by SW-846:8330B.

[d] HEXMOD (analytical suite) = Analysis of samples for HE and RDX-degradation products by SW-846:8330B.

Table 1.8-1
Sampling Schedule for MY2019: October 1, 2018–September 30, 2019

Primary Watershed/ Monitoring Group	Sampling Table	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
		Oct–Dec 2018	Jan–Mar 2019	Apr–Jun 2019	Jul–Sep 2019
Pajarito Watershed					
TA-54	Table 5.4-1	A, S	—[a]	S	—
General Surveillance	Table 8.3-1	S	—	B (2019)[b], A, S	—
Mortandad and Sandia Canyons					
Chromium Investigation	Table 3.4-1	A, S, Q, M	Q[c], M	S, Q, M	Q, M
MDA C	Table 4.4-1	A	—	—	—
General Surveillance	Table 8.3-1	A[d], S	—	S	A
Los Alamos and Pueblo Canyons					
TA-21	Table 2.4-1	—	—	—	A
General Surveillance	Table 8.3-1	S	—	A, S	—
Water/Cañon de Valle Watershed[e]					
TA-16 260	Table 6.4-1	Q	A, S, Q	Q	S, Q
General Surveillance	Table 8.3-1	—	S	—	A, S
Ancho Watershed					
MDA AB	Table 7.4-1	—	A	—	—
White Rock Canyon					
General Surveillance	Table 8.3-1	B (2019), A	—	—	—
Characterization					
All Watersheds	Characterization	Q	Q	Q	Q

Notes: Sampling frequencies: M = monthly (12 times/yr); Q = quarterly (4 times/yr); S = semiannual (2 times/yr); A = annual (1 time/yr); B = biennial (1 time/2 yr); T = triennial (1 time/3 yr); V = quinquennial (1 time/5 yr).

[a] — = No samples are scheduled to be collected from this monitoring group during this period.

[b] 2019 = Monitoring year that biennial, triennial, and/or quinquennial sample is to be collected.

[c] An 8-h extended purge will be conducted at R-62 during the second quarter (January–March) of MY2019.

[d] R-10 screen 1 (S1), R-10 S2, R-34.

[e] Semiannual sampling events in the Water/Cañon de Valle watershed will be conducted in March and August, when possible, to improve the likelihood that water will be sufficient to collect samples from base-flow, springs, and alluvial well locations.

Table 1.9-1
Frequencies for Locations Assigned to Water-Level Monitoring Only

Assigned Monitoring Group	Location	Rationale for Selection of Location	Source Aquifer	Water Level*
Los Alamos/Pueblo Canyons Watershed				
TA-21 Monitoring Group	R-5 S1	Well located downgradient of upper Pueblo and Acid Canyons. Screen has been dry since well installation (2001), although water was observed in the sump below the screen. Automated monitoring of water levels maintained to determine if the zone recovers.	Intermediate	C^{HD}
	R-5 S2	Well located downgradient of upper Pueblo and Acid Canyons. Water-level data at R-5 S2 will be used to continue development of the sitewide conceptual model and to support groundwater flow modeling and aquifer test activities.	Intermediate	C
	R-5 S3 R-5 S4	Well located downgradient of upper Pueblo and Acid Canyons. Water-level data at R-5 S3 and R-5 S4 are useful in understanding the local hydrogeology.	Regional	C
	R-7 S1	Well located in middle Los Alamos Canyon. Screen 1 went dry during sampling in December 2003. The zone produced water during drilling, and the screen produced small amounts of water for a short period following installation. Water was detected in the sump below the screen since 2005. Automated monitoring of water levels maintained to determine if either zone recovers.	Intermediate	C^{HD}
	R-7 S2	Well located in middle Los Alamos Canyon. Screen 2 has been dry since well installation in 2001, although water has been observed in the sump since mid-2008. Automated monitoring of water levels maintained to determine if either zone recovers.	Intermediate	C^{HD}
	R-7 S3	Well located in middle Los Alamos Canyon. The collection of water-quality samples from this screen is suspended because it remains impacted by drilling products. Automated monitoring of water levels should be maintained to monitor the top of the regional aquifer.	Regional	C
	R-8 S1 R-8 S2	Well located downgradient of upper Los Alamos Canyon, DP Canyon, and TA-21. Water-level data at R-8 S1 and R-8 S2 will be used to continue development of the sitewide conceptual model and to support groundwater-flow modeling and aquifer test activities.	Regional	C
	R-9i S1 R-9i S2	Water-level data at R-9i S1 and R-9i S2 are useful for understanding the local hydrogeology.	Intermediate	C
General Surveillance	LAO-4.5c	Monitors location downcanyon below confluence of Los Alamos/DP Canyon.	Alluvial	C
	PAO-2	Monitors location in upper Pueblo Canyon.	Alluvial	C

Table 1.9-1 (continued)

Assigned Monitoring Group	Location	Rationale for Selection of Location	Source Aquifer	Water Level*
Mortandad Canyon Watershed				
General Surveillance	MCO-2	Well monitors Effluent Canyon above the TA-50 outfall.	Alluvial	C
	MCO-4B	Well monitors upper part of Mortandad Canyon. Data will be used to assess the influence from reductions in discharge from the TA-50 RLWTF outfall.	Alluvial	C
	MCO-6	Well monitors upper part of Mortandad Canyon. Data will be used to assess the influence from reductions in discharge from the TA-50 RLWTF outfall.	Alluvial	C
Chromium Investigation Monitoring Group	MCA-9, MCO-9, MCO-12	Wells meet Discharge Permit 1793 requirement to monitor historically dry wells for verification that land application of waste water does not result in local saturation.	Alluvial	M
	MCOI-4	Well monitors upper Mortandad and Ten Site Canyons but no longer yields sufficient water for sampling.	Intermediate	C
	R-61 S2	Water levels should be monitored to assess hydraulic responses from pumping at production wells PM-4 and PM-5 and at other Chromium Investigation monitoring group wells during aquifer testing.	Regional	C
TA-54 Monitoring Group	R-41 S1	Well located east of MDA G at TA-54. Screen 1 has been dry since well installation (March 2009). Water level should be checked during sampling of R-41 S2.	Intermediate	Q^{HD}
Pajarito Canyon Watershed				
General Surveillance	PCAO-7b2	Well characterizes potential impacts from TA-18.	Alluvial	C
	R-19 S1	Well located on a mesa south of Threemile Canyon and downgradient of TA-16. Screen 1 has been dry since installation of the Westbay sampling system in September 2000 (Koch and Schmeer 2011, 201566). Water-level data will continue to be monitored in this screen.	Intermediate	C^{HD}
	R-19 S2	Well located on a mesa south of Threemile Canyon and downgradient of TA-16. Water-level data will continue to be collected from this screen until well R-19 is reconfigured or plugged and abandoned.	Intermediate	C
	R-19 S3 R-19 S4 R-19 S5 R-19 S6 R-19 S7	Well located on a mesa south of Threemile Canyon and downgradient of TA-16. The collection of water-quality samples from these screens is suspended because they remain impacted by drilling products. Water-level data will continue to be collected from these screens until well R-19 is reconfigured or plugged and abandoned.	Regional	C

Table 1.9-1 (continued)

Assigned Monitoring Group	Location	Rationale for Selection of Location	Source Aquifer	Water Level*
Water Canyon/Cañon de Valle Watershed				
TA-16 260 Monitoring Group	CdV-9-1(i) PZ-1 CdV-9-1(i) PZ-2	Intermediate well located north of Cañon de Valle. Completed on January 19, 2015.	Intermediate	C
	R-25 S3 R-25 S6 R-25 S7 R-25 S8	Located at TA-16 within the Cañon de Valle watershed. Water-level data at R-25 S3, R-25 S6, R-25 S7, and R-25 S8 will be used to continue development of the sitewide conceptual model and to support groundwater flow modeling and aquifer test activities.	Intermediate (S3) Regional (S6, S7, S8)	C
Ancho Canyon Watershed				
General Surveillance	R-31 S1	Located in the north Ancho Canyon tributary. Zone initially showed water during drilling but has been dry since installation of the Westbay system in April 2000. Water-level data will continue to be monitored in this screen, will be used for continued development of the sitewide conceptual model, and will support groundwater flow modeling and aquifer test activities.	Intermediate	C^{HD}
	R-31 S2 R-31 S3 R-31 S4 R-31 S5	The collection of water-quality samples from these screens is suspended because they remain impacted by drilling products. Water-level data will continue to be monitored in these screens, will be used for continued development of the sitewide conceptual model, and will support groundwater flow modeling and aquifer test activities.	Regional	C

* Sampling frequency: C = continuous; M = monthly (12 times/yr at set time periods); Q = quarterly (4 times/yr); S = semiannual (2 times/yr); A = annual (1 time/yr). The superscript HD indicates this sampling location is historically dry. Continuous monitoring for groundwater refers to the collection of groundwater-level measurements by a transducer placed in a well and programmed to collect groundwater-level measurements at highly frequent intervals (e.g., every 60 or 120 min daily throughout the year).

Table 2.4-1
Interim Monitoring Plan for TA-21 Monitoring Group

Location	Watershed	Monitoring Group	Surface Water Body or Source Aquifer	Metals	VOCs	SVOCs	PCBs	HEXP	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics
LADP-3	Los Alamos	TA-21	Intermediate	A	B (2020)[a]	B (2020)	—[b]	—	—	A	—	B (2020)	A
LAOI(a)-1.1	Los Alamos	TA-21	Intermediate	A	B (2020)	B (2020)	—	—	—	A	—	B (2020)	A
LAOI-3.2	Los Alamos	TA-21	Intermediate	A	B (2020)	B (2020)	—	—	—	A	A	—	A
LAOI-3.2a	Los Alamos	TA-21	Intermediate	A	B (2020)	B (2020)	—	—	—	A	A	—	A
LAOI-7	Los Alamos	TA-21	Intermediate	A	B (2020)	B (2020)	—	—	—	A	A	—	A
R-6i	Los Alamos	TA-21	Intermediate	A	A	A	—	—	—	A	A	—	A
TA-53i	Los Alamos	TA-21	Intermediate	A	A	A	—	—	—	A	—	A	A
R-6	Los Alamos	TA-21	Regional	A	A	B (2020)	—	—	—	A	—	A	A
R-64	Los Alamos	TA-21	Regional	A	A	A	—	—	—	A	—	A	A
R-66	Los Alamos	TA-21	Regional	A	A	A	—	—	—	A	—	A	A
R-9	Los Alamos	TA-21	Regional	A	B (2020)	B (2020)	—	—	—	A	—	A	A

Notes: Sampling suites and frequencies: M = monthly (12 times/yr); Q = quarterly (4 times/yr); S = semiannual (2 times/yr); A = annual (1 time/yr); B = biennial (1 time/2 yr); T = triennial (1 time/3 yr); V = quinquennial (1 time/5 yr).

[a] 2020 = Samples scheduled to be collected during implementation of MY2020 IFGMP.

[b] — = This analytical suite is not scheduled to be collected for this type of water at locations assigned to this monitoring group.

Table 3.4-1
Interim Monitoring Plan for Chromium Investigation Monitoring Group

Location	Watershed	Monitoring Group	Surface Water Body or Source Aquifer	Metals	VOCs	SVOCs	PCBs	HEXP	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics	Chromium Isotopes	$^{15}N/^{18}O$ Isotopes in Nitrate	Naphthalene Sulfonate Tracers	Sodium Bromide Tracer	Sodium Perrhenate Tracer	Deuterated Water Tracer
MCOI-5	Mortandad	Chromium Investigation	Intermediate	Q	S	S	—[a]	—	—	A	A	—	Q	—	A	—	—	—	—
MCOI-6	Mortandad	Chromium Investigation	Intermediate	Q	S	S	B (2020)[b]	—	—	A	A	—	Q	—	A	—	—	—	—
SCI-1	Sandia	Chromium Investigation	Intermediate	S	B (2020)	B (2020)	B (2020)	—	—	A	—	A	S	—	A	—	—	—	—
SCI-2	Sandia	Chromium Investigation	Intermediate	Q	B (2020)	B (2020)	B (2020)	—	—	A	A	—	Q	—	A	—	—	—	—
R-1	Mortandad	Chromium Investigation	Regional	S	B (2020)	B (2020)	B (2020)	—	—	B (2020)	—	A	S	—	A	—	—	—	—
R-11	Sandia	Chromium Investigation	Regional	M[c]	B (2020)	B (2020)	—	—	—	B (2020)	—	Q	M	—	A	M	M	M	M
R-13	Mortandad	Chromium Investigation	Regional	Q	B (2020)	B (2020)	—	—	—	B (2020)	—	A	Q	—	A	—	—	—	—
R-15	Mortandad	Chromium Investigation	Regional	Q	B (2020)	B (2020)	—	—	—	B (2020)	—	B (2020)	Q	—	A	—	—	—	—
R-28[d]	Mortandad	Chromium Investigation	Regional	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
R-33 S1	Mortandad	Chromium Investigation	Regional	Q	B (2020)	B (2020)	—	—	—	B (2020)	—	A	Q	—	A	—	—	—	—
R-33 S2	Mortandad	Chromium Investigation	Regional	Q	B (2020)	B (2020)	—	—	—	B (2020)	—	A	Q	—	A	—	—	—	—
R-35a	Sandia	Chromium Investigation	Regional	M	B (2020)	B (2020)	—	—	—	B (2020)	—	Q	M	—	A	M	—	M	M
R-35b	Sandia	Chromium Investigation	Regional	M	B (2020)	B (2020)	—	—	—	B (2020)	—	Q	M	—	A	M	—	M	M
R-36	Sandia	Chromium Investigation	Regional	Q	B (2020)	B (2020)	—	—	—	B (2020)	—	S	Q	—	A	—	—	—	—
R-42[d]	Mortandad	Chromium Investigation	Regional	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
R-43 S1	Sandia	Chromium Investigation	Regional	Q	B (2020)	B (2020)	—	—	—	B (2020)	—	A	Q	—	A	—	—	—	—
R-43 S2	Sandia	Chromium Investigation	Regional	Q	B (2020)	B (2020)	—	—	—	B (2020)	—	A	Q	—	A	—	—	—	—
R-44 S1	Mortandad	Chromium Investigation	Regional	M	B (2020)	B (2020)	—	—	—	B (2020)	—	Q	M	—	S	M	—	M	—
R-44 S2	Mortandad	Chromium Investigation	Regional	M	B (2020)	B (2020)	—	—	—	B (2020)	—	Q	M	—	A	M	—	M	—
R-45 S1	Mortandad	Chromium Investigation	Regional	M	B (2020)	B (2020)	—	—	—	B (2020)	—	Q	M	—	S	M	M	M	M
R-45 S2	Mortandad	Chromium Investigation	Regional	M	B (2020)	B (2020)	—	—	—	B (2020)	—	Q	M	—	S	M	M	M	M
R-50 S1	Mortandad	Chromium Investigation	Regional	M	B (2020)	B (2020)	—	—	—	B (2020)	—	Q	M	—	A	M	—	—	—
R-50 S2	Mortandad	Chromium Investigation	Regional	M	B (2020)	B (2020)	—	—	—	B (2020)	—	Q	M	—	A	M	—	—	—
R-61 S1	Mortandad	Chromium Investigation	Regional	M	—	—	—	—	—	—	—	Q	M	—	—	—	—	—	—
R-62[e]	Mortandad	Chromium Investigation	Regional	Q	B (2020)	B (2020)	—	—	—	B (2020)	—	A	Q	—	A	—	—	—	—
R-67	Sandia	Chromium Investigation	Regional	Q	B (2020)	B (2020)	—	—	—	B (2020)	—	S	Q	—	A	—	—	—	—
SIMR-2[f]	Mortandad	Chromium Investigation	Regional	M	B (2020)	B (2020)	—	—	—	B (2020)	—	Q	M	—	A	M	—	—	—

Notes: Sampling suites and frequencies: M = monthly (12 times/yr); Q = quarterly (4 times/yr); S = semiannual (2 times/yr); A = annual (1 time/yr); B = biennial (1 time/2 yr); T = triennial (1 time/3 yr); V = quinquennial (1 time/5 yr).

[a] — = This analytical suite is not scheduled to be collected for this type of water at locations assigned to this monitoring group.

[b] 2020 = Samples scheduled to be collected during implementation of MY2020 IFGMP.

[c] Monitoring locations that include monthly sampling and analysis are interim measure performance monitoring wells (see section 3.3).

[d] Gray shading indicates wells are included in the pilot amendments test and will be sampled per the NMED-approved work plan.

[e] Conduct an 8-h extended purge at R-62 during the second quarter (January–March) of MY2019.

[f] Orange shading indicates sampling location is on Pueblo de San Ildefonso land.

Table 4.4-1
Interim Monitoring Plan for MDA C Monitoring Group

Location	Watershed	Monitoring Group	Surface Water Body or Source Aquifer	Metals	VOCs	SVOCs	PCBs	HEXP	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics	Chromium Isotopes	$^{15}N/^{18}O$ Isotopes in Nitrate
R-14 S1	Mortandad	MDA C	Regional	A	A	A	A	V (2020)[a]	—[b]	A	—	A	A	—	—
R-46	Mortandad	MDA C	Regional	A	A	A	A	V (2020)	—	A	—	A	A	—	—
R-60	Mortandad	MDA C	Regional	A	A	A	A	V (2020)	—	A	—	A	A	—	—

Notes: Sampling suites and frequencies: M = monthly (12 times/yr); Q = quarterly (4 times/yr); S = semiannual (2 times/yr); A = annual (1 time/yr); B = biennial (1 time/2 yr); T = triennial (1 time/3 yr); V = quinquennial (1 time/5 yr).

[a] 2020 = Samples scheduled to be collected during implementation of MY2020 IFGMP.

[b] — = This analytical suite is not scheduled to be collected for this type of water at locations assigned to this monitoring group.

Table 5.4-1
Interim Monitoring Plan for TA-54 Monitoring Group

Location	Watershed	Monitoring Group	Surface Water Body or Source Aquifer	Metals	VOCs	SVOCs	PCBs	HEXP	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics
R-23i S1	Pajarito	TA-54	Intermediate	A	S	A	V (2020)[a]	V (2020)	—[b]	A	—	A	A
R-23i S2	Pajarito	TA-54	Intermediate	A	S	A	V (2020)	V (2020)	—	A	—	A	A
R-23i S3	Pajarito	TA-54	Intermediate	A	S	A	V (2020)	V (2020)	—	A	—	A	A
R-37 S1	Mortandad	TA-54	Intermediate	A	S	S	V (2020)	V (2020)	—	A	—	S	A
R-40 Si	Pajarito	TA-54	Intermediate	A	—	—	—	—	—	—	—	S	A
R-40 S1	Pajarito	TA-54	Intermediate	S	S	—	—	—	—	—	—	S	S
R-55i	Mortandad	TA-54	Intermediate	—	—	—	—	—	—	—	—	S	—
R-20 S1	Pajarito	TA-54	Regional	A	A	A	V (2020)	V (2020)	—	A	—	A	A
R-20 S2	Pajarito	TA-54	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A
R-21	Mortandad	TA-54	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A
R-23	Pajarito	TA-54	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A
R-32 S1	Pajarito	TA-54	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A
R-37 S2	Mortandad	TA-54	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A
R-38	Mortandad	TA-54	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A
R-39	Pajarito	TA-54	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A
R-40 S2	Pajarito	TA-54	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A

Table 5.4-1 (continued)

Location	Watershed	Monitoring Group	Surface Water Body or Source Aquifer	Metals	VOCs	SVOCs	PCBs	HEXP	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics
R-41 S2	Pajarito	TA-54	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A
R-49 S1	Pajarito	TA-54	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A
R-49 S2	Pajarito	TA-54	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A
R-51 S1	Pajarito	TA-54	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A
R-51 S2	Pajarito	TA-54	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A
R-52 S1	Pajarito	TA-54	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A
R-52 S2	Pajarito	TA-54	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A
R-53 S1	Pajarito	TA-54	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A
R-53 S2	Pajarito	TA-54	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A
R-54 S1	Pajarito	TA-54	Regional	—	—	—	—	—	—	—	—	S	—
R-54 S2	Pajarito	TA-54	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A
R-55 S1	Mortandad	TA-54	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A
R-55 S2	Mortandad	TA-54	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A
R-56 S1	Pajarito	TA-54	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A
R-56 S2	Pajarito	TA-54	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A
R-57 S1[c]	Pajarito	TA-54	Regional	A	S	A	A	V (2020)	A	A	—	S	A
R-57 S2[c]	Pajarito	TA-54	Regional	A	S	A	A	V (2020)	A	A	—	S	A

Notes: Sampling suites and frequencies: M = monthly (12 times/yr); Q = quarterly (4 times/yr); S = semiannual (2 times/yr); A = annual (1 time/yr); B = biennial (1 time/2 yr); T = triennial (1 time/3 yr); V = quinquennial (1 time/5 yr).

[a] 2020 = Samples scheduled to be collected during implementation of MY2020 IFGMP.

[b] — = This analytical suite is not scheduled to be collected for this type of water at locations assigned to this monitoring group.

[c] The IFGMP sampling and analysis specified for R-57 S1 and R-57 S2 for analysis of VOCs, SVOCs, and PCBs also satisfies the TA-54 Area G PCB compliance monitoring requirements.

Table 6.4-1
Interim Monitoring Plan for TA-16 260 Monitoring Group

Location	Watershed	Monitoring Group	Surface Water Body or Source Aquifer	Metals	VOCs	SVOCs	PCBs	HEXMOD	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics	Naphthalene Sulfonate Tracers	Sodium Bromide Tracer	$^{15}N/^{18}O$ Isotopes in Nitrate
Canon de Valle below MDA P[a]	Water	TA-16 260	Base flow	S	S	B (2020)[b]	V (2020)	S	V (2020)	B (2020)	—[c]	—	S	—	—	—
Between E252 and Water at Beta	Water	TA-16 260	Base flow	S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	—
Water at Beta	Water	TA-16 260	Base flow	S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	—
Pajarito below S&N Ancho E Basin Confluence	Pajarito	TA-16 260	Base flow	S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	—
Bulldog Spring	Pajarito	TA-16 260	Spring	S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	A
SWSC Spring	Water	TA-16 260	Spring	S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	A
Burning Ground Spring	Water	TA-16 260	Spring	S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	A	S	—	—	A
Martin Spring	Water	TA-16 260	Spring	S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	A	S	—	—	A
16-61439 (alias: PRB Alluvial Seep)	Water	TA-16 260	Spring	S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	—
FLC-16-25280	Water	TA-16 260	Alluvial	S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	—
CdV-16-02656	Water	TA-16 260	Alluvial	S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	—
CdV-16-02657r	Water	TA-16 260	Alluvial	S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	—
CdV-16-02659	Water	TA-16 260	Alluvial	S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	—
CdV-16-611923	Water	TA-16 260	Alluvial	S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	—
MSC-16-06293	Water	TA-16 260	Alluvial	S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	—
MSC-16-06294	Water	TA-16 260	Alluvial	S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	—
CdV-16-611937	Water	TA-16 260	Alluvial	S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	—
16-26644	Water	TA-16 260	Intermediate	S	S	B (2020)	—	Q	—	B (2020)	—	A	S	—	—	A
CdV-9-1(i) S1	Water	TA-16 260	Intermediate	S	S	B (2020)	V (2020)	Q	A	B (2020)	—	A	S	Q	Q	A
CdV-16-1(i)	Water	TA-16 260	Intermediate	S	S	B (2020)	—	Q	—	B (2020)	—	A	S	Q	Q	A
CdV-16-2(i)r	Water	TA-16 260	Intermediate	S	S	B (2020)	—	Q	—	B (2020)	—	A	S	Q	Q	A
CdV-16-4ip S1	Water	TA-16 260	Intermediate	S	S	B (2020)	V (2020)	Q	V (2020)	B (2020)	—	A	S	Q	—	A
CdV-37-1(i)	Water	TA-16 260	Intermediate	S	S	B (2020)	—	S	—	B (2020)	—	A	S	—	—	—
R-25 S1	Water	TA-16 260	Intermediate	—	—	—	—	—	—	—	—	—	—	Q	Q	—
R-25 S2	Water	TA-16 260	Intermediate	—	—	—	—	—	—	—	—	—	—	Q	Q	—
R-25 S4	Water	TA-16 260	Intermediate	—	—	—	—	—	—	—	—	—	—	Q	Q	—
R-25b	Water	TA-16 260	Intermediate	S	S	B (2020)	—	S	—	B (2020)	—	A	S	S	S	—
R-26 PZ-2	Water	TA-16 260	Intermediate	S	S	B (2020)	—	S	—	B (2020)	—	A	S	—	—	—
R-26 S1	Water	TA-16 260	Intermediate	S	S	B (2020)	—	S	—	B (2020)	—	A	S	—	—	—
R-47i	Water	TA-16 260	Intermediate	S	S	B (2020)	—	Q	—	B (2020)	—	A	S	Q	Q	A
R-63i	Water	TA-16 260	Intermediate	S	S	—	—	S	—	A	—	A	S	S	S	A

Table 6.4-1 (continued)

Location	Watershed	Monitoring Group	Surface Water Body or Source Aquifer	Metals	VOCs	SVOCs	PCBs	HEXMOD	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics	Naphthalene Sulfonate Tracers	Sodium Bromide Tracer	$^{15}N/^{18}O$ Isotopes in Nitrate
16-612309 (alias: Surge Bed Monitoring Well)	Water	TA-16 260	Intermediate	S	S	S	—	S	—	—	—	—	S	—	—	—
R-47	Water	TA-16 260	Regional	S	Q	B (2020)	V (2020)	Q	V (2020)	B (2020)	—	A	S	Q	Q	A
CdV-R-15-3 S4	Water	TA-16 260	Regional	S	S	B (2020)	—	S	—	B (2020)	—	A	S	—	—	—
CdV-R-37-2 S2	Water	TA-16 260	Regional	A	—	—	—	A	—	—	—	A	A	—	—	—
R-18	Pajarito	TA-16 260	Regional	S	Q	B (2020)	—	Q	—	B (2020)	—	A	S	Q	Q	A
R-25 S5	Water	TA-16 260	Regional	—	—	—	—	—	—	—	—	—	—	Q	Q	—
R-48	Water	TA-16 260	Regional	S	S	B (2020)	—	Q	—	B (2020)	—	A	S	Q	Q	A
R-58	Water	TA-16 260	Regional	S	Q	B (2020)	V (2020)	Q	V (2020)	B (2020)	—	A	S	Q	Q	A
R-63	Water	TA-16 260	Regional	S	S	B (2020)	—	Q	—	B (2020)	—	A	S	Q	Q	—
R-68	Water	TA-16 260	Regional	S	Q	S	—	Q	—	B (2020)	—	A	S	Q	Q	A
R-69 (Proposed)[d]	Water	TA-16 260	Regional	Q	Q	Q	Q	Q	Q	Q	—	Q	Q	Q	Q	Q

Notes: Sampling suites and frequencies: M = monthly (12 times/yr); Q = quarterly (4 times/yr); S = semiannual (2 times/yr); A = annual (1 time/yr); B = biennial (1 time/2 yr); T = triennial (1 time/3 yr); V = quinquennial (1 time/5 yr).

[a] Blue shading indicates a long-term monitoring location per Appendix A of the Remedy Completion Report for Corrective Measures Implementation at Consolidated Unit 16-021(c)-99 (LANL 2017, 602597).

[b] 2020 = Samples scheduled to be collected during implementation of MY2020 IFGMP.

[c] — = This analytical suite is not scheduled to be collected for this type of water at locations assigned to this monitoring group.

[d] Monitoring well R-69 is expected to be ready to sample in the first quarter of MY2019.

Table 7.4-1
Interim Monitoring Plan for MDA AB Monitoring Group

Location	Watershed	Monitoring Group	Surface Water Body or Source Aquifer	Metals	VOCs	SVOCs	PCBs	HEXP	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics
R-27i	Water	MDA AB	Intermediate	A	A	A	—*	—	—	A	—	A	A
R-27	Water	MDA AB	Regional	A	A	A	—	—	—	A	—	A	A
R-29	Ancho	MDA AB	Regional	A	A	A	—	A	—	A	—	A	A
R-30	Ancho	MDA AB	Regional	A	A	A	—	A	—	A	—	A	A

Notes: Sampling suites and frequencies: M = monthly (12 times/yr); Q = quarterly (4 times/yr); S = semiannual (2 times/yr); A = annual (1 time/yr); B = biennial (1 time/2 yr); T = triennial (1 time/3 yr); V = quinquennial (1 time/5 yr).

* — = This analytical suite is not scheduled to be collected for this type of water at locations assigned to this monitoring group.

Table 8.3-1
Interim Monitoring Plan for General Surveillance Monitoring Group

Location	Watershed	Monitoring Group	Surface Water Body or Source Aquifer	Metals	VOCs	SVOCs	PCBs	HEXP	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics
LA Canyon near Otowi Bridge[a]	Los Alamos	General Surveillance	Base flow	S	S	S	V (2020)[b]	T (2021)[c]	V (2020)	S	—[d]	S	S
Vine Tree Spring	Los Alamos	General Surveillance	Spring	S	S	T (2021)	T (2021)	T (2021)	V (2020)	S	—	S	S
LLAO-1b	Los Alamos	General Surveillance	Alluvial	A	A	T (2021)	T (2021)	T (2021)	V (2020)	A	—	—	A
LLAO-4	Los Alamos	General Surveillance	Alluvial	A	A	T (2021)	T (2021)	T (2021)	V (2020)	A	—	—	A
LAO-3a	Los Alamos	General Surveillance	Alluvial	A	B (2020)	B (2020)	V (2020)	—	V (2020)	A	—	—	A
LAUZ-1	Los Alamos	General Surveillance	Alluvial	A	A	A	—	A	—	A	—	A	A
PAO-5n	Pueblo	General Surveillance	Alluvial	A	B (2020)	B (2020)	V (2020)	—	V (2020)	A	—	—	A
POI-4	Pueblo	General Surveillance	Intermediate	A	B (2020)	B (2020)	—	—	—	A	—	B (2020)	A
R-3i	Pueblo	General Surveillance	Intermediate	A	B (2020)	B (2020)	—	—	—	A	—	B (2020)	A
TW-2Ar	Pueblo	General Surveillance	Intermediate	A	B (2020)	B (2020)	—	—	—	A	B (2020)	—	A
R-2	Pueblo	General Surveillance	Regional	A	B (2020)	B (2020)	—	—	—	A	—	A	A
R-24	Pueblo	General Surveillance	Regional	A	B (2020)	B (2020)	—	—	—	A	—	B (2020)	A
R-3	Pueblo	General Surveillance	Regional	A	B (2020)	B (2020)	—	—	—	A	—	B (2020)	A
R-4	Pueblo	General Surveillance	Regional	A	A	A	—	—	—	A	—	B (2020)	A
Sandia right fork at Pwr Plant	Sandia	General Surveillance	Base flow	A	A	A	A	V (2020)	V (2020)	A	—	—	A
Sandia below Wetlands	Sandia	General Surveillance	Base flow	A	A	A	A	V (2020)	V (2020)	A	—	—	A
R-12 S1	Sandia	General Surveillance	Intermediate	—	—	—	—	—	—	—	—	B (2019)[e]	—
R-12 S2	Sandia	General Surveillance	Intermediate	A	B (2020)	B (2020)	—	—	—	A	—	A	A
R-10 S1	Sandia	General Surveillance	Regional	A	A	A	T (2021)	T (2021)	—	A	—	A	A
R-10 S2	Sandia	General Surveillance	Regional	A	A	A	T (2021)	T (2021)	—	A	—	A	A
R-10a	Sandia	General Surveillance	Regional	S	S	S	T (2021)	T (2021)	—	S	—	S	S
CDBO-6	Mortandad	General Surveillance	Alluvial	B (2020)	B (2020)	B (2020)	V (2020)	—	V (2020)	A	—	—	B (2020)
MCO-5	Mortandad	General Surveillance	Alluvial	A	B (2020)	B (2020)	V (2020)	—	V (2020)	A	—	A	A
MCO-7	Mortandad	General Surveillance	Alluvial	A	A	A	A	—	V (2020)	A	—	A	A
R-16 S2	Mortandad	General Surveillance	Regional	A	B (2020)	B (2020)	—	—	—	A	—	A	A
R-16 S4	Mortandad	General Surveillance	Regional	A	B (2020)	B (2020)	—	—	—	A	—	A	A
R-16r	Mortandad	General Surveillance	Regional	A	B (2020)	B (2020)	—	—	—	A	—	A	A
R-34	Mortandad	General Surveillance	Regional	A	A	A	T (2021)	T (2021)	—	A	—	A	A

Table 8.3-1 (continued)

Location	Watershed	Monitoring Group	Surface Water Body or Source Aquifer	Metals	VOCs	SVOCs	PCBs	HEXP	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics
Two Mile Canyon Below TA-59	Pajarito	General Surveillance	Base flow	A	A	A	V (2020)	A	V (2020)	A	—	—	A
Homestead Spring	Pajarito	General Surveillance	Spring	A	A	A	—	A	—	A	—	A	A
Starmer Spring	Pajarito	General Surveillance	Spring	A	A	A	—	A	—	A	—	A	A
18-MW-18	Pajarito	General Surveillance	Alluvial	S	B (2019)	B (2019)	V (2020)	V (2020)	V (2020)	S	—	B (2019)	S
PCAO-8	Pajarito	General Surveillance	Alluvial	A	B (2019)	B (2019)	V (2020)	V (2020)	V (2020)	A	—	—	A
03-B-13	Pajarito	General Surveillance	Intermediate	S	S	S	—	V (2020)	—	A	B (2019)	—	S
PCI-2	Pajarito	General Surveillance	Intermediate	S	S	S	—	S	—	A	—	A	S
R-17 S1	Pajarito	General Surveillance	Regional	A	A	A	—	A	—	A	—	A	A
R-17 S2	Pajarito	General Surveillance	Regional	A	A	A	—	A	—	A	—	A	A
WCO-1r	Water	General Surveillance	Alluvial	S	B (2020)	B (2020)	V (2020)	S	V (2020)	A	—	A	S
Ancho at Rio Grande	White Rock and Rio Grande	General Surveillance	Base flow	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	—	—	B (2019)
Frijoles at Rio Grande	White Rock and Rio Grande	General Surveillance	Base flow	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	—	—	B (2019)
Mortandad at Rio Grande	White Rock and Rio Grande	General Surveillance	Base flow	B (2020)	B (2020)	B (2020)	B (2020)	B (2020)	B (2020)	B (2020)	—	—	B (2020)
Pajarito at Rio Grande	White Rock and Rio Grande	General Surveillance	Base flow	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	—	—	B (2019)
Rio Grande at Frijoles	White Rock and Rio Grande	General Surveillance	Base flow	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	—	—	B (2019)
Rio Grande at Otowi Bridge	White Rock and Rio Grande	General Surveillance	Base flow	A	A	A	A	—	A	A	—	A	A
Ancho Spring	White Rock and Rio Grande	General Surveillance	Spring	A	A	A	—	A	—	A	—	A	A
La Mesita Spring	White Rock and Rio Grande	General Surveillance	Spring	A	A	A	T (2021)	T (2021)	—	A	—	A	A
Upper La Mesita Spring	White Rock and Rio Grande	General Surveillance	Spring	A	A	A	T (2021)	T (2021)	—	A	—	A	A
Sacred Spring	White Rock and Rio Grande	General Surveillance	Spring	A	A	A	T (2021)	T (2021)	—	A	—	A	A
Sandia Spring	White Rock and Rio Grande	General Surveillance	Spring	A	A	A	B (2020)	B (2020)	—	A	—	A	A
Lower Sandia Spring	White Rock and Rio Grande	General Surveillance	Spring	A	A	A	B (2020)	B (2020)	—	A	—	A	A
Spring 1	White Rock and Rio Grande	General Surveillance	Spring	A	A	A	A	A	—	A	—	A	A
Spring 2	White Rock and Rio Grande	General Surveillance	Spring	A	A	A	B (2020)	B (2020)	—	A	—	A	A
Spring 3[f]	White Rock and Rio Grande	General Surveillance	Spring	A	A	A	B (2019)	A	B (2019)	A	—	B (2019)	A
Spring 3A	White Rock and Rio Grande	General Surveillance	Spring	A	A	A	—	A	—	A	—	A	A
Spring 3AA	White Rock and Rio Grande	General Surveillance	Spring	A	A	A	—	A	—	A	—	A	A
Spring 4[f]	White Rock and Rio Grande	General Surveillance	Spring	A	A	A	A	A	A	A	—	B (2019)	A
Spring 4A	White Rock and Rio Grande	General Surveillance	Spring	A	A	A	—	A	—	A	—	A	A
Spring 4AA	White Rock and Rio Grande	General Surveillance	Spring	A	A	A	—	A	—	A	—	A	A
Spring 4B	White Rock and Rio Grande	General Surveillance	Spring	A	A	A	—	A	—	A	—	B (2019)	A
Spring 5	White Rock and Rio Grande	General Surveillance	Spring	A	A	A	—	A	—	A	—	A	A
Spring 5A	White Rock and Rio Grande	General Surveillance	Spring	A	A	A	—	A	—	A	—	B (2019)	A
Spring 5B	White Rock and Rio Grande	General Surveillance	Spring	A	A	A	—	A	—	A	—	A	A
Spring 6	White Rock and Rio Grande	General Surveillance	Spring	A	A	A	—	A	—	A	—	B (2019)	A

Table 8.3-1 (continued)

Location	Watershed	Monitoring Group	Surface Water Body or Source Aquifer	Metals	VOCs	SVOCs	PCBs	HEXP	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics
Spring 6A	White Rock and Rio Grande	General Surveillance	Spring	A	A	A	—	A	—	A	—	A	A
Spring 8A	White Rock and Rio Grande	General Surveillance	Spring	A	A	A	—	A	—	A	—	A	A
Spring 9	White Rock and Rio Grande	General Surveillance	Spring	A	A	A	—	A	—	A	—	B (2019)	A
Spring 9A	White Rock and Rio Grande	General Surveillance	Spring	A	A	A	—	A	—	A	—	A	A

Notes: Sampling suites and frequencies: M = monthly (12 times/yr); Q = quarterly (4 times/yr); S = semiannual (2 times/yr); A = annual (1 time/yr); B = biennial (1 time/2 yr); T = triennial (1 time/3 yr); V = quinquennial (1 time/5 yr).

[a] Orange shading indicates a sampling location is on Pueblo de San Ildefonso land.

[b] 2020 = Samples scheduled to be collected during implementation of MY2020 IFGMP.

[c] 2021 = Samples scheduled to be collected during implementation of MY2021 IFGMP.

[d] — = This analytical suite is not scheduled to be collected for this type of water at locations assigned to this monitoring group.

[e] 2019 = Samples scheduled to be collected during implementation of MY2019 IFGMP.

[f] Springs 3 and 4 are backup locations for primary TA-54 Area G PCB compliance monitoring locations R-57 S1 and R-57 S2. The VOC, SVOC, and PCB sampling and analysis plan will be modified as necessary for Springs 3 and 4 in the event that all specified samples from R-57 S1 and/or R-57 S2 cannot be collected.

Appendix A

Acronyms and Abbreviations,
Metric Conversion Table, and Data Qualifier Definitions

A-1.0 ACRONYMS AND ABBREVIATIONS

AK	acceptable knowledge
AOC	area of concern
AWM	approval with modifications
bgs	below ground surface
CAS	Chemical Abstract Service
CME	corrective measures evaluation
CMI	corrective measures implementation
Consent Order	Compliance Order on Consent
CV	casing volume
D/F	dioxins/furans
DO	dissolved oxygen
DOE	Department of Energy (U.S.)
EM	Office of Environmental Management (DOE)
EPA	Environmental Protection Agency (U.S.)
GFM	geologic framework model
HE	high explosives
HMX	octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
HPLC	high-performance liquid chromatography
ICP-AES	inductively coupled plasma atomic emission spectroscopy
ICP-MS	inductively coupled plasma mass spectrometry
IDW	investigation-derived waste
IFGMP	Interim Facility-Wide Groundwater Monitoring Plan
IM	interim measure
IR	investigation report
Laboratory	Los Alamos National Laboratory
LANL	Los Alamos National Laboratory
MCL	maximum contaminant level
MDA	material disposal area
MDL	method detection limit
meq	milliequivalent
MOU	memorandum of understanding
MP	multiport (Westbay system)
MTBE	methyl tert butyl ether

MY	monitoring year
N3B	Newport News Nuclear BWXT – Los Alamos, LLC
NIST	National Institute of Standards and Technology
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Control Commission
NNSA	National Nuclear Security Administration (DOE)
NOI	notice of intent
NPDES	National Pollutant Discharge Elimination System
NTU	nephelometric turbidity unit
ORP	oxygen-reduction potential
PCB	polychlorinated biphenyl
PEB	performance evaluation blank
PMR	periodic monitoring report
PQL	practical quantitation limit
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RDX	hexahydro-1,3,5,trinitro-1,3,5-triazine
RLWTF	Radioactive Liquid Waste Treatment Facility
S	screen
SC	specific conductance
SCC	Strategic Computing Complex
SERF	Sanitary Effluent Reclamation Facility
SMO	Sample Management Office
SOP	standard operating procedure
SU	Standard Unit
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TA	technical area
TCE	trichloroethene
TDS	total dissolved solids
TKN	total Kjeldahl nitrogen
TNT	trinitrotoluene(2,4,6)
TOC	total organic carbon

TW test well

USGS U.S. Geological Survey

VOC volatile organic compound

WCSF waste characterization strategy form

WWTP wastewater treatment plant

A-2.0 METRIC CONVERSION TABLE

Multiply SI (Metric) Unit	by	To Obtain U.S. Customary Unit
kilometers (km)	0.622	miles (mi)
kilometers (km)	3281	feet (ft)
meters (m)	3.281	feet (ft)
meters (m)	39.37	inches (in.)
centimeters (cm)	0.03281	feet (ft)
centimeters (cm)	0.394	inches (in.)
millimeters (mm)	0.0394	inches (in.)
micrometers or microns (µm)	0.0000394	inches (in.)
square kilometers (km^2)	0.3861	square miles (mi^2)
hectares (ha)	2.5	acres
square meters (m^2)	10.764	square feet (ft^2)
cubic meters (m^3)	35.31	cubic feet (ft^3)
kilograms (kg)	2.2046	pounds (lb)
grams (g)	0.0353	ounces (oz)
grams per cubic centimeter (g/cm^3)	62.422	pounds per cubic foot (lb/ft^3)
milligrams per kilogram (mg/kg)	1	parts per million (ppm)
micrograms per gram (µg/g)	1	parts per million (ppm)
liters (L)	0.26	gallons (gal.)
milligrams per liter (mg/L)	1	parts per million (ppm)
degrees Celsius (°C)	9/5 + 32	degrees Fahrenheit (°F)

A-3.0 DATA QUALIFIER DEFINITIONS

Data Qualifier	Definition
U	The analyte is classified as not detected.
J	The analyte is classified as detected but the reported concentration value is expected to be more uncertain than usual.
J+	The analyte is classified as detected but the reported concentration value is expected to be more uncertain than usual with a potential positive bias.
J-	The analyte is classified as detected but the reported concentration value is expected to be more uncertain than usual with a potential negative bias.
UJ	The analyte is classified as not detected, with an expectation that the reported result is more uncertain than usual.
R	The reported sample result is classified as rejected due to serious noncompliances regarding quality control acceptance criteria. The presence or absence of the analyte cannot be verified.
NQ	No validation qualifier flag is associated with this result, and the analyte is classified as detected.

Appendix B

Procedures, Methods, and
Investigation-Derived Waste Management

B-1.0 PROCEDURES FOR MEASURING GROUNDWATER LEVELS AND COLLECTING WATER SAMPLES

This section summarizes standard operating procedures (SOPs) used to measure groundwater levels and to collect groundwater, base-flow, and spring samples. These procedures are listed in the table below and are summarized in subsequent sections. These procedures (or their equivalent) will be used during sampling activities conducted in accordance with this Interim Facility-Wide Groundwater Monitoring Plan (IFGMP). Newport News Nuclear BWXT, LLC – Los Alamos (N3B) has transferred ownership of all applicable procedures and is operating to them.

Procedure Identifier	Procedure Title	Applicability
Measurement of Groundwater Levels		
ER-SOP-20243	Manual Groundwater Level Measurements	Procedure for measuring depth to groundwater and determining groundwater elevation in a monitoring well or an open borehole
ER-SOP-10010	Pressure Transducer Installation, Removal, and Maintenance	Procedure to install, remove, and maintain pressure transducers to monitor and record water-level data in monitoring wells and piezometers
SOP-5226	Westbay Pressure Transducer Installation, Removal, and Maintenance	Procedure to install, remove, and maintain pressure transducers to monitor and record water-level data in Westbay monitoring wells
ER-SOP-20231	Groundwater-Level Data Processing, Review, and Validation	Procedure to review and validate groundwater-level data obtained from pressure transducers
ER-SOP-20006	Monitoring Well Packer System Reinflation	Procedure for monitoring and maintenance of Baski sampling system packers and temporary packers installed in water wells
Collection of Groundwater Samples		
ER-SOP-20032	Groundwater Sampling	Procedure for sampling groundwater using various types of pumps. Procedure also addresses sampling of water supply wells and domestic wells.
SOP-5225	Groundwater Sampling Using Westbay MP System	Procedure for sampling groundwater using the Westbay multiport (MP) system
EP-ERSS-SOP-5061	Field Decontamination of Equipment	Procedure for field decontamination of equipment
Collection of Surface Water and Spring Samples		
SOP-5224	Spring and Surface Water Sampling	Procedure for sampling springs and surface water
Sample Preparation, Preservation, and Transportation		
ER-SOP-20235	Sample Containers, Preservation, and Field Quality Control	Procedure specifying sample containers, collection and preservation techniques, and holding times
ER-SOP-10093	Sample Control and Field Documentation	Procedure for field preparation, packaging, and transport to the sample management office
ER-SOP-10094	Sample Receiving and Shipping by the N3B Sample Management Office	Procedure for receiving, packaging, and shipping samples to analytical laboratories

Procedure Identifier	Procedure Title	Applicability
Field Activities Documentation		
RCRA [Resource Conservation and Recovery Act] Ground-Water Monitoring Draft Technical Guidance (EPA 1992, 600436)	Notebook and logbook documentation will follow the guidance in Section 7.6.3 of the U.S. Environmental Protection Agency's (EPA's) RCRA Ground-Water Monitoring Draft Technical Guidance	Procedure for documenting technical work and field activities in a notebook or logbook
Waste Management		
EP2016-0117 (LANL 2016, 601812)	Waste Characterization Strategy Form	Strategy for characterizing and managing generated waste

B-2.0 SUMMARY OF FIELD INVESTIGATION METHODS

Method	Summary
General	The objective of this sampling program is to collect samples from wells, springs, or base-flow stations that are representative of physical and geochemical conditions in the targeted hydrogeologic unit. To meet this objective, sampling equipment, sampling methods, monitoring-well operation and maintenance, and sample-handling procedures are implemented such that the chemistry of the sample is not altered. The procedures summarized below have been developed to meet the above objective and to be consistent with the requirements of the Compliance Order on Consent (the Consent Order).
Groundwater-Level Measurements Referenced Procedures: • ER-SOP-10010, Pressure Transducer Installation, Removal, and Maintenance • SOP-5226, Westbay Pressure Transducer Installation, Removal and Maintenance • ER-SOP-20243, Manual Groundwater Level Measurements • ER-SOP-20231, Groundwater Level Data Processing, Review and Validation	This summary applies to the collection of groundwater-level data. Groundwater levels are manually measured at predetermined intervals. Additionally, data are downloaded at wells with pressure transducers installed after each sampling event. Water levels cannot be manually measured in wells equipped with the Westbay sampling system; however, data from these wells are downloaded before and after each sampling event. Westbay transducers must be removed before sampling and are reinstalled after each sampling event. Two methods are used to collect water-level data: • Pressure transducers are used to measure water levels in individual wells or well screens at specified intervals. Most wells sampled under the IFGMP are monitored with pressure transducers. • Manual water-level measurements are routinely measured in wells not instrumented with pressure transducers. These measurements are also taken before purging and sampling alluvial wells. Manual water-level measurements are also taken periodically to verify transducer readings. Data from pressure transducers are automatically recorded in a data logger for later retrieval and processing to calculate water levels. Information collected during manual water-level measurements is documented on the Groundwater Level Measurement Form or Groundwater Level Project Field Form. Pressure transducers are periodically bench-tested to verify calibration.

<table>
<tr><th>Method</th><th>Summary</th></tr>
<tr>
<td>Collection of Groundwater Samples Using Dedicated Submersible or Portable Pumping Systems
Referenced Procedures:

ER-SOP-20032 Groundwater Sampling
ER-SOP-20235, Sample Containers and Preservation
Waste Characterization Strategy Form (EP2016-0117; LANL 2016, 601812)
RCRA Ground-Water Monitoring Draft Technical Guidance (EPA 1992, 600436)
</td>
<td>This summary applies to the use of an electric gear-driven submersible pump system, a bladder-pump system, a Bennett pump system, a Baski pump system, a hand-bailer system, and portable versions of the bladder pump and Bennett pump to sample wells.

Wells are purged sufficiently before sample collection to ensure samples will be representative of formation water.
The pumping rate should be adjusted, if possible, during purging so excessive drawdown does not occur. Field crews may have limited ability to restrict flow, depending on the pumping system. Turning off the pump while purging regional and intermediate wells should be avoided unless absolutely necessary. Instead, the pumping rate should be slowed to prevent drawdown into the screen, whenever possible.
The discharge rate is calculated either by using an in-line flow meter or by filling a bucket or bottle of known volume and dividing by the fill time. Flow rate is monitored at regular intervals during the purge, preferably once per casing volume (CV) and while the drop pipe is being cleared.
In general, a well may be sampled once the following criteria have been met (see ER-SOP-20032 for details):

A minimum of 1 CV has been removed for alluvial wells and a minimum of 3 CVs (plus the drop pipe) has been removed for intermediate or regional wells (unless otherwise requested).
The field indicator parameters have stabilized within their allowable ranges (as listed below) for at least three consecutive measurements taken a minimum of 3 or 5 min apart.

<table>
<tr><th>Field Parameter</th><th>Stabilization Criteria
(Yeskis and Zavala 2002, 204429)</th></tr>
<tr><td>Turbidity</td><td><10 nephelometric turbidity units (NTU), or turbidity should vary no more than 10% when turbidity is greater than 10 NTU.</td></tr>
<tr><td>Dissolved Oxygen (DO)</td><td>DO varies no more than 0.3 mg/L.</td></tr>
<tr><td>pH</td><td>pH varies no more than 0.2 Standard Units (SU).</td></tr>
<tr><td>Specific Conductance (SC)</td><td>For SC>100 μS/cm, SC varies no more than 3%, or for SC≤100 μS/cm, SC varies no more than 5%.</td></tr>
</table>

At the start of each sampling campaign, well-specific work plans are developed which provide additional direction where purge volume and/or field parameter stability requirements cannot be met. In these cases, the work plan requirements will supersede the requirements of this SOP.
Purge water is discharged under the notice of intent (NOI) with the New Mexico Environment Department (NMED) or containerized pending waste determination.
Sample labels and documentation are completed for each sample following procedures referenced in this IFGMP. All activities are documented in the field logbook and appropriate field forms.
Chain-of-custody seals are applied to each sample container before samples are transported from the site.
All samples are submitted to the Sample Management Office (SMO) and then shipped to the designated off-site analytical laboratory in a timely manner to allow the laboratory to conduct analyses within proper holding times.
</td>
</tr>
</table>

Method	Summary
Collection of Groundwater Samples Using Westbay System Referenced Procedures: • SOP-5225, Groundwater Sampling Using Westbay Sampling System • SOP-5226, Westbay Pressure Transducer Installation, Removal and Maintenance • ER-SOP-20235, Sample Containers and Preservation	This summary applies to the sampling of wells equipped with the Westbay MP system, a multilevel groundwater monitoring system. Samples are collected using a dedicated closed-access tube with valved ports that provide access to multiple levels of a borehole through a single well casing. The Westbay system is designed to allow for sampling without purging under normal aquifer conditions and takes samples at an in situ pressure. • The Westbay MP system consists of casing components that are permanently installed in the final casing, portable pressure measurement and sampling probes, and specialized tools. • The sampling probes are lowered to a precise port depth from which the sample is collected. This sampling system is a nonpurge system so no purge water is generated. • Samples are collected directly into the sampling probe's sample containers and are transferred into the appropriate sample containers as soon as possible. • Data collected during sampling, including port pressures and field parameters, are documented on the appropriate forms in SOP-5225. • The sample probe and sample containers are the only equipment or materials that are reused and are decontaminated between sampling each port, as described in SOP-5225. • Sample labels and documentation are completed for each sample following procedures referenced in this IFGMP. Samples are delivered to SMO and shipped to the designated off-site analytical laboratory in a timely manner to allow the samples to be analyzed within proper holding times.
Collection of Spring and Surface Water Samples Referenced Procedures: • SOP-5224, Spring and Surface Water Sampling • ER-SOP-20235, Sample Containers and Preservation	This summary applies to collecting water-quality samples from base-flow sites and springs. • Permanent spring and base-flow sampling sites are usually identified by posts or gaging stations. However, this may not be possible at some sites. • Ideally, samples are collected from flowing water. In some cases, the samples may need to be collected from pooled or ponded water. Samples are collected far enough upstream of a confluence so they are not influenced by water from another stream. If there is any question about whether a representative sample can be collected, field personnel are instructed to contact the requestor before proceeding. • Samples may be collected using either the direct containment method or a peristaltic pump. Filtered samples must be collected using a peristaltic pump. • Where both field conditions and flow conditions allow, a discharge measurement should be taken using one of the methods outlined in SOP-5224. Discharge may be estimated where quantitative measurements are not possible. • Sample labels and documentation are completed for each sample following procedures referenced in this IFGMP. All activities are documented in the field logbook and appropriate field forms. • Samples are delivered to SMO and shipped to the designated off-site analytical laboratory in a timely manner to allow the samples to be analyzed within proper holding times.

Method	Summary
Sample Bottles and Preservation of Samples Referenced Procedure: • ER-SOP-20235, Sample Containers and Preservation	This summary applies to requirements for sampling containers, sample pretreatment, and sample preservation requirements that are applicable to all water-quality samples. • All samples are collected in containers specifically prepared for that given parameter. • Sample containers are precleaned to a 300 Series (I-Chem, ESS) and are commercially available through a number of vendors. • For filtered samples for the analysis of dissolved constituents, the following systems will be used: ❖ in-line 0.45-μm disposable filter capsules, ❖ in-line filter holders with 0.45-μm filter membranes, or ❖ in-line 0.02-μm disposable filter capsules (for samples requiring microfiltration only). • Samples are preserved in accordance with Attachment 1 to ER-SOP-20235. Samples are preserved and pH tested immediately after collection.
Handling, Packaging, and Shipping of Samples Referenced Procedures: • ER-SOP-10093, Sample Control and Field Documentation	This summary applies to requirements for handling, packaging, and shipping of samples. • After all samples are collected and preserved, the sample containers are wiped off and custody tape is applied before packaging. • Samples for off-site analysis are transported to the SMO for shipment to off-site analytical laboratories. • The sampling personnel will coordinate with the SMO regarding shipment of all samples.
Sample Documentation Referenced Procedures: • RCRA Ground-Water Monitoring Draft Technical Guidance (EPA 1992, 600436)	This summary applies to requirements for documentation of sample collection. • The requested parameters, preservation and bottle type, chain of custody, required field parameters, and any other additional information are included on the analytical request generated from the database. • All sampling activities are documented in the field logbooks and appropriate field forms. • Chain of custody is documented on the analytical request form and signed to verify that the samples were not left unattended. • All field information, date and time of sample, purging and final field parameters, field conditions, and sampling personnel are included in the specific sampling method field sheets.
Field Quality Assurance/Quality Control Samples Referenced Document: • Current IFGMP	Field quality assurance (QA)/quality control (QC) samples are required by the Consent Order and are discussed in detail in Appendix D. Field QA/QC samples to be collected are summarized below. • Field blanks are collected at a minimum frequency of 10% of all samples collected in a sampling campaign. • Equipment rinsate blanks are collected before a well with a nondedicated pump is sampled and before each well equipped with a Westbay sampling system is sampled. • Field duplicates are collected at a rate of 10% of all samples collected during a sampling campaign and are distributed proportionately by media type (surface water, alluvial groundwater, and intermediate/regional groundwater). • Field trip blanks are included with any coolers containing samples submitted for volatile organic compound (VOC) analysis. • Performance evaluation blanks are collected once per sampling campaign, and analyzed for all constituents sampled for during the campaign. They are prepared from reagent-grade deionized water.

B-3.0 METHODS AND INSTRUMENTS USED FOR FIELD MEASUREMENTS

Field Parameter	Method Description	EPA-Approved Methods	Primary Field Instrument(s)	Primary Flow-Through Cell	Description
pH	Hydrogen ion, pH (pH units): electrometric measurement	EPA Method 150.1 Standard Methods,* 4500-H^+ B Editions 18th, 19th, 20th	YSI ProDSS Multiparameter Water Quality Meter with YSI ProDSS 4-Port Cable Assembly with Sensors or Equivalent	YSI ProDSS	Samples will be analyzed for pH in the field using a flow-through cell during well purging and at the time of sample collection. The listed instrument is commercially available with a temperature sensor for automatic compensation. A calibration check is performed following the manufacturer's instructions with standard buffers traceable to National Institute of Standards and Technology (NIST). Standards are purchased from commercial vendors.
Temperature	Temperature, thermometric (°C)	EPA Method 170.1 Standard Methods, 2550 B Editions 18th, 19th, 20th	YSI ProDSS Multiparameter Water Quality Meter with YSI ProDSS 4-Port Cable Assembly with Sensors or Equivalent	YSI ProDSS	Samples will be analyzed for temperature concurrently with pH measurement in the field using a flow-through cell during well purging and at the time of sample collection. The listed instruments are commercially available with a temperature sensor for automatic compensation.
Specific Conductance	Electrical conductance (micromhos/cm at 25°C): Wheatstone bridge	EPA Method 120.1 Standard Methods, 2510 B Editions 18th, 19th, 20th	YSI ProDSS Multiparameter Water Quality Meter with YSI ProDSS 4-Port Cable Assembly with Sensors or Equivalent	YSI ProDSS	Samples will be analyzed for SC in the field during well purging and at the time of sample collection. The listed instruments are commercially available with a temperature sensor for automatic compensation. A calibration check is performed following the manufacturer's instructions with standard buffers traceable to NIST. Standards are purchased from commercial vendors.
Dissolved Oxygen	Oxygen, dissolved (mg/L): electrode	EPA Method 360.1 Standard Methods, 4500-O G Editions 18th, 19th, 20th ASTM D888-09(C)	YSI ProDSS Multiparameter Water Quality Meter with YSI ProDSS 4-Port Cable Assembly with Sensors or Equivalent	YSI ProDSS	Samples will be analyzed for DO in the field using a flow-through cell during well purging and at the time of sample collection. The listed instruments are commercially available with a temperature sensor for automatic compensation. The instrument is calibrated following the manufacturer's instructions.

Field Parameter	Method Description	EPA-Approved Methods	Primary Field Instrument(s)	Primary Flow-Through Cell	Description
Turbidity	Static determination using white-light turbidimeter	EPA Method 180.1 Standard Methods, 2130 B Editions 18^{th}, 19^{th}, 20^{th} ASTM D7315, ISO 7027	Hach 2100Q YSI ProDSS Multiparameter Water Quality Meter with YSI ProDSS 4-Port Cable Assembly with Sensors or Equivalent	Single sample aliquot application YSI ProDSS	Samples will be analyzed for turbidity in the field using a flow-through cell and/or a single aliquot method during well purging and at the time of sample collection. The listed instruments are commercially available, and a calibration check is performed following the manufacturer's instructions.
Oxidation-Reduction Potential	Oxidation-reduction potential (mV): electrode method	Standard Methods, 2580 A Editions 18^{th}, 19^{th}, 20^{th}	YSI ProDSS Multiparameter Water Quality Meter with YSI ProDSS 4-Port Cable Assembly with Sensors or Equivalent	YSI ProDSS	Samples will be analyzed for oxidation-reduction potential in the field using a flow-through cell during well purging and at the time of sample collection. The listed instruments are commercially available with a temperature sensor for automatic compensation. A calibration check is performed following the manufacturer's instructions and is recorded.

* "Standard Methods" refers to editions of the Standard Methods for the Examination of Water and Wastewater, published by the American Public Health Association (Washington, D.C.).

B-4.0 ANALYTICAL METHODS—GROUNDWATER ANALYTICAL SUITES

B-4.1 Analyses by Accredited Contract Laboratories

Samples for laboratory analysis are submitted to accredited contract laboratories and analyzed using the methods listed in Tables 1.7-2 and B-4.1-1. The accredited contract laboratories are required to establish method detection limits (MDLs) and practical quantitation limits (PQLs) for target analytes.

The MDL is the minimum concentration of an analyte that can be measured and reported with a 99% confidence that the concentration is greater than 0, as determined by the procedure set forth in Appendix B of 40 Code of Federal Regulations Part 136. The MDL is based on prepared spiked samples that undergo the entire sample-preparation scheme before they are analyzed. Most often, the MDL samples are analyzed by accredited contract laboratories under ideal conditions when the analytical instrumentation has been recently serviced, cleaned, and calibrated.

The PQL is the lowest concentration that can be reliably measured within specified limits of precision, accuracy, representativeness, completeness, and comparability during *routine* laboratory operating conditions using approved EPA methods. In most cases the accredited contract laboratories define the low spike on their initial calibration curve as the PQL. Generally, the PQL is 3 to 5 times higher than the MDL and should not be more than 10 times the MDL.

Tables B-4.1-2 and B-4.1-3 list analytical suites, analytes, and minimum and maximum MDLs and PQLs for groundwater and base-flow samples, respectively, collected in Monitoring Years (MY) 2016 and 2017. For comparison, both tables also include the applicable groundwater and base-flow screening values, which are determined by the three-tier screening process specified in Section IX of the 2016 Consent Order.

The data set used to develop Tables B-4.1-2 and B-4.1-3 can be created using the data extraction bounds listed below.

- Monitoring locations specified in the “Interim Facility-Wide Groundwater Monitoring Plan for the 2018 Monitoring Year, October 2017–September 2018” (LANL 2017, 602406) (MY2018 IFGMP)
- Sample dates from October 1, 2015, to September 30, 2017 (i.e., MY2016 and MY2017)
- All analytical suites listed in Table 1.6-2 of the MY2018 IFGMP except for the radionuclide analytical suite
- Data possessing the following attributes:
    - Sample type of WG (for groundwater data) or WS (for base flow data)
    - Sample purpose of either regular (REG) or field duplicate (FD)
    - Best value flag of yes (Y)
    - Sample usage code of either investigation (INV) or quality control (QC) or a null value
    - Dilution factor of 1 (except for high explosives where the default dilution factor is 2)
- Exclude MDL data associated with analysis of samples collected under Field Sample ID CASA-17-127277. The excluded MDLs include more uncertainty than typical because of lower resolution in the laboratory QC analyses (e.g., matrix spike, method blank) used to determine the MDLs. The lower analytical resolution resulted from the use of reduced aliquot volumes, 100 mL instead of 1000 mL (standard), for the QC analyses.

B-5.0 INVESTIGATION-DERIVED WASTE MANAGEMENT

This section describes how investigation-derived waste (IDW) generated during the groundwater monitoring activities conducted under this IFGMP will be managed. IDW is waste generated as a result of field-investigation activities and may include, but is not limited to, purge water, contact waste, decontamination fluids, and all other wastes that have potentially come into contact with contaminants. IDW generated during implementation of the IFGMP will be managed to protect human health and the environment, comply with applicable regulatory requirements, and adhere to waste minimization goals.

All IDW generated during groundwater monitoring activities will be managed in accordance with applicable SOPs, which incorporate the requirements of all applicable EPA and NMED regulations, U.S. Department of Energy (DOE) orders, and N3B requirements.

The most current version of the Laboratory's "2017 Hazardous Waste Minimization Report" (LANL 2017, 602764) will be implemented during groundwater monitoring to minimize waste generation. This document is updated annually as a requirement of section 2.9 of the Hazardous Waste Facility Permit.

The IDW streams associated with groundwater monitoring are identified in Table B-5.0-1 and are briefly described below. The estimated volumes of these waste streams that may be generated during the implementation of this IFGMP are summarized in Table B-5.0-1.

The document providing detailed waste characterization and management requirements for IDW generated by groundwater monitoring activities is the waste characterization strategy form (WCSF) for the groundwater monitoring program (EP2016, 0117; LANL 2016, 601812). The WCSF provides detailed information on IDW characterization methods, management, containerization, and potential volumes. IDW characterization is completed through review of sampling data and/or documentation or by direct sampling of the IDW or the media being investigated (e.g., groundwater). Waste characterization may include a review of historical information and process knowledge to identify whether listed hazardous waste may be present (i.e., due diligence reviews). If low levels of hazardous waste from a listed source are identified, a "contained in" determination may be submitted for approval to NMED.

Wastes will be containerized and placed in clearly marked, appropriately constructed waste accumulation areas. Waste accumulation area postings, regulated storage duration, and inspection requirements will be based on the type of IDW and its classification. Container and storage requirements are specified in the WCSF and approved before the waste is generated. Transportation and disposal requirements are also presented in the WCSF and approved before waste is generated.

Waste Determinations

The number of sampling events needed to make RCRA waste determinations will be based on acceptable knowledge (AK) of groundwater conditions within a watershed at the well or surface sample location. AK includes a review of historical information and process knowledge to identify whether hazardous waste, from a listed source, may be present (i.e., due diligence reviews).

The number of sampling events needed to make the waste determination for a given location is summarized as follows:

- For locations where existing AK demonstrates no RCRA hazardous waste or hazardous constituents above RCRA regulatory limits, a minimum of one sampling event will be used annually to confirm the nonhazardous waste determination. This waste determination will be reevaluated with data from subsequent sampling campaigns.

- For new wells with no existing AK, two consecutive sampling events will be conducted to ensure reproducibility and to establish reliable AK. Wastes generated during the first sampling event will be characterized by the data collected during the event. These wastes will be managed in accordance with the regulatory classification.
- For locations where RCRA hazardous constituents are suspected to exhibit a characteristic or sporadic, but not confirmed, detection, the waste will initially be managed as hazardous. Once data from the first sampling event are received, waste will be managed and disposed of according to the analytical results. Waste generated from subsequent sampling events will be managed using AK from previous events until analytical data are available.

For new locations at or near a known listed hazardous waste source that does not have a "contained in" determination, waste will be managed as hazardous until a due diligence can be performed. If a listed hazardous waste source is identified and low levels of listed hazardous waste constituents are detected, a "contained in" determination may be submitted to NMED for approval.

- For locations where IDW has been identified as RCRA hazardous waste, subsequent IDW generated at the location will be managed as hazardous waste until the data from four consecutive sampling events contain no RCRA hazardous waste or hazardous constituents above RCRA regulatory limits. At this point, the waste will be managed as nonhazardous.

Where RCRA constituents are detected, the following steps may be taken to complete the waste determination:

- Where duplicate groundwater samples are collected during the same sampling event and one is a nondetect and the other is detected, the Laboratory assumes the detection is the result of laboratory or field contamination. The detection will not be used for waste determination.
- When an F-, U-, P-, or K-listed contaminant is detected, the sources contributing to the watershed will be evaluated (i.e., due diligence reviews). If there is no documentation that these contaminants are from listed processes, the waste will be managed as nonhazardous.
- Sampling purge water will be managed in accordance with the most current version of EPC-CP-QP-010, "Land Application of Groundwater," as amended by the NMED-approved "Decision Tree for Land Application of Drilling, Development, Rehabilitation and Sampling Purge Water," revised November 2016.

Waste Management

Purge water: This waste stream consists of water purged from wells before and during sampling. The management of nonhazardous purge water will comply with EPC-CP-QP-010, "Land Application of Groundwater." If the purge water is hazardous, it will be managed in accordance with hazardous waste management requirements.

Purge water will be characterized based on the results of the analysis of water samples from the well from which the purge water originated or by direct sampling and analysis of the purge water. Purge water will be land-applied if it meets the criteria in the NMED-approved NOI for land application of groundwater.

Contact waste: The contact waste stream consists of potentially contaminated wastes that "contacted" purge water during sampling. This waste stream consists primarily of, but is not limited to, personal protective equipment such as gloves; decontamination wastes such as paper wipes; and disposable sampling supplies. Characterization of this waste stream will be performed through AK from analytical results for the environmental media (i.e., purge water) with which it came into contact or direct sampling of the containerized waste and a review of any potentially RCRA Hazardous Listed Waste sources. N3B expects most of these contact wastes will be nonhazardous waste that will be disposed of at a New Mexico solid waste landfill or low-level waste that will be disposed of at Area G at Technical Area 54 (TA-54).

Decontamination fluids: The decontamination fluids waste stream will consist of liquid wastes from decontamination activities (i.e., decontamination solutions and rinse waters). Consistent with waste minimization practices, the Laboratory employs dry decontamination methods to the extent possible. If dry decontamination cannot be performed, liquid decontamination wastes will be collected in containers at the point of generation. The decontamination fluids will be characterized through AK of the waste materials, the levels of contamination detected in the environmental media (e.g., purge water) and, if necessary, direct sampling of the containerized waste. N3B expects most of these wastes to be nonhazardous liquid waste or radioactive liquid waste that will be sent to an N3B-approved off-site treatment facility.

B-6.0 REFERENCES

The following reference list includes documents cited in this appendix. Parenthetical information following each reference provides the author(s), publication date, and ERID, ESHID, or EMID. This information is also included in text citations. ERIDs were assigned by the Laboratory's Associate Directorate for Environmental Management (IDs through 599999); ESHIDs were assigned by the Laboratory's Associate Directorate for Environment, Safety, and Health (IDs 600000 through 699999); and EMIDs are assigned by N3B (IDs 700000 and above). IDs are used to locate documents in N3B's Records Management System and in the Master Reference Set. The NMED Hazardous Waste Bureau and N3B maintain copies of the Master Reference Set. The set ensures that NMED has the references to review documents. The set is updated when new references are cited in documents.

EPA (U.S. Environmental Protection Agency), November 1992. "RCRA Ground-Water Monitoring: Draft Technical Guidance," Office of Solid Waste, Washington, D.C. (EPA 1992, 600436)

LANL (Los Alamos National Laboratory), August 23, 2016, "Waste Characterization Strategy Form for Groundwater Monitoring," Los Alamos National Laboratory document EP2016-0117 (LANL 2016, 601812)

LANL (Los Alamos National Laboratory), May 2017. "Interim Facility-Wide Groundwater Monitoring Plan for the 2018 Monitoring Year, October 2017–September 2018," Los Alamos National Laboratory document LA-UR-16-24070, Los Alamos, New Mexico. (LANL 2017, 602406)

LANL (Los Alamos National Laboratory), December 1, 2017. "2017 Hazardous Waste Minimization Report," Los Alamos National Laboratory document LA-UR-17-30837, Los Alamos, New Mexico. (LANL 2017, 602764)

Yeskis, D., and B. Zavala, May 2002. "Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers," a Ground Water Forum Issue Paper, EPA 542-S-02-001, Office of Solid Waste and Emergency Response, Washington, D.C. (Yeskis and Zavala 2002, 204429)

Table B-4.1-1
Analytical Methods Used by
Contract Laboratories for Samples Collected under the IFGMP

Symbol or CAS No.	Analyte
Analytical Suite: VOCs **Analytical Group: WSP-8260B-VOA** **Analytical Method: SW-846:8260**	
67-64-1	Acetone
75-05-8	Acetonitrile
107-02-8	Acrolein
107-13-1	Acrylonitrile
71-43-2	Benzene
108-86-1	Bromobenzene
74-97-5	Bromochloromethane
75-27-4	Bromodichloromethane
75-25-2	Bromoform
74-83-9	Bromomethane
71-36-3	Butanol[1-]
78-93-3	Butanone[2-]
104-51-8	Butylbenzene[n-]
135-98-8	Butylbenzene[sec-]
98-06-6	Butylbenzene[tert-]
75-15-0	Carbon Disulfide
56-23-5	Carbon Tetrachloride
126-99-8	Chloro-1,3-butadiene[2-]
107-05-1	Chloro-1-propene[3-]
108-90-7	Chlorobenzene
124-48-1	Chlorodibromomethane
75-00-3	Chloroethane
67-66-3	Chloroform
74-87-3	Chloromethane
95-49-8	Chlorotoluene[2-]
106-43-4	Chlorotoluene[4-]
96-12-8	Dibromo-3-Chloropropane[1,2-]
106-93-4	Dibromoethane[1,2-]
74-95-3	Dibromomethane
95-50-1	Dichlorobenzene[1,2-]
541-73-1	Dichlorobenzene[1,3-]
106-46-7	Dichlorobenzene[1,4-]
75-71-8	Dichlorodifluoromethane
75-34-3	Dichloroethane[1,1-]

Table B-4.1-1 (continued)

Symbol or CAS No.	Analyte
107-06-2	Dichloroethane[1,2-]
75-35-4	Dichloroethene[1,1-]
540-59-0	Dichloroethene[cis/trans-1,2-]
156-59-2	Dichloroethene[cis-1,2-]
156-60-5	Dichloroethene[trans-1,2-]
78-87-5	Dichloropropane[1,2-]
142-28-9	Dichloropropane[1,3-]
594-20-7	Dichloropropane[2,2-]
563-58-6	Dichloropropene[1,1-]
10061-01-5	Dichloropropene[cis-1,3-]
10061-02-6	Dichloropropene[trans-1,3-]
60-29-7	Diethyl Ether
123-91-1	Dioxane[1,4-]
97-63-2	Ethyl Methacrylate
100-41-4	Ethylbenzene
87-68-3	Hexachlorobutadiene
591-78-6	Hexanone[2-]
74-88-4	Iodomethane
78-83-1	Isobutyl alcohol
98-82-8	Isopropylbenzene
99-87-6	Isopropyltoluene[4-]
126-98-7	Methacrylonitrile
80-62-6	Methyl Methacrylate
1634-04-4	Methyl tert-Butyl Ether
108-10-1	Methyl-2-pentanone[4-]
75-09-2	Methylene Chloride
91-20-3	Naphthalene
107-12-0	Propionitrile
103-65-1	Propylbenzene[1-]
100-42-5	Styrene
630-20-6	Tetrachloroethane[1,1,1,2-]
79-34-5	Tetrachloroethane[1,1,2,2-]
127-18-4	Tetrachloroethene
108-88-3	Toluene
76-13-1	Trichloro-1,2,2-trifluoroethane[1,1,2-]
87-61-6	Trichlorobenzene[1,2,3-]
120-82-1	Trichlorobenzene[1,2,4-]
71-55-6	Trichloroethane[1,1,1-]
79-00-5	Trichloroethane[1,1,2-]
79-01-6	Trichloroethene

Table B-4.1-1 (continued)

Symbol or CAS No.	Analyte
75-69-4	Trichlorofluoromethane
96-18-4	Trichloropropane[1,2,3-]
95-63-6	Trimethylbenzene[1,2,4-]
108-67-8	Trimethylbenzene[1,3,5-]
108-05-4	Vinyl acetate
75-01-4	Vinyl Chloride
95-47-6	Xylene[1,2-]
Xylene[m+p]	Xylene[1,3-]+Xylene[1,4-]
Analytical Suite: SVOCs **Analytical Group: WSP-8270C-SVOA** **Analytical Method: SW-846:8270**	
83-32-9	Acenaphthene
208-96-8	Acenaphthylene
62-53-3	Aniline
120-12-7	Anthracene
1912-24-9	Atrazine
103-33-3	Azobenzene
92-87-5	Benzidine
56-55-3	Benzo(a)anthracene
50-32-8	Benzo(a)pyrene
205-99-2	Benzo(b)fluoranthene
191-24-2	Benzo(g,h,i)perylene
207-08-9	Benzo(k)fluoranthene
65-85-0	Benzoic Acid
100-51-6	Benzyl Alcohol
111-91-1	Bis(2-chloroethoxy)methane
111-44-4	Bis(2-chloroethyl)ether
117-81-7	Bis(2-ethylhexyl)phthalate
101-55-3	Bromophenyl-phenylether[4-]
85-68-7	Butylbenzylphthalate
59-50-7	Chloro-3-methylphenol[4-]
106-47-8	Chloroaniline[4-]
91-58-7	Chloronaphthalene[2-]
95-57-8	Chlorophenol[2-]
7005-72-3	Chlorophenyl-phenyl[4-] Ether
218-01-9	Chrysene
53-70-3	Dibenz(a,h)anthracene
132-64-9	Dibenzofuran
95-50-1	Dichlorobenzene[1,2-]
541-73-1	Dichlorobenzene[1,3-]

Table B-4.1-1 (continued)

Symbol or CAS No.	Analyte
106-46-7	Dichlorobenzene[1,4-]
91-94-1	Dichlorobenzidine[3,3'-]
120-83-2	Dichlorophenol[2,4-]
84-66-2	Diethylphthalate
131-11-3	Dimethyl Phthalate
105-67-9	Dimethylphenol[2,4-]
84-74-2	Di-n-butylphthalate
534-52-1	Dinitro-2-methylphenol[4,6-]
51-28-5	Dinitrophenol[2,4-]
121-14-2	Dinitrotoluene[2,4-]
606-20-2	Dinitrotoluene[2,6-]
117-84-0	Di-n-octylphthalate
88-85-7	Dinoseb
123-91-1	Dioxane[1,4-]
122-39-4	Diphenylamine
206-44-0	Fluoranthene
86-73-7	Fluorene
118-74-1	Hexachlorobenzene
87-68-3	Hexachlorobutadiene
77-47-4	Hexachlorocyclopentadiene
67-72-1	Hexachloroethane
193-39-5	Indeno(1,2,3-cd)pyrene
78-59-1	Isophorone
90-12-0	Methylnaphthalene[1-]
91-57-6	Methylnaphthalene[2-]
95-48-7	Methylphenol[2-]
106-44-5	Methylphenol[4-]
91-20-3	Naphthalene
88-74-4	Nitroaniline[2-]
99-09-2	Nitroaniline[3-]
100-01-6	Nitroaniline[4-]
98-95-3	Nitrobenzene
88-75-5	Nitrophenol[2-]
100-02-7	Nitrophenol[4-]
55-18-5	Nitrosodiethylamine[N-]
62-75-9	Nitrosodimethylamine[N-]
924-16-3	Nitroso-di-n-butylamine[N-]
621-64-7	Nitroso-di-n-propylamine[N-]
86-30-6	Nitrosodiphenylamine[N-]
930-55-2	Nitrosopyrrolidine[N-]

Table B-4.1-1 (continued)

Symbol or CAS No.	Analyte
108-60-1	Oxybis(1-chloropropane)[2,2'-]
608-93-5	Pentachlorobenzene
87-86-5	Pentachlorophenol
85-01-8	Phenanthrene
108-95-2	Phenol
129-00-0	Pyrene
110-86-1	Pyridine
95-94-3	Tetrachlorobenzene[1,2,4,5]
58-90-2	Tetrachlorophenol[2,3,4,6-]
120-82-1	Trichlorobenzene[1,2,4-]
95-95-4	Trichlorophenol[2,4,5-]
88-06-2	Trichlorophenol[2,4,6-]
Analytical Suite: Polychlorinated Biphenyls (PCBs) **Analytical Group: WSP-8082-PCB** **Analytical Method: SW-846:8082**	
12674-11-2	Aroclor-1016
11104-28-2	Aroclor-1221
11141-16-5	Aroclor-1232
53469-21-9	Aroclor-1242
12672-29-6	Aroclor-1248
11097-69-1	Aroclor-1254
11096-82-5	Aroclor-1260
37324-23-5	Aroclor-1262
Analytical Suite: HEXP (High Explosives) **Analytical Group: WSP-8330B-NMED HEXP** **Analytical Method: SW-846:8330B**	
6629-29-4	2,4-Diamino-6-nitrotoluene
59229-75-3	2,6-Diamino-4-nitrotoluene
618-87-1	3,5-Dinitroaniline
19406-51-0	Amino-2,6-dinitrotoluene[4-]
35572-78-2	Amino-4,6-dinitrotoluene[2-]
99-65-0	Dinitrobenzene[1,3-]
121-14-2	Dinitrotoluene[2,4-]
606-20-2	Dinitrotoluene[2,6-]
2691-41-0	HMX
98-95-3	Nitrobenzene
88-72-2	Nitrotoluene[2-]
99-08-1	Nitrotoluene[3-]
99-99-0	Nitrotoluene[4-]
78-11-5	PETN

Table B-4.1-1 (continued)

Symbol or CAS No.	Analyte
121-82-4	RDX
3058-38-6	TATB
479-45-8	Tetryl
99-35-4	Trinitrobenzene[1,3,5-]
118-96-7	Trinitrotoluene[2,4,6-]
78-30-8	Tris (o-cresyl) phosphate
Analytical Suite: HEXMOD (High Explosives and RDX [Hexahydro-1,3,5,trinitro-1,3,5-triazine] Degradation Products) **Analytical Group: WSP-8330B-NMED HEXMOD** **Analytical Method: SW-846:8330B**	
6629-29-4	2,4-Diamino-6-nitrotoluene
59229-75-3	2,6-Diamino-4-nitrotoluene
618-87-1	3,5-Dinitroaniline
19406-51-0	Amino-2,6-dinitrotoluene[4-]
35572-78-2	Amino-4,6-dinitrotoluene[2-]
99-65-0	Dinitrobenzene[1,3-]
121-14-2	Dinitrotoluene[2,4-]
606-20-2	Dinitrotoluene[2,6-]
2691-41-0	HMX
98-95-3	Nitrobenzene
88-72-2	Nitrotoluene[2-]
99-08-1	Nitrotoluene[3-]
99-99-0	Nitrotoluene[4-]
78-11-5	PETN
121-82-4	RDX
3058-38-6	TATB
479-45-8	Tetryl
99-35-4	Trinitrobenzene[1,3,5-]
118-96-7	Trinitrotoluene[2,4,6-]
78-30-8	Tris (o-cresyl) phosphate
80251-29-2	DNX*
5755-27-1	MNX*
13980-04-6	TNX*
Analytical Suite: Dioxins/Furans (D/F) **Analytical Group: WSP-8290-D/F** **Analytical Method SW-846:8290**	
35822-46-9	Heptachlorodibenzodioxin[1,2,3,4,6,7,8-]
37871-00-4	Heptachlorodibenzodioxins (Total)
67562-39-4	Heptachlorodibenzofuran[1,2,3,4,6,7,8-]
55673-89-7	Heptachlorodibenzofuran[1,2,3,4,7,8,9-]

Table B-4.1-1 (continued)

Symbol or CAS No.	Analyte
38998-75-3	Heptachlorodibenzofurans (Total)
39227-28-6	Hexachlorodibenzodioxin[1,2,3,4,7,8-]
57653-85-7	Hexachlorodibenzodioxin[1,2,3,6,7,8-]
19408-74-3	Hexachlorodibenzodioxin[1,2,3,7,8,9-]
34465-46-8	Hexachlorodibenzodioxins (Total)
70648-26-9	Hexachlorodibenzofuran[1,2,3,4,7,8-]
57117-44-9	Hexachlorodibenzofuran[1,2,3,6,7,8-]
72918-21-9	Hexachlorodibenzofuran[1,2,3,7,8,9-]
60851-34-5	Hexachlorodibenzofuran[2,3,4,6,7,8-]
55684-94-1	Hexachlorodibenzofurans (Total)
3268-87-9	Octachlorodibenzodioxin[1,2,3,4,6,7,8,9-]
39001-02-0	Octachlorodibenzofuran[1,2,3,4,6,7,8,9-]
40321-76-4	Pentachlorodibenzodioxin[1,2,3,7,8-]
36088-22-9	Pentachlorodibenzodioxins (Total)
57117-41-6	Pentachlorodibenzofuran[1,2,3,7,8-]
57117-31-4	Pentachlorodibenzofuran[2,3,4,7,8-]
30402-15-4	Pentachlorodibenzofurans (Totals)
1746-01-6	Tetrachlorodibenzodioxin[2,3,7,8-]
41903-57-5	Tetrachlorodibenzodioxins (Total)
51207-31-9	Tetrachlorodibenzofuran[2,3,7,8-]
55722-27-5	Tetrachlorodibenzofurans (Totals)

Note: Table B-4.1-1 is referenced in Table 1.7-2 and serves to complete the analyte lists in Table 1.7-2.

*DNX, MNX, and TNX are RDX degradation products.

Table B-4.1-2
Analyte MDLs and PQLs for Groundwater Samples Collected in MY2016 and MY2017 and Analyzed by Accredited Contract Laboratories

Suite	Symbol or CAS No.	Analyte	Analytical Method	Field Preparation Code	Unit	Number of Analyses	MDL (Minimum)	MDL (Average)	MDL (Maximum)	PQL (Minimum)	PQL (Average)	PQL (Maximum)	Screening Value	Screening Value Type
Dioxins/Furans	35822-46-9	Heptachlorodibenzodioxin[1,2,3,4,6,7,8-]	SW-846:8290A	UF	µg/L	26	1.66E-05	1.77E-05	1.83E-05	5.00E-05	5.30E-05	5.50E-05	—*	—
Dioxins/Furans	37871-00-4	Heptachlorodibenzodioxins (Total)	SW-846:8290A	UF	µg/L	26	1.66E-05	1.74E-05	1.81E-05	—	—	—	—	—
Dioxins/Furans	67562-39-4	Heptachlorodibenzofuran[1,2,3,4,6,7,8-]	SW-846:8290A	UF	µg/L	26	1.66E-05	1.77E-05	1.83E-05	5.00E-05	5.30E-05	5.50E-05	—	—
Dioxins/Furans	55673-89-7	Heptachlorodibenzofuran[1,2,3,4,7,8,9-]	SW-846:8290A	UF	µg/L	26	1.66E-05	1.77E-05	1.83E-05	5.00E-05	5.30E-05	5.50E-05	—	—
Dioxins/Furans	38998-75-3	Heptachlorodibenzofurans (Total)	SW-846:8290A	UF	µg/L	26	1.66E-05	1.74E-05	1.81E-05	—	—	—	—	—
Dioxins/Furans	39227-28-6	Hexachlorodibenzodioxin[1,2,3,4,7,8-]	SW-846:8290A	UF	µg/L	26	1.66E-05	1.77E-05	1.83E-05	5.00E-05	5.30E-05	5.50E-05	—	—
Dioxins/Furans	57653-85-7	Hexachlorodibenzodioxin[1,2,3,6,7,8-]	SW-846:8290A	UF	µg/L	26	1.66E-05	1.77E-05	1.83E-05	5.00E-05	5.30E-05	5.50E-05	—	—
Dioxins/Furans	19408-74-3	Hexachlorodibenzodioxin[1,2,3,7,8,9-]	SW-846:8290A	UF	µg/L	26	1.66E-05	1.77E-05	1.83E-05	5.00E-05	5.30E-05	5.50E-05	—	—
Dioxins/Furans	34465-46-8	Hexachlorodibenzodioxins (Total)	SW-846:8290A	UF	µg/L	26	1.66E-05	1.74E-05	1.81E-05	—	—	—	0.00013	EPA TAP SCRN LVL
Dioxins/Furans	70648-26-9	Hexachlorodibenzofuran[1,2,3,4,7,8-]	SW-846:8290A	UF	µg/L	26	1.66E-05	1.77E-05	1.83E-05	5.00E-05	5.30E-05	5.50E-05	—	—
Dioxins/Furans	57117-44-9	Hexachlorodibenzofuran[1,2,3,6,7,8-]	SW-846:8290A	UF	µg/L	26	1.66E-05	1.77E-05	1.83E-05	5.00E-05	5.30E-05	5.50E-05	—	—
Dioxins/Furans	72918-21-9	Hexachlorodibenzofuran[1,2,3,7,8,9-]	SW-846:8290A	UF	µg/L	26	1.66E-05	1.77E-05	1.83E-05	5.00E-05	5.30E-05	5.50E-05	—	—
Dioxins/Furans	60851-34-5	Hexachlorodibenzofuran[2,3,4,6,7,8-]	SW-846:8290A	UF	µg/L	26	1.66E-05	1.77E-05	1.83E-05	5.00E-05	5.30E-05	5.50E-05	—	—
Dioxins/Furans	55684-94-1	Hexachlorodibenzofurans (Total)	SW-846:8290A	UF	µg/L	26	1.66E-05	1.74E-05	1.81E-05	—	—	—	—	—
Dioxins/Furans	3268-87-9	Octachlorodibenzodioxin[1,2,3,4,6,7,8,9-]	SW-846:8290A	UF	µg/L	26	3.33E-05	3.54E-05	3.67E-05	1.00E-04	1.08E-04	1.10E-04	—	—
Dioxins/Furans	39001-02-0	Octachlorodibenzofuran[1,2,3,4,6,7,8,9-]	SW-846:8290A	UF	µg/L	26	3.33E-05	3.54E-05	3.67E-05	1.00E-04	1.08E-04	1.10E-04	—	—
Dioxins/Furans	40321-76-4	Pentachlorodibenzodioxin[1,2,3,7,8-]	SW-846:8290A	UF	µg/L	26	1.66E-05	1.77E-05	1.83E-05	5.00E-05	5.30E-05	5.50E-05	—	—
Dioxins/Furans	36088-22-9	Pentachlorodibenzodioxins (Total)	SW-846:8290A	UF	µg/L	26	1.66E-05	1.74E-05	1.81E-05	—	—	—	—	—
Dioxins/Furans	57117-41-6	Pentachlorodibenzofuran[1,2,3,7,8-]	SW-846:8290A	UF	µg/L	26	1.66E-05	1.77E-05	1.83E-05	5.00E-05	5.30E-05	5.50E-05	—	—
Dioxins/Furans	57117-31-4	Pentachlorodibenzofuran[2,3,4,7,8-]	SW-846:8290A	UF	µg/L	26	1.66E-05	1.77E-05	1.83E-05	5.00E-05	5.30E-05	5.50E-05	—	—
Dioxins/Furans	30402-15-4	Pentachlorodibenzofurans (Totals)	SW-846:8290A	UF	µg/L	26	1.66E-05	1.74E-05	1.81E-05	—	—	—	—	—
Dioxins/Furans	1746-01-6	Tetrachlorodibenzodioxin[2,3,7,8-]	SW-846:8290A	UF	µg/L	26	3.33E-06	3.54E-06	3.67E-06	1.00E-05	1.08E-05	1.10E-05	0.00003	EPA MCL
Dioxins/Furans	41903-57-5	Tetrachlorodibenzodioxins (Total)	SW-846:8290A	UF	µg/L	26	3.33E-06	3.50E-06	3.63E-06	—	—	—	—	—
Dioxins/Furans	51207-31-9	Tetrachlorodibenzofuran[2,3,7,8-]	SW-846:8290A	UF	µg/L	26	3.33E-06	3.54E-06	3.67E-06	1.00E-05	1.08E-05	1.10E-05	0.00000184	NMED A1 TAP SCRN LVL
Dioxins/Furans	55722-27-5	Tetrachlorodibenzofurans (Totals)	SW-846:8290A	UF	µg/L	26	3.33E-06	3.50E-06	3.63E-06	—	—	—	—	—
General Inorganics	pH	Acidity or Alkalinity of a solution	EPA:150.1	F	SU	636	0.01	0.01	0.01	0.1	0.1	0.1	—	—
General Inorganics	ALK-CO3	Alkalinity-CO3	EPA:310.1	F	mg/L	636	0.33	1.145	1.45	1	2.847	4	—	—
General Inorganics	ALK-CO3+HCO3	Alkalinity-CO3+HCO3	EPA:310.1	F	mg/L	636	0.33	1.145	1.45	1	2.847	4	—	—
General Inorganics	NH3-N	Ammonia as Nitrogen	EPA:350.1	F	mg/L	635	0.017	0.017	0.085	0.05	0.050	0.25	—	—
General Inorganics	Br(-1)	Bromide	EPA:300.0	F	mg/L	633	0.067	0.067	0.067	0.2	0.2	0.2	—	—
General Inorganics	Cl(-1)	Chloride	EPA:300.0	F	mg/L	447	0.067	0.067	0.067	0.2	0.2	0.2	250	NM GW STD
General Inorganics	F(-1)	Fluoride	EPA:300.0	F	mg/L	634	0.033	0.033	0.033	0.1	0.1	0.1	1.6	NM GW STD
General Inorganics	NO3+NO2-N	Nitrate-Nitrite as Nitrogen	EPA:353.2	F	mg/L	437	0.017	0.017	0.017	0.05	0.05	0.05	10	EPA MCL
General Inorganics	SPEC_CONDC	Specific Conductance	EPA:120.1	F	µS/cm	636	1	1.765	3.63	1	4.927	14.5	—	—
General Inorganics	SO4(-2)	Sulfate	EPA:300.0	F	mg/L	568	0.133	0.133	0.133	0.4	0.4	0.4	600	NM GW STD
General Inorganics	TDS	Total Dissolved Solids	EPA:160.1	F	mg/L	636	3.4	3.4	3.4	14.3	14.3	14.3	1000	NM GW STD

Table B-4.1-2 (continued)

Suite	Symbol or CAS No.	Analyte	Analytical Method	Field Preparation Code	Unit	Number of Analyses	MDL (Minimum)	MDL (Average)	MDL (Maximum)	PQL (Minimum)	PQL (Average)	PQL (Maximum)	Screening Value	Screening Value Type
General Inorganics	TKN	Total Kjeldahl Nitrogen	EPA:351.2	UF	mg/L	597	0.033	0.033	0.033	0.1	0.1	0.1	—	—
General Inorganics	TOC	Total Organic Carbon	SW-846:9060	UF	mg/L	623	0.33	0.33	0.33	1	1	1	—	—
General Inorganics	PO4-P	Total Phosphate as Phosphorus	EPA:365.4	F	mg/L	635	0.017	0.019	0.02	0.05	0.05	0.05	—	—
General Inorganics	CN(TOTAL)	Cyanide (Total)	EPA:335.4	UF	mg/L	638	0.00167	0.00167	0.00167	0.005	0.005	0.005	0.2	EPA MCL
General Inorganics	ClO4	Perchlorate	SW-846:6850	F	µg/L	567	0.05	0.05	0.05	0.2	0.2	0.2	13.8	NMED A1 TAP SCRN LVL
HEXP	6629-29-4	2,4-Diamino-6-nitrotoluene	SW-846:8330B	UF	µg/L	60	0.521	0.541	0.581	2.6	2.704	2.91	—	—
HEXP	59229-75-3	2,6-Diamino-4-nitrotoluene	SW-846:8330B	UF	µg/L	60	0.521	0.541	0.581	2.6	2.704	2.91	—	—
HEXP	618-87-1	3,5-Dinitroaniline	SW-846:8330B	UF	µg/L	60	0.313	0.325	0.349	1.04	1.082	1.16	—	—
HEXP	19406-51-0	Amino-2,6-dinitrotoluene[4-]	SW-846:8330B	UF	µg/L	60	0.0833	0.087	0.093	0.26	0.270	0.291	39	EPA TAP SCRN LVL
HEXP	35572-78-2	Amino-4,6-dinitrotoluene[2-]	SW-846:8330B	UF	µg/L	60	0.0833	0.087	0.093	0.26	0.270	0.291	39	EPA TAP SCRN LVL
HEXP	99-65-0	Dinitrobenzene[1,3-]	SW-846:8330B	UF	µg/L	60	0.0833	0.087	0.093	0.26	0.270	0.291	2	EPA TAP SCRN LVL
HEXP	121-14-2	Dinitrotoluene[2,4-]	SW-846:8330B	UF	µg/L	60	0.0833	0.087	0.093	0.26	0.270	0.291	2.37	NMED A1 TAP SCRN LVL
HEXP	606-20-2	Dinitrotoluene[2,6-]	SW-846:8330B	UF	µg/L	60	0.0833	0.087	0.093	0.26	0.270	0.291	0.485	NMED A1 TAP SCRN LVL
HEXP	DNX	DNX	SW-846:8330B	UF	µg/L	49	0.0833	0.087	0.093	0.26	0.270	0.291	—	—
HEXP	2691-41-0	HMX	SW-846:8330B	UF	µg/L	57	0.0833	0.086	0.093	0.26	0.270	0.291	1000	NMED A1 TAP SCRN LVL
HEXP	MNX	MNX	SW-846:8330B	UF	µg/L	49	0.0833	0.087	0.093	0.26	0.270	0.291	—	—
HEXP	98-95-3	Nitrobenzene	SW-846:8330B	UF	µg/L	60	0.0833	0.087	0.093	0.26	0.270	0.291	1.4	NMED A1 TAP SCRN LVL
HEXP	88-72-2	Nitrotoluene[2-]	SW-846:8330B	UF	µg/L	60	0.0854	0.089	0.0953	0.26	0.270	0.291	3.14	NMED A1 TAP SCRN LVL
HEXP	99-08-1	Nitrotoluene[3-]	SW-846:8330B	UF	µg/L	60	0.0833	0.087	0.093	0.26	0.270	0.291	1.74	NMED A1 TAP SCRN LVL
HEXP	99-99-0	Nitrotoluene[4-]	SW-846:8330B	UF	µg/L	60	0.156	0.162	0.174	0.521	0.541	0.581	42.7	NMED A1 TAP SCRN LVL
HEXP	78-11-5	PETN	SW-846:8330B	UF	µg/L	60	0.104	0.108	0.116	0.521	0.541	0.581	190	EPA TAP SCRN LVL
HEXP	121-82-4	RDX	SW-846:8330B	UF	µg/L	44	0.0833	0.087	0.093	0.26	0.271	0.291	7.02	NMED A1 TAP SCRN LVL
HEXP	3058-38-6	TATB	SW-846:8330B	UF	µg/L	60	0.313	0.325	0.349	1.04	1.082	1.16	—	—
HEXP	479-45-8	Tetryl	SW-846:8330B	UF	µg/L	60	0.0833	0.087	0.093	0.521	0.541	0.581	39.4	NMED A1 TAP SCRN LVL
HEXP	TNX	TNX	SW-846:8330B	UF	µg/L	49	0.0833	0.087	0.093	0.26	0.270	0.291	—	—
HEXP	99-35-4	Trinitrobenzene[1,3,5-]	SW-846:8330B	UF	µg/L	60	0.0833	0.087	0.093	0.26	0.270	0.291	590	EPA TAP SCRN LVL
HEXP	118-96-7	Trinitrotoluene[2,4,6-]	SW-846:8330B	UF	µg/L	60	0.0833	0.087	0.093	0.26	0.270	0.291	9.8	NMED A1 TAP SCRN LVL
HEXP	78-30-8	Tris (o-cresyl) phosphate	SW-846:8330B	UF	µg/L	60	0.313	0.325	0.349	1.04	1.082	1.16	—	—
METALS	Al	Aluminum	SW-846:6010C	F	µg/L	635	68	68	68	200	200	200	5000	NM GW STD
METALS	Sb	Antimony	SW-846:6020	F	µg/L	635	1	1	1	3	3	3	6	EPA MCL
METALS	As	Arsenic	SW-846:6020	F	µg/L	635	1.7	1.771	2	5	5	5	10	EPA MCL
METALS	Ba	Barium	SW-846:6010C	F	µg/L	635	1	1	1	5	5	5	1000	NM GW STD
METALS	Be	Beryllium	SW-846:6010C	F	µg/L	635	1	1	1	5	5	5	4	EPA MCL
METALS	B	Boron	SW-846:6010C	F	µg/L	635	15	15	15	50	50	50	750	NM GW STD
METALS	Cd	Cadmium	SW-846:6020	F	µg/L	635	0.11	0.217	0.3	1	1	1	5	EPA MCL
METALS	Ca	Calcium	SW-846:6010C	F	mg/L	635	0.05	0.05	0.05	0.2	0.2	0.2	—	—
METALS	Cr	Chromium	SW-846:6020	F	µg/L	629	2	2.563	3	10	10	10	50	NM GW STD
METALS	Co	Cobalt	SW-846:6010C	F	µg/L	635	1	1	1	5	5	5	50	NM GW STD
METALS	Cu	Copper	SW-846:6010C	F	µg/L	635	3	3	3	10	10	10	1000	NM GW STD

Table B-4.1-2 (continued)

Suite	Symbol or CAS No.	Analyte	Analytical Method	Field Preparation Code	Unit	Number of Analyses	MDL (Minimum)	MDL (Average)	MDL (Maximum)	PQL (Minimum)	PQL (Average)	PQL (Maximum)	Screening Value	Screening Value Type
METALS	HARDNESS	Hardness	SM:A2340B	F	mg/L	639	0.453	0.459	4.53	1.24	1.257	12.4	—	—
METALS	Fe	Iron	SW-846:6010C	F	µg/L	635	30	30	30	100	100	100	1000	NM GW STD
METALS	Pb	Lead	SW-846:6020	F	µg/L	635	0.5	0.502	1	2	2	2	15	EPA MCL
METALS	Mg	Magnesium	SW-846:6010C	F	mg/L	635	0.11	0.11	0.11	0.3	0.3	0.3	—	—
METALS	Mn	Manganese	SW-846:6010C	F	µg/L	635	2	2	2	10	10	10	200	NM GW STD
METALS	Hg	Mercury	EPA:245.2	F	µg/L	639	0.067	0.067	0.067	0.2	0.2	0.2	2	EPA MCL
METALS	Hg	Mercury	EPA:245.2	UF	µg/L	635	0.067	0.067	0.067	0.2	0.2	0.2	2	EPA MCL
METALS	Mo	Molybdenum	SW-846:6020	F	µg/L	633	0.165	0.218	0.4	0.5	0.5	0.5	1000	NM GW STD
METALS	Ni	Nickel	SW-846:6020	F	µg/L	633	0.5	0.526	1	2	2	2	200	NM GW STD
METALS	K	Potassium	SW-846:6010C	F	mg/L	635	0.05	0.05	0.05	0.15	0.15	0.15	—	—
METALS	Se	Selenium	SW-846:6020	F	µg/L	635	1.5	1.782	2	5	5	5	50	EPA MCL
METALS	SiO2	Silicon Dioxide	SW-846:6010C	F	mg/L	618	0.053	0.053	0.053	0.213	0.213	0.213	—	—
METALS	Ag	Silver	SW-846:6020	F	µg/L	635	0.1	0.274	0.4	1	1	1	50	NM GW STD
METALS	Na	Sodium	SW-846:6010C	F	mg/L	635	0.1	0.1	0.1	0.3	0.3	0.3	—	—
METALS	Sr	Strontium	SW-846:6010C	F	µg/L	635	1	1	1	5	5	5	11800	NMED A1 TAP SCRN LVL
METALS	Tl	Thallium	SW-846:6020	F	µg/L	635	0.45	0.537	1.2	2	2	2	2	EPA MCL
METALS	Sn	Tin	SW-846:6010C	F	µg/L	635	2.5	2.5	2.5	10	10	10	12000	EPA TAP SCRN LVL
METALS	U	Uranium	SW-846:6020	F	µg/L	635	0.067	0.067	0.134	0.2	0.2	0.2	30	EPA MCL
METALS	V	Vanadium	SW-846:6010C	F	µg/L	635	1	1	1	5	5	5	63.1	NMED A1 TAP SCRN LVL
METALS	Zn	Zinc	SW-846:6010C	F	µg/L	635	3.3	3.3	3.3	10	10	10	10000	NM GW STD
PCB	12674-11-2	Aroclor-1016	SW-846:8082	UF	µg/L	54	0.0333	0.0350	0.0396	0.1	0.105	0.119	1	NM GW STD
PCB	11104-28-2	Aroclor-1221	SW-846:8082	UF	µg/L	54	0.0333	0.0350	0.0396	0.1	0.105	0.119	1	NM GW STD
PCB	11141-16-5	Aroclor-1232	SW-846:8082	UF	µg/L	54	0.0333	0.0350	0.0396	0.1	0.105	0.119	1	NM GW STD
PCB	53469-21-9	Aroclor-1242	SW-846:8082	UF	µg/L	54	0.0333	0.0350	0.0396	0.1	0.105	0.119	1	NM GW STD
PCB	12672-29-6	Aroclor-1248	SW-846:8082	UF	µg/L	54	0.0333	0.0350	0.0396	0.1	0.105	0.119	1	NM GW STD
PCB	11097-69-1	Aroclor-1254	SW-846:8082	UF	µg/L	54	0.0333	0.0350	0.0396	0.1	0.105	0.119	1	NM GW STD
PCB	11096-82-5	Aroclor-1260	SW-846:8082	UF	µg/L	54	0.0333	0.0350	0.0396	0.1	0.105	0.119	1	NM GW STD
PCB	37324-23-5	Aroclor-1262	SW-846:8082	UF	µg/L	54	0.0333	0.0350	0.0396	0.1	0.105	0.119	1	NM GW STD
SVOC	83-32-9	Acenaphthene	SW-846:8270D	UF	µg/L	306	0.15	0.235	0.361	0.5	0.782	1.2	535	NMED A1 TAP SCRN LVL
SVOC	208-96-8	Acenaphthylene	SW-846:8270D	UF	µg/L	306	0.15	0.235	0.361	0.5	0.782	1.2	—	—
SVOC	62-53-3	Aniline	SW-846:8270D	UF	µg/L	307	2.1	3.289	5.06	5	7.828	12	130	EPA TAP SCRN LVL
SVOC	120-12-7	Anthracene	SW-846:8270D	UF	µg/L	306	0.15	0.235	0.361	0.5	0.782	1.2	1720	NMED A1 TAP SCRN LVL
SVOC	1912-24-9	Atrazine	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	3	EPA MCL
SVOC	103-33-3	Azobenzene	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	1.2	EPA TAP SCRN LVL
SVOC	92-87-5	Benzidine	SW-846:8270D	UF	µg/L	307	1.95	3.054	4.7	5	7.828	12	0.00109	NMED A1 TAP SCRN LVL
SVOC	56-55-3	Benzo(a)anthracene	SW-846:8270D	UF	µg/L	306	0.15	0.235	0.361	0.5	0.782	1.2	0.12	NMED A1 TAP SCRN LVL
SVOC	50-32-8	Benzo(a)pyrene	SW-846:8270D	UF	µg/L	306	0.15	0.235	0.361	0.5	0.782	1.2	0.2	EPA MCL
SVOC	205-99-2	Benzo(b)fluoranthene	SW-846:8270D	UF	µg/L	306	0.15	0.235	0.361	0.5	0.782	1.2	0.343	NMED A1 TAP SCRN LVL
SVOC	191-24-2	Benzo(g,h,i)perylene	SW-846:8270D	UF	µg/L	306	0.15	0.235	0.361	0.5	0.782	1.2	—	—

Table B-4.1-2 (continued)

Suite	Symbol or CAS No.	Analyte	Analytical Method	Field Preparation Code	Unit	Number of Analyses	MDL (Minimum)	MDL (Average)	MDL (Maximum)	PQL (Minimum)	PQL (Average)	PQL (Maximum)	Screening Value	Screening Value Type
SVOC	207-08-9	Benzo(k)fluoranthene	SW-846:8270D	UF	µg/L	306	0.15	0.235	0.361	0.5	0.782	1.2	3.43	NMED A1 TAP SCRN LVL
SVOC	65-85-0	Benzoic Acid	SW-846:8270D	UF	µg/L	307	3	4.699	7.23	10	15.658	24.1	75000	EPA TAP SCRN LVL
SVOC	100-51-6	Benzyl Alcohol	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	2000	EPA TAP SCRN LVL
SVOC	111-91-1	Bis(2-chloroethoxy)methane	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	59	EPA TAP SCRN LVL
SVOC	111-44-4	Bis(2-chloroethyl)ether	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	0.137	NMED A1 TAP SCRN LVL
SVOC	117-81-7	Bis(2-ethylhexyl)phthalate	SW-846:8270D	UF	µg/L	305	1.5	2.349	3.61	5	7.828	12	6	EPA MCL
SVOC	101-55-3	Bromophenyl-phenylether[4-]	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	—	—
SVOC	85-68-7	Butylbenzylphthalate	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	160	EPA TAP SCRN LVL
SVOC	59-50-7	Chloro-3-methylphenol[4-]	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	1400	EPA TAP SCRN LVL
SVOC	106-47-8	Chloroaniline[4-]	SW-846:8270D	UF	µg/L	307	1.65	2.584	3.98	5	7.828	12	3.7	EPA TAP SCRN LVL
SVOC	91-58-7	Chloronaphthalene[2-]	SW-846:8270D	UF	µg/L	307	0.205	0.321	0.494	0.5	0.783	1.2	733	NMED A1 TAP SCRN LVL
SVOC	95-57-8	Chlorophenol[2-]	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	91	NMED A1 TAP SCRN LVL
SVOC	7005-72-3	Chlorophenyl-phenyl[4-] Ether	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	—	—
SVOC	218-01-9	Chrysene	SW-846:8270D	UF	µg/L	306	0.15	0.235	0.361	0.5	0.782	1.2	34.3	NMED A1 TAP SCRN LVL
SVOC	53-70-3	Dibenz(a,h)anthracene	SW-846:8270D	UF	µg/L	306	0.15	0.235	0.361	0.5	0.782	1.2	0.0343	NMED A1 TAP SCRN LVL
SVOC	132-64-9	Dibenzofuran	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	7.9	EPA TAP SCRN LVL
SVOC	95-50-1	Dichlorobenzene[1,2-]	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	600	EPA MCL
SVOC	541-73-1	Dichlorobenzene[1,3-]	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	—	—
SVOC	106-46-7	Dichlorobenzene[1,4-]	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	75	EPA MCL
SVOC	91-94-1	Dichlorobenzidine[3,3'-]	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	1.25	NMED A1 TAP SCRN LVL
SVOC	120-83-2	Dichlorophenol[2,4-]	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	45.3	NMED A1 TAP SCRN LVL
SVOC	84-66-2	Diethylphthalate	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	14800	NMED A1 TAP SCRN LVL
SVOC	131-11-3	Dimethyl Phthalate	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	612	NMED A1 TAP SCRN LVL
SVOC	105-67-9	Dimethylphenol[2,4-]	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	354	NMED A1 TAP SCRN LVL
SVOC	84-74-2	Di-n-butylphthalate	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	885	NMED A1 TAP SCRN LVL
SVOC	534-52-1	Dinitro-2-methylphenol[4,6-]	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	1.52	NMED A1 TAP SCRN LVL
SVOC	51-28-5	Dinitrophenol[2,4-]	SW-846:8270D	UF	µg/L	307	2.5	3.915	6.02	10	15.658	24.1	38.7	NMED A1 TAP SCRN LVL
SVOC	121-14-2	Dinitrotoluene[2,4-]	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	2.37	NMED A1 TAP SCRN LVL
SVOC	606-20-2	Dinitrotoluene[2,6-]	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	0.485	NMED A1 TAP SCRN LVL
SVOC	117-84-0	Di-n-octylphthalate	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	200	EPA TAP SCRN LVL
SVOC	88-85-7	Dinoseb	SW-846:8270D	UF	µg/L	306	1.5	2.347	3.61	5	7.819	12	7	EPA MCL
SVOC	123-91-1	Dioxane[1,4-]	SW-846:8270D	UF	µg/L	305	1.5	2.355	3.61	5	7.846	12	4.59	NMED A1 TAP SCRN LVL
SVOC	122-39-4	Diphenylamine	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	1300	EPA TAP SCRN LVL
SVOC	206-44-0	Fluoranthene	SW-846:8270D	UF	µg/L	306	0.15	0.235	0.361	0.5	0.782	1.2	802	NMED A1 TAP SCRN LVL
SVOC	86-73-7	Fluorene	SW-846:8270D	UF	µg/L	306	0.15	0.235	0.361	0.5	0.782	1.2	288	NMED A1 TAP SCRN LVL
SVOC	118-74-1	Hexachlorobenzene	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	1	EPA MCL
SVOC	87-68-3	Hexachlorobutadiene	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	1.39	NMED A1 TAP SCRN LVL
SVOC	77-47-4	Hexachlorocyclopentadiene	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	50	EPA MCL
SVOC	67-72-1	Hexachloroethane	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	3.28	NMED A1 TAP SCRN LVL

Table B-4.1-2 (continued)

Suite	Symbol or CAS No.	Analyte	Analytical Method	Field Preparation Code	Unit	Number of Analyses	MDL (Minimum)	MDL (Average)	MDL (Maximum)	PQL (Minimum)	PQL (Average)	PQL (Maximum)	Screening Value	Screening Value Type
SVOC	193-39-5	Indeno(1,2,3-cd)pyrene	SW-846:8270D	UF	µg/L	306	0.15	0.235	0.361	0.5	0.782	1.2	0.343	NMED A1 TAP SCRN LVL
SVOC	78-59-1	Isophorone	SW-846:8270D	UF	µg/L	307	1.75	2.740	4.22	5	7.828	12	781	NMED A1 TAP SCRN LVL
SVOC	90-12-0	Methylnaphthalene[1-]	SW-846:8270D	UF	µg/L	306	0.15	0.235	0.361	0.5	0.782	1.2	11.4	NMED A1 TAP SCRN LVL
SVOC	91-57-6	Methylnaphthalene[2-]	SW-846:8270D	UF	µg/L	306	0.15	0.235	0.361	0.5	0.782	1.2	35.1	NMED A1 TAP SCRN LVL
SVOC	95-48-7	Methylphenol[2-]	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	930	EPA TAP SCRN LVL
SVOC	65794-96-9	Methylphenol[3-,4-]	SW-846:8270D	UF	µg/L	77	3.7	3.837	4.35	10	10.369	11.8	—	—
SVOC	106-44-5	Methylphenol[4-]	SW-846:8270D	UF	µg/L	230	1.85	2.583	4.46	5	6.978	12	1900	EPA TAP SCRN LVL
SVOC	91-20-3	Naphthalene	SW-846:8270D	UF	µg/L	306	0.15	0.235	0.361	0.5	0.782	1.2	30	NM GW STD
SVOC	88-74-4	Nitroaniline[2-]	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	190	EPA TAP SCRN LVL
SVOC	99-09-2	Nitroaniline[3-]	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	—	—
SVOC	100-01-6	Nitroaniline[4-]	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	38	EPA TAP SCRN LVL
SVOC	98-95-3	Nitrobenzene	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	1.4	NMED A1 TAP SCRN LVL
SVOC	88-75-5	Nitrophenol[2-]	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	—	—
SVOC	100-02-7	Nitrophenol[4-]	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	—	—
SVOC	55-18-5	Nitrosodiethylamine[N-]	SW-846:8270D	UF	µg/L	306	1.5	2.347	3.61	5	7.819	12	0.00167	NMED A1 TAP SCRN LVL
SVOC	62-75-9	Nitrosodimethylamine[N-]	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	0.00491	NMED A1 TAP SCRN LVL
SVOC	924-16-3	Nitroso-di-n-butylamine[N-]	SW-846:8270D	UF	µg/L	306	1.5	2.347	3.61	5	7.819	12	0.0273	NMED A1 TAP SCRN LVL
SVOC	621-64-7	Nitroso-di-n-propylamine[N-]	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	0.11	EPA TAP SCRN LVL
SVOC	930-55-2	Nitrosopyrrolidine[N-]	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	0.37	NMED A1 TAP SCRN LVL
SVOC	108-60-1	Oxybis(1-chloropropane)[2,2'-]	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	710	EPA TAP SCRN LVL
SVOC	608-93-5	Pentachlorobenzene	SW-846:8270D	UF	µg/L	306	1.5	2.347	3.61	5	7.819	12	3.07	NMED A1 TAP SCRN LVL
SVOC	87-86-5	Pentachlorophenol	SW-846:8270D	UF	µg/L	306	1.5	2.346	3.61	5	7.817	12	1	EPA MCL
SVOC	85-01-8	Phenanthrene	SW-846:8270D	UF	µg/L	306	0.15	0.235	0.361	0.5	0.782	1.2	170	NMED A1 TAP SCRN LVL
SVOC	108-95-2	Phenol	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	5	NM GW STD
SVOC	129-00-0	Pyrene	SW-846:8270D	UF	µg/L	306	0.15	0.235	0.361	0.5	0.782	1.2	117	NMED A1 TAP SCRN LVL
SVOC	110-86-1	Pyridine	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	20	EPA TAP SCRN LVL
SVOC	95-94-3	Tetrachlorobenzene[1,2,4,5]	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	1.66	NMED A1 TAP SCRN LVL
SVOC	58-90-2	Tetrachlorophenol[2,3,4,6-]	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	240	EPA TAP SCRN LVL
SVOC	120-82-1	Trichlorobenzene[1,2,4-]	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	70	EPA MCL
SVOC	95-95-4	Trichlorophenol[2,4,5-]	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	1170	NMED A1 TAP SCRN LVL
SVOC	88-06-2	Trichlorophenol[2,4,6-]	SW-846:8270D	UF	µg/L	307	1.5	2.349	3.61	5	7.828	12	11.9	NMED A1 TAP SCRN LVL
VOC	67-64-1	Acetone	SW-846:8260B	UF	µg/L	523	1.5	1.979	3	10	10	10	14100	NMED A1 TAP SCRN LVL
VOC	75-05-8	Acetonitrile	SW-846:8260B	UF	µg/L	523	8	8	8	25	25	25	130	EPA TAP SCRN LVL
VOC	107-02-8	Acrolein	SW-846:8260B	UF	µg/L	523	1.5	1.5	1.5	5	5	5	0.0415	NMED A1 TAP SCRN LVL
VOC	107-13-1	Acrylonitrile	SW-846:8260B	UF	µg/L	523	1	1.34	1.5	5	5	5	0.523	NMED A1 TAP SCRN LVL
VOC	71-43-2	Benzene	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	5	EPA MCL
VOC	108-86-1	Bromobenzene	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	62	EPA TAP SCRN LVL
VOC	74-97-5	Bromochloromethane	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	83	EPA TAP SCRN LVL
VOC	75-27-4	Bromodichloromethane	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	1.34	NMED A1 TAP SCRN LVL

Table B-4.1-2 (continued)

Suite	Symbol or CAS No.	Analyte	Analytical Method	Field Preparation Code	Unit	Number of Analyses	MDL (Minimum)	MDL (Average)	MDL (Maximum)	PQL (Minimum)	PQL (Average)	PQL (Maximum)	Screening Value	Screening Value Type
VOC	75-25-2	Bromoform	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	80	EPA MCL
VOC	74-83-9	Bromomethane	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	7.54	NMED A1 TAP SCRN LVL
VOC	71-36-3	Butanol[1-]	SW-846:8260B	UF	µg/L	523	15	15	15	50	50	50	2000	EPA TAP SCRN LVL
VOC	78-93-3	Butanone[2-]	SW-846:8260B	UF	µg/L	523	1.5	1.66	2	5	5	5	5560	NMED A1 TAP SCRN LVL
VOC	104-51-8	Butylbenzene[n-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	1000	EPA TAP SCRN LVL
VOC	135-98-8	Butylbenzene[sec-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	2000	EPA TAP SCRN LVL
VOC	98-06-6	Butylbenzene[tert-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	690	EPA TAP SCRN LVL
VOC	75-15-0	Carbon Disulfide	SW-846:8260B	UF	µg/L	523	1.5	1.5	1.5	5	5	5	810	NMED A1 TAP SCRN LVL
VOC	56-23-5	Carbon Tetrachloride	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	5	EPA MCL
VOC	126-99-8	Chloro-1,3-butadiene[2-]	SW-846:8260B	UF	µg/L	523	0.2	0.27	0.3	1	1	1	0.187	NMED A1 TAP SCRN LVL
VOC	107-05-1	Chloro-1-propene[3-]	SW-846:8260B	UF	µg/L	523	1.5	1.5	1.5	5	5	5	7.3	EPA TAP SCRN LVL
VOC	108-90-7	Chlorobenzene	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	100	EPA MCL
VOC	124-48-1	Chlorodibromomethane	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	1.68	NMED A1 TAP SCRN LVL
VOC	75-00-3	Chloroethane	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	20900	NMED A1 TAP SCRN LVL
VOC	67-66-3	Chloroform	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	80	EPA MCL
VOC	74-87-3	Chloromethane	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	20.3	NMED A1 TAP SCRN LVL
VOC	95-49-8	Chlorotoluene[2-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	233	NMED A1 TAP SCRN LVL
VOC	106-43-4	Chlorotoluene[4-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	250	EPA TAP SCRN LVL
VOC	96-12-8	Dibromo-3-Chloropropane[1,2-]	SW-846:8260B	UF	µg/L	356	0.5	0.5	0.5	1	1	1	0.2	EPA MCL
VOC	106-93-4	Dibromoethane[1,2-]	SW-846:8260B	UF	µg/L	356	0.3	0.3	0.3	1	1	1	0.05	EPA MCL
VOC	74-95-3	Dibromomethane	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	0.0747	NMED A1 TAP SCRN LVL
VOC	95-50-1	Dichlorobenzene[1,2-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	600	EPA MCL
VOC	541-73-1	Dichlorobenzene[1,3-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	—	—
VOC	106-46-7	Dichlorobenzene[1,4-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	75	EPA MCL
VOC	75-71-8	Dichlorodifluoromethane	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	197	NMED A1 TAP SCRN LVL
VOC	75-34-3	Dichloroethane[1,1-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	25	NM GW STD
VOC	107-06-2	Dichloroethane[1,2-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	5	EPA MCL
VOC	75-35-4	Dichloroethene[1,1-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	5	NM GW STD
VOC	540-59-0	Dichloroethene[cis/trans-1,2-]	SW-846:8260B	UF	µg/L	3	0.3	0.3	0.3	1	1	1	—	—
VOC	156-59-2	Dichloroethene[cis-1,2-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	70	EPA MCL
VOC	156-60-5	Dichloroethene[trans-1,2-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	100	EPA MCL
VOC	78-87-5	Dichloropropane[1,2-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	5	EPA MCL
VOC	142-28-9	Dichloropropane[1,3-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	370	EPA TAP SCRN LVL
VOC	594-20-7	Dichloropropane[2,2-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	—	—
VOC	563-58-6	Dichloropropene[1,1-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	—	—
VOC	10061-01-5	Dichloropropene[cis-1,3-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	—	—
VOC	10061-02-6	Dichloropropene[trans-1,3-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	—	—
VOC	60-29-7	Diethyl Ether	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	3930	NMED A1 TAP SCRN LVL
VOC	123-91-1	Dioxane[1,4-]	SW-846:8260B	UF	µg/L	3	15	15	15	50	50	50	4.59	NMED A1 TAP SCRN LVL

Table B-4.1-2 (continued)

Suite	Symbol or CAS No.	Analyte	Analytical Method	Field Preparation Code	Unit	Number of Analyses	MDL (Minimum)	MDL (Average)	MDL (Maximum)	PQL (Minimum)	PQL (Average)	PQL (Maximum)	Screening Value	Screening Value Type
VOC	97-63-2	Ethyl Methacrylate	SW-846:8260B	UF	µg/L	523	1.5	1.5	1.5	5	5	5	455	NMED A1 TAP SCRN LVL
VOC	100-41-4	Ethylbenzene	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	700	EPA MCL
VOC	87-68-3	Hexachlorobutadiene	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	1.39	NMED A1 TAP SCRN LVL
VOC	591-78-6	Hexanone[2-]	SW-846:8260B	UF	µg/L	523	1.5	1.72	2.2	5	5	5	38	EPA TAP SCRN LVL
VOC	74-88-4	Iodomethane	SW-846:8260B	UF	µg/L	523	1.5	1.5	1.5	5	5	5	—	—
VOC	78-83-1	Isobutyl alcohol	SW-846:8260B	UF	µg/L	523	15	15	15	50	50	50	5910	NMED A1 TAP SCRN LVL
VOC	98-82-8	Isopropylbenzene	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	447	NMED A1 TAP SCRN LVL
VOC	99-87-6	Isopropyltoluene[4-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	—	—
VOC	126-98-7	Methacrylonitrile	SW-846:8260B	UF	µg/L	523	1	1.34	1.5	5	5	5	1.91	NMED A1 TAP SCRN LVL
VOC	80-62-6	Methyl Methacrylate	SW-846:8260B	UF	µg/L	523	1.5	1.5	1.5	5	5	5	1390	NMED A1 TAP SCRN LVL
VOC	1634-04-4	Methyl tert-Butyl Ether	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	143	NMED A1 TAP SCRN LVL
VOC	108-10-1	Methyl-2-pentanone[4-]	SW-846:8260B	UF	µg/L	523	1.5	1.5	1.5	5	5	5	1240	NMED A1 TAP SCRN LVL
VOC	75-09-2	Methylene Chloride	SW-846:8260B	UF	µg/L	523	1	1.64	3	10	10	10	5	EPA MCL
VOC	91-20-3	Naphthalene	SW-846:8260B	UF	µg/L	523	0.3	0.33	0.4	1	1	1	30	NM GW STD
VOC	107-12-0	Propionitrile	SW-846:8260B	UF	µg/L	523	1.5	1.5	1.5	5	5	5	—	—
VOC	103-65-1	Propylbenzene[1-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	660	EPA TAP SCRN LVL
VOC	100-42-5	Styrene	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	100	EPA MCL
VOC	630-20-6	Tetrachloroethane[1,1,1,2-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	5.74	NMED A1 TAP SCRN LVL
VOC	79-34-5	Tetrachloroethane[1,1,2,2-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	10	NM GW STD
VOC	127-18-4	Tetrachloroethene	SW-846:8260B	UF	µg/L	522	0.3	0.3	0.3	1	1	1	5	EPA MCL
VOC	108-88-3	Toluene	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	750	NM GW STD
VOC	76-13-1	Trichloro-1,2,2-trifluoroethane[1,1,2-]	SW-846:8260B	UF	µg/L	523	1.5	1.84	2	5	5	5	55000	NMED A1 TAP SCRN LVL
VOC	87-61-6	Trichlorobenzene[1,2,3-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	7	EPA TAP SCRN LVL
VOC	120-82-1	Trichlorobenzene[1,2,4-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	70	EPA MCL
VOC	71-55-6	Trichloroethane[1,1,1-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	60	NM GW STD
VOC	79-00-5	Trichloroethane[1,1,2-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	5	EPA MCL
VOC	79-01-6	Trichloroethene	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	5	EPA MCL
VOC	75-69-4	Trichlorofluoromethane	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	1140	NMED A1 TAP SCRN LVL
VOC	96-18-4	Trichloropropane[1,2,3-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	0.00835	NMED A1 TAP SCRN LVL
VOC	95-63-6	Trimethylbenzene[1,2,4-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	56	EPA TAP SCRN LVL
VOC	108-67-8	Trimethylbenzene[1,3,5-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	60	EPA TAP SCRN LVL
VOC	108-05-4	Vinyl acetate	SW-846:8260B	UF	µg/L	523	1.5	1.5	1.5	5	5	5	409	NMED A1 TAP SCRN LVL
VOC	75-01-4	Vinyl Chloride	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	1	NM GW STD
VOC	95-47-6	Xylene[1,2-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	1	1	1	193	NMED A1 TAP SCRN LVL
VOC	Xylene[m+p]	Xylene[1,3-]+Xylene[1,4-]	SW-846:8260B	UF	µg/L	523	0.3	0.3	0.3	2	2	2	193	NMED A1 TAP SCRN LVL

Notes: CAS = Chemical Abstracts Service; EPA MCL = EPA maximum contaminant level; NM GW STD = New Mexico groundwater standard; EPA TAP SCRN LVL = EPA tap water screening level; NMED A1 TAP SCRN LVL = NMED screening level for tap water.

*— = Not available.

Table B-4.1-3
Analyte MDLs and PQLs for Base-Flow Samples Collected in MY2016 and MY2017 and Analyzed by Accredited Contract Laboratories

Suite	Symbol or CAS No.	Analyte	Analytical Method	Field Preparation Code	Unit	Number of Analyses	MDL (Minimum)	MDL (Average)	MDL (Maximum)	PQL (Minimum)	PQL (Average)	PQL (Maximum)	Screening Value	Screening Value Type
Dioxins/Furans	35822-46-9	Heptachlorodibenzodioxin[1,2,3,4,6,7,8-]	SW-846:8290A	UF	µg/L	7	1.69E-05	1.76E-05	1.86E-05	5.10E-05	5.29E-05	5.60E-05	—*	—
Dioxins/Furans	37871-00-4	Heptachlorodibenzodioxins (Total)	SW-846:8290A	UF	µg/L	7	1.69E-05	1.70E-05	1.70E-05	—	—	—	—	—
Dioxins/Furans	67562-39-4	Heptachlorodibenzofuran[1,2,3,4,6,7,8-]	SW-846:8290A	UF	µg/L	7	1.69E-05	1.76E-05	1.86E-05	5.10E-05	5.29E-05	5.60E-05	—	—
Dioxins/Furans	55673-89-7	Heptachlorodibenzofuran[1,2,3,4,7,8,9-]	SW-846:8290A	UF	µg/L	7	1.69E-05	1.76E-05	1.86E-05	5.10E-05	5.29E-05	5.60E-05	—	—
Dioxins/Furans	38998-75-3	Heptachlorodibenzofurans (Total)	SW-846:8290A	UF	µg/L	7	1.69E-05	1.70E-05	1.70E-05	—	—	—	—	—
Dioxins/Furans	39227-28-6	Hexachlorodibenzodioxin[1,2,3,4,7,8-]	SW-846:8290A	UF	µg/L	7	1.69E-05	1.76E-05	1.86E-05	5.10E-05	5.29E-05	5.60E-05	—	—
Dioxins/Furans	57653-85-7	Hexachlorodibenzodioxin[1,2,3,6,7,8-]	SW-846:8290A	UF	µg/L	7	1.69E-05	1.76E-05	1.86E-05	5.10E-05	5.29E-05	5.60E-05	—	—
Dioxins/Furans	19408-74-3	Hexachlorodibenzodioxin[1,2,3,7,8,9-]	SW-846:8290A	UF	µg/L	7	1.69E-05	1.76E-05	1.86E-05	5.10E-05	5.29E-05	5.60E-05	—	—
Dioxins/Furans	34465-46-8	Hexachlorodibenzodioxins (Total)	SW-846:8290A	UF	µg/L	7	1.69E-05	1.70E-05	1.70E-05	—	—	—	0.00013	EPA TAP SCRN LVL
Dioxins/Furans	70648-26-9	Hexachlorodibenzofuran[1,2,3,4,7,8-]	SW-846:8290A	UF	µg/L	7	1.69E-05	1.76E-05	1.86E-05	5.10E-05	5.29E-05	5.60E-05	—	—
Dioxins/Furans	57117-44-9	Hexachlorodibenzofuran[1,2,3,6,7,8-]	SW-846:8290A	UF	µg/L	7	1.69E-05	1.76E-05	1.86E-05	5.10E-05	5.29E-05	5.60E-05	—	—
Dioxins/Furans	72918-21-9	Hexachlorodibenzofuran[1,2,3,7,8,9-]	SW-846:8290A	UF	µg/L	7	1.69E-05	1.76E-05	1.86E-05	5.10E-05	5.29E-05	5.60E-05	—	—
Dioxins/Furans	60851-34-5	Hexachlorodibenzofuran[2,3,4,6,7,8-]	SW-846:8290A	UF	µg/L	7	1.69E-05	1.76E-05	1.86E-05	5.10E-05	5.29E-05	5.60E-05	—	—
Dioxins/Furans	55684-94-1	Hexachlorodibenzofurans (Total)	SW-846:8290A	UF	µg/L	7	1.69E-05	1.70E-05	1.70E-05	—	—	—	—	—
Dioxins/Furans	3268-87-9	Octachlorodibenzodioxin[1,2,3,4,6,7,8,9-]	SW-846:8290A	UF	µg/L	7	3.38E-05	3.52E-05	3.73E-05	1.00E-04	1.06E-04	1.10E-04	—	—
Dioxins/Furans	39001-02-0	Octachlorodibenzofuran[1,2,3,4,6,7,8,9-]	SW-846:8290A	UF	µg/L	7	3.38E-05	3.52E-05	3.73E-05	1.00E-04	1.06E-04	1.10E-04	—	—
Dioxins/Furans	40321-76-4	Pentachlorodibenzodioxin[1,2,3,7,8-]	SW-846:8290A	UF	µg/L	7	1.69E-05	1.76E-05	1.86E-05	5.10E-05	5.29E-05	5.60E-05	—	—
Dioxins/Furans	36088-22-9	Pentachlorodibenzodioxins (Total)	SW-846:8290A	UF	µg/L	7	1.69E-05	1.70E-05	1.70E-05	—	—	—	—	—
Dioxins/Furans	57117-41-6	Pentachlorodibenzofuran[1,2,3,7,8-]	SW-846:8290A	UF	µg/L	7	1.69E-05	1.76E-05	1.86E-05	5.10E-05	5.29E-05	5.60E-05	—	—
Dioxins/Furans	57117-31-4	Pentachlorodibenzofuran[2,3,4,7,8-]	SW-846:8290A	UF	µg/L	7	1.69E-05	1.76E-05	1.86E-05	5.10E-05	5.29E-05	5.60E-05	—	—
Dioxins/Furans	30402-15-4	Pentachlorodibenzofurans (Totals)	SW-846:8290A	UF	µg/L	7	1.69E-05	1.70E-05	1.70E-05	—	—	—	—	—
Dioxins/Furans	1746-01-6	Tetrachlorodibenzodioxin[2,3,7,8-]	SW-846:8290A	UF	µg/L	7	3.38E-06	3.52E-06	3.73E-06	1.00E-05	1.06E-05	1.10E-05	0.00003	EPA MCL
Dioxins/Furans	41903-57-5	Tetrachlorodibenzodioxins (Total)	SW-846:8290A	UF	µg/L	7	3.38E-06	3.40E-06	3.41E-06	—	—	—	—	—
Dioxins/Furans	51207-31-9	Tetrachlorodibenzofuran[2,3,7,8-]	SW-846:8290A	UF	µg/L	7	3.38E-06	3.52E-06	3.73E-06	1.00E-05	1.06E-05	1.10E-05	0.00000184	NMED A1 TAP SCRN LVL
Dioxins/Furans	55722-27-5	Tetrachlorodibenzofurans (Totals)	SW-846:8290A	UF	µg/L	7	3.38E-06	3.40E-06	3.41E-06	—	—	—	—	—
General Inorganics	pH	Acidity or Alkalinity of a solution	EPA:150.1	F	SU	44	0.01	0.01	0.01	0.1	0.1	0.1	—	—
General Inorganics	ALK-CO3	Alkalinity-CO3	EPA:310.1	F	mg/L	44	0.725	1.203	1.45	1	3.068	4	—	—
General Inorganics	ALK-CO3+HCO3	Alkalinity-CO3+HCO3	EPA:310.1	F	mg/L	44	0.725	1.203	1.45	1	3.068	4	—	—
General Inorganics	NH3-N	Ammonia as Nitrogen	EPA:350.1	F	mg/L	44	0.017	0.017	0.017	0.05	0.05	0.05	—	—
General Inorganics	Br(-1)	Bromide	EPA:300.0	F	mg/L	42	0.067	0.067	0.067	0.2	0.2	0.2	—	—
General Inorganics	Cl(-1)	Chloride	EPA:300.0	F	mg/L	11	0.067	0.067	0.067	0.2	0.2	0.2	250	NM GW STD
General Inorganics	F(-1)	Fluoride	EPA:300.0	F	mg/L	44	0.033	0.033	0.033	0.1	0.1	0.1	1.6	NM GW STD
General Inorganics	NO3+NO2-N	Nitrate-Nitrite as Nitrogen	EPA:353.2	F	mg/L	42	0.017	0.017	0.017	0.05	0.05	0.05	10	EPA MCL
General Inorganics	SPEC_CONDC	Specific Conductance	EPA:120.1	F	µS/cm	44	1	1.777	3.63	1	4.989	14.5	—	—
General Inorganics	SO4(-2)	Sulfate	EPA:300.0	F	mg/L	40	0.133	0.133	0.133	0.4	0.4	0.4	600	NM GW STD
General Inorganics	TDS	Total Dissolved Solids	EPA:160.1	F	mg/L	44	3.4	3.4	3.4	14.3	14.3	14.3	1000	NM GW STD

Table B-4.1-3 (continued)

Suite	Symbol or CAS No.	Analyte	Analytical Method	Field Preparation Code	Unit	Number of Analyses	MDL (Minimum)	MDL (Average)	MDL (Maximum)	PQL (Minimum)	PQL (Average)	PQL (Maximum)	Screening Value	Screening Value Type
General Inorganics	TKN	Total Kjeldahl Nitrogen	EPA:351.2	UF	mg/L	44	0.033	0.033	0.033	0.1	0.1	0.1	—	—
General Inorganics	TOC	Total Organic Carbon	SW-846:9060	UF	mg/L	44	0.33	0.33	0.33	1	1	1	—	—
General Inorganics	PO4-P	Total Phosphate as Phosphorus	EPA:365.4	F	mg/L	44	0.017	0.019	0.02	0.05	0.05	0.05	—	—
General Inorganics	CN(TOTAL)	Cyanide (Total)	EPA:335.4	UF	mg/L	44	0.00167	0.00167	0.00167	0.005	0.005	0.005	0.2	EPA MCL
General Inorganics	ClO4	Perchlorate	SW-846:6850	F	µg/L	44	0.05	0.05	0.05	0.2	0.2	0.2	13.8	NMED A1 TAP SCRN LVL
HEXP	6629-29-4	2,4-Diamino-6-nitrotoluene	SW-846:8330B	UF	µg/L	11	0.521	0.549	0.575	2.6	2.745	2.87	—	—
HEXP	59229-75-3	2,6-Diamino-4-nitrotoluene	SW-846:8330B	UF	µg/L	11	0.521	0.549	0.575	2.6	2.745	2.87	—	—
HEXP	618-87-1	3,5-Dinitroaniline	SW-846:8330B	UF	µg/L	11	0.313	0.3295	0.345	1.04	1.098	1.15	—	—
HEXP	19406-51-0	Amino-2,6-dinitrotoluene[4-]	SW-846:8330B	UF	µg/L	11	0.0833	0.0878	0.092	0.26	0.274	0.287	39	EPA TAP SCRN LVL
HEXP	35572-78-2	Amino-4,6-dinitrotoluene[2-]	SW-846:8330B	UF	µg/L	11	0.0833	0.0878	0.092	0.26	0.274	0.287	39	EPA TAP SCRN LVL
HEXP	99-65-0	Dinitrobenzene[1,3-]	SW-846:8330B	UF	µg/L	11	0.0833	0.0878	0.092	0.26	0.274	0.287	2	EPA TAP SCRN LVL
HEXP	121-14-2	Dinitrotoluene[2,4-]	SW-846:8330B	UF	µg/L	11	0.0833	0.0878	0.092	0.26	0.274	0.287	2.37	NMED A1 TAP SCRN LVL
HEXP	606-20-2	Dinitrotoluene[2,6-]	SW-846:8330B	UF	µg/L	11	0.0833	0.0878	0.092	0.26	0.274	0.287	0.485	NMED A1 TAP SCRN LVL
HEXP	DNX	DNX	SW-846:8330B	UF	µg/L	7	0.0833	0.0875	0.092	0.26	0.273	0.287	—	—
HEXP	2691-41-0	HMX	SW-846:8330B	UF	µg/L	11	0.0833	0.0878	0.092	0.26	0.274	0.287	1000	NMED A1 TAP SCRN LVL
HEXP	MNX	MNX	SW-846:8330B	UF	µg/L	7	0.0833	0.0875	0.092	0.26	0.273	0.287	—	—
HEXP	98-95-3	Nitrobenzene	SW-846:8330B	UF	µg/L	11	0.0833	0.0878	0.092	0.26	0.274	0.287	1.4	NMED A1 TAP SCRN LVL
HEXP	88-72-2	Nitrotoluene[2-]	SW-846:8330B	UF	µg/L	11	0.0854	0.0900	0.0943	0.26	0.274	0.287	3.14	NMED A1 TAP SCRN LVL
HEXP	99-08-1	Nitrotoluene[3-]	SW-846:8330B	UF	µg/L	11	0.0833	0.0878	0.092	0.26	0.274	0.287	1.74	NMED A1 TAP SCRN LVL
HEXP	99-99-0	Nitrotoluene[4-]	SW-846:8330B	UF	µg/L	11	0.156	0.1646	0.172	0.521	0.549	0.575	42.7	NMED A1 TAP SCRN LVL
HEXP	78-11-5	PETN	SW-846:8330B	UF	µg/L	11	0.104	0.1098	0.115	0.521	0.549	0.575	190	EPA TAP SCRN LVL
HEXP	121-82-4	RDX	SW-846:8330B	UF	µg/L	11	0.0833	0.0878	0.092	0.26	0.274	0.287	7.02	NMED A1 TAP SCRN LVL
HEXP	3058-38-6	TATB	SW-846:8330B	UF	µg/L	11	0.313	0.3295	0.345	1.04	1.098	1.15	—	—
HEXP	479-45-8	Tetryl	SW-846:8330B	UF	µg/L	11	0.0833	0.0878	0.092	0.521	0.549	0.575	39.4	NMED A1 TAP SCRN LVL
HEXP	TNX	TNX	SW-846:8330B	UF	µg/L	7	0.0833	0.0875	0.092	0.26	0.273	0.287	—	—
HEXP	99-35-4	Trinitrobenzene[1,3,5-]	SW-846:8330B	UF	µg/L	11	0.0833	0.0878	0.092	0.26	0.274	0.287	590	EPA TAP SCRN LVL
HEXP	118-96-7	Trinitrotoluene[2,4,6-]	SW-846:8330B	UF	µg/L	11	0.0833	0.0878	0.092	0.26	0.274	0.287	9.8	NMED A1 TAP SCRN LVL
HEXP	78-30-8	Tris (o-cresyl) phosphate	SW-846:8330B	UF	µg/L	11	0.313	0.3295	0.345	1.04	1.098	1.15	—	—
METALS	Al	Aluminum	SW-846:6010C	F	µg/L	51	68	68	68	200	200	200	5000	NM GW STD
METALS	Al	Aluminum	SW-846:6010C	UF	µg/L	40	68	68	68	200	200	200	5000	NM GW STD
METALS	Sb	Antimony	SW-846:6020	F	µg/L	51	1	1	1	3	3	3	6	EPA MCL
METALS	As	Arsenic	SW-846:6020	F	µg/L	51	1.7	1.8	2	5	5	5	10	EPA MCL
METALS	Ba	Barium	SW-846:6010C	F	µg/L	51	1	1	1	5	5	5	1000	NM GW STD
METALS	Be	Beryllium	SW-846:6010C	F	µg/L	51	1	1	1	5	5	5	4	EPA MCL
METALS	B	Boron	SW-846:6010C	F	µg/L	51	15	15	15	50	50	50	750	NM GW STD
METALS	Cd	Cadmium	SW-846:6020	F	µg/L	51	0.11	0.248	0.3	1	1	1	5	EPA MCL
METALS	Ca	Calcium	SW-846:6010C	F	mg/L	51	0.05	0.05	0.05	0.2	0.2	0.2	—	—
METALS	Cr	Chromium	SW-846:6020	F	µg/L	51	2	2.725	3	10	10	10	50	NM GW STD
METALS	Co	Cobalt	SW-846:6010C	F	µg/L	51	1	1	1	5	5	5	50	NM GW STD

Table B-4.1-3 (continued)

Suite	Symbol or CAS No.	Analyte	Analytical Method	Field Preparation Code	Unit	Number of Analyses	MDL (Minimum)	MDL (Average)	MDL (Maximum)	PQL (Minimum)	PQL (Average)	PQL (Maximum)	Screening Value	Screening Value Type
METALS	Cu	Copper	SW-846:6010C	F	µg/L	51	3	3	3	10	10	10	1000	NM GW STD
METALS	HARDNESS	Hardness	SM:A2340B	F	mg/L	52	0.453	0.453	0.453	1.24	1.24	1.24	—	—
METALS	Fe	Iron	SW-846:6010C	F	µg/L	51	30	30	30	100	100	100	1000	NM GW STD
METALS	Pb	Lead	SW-846:6020	F	µg/L	51	0.5	0.5	0.5	2	2	2	15	EPA MCL
METALS	Mg	Magnesium	SW-846:6010C	F	mg/L	51	0.11	0.11	0.11	0.3	0.3	0.3	—	—
METALS	Mn	Manganese	SW-846:6010C	F	µg/L	51	2	2	2	10	10	10	200	NM GW STD
METALS	Hg	Mercury	EPA:245.2	F	µg/L	52	0.067	0.067	0.067	0.2	0.2	0.2	2	EPA MCL
METALS	Hg	Mercury	EPA:245.2	UF	µg/L	52	0.067	0.067	0.067	0.2	0.2	0.2	2	EPA MCL
METALS	Mo	Molybdenum	SW-846:6020	F	µg/L	51	0.165	0.230	0.3	0.5	0.5	0.5	1000	NM GW STD
METALS	Ni	Nickel	SW-846:6020	F	µg/L	51	0.5	0.533	0.6	2	2	2	200	NM GW STD
METALS	K	Potassium	SW-846:6010C	F	mg/L	51	0.05	0.05	0.05	0.15	0.15	0.15	—	—
METALS	Se	Selenium	SW-846:6020	F	µg/L	51	1.5	1.863	2	5	5	5	50	EPA MCL
METALS	Se	Selenium	SW-846:6020	UF	µg/L	40	1.5	1.925	2	5	5	5	50	EPA MCL
METALS	SiO2	Silicon Dioxide	SW-846:6010C	F	mg/L	43	0.053	0.053	0.053	0.213	0.213	0.213	—	—
METALS	Ag	Silver	SW-846:6020	F	µg/L	51	0.1	0.304	0.4	1	1	1	50	NM GW STD
METALS	Na	Sodium	SW-846:6010C	F	mg/L	51	0.1	0.1	0.1	0.3	0.3	0.3	—	—
METALS	Sr	Strontium	SW-846:6010C	F	µg/L	51	1	1	1	5	5	5	11800	NMED A1 TAP SCRN LVL
METALS	Tl	Thallium	SW-846:6020	F	µg/L	51	0.45	0.559	0.6	2	2	2	2	EPA MCL
METALS	Sn	Tin	SW-846:6010C	F	µg/L	51	2.5	2.5	2.5	10	10	10	12000	EPA TAP SCRN LVL
METALS	U	Uranium	SW-846:6020	F	µg/L	51	0.067	0.067	0.067	0.2	0.2	0.2	30	EPA MCL
METALS	V	Vanadium	SW-846:6010C	F	µg/L	51	1	1	1	5	5	5	63.1	NMED A1 TAP SCRN LVL
METALS	Zn	Zinc	SW-846:6010C	F	µg/L	51	3.3	3.3	3.3	10	10	10	10000	NM GW STD
PCB	12674-11-2	Aroclor-1016	SW-846:8082	UF	µg/L	14	0.0333	0.0352	0.0374	0.1	0.1056	0.112	1	NM GW STD
PCB	11104-28-2	Aroclor-1221	SW-846:8082	UF	µg/L	14	0.0333	0.0352	0.0374	0.1	0.1056	0.112	1	NM GW STD
PCB	11141-16-5	Aroclor-1232	SW-846:8082	UF	µg/L	14	0.0333	0.0352	0.0374	0.1	0.1056	0.112	1	NM GW STD
PCB	53469-21-9	Aroclor-1242	SW-846:8082	UF	µg/L	14	0.0333	0.0352	0.0374	0.1	0.1056	0.112	1	NM GW STD
PCB	12672-29-6	Aroclor-1248	SW-846:8082	UF	µg/L	14	0.0333	0.0352	0.0374	0.1	0.1056	0.112	1	NM GW STD
PCB	11097-69-1	Aroclor-1254	SW-846:8082	UF	µg/L	14	0.0333	0.0352	0.0374	0.1	0.1056	0.112	1	NM GW STD
PCB	11096-82-5	Aroclor-1260	SW-846:8082	UF	µg/L	14	0.0333	0.0352	0.0374	0.1	0.1056	0.112	1	NM GW STD
PCB	37324-23-5	Aroclor-1262	SW-846:8082	UF	µg/L	14	0.0333	0.0352	0.0374	0.1	0.1056	0.112	1	NM GW STD
SVOC	83-32-9	Acenaphthene	SW-846:8270D	UF	µg/L	19	0.15	0.245	0.319	0.5	0.815	1.06	535	NMED A1 TAP SCRN LVL
SVOC	208-96-8	Acenaphthylene	SW-846:8270D	UF	µg/L	19	0.15	0.245	0.319	0.5	0.815	1.06	—	—
SVOC	62-53-3	Aniline	SW-846:8270D	UF	µg/L	19	2.1	3.425	4.47	5	8.147	10.6	130	EPA TAP SCRN LVL
SVOC	120-12-7	Anthracene	SW-846:8270D	UF	µg/L	19	0.15	0.245	0.319	0.5	0.815	1.06	1720	NMED A1 TAP SCRN LVL
SVOC	1912-24-9	Atrazine	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	3	EPA MCL
SVOC	103-33-3	Azobenzene	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	1.2	EPA TAP SCRN LVL
SVOC	92-87-5	Benzidine	SW-846:8270D	UF	µg/L	19	1.95	3.182	4.15	5	8.147	10.6	0.00109	NMED A1 TAP SCRN LVL
SVOC	56-55-3	Benzo(a)anthracene	SW-846:8270D	UF	µg/L	19	0.15	0.245	0.319	0.5	0.815	1.06	0.12	NMED A1 TAP SCRN LVL
SVOC	50-32-8	Benzo(a)pyrene	SW-846:8270D	UF	µg/L	19	0.15	0.245	0.319	0.5	0.815	1.06	0.2	EPA MCL

Table B-4.1-3 (continued)

Suite	Symbol or CAS No.	Analyte	Analytical Method	Field Preparation Code	Unit	Number of Analyses	MDL (Minimum)	MDL (Average)	MDL (Maximum)	PQL (Minimum)	PQL (Average)	PQL (Maximum)	Screening Value	Screening Value Type
SVOC	205-99-2	Benzo(b)fluoranthene	SW-846:8270D	UF	µg/L	19	0.15	0.245	0.319	0.5	0.815	1.06	0.343	NMED A1 TAP SCRN LVL
SVOC	191-24-2	Benzo(g,h,i)perylene	SW-846:8270D	UF	µg/L	19	0.15	0.245	0.319	0.5	0.815	1.06	—	—
SVOC	207-08-9	Benzo(k)fluoranthene	SW-846:8270D	UF	µg/L	19	0.15	0.245	0.319	0.5	0.815	1.06	3.43	NMED A1 TAP SCRN LVL
SVOC	65-85-0	Benzoic Acid	SW-846:8270D	UF	µg/L	19	3	4.893	6.38	10	16.316	21.3	75000	EPA TAP SCRN LVL
SVOC	100-51-6	Benzyl Alcohol	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	2000	EPA TAP SCRN LVL
SVOC	111-91-1	Bis(2-chloroethoxy)methane	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	59	EPA TAP SCRN LVL
SVOC	111-44-4	Bis(2-chloroethyl)ether	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	0.137	NMED A1 TAP SCRN LVL
SVOC	117-81-7	Bis(2-ethylhexyl)phthalate	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	6	EPA MCL
SVOC	101-55-3	Bromophenyl-phenylether[4-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	—	—
SVOC	85-68-7	Butylbenzylphthalate	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	160	EPA TAP SCRN LVL
SVOC	59-50-7	Chloro-3-methylphenol[4-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	1400	EPA TAP SCRN LVL
SVOC	106-47-8	Chloroaniline[4-]	SW-846:8270D	UF	µg/L	19	1.65	2.691	3.51	5	8.147	10.6	3.7	EPA TAP SCRN LVL
SVOC	91-58-7	Chloronaphthalene[2-]	SW-846:8270D	UF	µg/L	19	0.205	0.334	0.436	0.5	0.815	1.06	733	NMED A1 TAP SCRN LVL
SVOC	95-57-8	Chlorophenol[2-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	91	NMED A1 TAP SCRN LVL
SVOC	7005-72-3	Chlorophenyl-phenyl[4-] Ether	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	—	—
SVOC	218-01-9	Chrysene	SW-846:8270D	UF	µg/L	19	0.15	0.245	0.319	0.5	0.815	1.06	34.3	NMED A1 TAP SCRN LVL
SVOC	53-70-3	Dibenz(a,h)anthracene	SW-846:8270D	UF	µg/L	19	0.15	0.245	0.319	0.5	0.815	1.06	0.0343	NMED A1 TAP SCRN LVL
SVOC	132-64-9	Dibenzofuran	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	7.9	EPA TAP SCRN LVL
SVOC	95-50-1	Dichlorobenzene[1,2-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	600	EPA MCL
SVOC	541-73-1	Dichlorobenzene[1,3-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	—	—
SVOC	106-46-7	Dichlorobenzene[1,4-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	75	EPA MCL
SVOC	91-94-1	Dichlorobenzidine[3,3'-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	1.25	NMED A1 TAP SCRN LVL
SVOC	120-83-2	Dichlorophenol[2,4-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	45.3	NMED A1 TAP SCRN LVL
SVOC	84-66-2	Diethylphthalate	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	14800	NMED A1 TAP SCRN LVL
SVOC	131-11-3	Dimethyl Phthalate	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	612	NMED A1 TAP SCRN LVL
SVOC	105-67-9	Dimethylphenol[2,4-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	354	NMED A1 TAP SCRN LVL
SVOC	84-74-2	Di-n-butylphthalate	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	885	NMED A1 TAP SCRN LVL
SVOC	534-52-1	Dinitro-2-methylphenol[4,6-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	1.52	NMED A1 TAP SCRN LVL
SVOC	51-28-5	Dinitrophenol[2,4-]	SW-846:8270D	UF	µg/L	19	2.5	4.077	5.32	10	16.316	21.3	38.7	NMED A1 TAP SCRN LVL
SVOC	121-14-2	Dinitrotoluene[2,4-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	2.37	NMED A1 TAP SCRN LVL
SVOC	606-20-2	Dinitrotoluene[2,6-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	0.485	NMED A1 TAP SCRN LVL
SVOC	117-84-0	Di-n-octylphthalate	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	200	EPA TAP SCRN LVL
SVOC	88-85-7	Dinoseb	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	7	EPA MCL
SVOC	123-91-1	Dioxane[1,4-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	4.59	NMED A1 TAP SCRN LVL
SVOC	122-39-4	Diphenylamine	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	1300	EPA TAP SCRN LVL
SVOC	206-44-0	Fluoranthene	SW-846:8270D	UF	µg/L	19	0.15	0.245	0.319	0.5	0.815	1.06	802	NMED A1 TAP SCRN LVL
SVOC	86-73-7	Fluorene	SW-846:8270D	UF	µg/L	19	0.15	0.245	0.319	0.5	0.815	1.06	288	NMED A1 TAP SCRN LVL
SVOC	118-74-1	Hexachlorobenzene	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	1	EPA MCL
SVOC	87-68-3	Hexachlorobutadiene	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	1.39	NMED A1 TAP SCRN LVL

Table B-4.1-3 (continued)

Suite	Symbol or CAS No.	Analyte	Analytical Method	Field Preparation Code	Unit	Number of Analyses	MDL (Minimum)	MDL (Average)	MDL (Maximum)	PQL (Minimum)	PQL (Average)	PQL (Maximum)	Screening Value	Screening Value Type
SVOC	77-47-4	Hexachlorocyclopentadiene	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	50	EPA MCL
SVOC	67-72-1	Hexachloroethane	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	3.28	NMED A1 TAP SCRN LVL
SVOC	193-39-5	Indeno(1,2,3-cd)pyrene	SW-846:8270D	UF	µg/L	19	0.15	0.245	0.319	0.5	0.815	1.06	0.343	NMED A1 TAP SCRN LVL
SVOC	78-59-1	Isophorone	SW-846:8270D	UF	µg/L	19	1.75	2.854	3.72	5	8.147	10.6	781	NMED A1 TAP SCRN LVL
SVOC	90-12-0	Methylnaphthalene[1-]	SW-846:8270D	UF	µg/L	19	0.15	0.245	0.319	0.5	0.815	1.06	11.4	NMED A1 TAP SCRN LVL
SVOC	91-57-6	Methylnaphthalene[2-]	SW-846:8270D	UF	µg/L	19	0.15	0.245	0.319	0.5	0.815	1.06	35.1	NMED A1 TAP SCRN LVL
SVOC	95-48-7	Methylphenol[2-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	930	EPA TAP SCRN LVL
SVOC	65794-96-9	Methylphenol[3-,4-]	SW-846:8270D	UF	µg/L	4	3.78	3.9	3.94	10.2	10.5	10.6	—	—
SVOC	106-44-5	Methylphenol[4-]	SW-846:8270D	UF	µg/L	15	1.85	2.785	3.89	5	7.519	10.5	1900	EPA TAP SCRN LVL
SVOC	91-20-3	Naphthalene	SW-846:8270D	UF	µg/L	19	0.15	0.245	0.319	0.5	0.815	1.06	30	NM GW STD
SVOC	88-74-4	Nitroaniline[2-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	190	EPA TAP SCRN LVL
SVOC	99-09-2	Nitroaniline[3-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	—	—
SVOC	100-01-6	Nitroaniline[4-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	38	EPA TAP SCRN LVL
SVOC	98-95-3	Nitrobenzene	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	1.4	NMED A1 TAP SCRN LVL
SVOC	88-75-5	Nitrophenol[2-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	—	—
SVOC	100-02-7	Nitrophenol[4-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	—	—
SVOC	55-18-5	Nitrosodiethylamine[N-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	0.00167	NMED A1 TAP SCRN LVL
SVOC	62-75-9	Nitrosodimethylamine[N-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	0.00491	NMED A1 TAP SCRN LVL
SVOC	924-16-3	Nitroso-di-n-butylamine[N-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	0.0273	NMED A1 TAP SCRN LVL
SVOC	621-64-7	Nitroso-di-n-propylamine[N-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	0.11	EPA TAP SCRN LVL
SVOC	930-55-2	Nitrosopyrrolidine[N-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	0.37	NMED A1 TAP SCRN LVL
SVOC	108-60-1	Oxybis(1-chloropropane)[2,2'-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	710	EPA TAP SCRN LVL
SVOC	608-93-5	Pentachlorobenzene	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	3.07	NMED A1 TAP SCRN LVL
SVOC	87-86-5	Pentachlorophenol	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	1	EPA MCL
SVOC	85-01-8	Phenanthrene	SW-846:8270D	UF	µg/L	19	0.15	0.245	0.319	0.5	0.815	1.06	170	NMED A1 TAP SCRN LVL
SVOC	108-95-2	Phenol	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	5	NM GW STD
SVOC	129-00-0	Pyrene	SW-846:8270D	UF	µg/L	19	0.15	0.245	0.319	0.5	0.815	1.06	117	NMED A1 TAP SCRN LVL
SVOC	110-86-1	Pyridine	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	20	EPA TAP SCRN LVL
SVOC	95-94-3	Tetrachlorobenzene[1,2,4,5]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	1.66	NMED A1 TAP SCRN LVL
SVOC	58-90-2	Tetrachlorophenol[2,3,4,6-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	240	EPA TAP SCRN LVL
SVOC	120-82-1	Trichlorobenzene[1,2,4-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	70	EPA MCL
SVOC	95-95-4	Trichlorophenol[2,4,5-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	1170	NMED A1 TAP SCRN LVL
SVOC	88-06-2	Trichlorophenol[2,4,6-]	SW-846:8270D	UF	µg/L	19	1.5	2.447	3.19	5	8.147	10.6	11.9	NMED A1 TAP SCRN LVL
VOC	67-64-1	Acetone	SW-846:8260B	UF	µg/L	29	1.5	1.966	3	10	10	10	14100	NMED A1 TAP SCRN LVL
VOC	75-05-8	Acetonitrile	SW-846:8260B	UF	µg/L	29	8	8	8	25	25	25	130	EPA TAP SCRN LVL
VOC	107-02-8	Acrolein	SW-846:8260B	UF	µg/L	29	1.5	1.5	1.5	5	5	5	0.0415	NMED A1 TAP SCRN LVL
VOC	107-13-1	Acrylonitrile	SW-846:8260B	UF	µg/L	29	1	1.345	1.5	5	5	5	0.523	NMED A1 TAP SCRN LVL
VOC	71-43-2	Benzene	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	5	EPA MCL
VOC	108-86-1	Bromobenzene	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	62	EPA TAP SCRN LVL

Table B-4.1-3 (continued)

Suite	Symbol or CAS No.	Analyte	Analytical Method	Field Preparation Code	Unit	Number of Analyses	MDL (Minimum)	MDL (Average)	MDL (Maximum)	PQL (Minimum)	PQL (Average)	PQL (Maximum)	Screening Value	Screening Value Type
VOC	74-97-5	Bromochloromethane	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	83	EPA TAP SCRN LVL
VOC	75-27-4	Bromodichloromethane	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	1.34	NMED A1 TAP SCRN LVL
VOC	75-25-2	Bromoform	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	80	EPA MCL
VOC	74-83-9	Bromomethane	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	7.54	NMED A1 TAP SCRN LVL
VOC	71-36-3	Butanol[1-]	SW-846:8260B	UF	µg/L	29	15	15	15	50	50	50	2000	EPA TAP SCRN LVL
VOC	78-93-3	Butanone[2-]	SW-846:8260B	UF	µg/L	29	1.5	1.655	2	5	5	5	5560	NMED A1 TAP SCRN LVL
VOC	104-51-8	Butylbenzene[n-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	1000	EPA TAP SCRN LVL
VOC	135-98-8	Butylbenzene[sec-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	2000	EPA TAP SCRN LVL
VOC	98-06-6	Butylbenzene[tert-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	690	EPA TAP SCRN LVL
VOC	75-15-0	Carbon Disulfide	SW-846:8260B	UF	µg/L	29	1.5	1.5	1.5	5	5	5	810	NMED A1 TAP SCRN LVL
VOC	56-23-5	Carbon Tetrachloride	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	5	EPA MCL
VOC	126-99-8	Chloro-1,3-butadiene[2-]	SW-846:8260B	UF	µg/L	29	0.2	0.269	0.3	1	1	1	0.187	NMED A1 TAP SCRN LVL
VOC	107-05-1	Chloro-1-propene[3-]	SW-846:8260B	UF	µg/L	29	1.5	1.5	1.5	5	5	5	7.3	EPA TAP SCRN LVL
VOC	108-90-7	Chlorobenzene	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	100	EPA MCL
VOC	124-48-1	Chlorodibromomethane	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	1.68	NMED A1 TAP SCRN LVL
VOC	75-00-3	Chloroethane	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	20900	NMED A1 TAP SCRN LVL
VOC	67-66-3	Chloroform	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	80	EPA MCL
VOC	74-87-3	Chloromethane	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	20.3	NMED A1 TAP SCRN LVL
VOC	95-49-8	Chlorotoluene[2-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	233	NMED A1 TAP SCRN LVL
VOC	106-43-4	Chlorotoluene[4-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	250	EPA TAP SCRN LVL
VOC	96-12-8	Dibromo-3-Chloropropane[1,2-]	SW-846:8260B	UF	µg/L	20	0.5	0.5	0.5	1	1	1	0.2	EPA MCL
VOC	106-93-4	Dibromoethane[1,2-]	SW-846:8260B	UF	µg/L	20	0.3	0.3	0.3	1	1	1	0.05	EPA MCL
VOC	74-95-3	Dibromomethane	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	0.0747	NMED A1 TAP SCRN LVL
VOC	95-50-1	Dichlorobenzene[1,2-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	600	EPA MCL
VOC	541-73-1	Dichlorobenzene[1,3-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	—	—
VOC	106-46-7	Dichlorobenzene[1,4-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	75	EPA MCL
VOC	75-71-8	Dichlorodifluoromethane	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	197	NMED A1 TAP SCRN LVL
VOC	75-34-3	Dichloroethane[1,1-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	25	NM GW STD
VOC	107-06-2	Dichloroethane[1,2-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	5	EPA MCL
VOC	75-35-4	Dichloroethene[1,1-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	5	NM GW STD
VOC	156-59-2	Dichloroethene[cis-1,2-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	70	EPA MCL
VOC	156-60-5	Dichloroethene[trans-1,2-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	100	EPA MCL
VOC	78-87-5	Dichloropropane[1,2-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	5	EPA MCL
VOC	142-28-9	Dichloropropane[1,3-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	370	EPA TAP SCRN LVL
VOC	594-20-7	Dichloropropane[2,2-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	—	—
VOC	563-58-6	Dichloropropene[1,1-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	—	—
VOC	10061-01-5	Dichloropropene[cis-1,3-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	—	—
VOC	10061-02-6	Dichloropropene[trans-1,3-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	—	—
VOC	60-29-7	Diethyl Ether	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	3930	NMED A1 TAP SCRN LVL

Table B-4.1-3 (continued)

Suite	Symbol or CAS No.	Analyte	Analytical Method	Field Preparation Code	Unit	Number of Analyses	MDL (Minimum)	MDL (Average)	MDL (Maximum)	PQL (Minimum)	PQL (Average)	PQL (Maximum)	Screening Value	Screening Value Type
VOC	97-63-2	Ethyl Methacrylate	SW-846:8260B	UF	µg/L	29	1.5	1.5	1.5	5	5	5	455	NMED A1 TAP SCRN LVL
VOC	100-41-4	Ethylbenzene	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	700	EPA MCL
VOC	87-68-3	Hexachlorobutadiene	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	1.39	NMED A1 TAP SCRN LVL
VOC	591-78-6	Hexanone[2-]	SW-846:8260B	UF	µg/L	29	1.5	1.72	2.2	5	5	5	38	EPA TAP SCRN LVL
VOC	74-88-4	Iodomethane	SW-846:8260B	UF	µg/L	29	1.5	1.5	1.5	5	5	5	—	—
VOC	78-83-1	Isobutyl alcohol	SW-846:8260B	UF	µg/L	29	15	15	15	50	50	50	5910	NMED A1 TAP SCRN LVL
VOC	98-82-8	Isopropylbenzene	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	447	NMED A1 TAP SCRN LVL
VOC	99-87-6	Isopropyltoluene[4-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	—	—
VOC	126-98-7	Methacrylonitrile	SW-846:8260B	UF	µg/L	29	1	1.34	1.5	5	5	5	1.91	NMED A1 TAP SCRN LVL
VOC	80-62-6	Methyl Methacrylate	SW-846:8260B	UF	µg/L	29	1.5	1.5	1.5	5	5	5	1390	NMED A1 TAP SCRN LVL
VOC	1634-04-4	Methyl tert-Butyl Ether	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	143	NMED A1 TAP SCRN LVL
VOC	108-10-1	Methyl-2-pentanone[4-]	SW-846:8260B	UF	µg/L	29	1.5	1.5	1.5	5	5	5	1240	NMED A1 TAP SCRN LVL
VOC	75-09-2	Methylene Chloride	SW-846:8260B	UF	µg/L	29	1	1.62	3	10	10	10	5	EPA MCL
VOC	91-20-3	Naphthalene	SW-846:8260B	UF	µg/L	29	0.3	0.33	0.4	1	1	1	30	NM GW STD
VOC	107-12-0	Propionitrile	SW-846:8260B	UF	µg/L	29	1.5	1.5	1.5	5	5	5	—	—
VOC	103-65-1	Propylbenzene[1-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	660	EPA TAP SCRN LVL
VOC	100-42-5	Styrene	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	100	EPA MCL
VOC	630-20-6	Tetrachloroethane[1,1,1,2-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	5.74	NMED A1 TAP SCRN LVL
VOC	79-34-5	Tetrachloroethane[1,1,2,2-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	10	NM GW STD
VOC	127-18-4	Tetrachloroethene	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	5	EPA MCL
VOC	108-88-3	Toluene	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	750	NM GW STD
VOC	76-13-1	Trichloro-1,2,2-trifluoroethane[1,1,2-]	SW-846:8260B	UF	µg/L	29	1.5	1.84	2	5	5	5	55000	NMED A1 TAP SCRN LVL
VOC	87-61-6	Trichlorobenzene[1,2,3-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	7	EPA TAP SCRN LVL
VOC	120-82-1	Trichlorobenzene[1,2,4-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	70	EPA MCL
VOC	71-55-6	Trichloroethane[1,1,1-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	60	NM GW STD
VOC	79-00-5	Trichloroethane[1,1,2-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	5	EPA MCL
VOC	79-01-6	Trichloroethene	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	5	EPA MCL
VOC	75-69-4	Trichlorofluoromethane	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	1140	NMED A1 TAP SCRN LVL
VOC	96-18-4	Trichloropropane[1,2,3-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	0.00835	NMED A1 TAP SCRN LVL
VOC	95-63-6	Trimethylbenzene[1,2,4-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	56	EPA TAP SCRN LVL
VOC	108-67-8	Trimethylbenzene[1,3,5-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	60	EPA TAP SCRN LVL
VOC	108-05-4	Vinyl acetate	SW-846:8260B	UF	µg/L	29	1.5	1.5	1.5	5	5	5	409	NMED A1 TAP SCRN LVL
VOC	75-01-4	Vinyl Chloride	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	1	NM GW STD
VOC	95-47-6	Xylene[1,2-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	1	1	1	193	NMED A1 TAP SCRN LVL
VOC	Xylene[m+p]	Xylene[1,3-]+Xylene[1,4-]	SW-846:8260B	UF	µg/L	29	0.3	0.3	0.3	2	2	2	193	NMED A1 TAP SCRN LVL

Notes: CAS = Chemical Abstracts Service; EPA MCL = EPA maximum contaminant level; NM GW STD = New Mexico groundwater standard; EPA TAP SCRN LVL = EPA tap water screening level; NMED A1 TAP SCRN LVL = NMED screening level for tap water.

*— = Not available.

Table B-5.0-1
Waste Stream, Estimated Volumes, and Management of IDW

Waste Stream	Estimated Volume	On-Site Management and Final Disposition
Purge water	5 to 3000 gal. per well per sampling event	Land application per ENV-RCRA-QP-010, Land Application of Groundwater
Contact waste	Less than 110 gal. per watershed monitoring campaign	Accumulation in 55-gal. drums with drum liners. Disposal off-site at a New Mexico solid waste landfill or on-site disposal at TA-54, Area G
Decontamination fluids	Less than 55 gal. per watershed monitoring campaign	Treatment at an N3B-approved off-site wastewater treatment facility for which waste meets waste acceptance criteria

Appendix C

Supplemental Information for
Assigned Sampling Suites and Frequencies

This appendix of the Interim Facility-Wide Groundwater Monitoring Plan (IFGMP) provides supplemental information relevant to sampling frequencies and analytical suites assigned to locations in each area-specific monitoring group or watershed within Los Alamos National Laboratory (LANL or the Laboratory). The following are primary considerations used to define sampling frequencies and analytical suites that are protective of groundwater:

- general types of contaminants released from upgradient sources
- extent to which contaminant nature and extent have been defined
- expected transport characteristics of the released contaminants
- frequency of detection of contaminants in the monitoring group
- magnitude of concentrations relative to the lowest applicable standard
- nature and rate of change of contaminant concentrations
- regulatory direction specified in New Mexico Environment Department (NMED) approval letters related to earlier IFGMPs
- programmatic data requirements to support decisions regarding corrective actions

The highest sampling frequencies apply to areas where a mobile contaminant has been detected above a standard but its nature and extent may not be characterized sufficiently to support decisions about potential remedial actions to be taken. Lower sampling frequencies apply to analytes that are not of significance for a given monitoring group, are relatively immobile in the subsurface, and have not been detected or have been detected infrequently.

The following general rules of thumb were used to define the lowest sampling frequencies for specific analytical suites (excluding those locations undergoing characterization sampling).

Field Parameters. Field parameters are measured at all locations during every sampling event. Field parameters include pH, turbidity, specific conductance, dissolved oxygen, and temperature. Oxidation-reduction potential will be measured if a flow-through cell is used and will not be measured in surface water, spring water, or water collected from Westbay sampling systems unless specified otherwise.

Inorganic Constituents. General inorganic chemicals and metals are typically sampled annually if these suites contain one or more significant contaminants for a monitoring group, the nature and extent of those constituents are well characterized, and additional data are not needed to support regulatory decision-making, such as an investigation report or a corrective measures evaluation (CME). To the extent that additional data are needed to meet project objectives or for new wells, the relevant analytical suite is sampled more frequently.

Organic Constituents. The main characteristic used to determine the lowest sampling frequency for an organic analytical suite is the mobility of its constituents. Suites containing organic constituents with moderate to high mobility in the environment (volatile organic compounds [VOCs] and, to a lesser extent, semivolatile organic compounds [SVOCs]) are sampled annually or not sampled in areas for which there is a history of nondetections and where additional data are not needed to support regulatory decision-making, such as an investigation report or a CME. If consistently detected or if additional data are needed to meet project objectives, then the relevant suite is sampled annually or more frequently. Data from across the Laboratory show a history of nondetections for dioxins/furans, pesticides, and polychlorinated biphenyls (PCBs) in deeper groundwater zones, reflecting the tendency for these constituents to sorb to soils and fine-grained materials rather than to migrate to deeper groundwater zones. Therefore, the frequency of sampling for these constituents has been significantly reduced in regional monitoring wells at many locations, and in some cases, these constituents are no longer analyzed. Similarly, high explosives (HE) are not present in the northern watersheds (those north of Pajarito Canyon) and are typically not part of the analytical suite after initial characterization sampling of new wells has been completed. Pesticides are no longer sampled under the groundwater monitoring program because they are not primary contaminants at the Laboratory.

Radionuclides (Excluding Tritium). If there is a history of nondetections or if detections fall within the range of natural background (for naturally occurring radionuclides), then the lowest sampling frequency applies: quarterly or semiannually for new wells, annually if radionuclides are among the significant constituents for an area being monitored, and biennially otherwise.

Tritium. Tritium samples are collected from select springs and deep groundwater on an annual or greater basis. Tritium may not be analyzed at locations where tritium is not a significant contaminant, such as in some General Surveillance locations. Samples are collected for low-level tritium analysis at locations in select monitoring groups where a very low minimum detectable activity is useful to support a conceptual model for fate and transport.

Tritium samples may be submitted for analysis by liquid scintillation if average activities are anticipated to exceed 200 pCi/L. Low-level tritium is analyzed using electrolytic enrichment or direct counting.

Table C-1 provides background information and the objectives generally used to define the sampling frequencies and analytical suites for the area-specific monitoring groups. The specific sampling frequencies and analytical suites for individual sampling locations are provided in Tables 2.4-1 through 8.3-1.

REFERENCES

The following reference list includes documents cited in this appendix. Parenthetical information following each reference provides the author(s), publication date, and ERID, ESHID, or EMID. This information is also included in text citations. ERIDs were assigned by the Laboratory's Associate Directorate for Environmental Management (IDs through 599999); ESHIDs were assigned by the Laboratory's Associate Directorate for Environment, Safety, and Health (IDs 600000 through 699999); and EMIDs are assigned by N3B (IDs 700000 and above). IDs are used to locate documents in N3B's Records Management System and in the Master Reference Set. The NMED Hazardous Waste Bureau and N3B maintain copies of the Master Reference Set. The set ensures that NMED has the references to review documents. The set is updated when new references are cited in documents.

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LANL (Los Alamos National Laboratory), September 2012. "Corrective Measures Evaluation Report for Material Disposal Area C, Solid Waste Management Unit 50-009 at Technical Area 50," Los Alamos National Laboratory document LA-UR-12-24944, Los Alamos, New Mexico. (LANL 2012, 222830)

Table C-1
Background Information and Objectives Used to Determine Sampling Frequencies and Analytical Suites for Area-Specific Monitoring Groups

Monitoring Group	Background*	Proposed Frequency	Proposed Analyte Suites	Objectives
Technical Area 21 (TA-21)	• Nature and extent of groundwater contamination generally understood • No concentrations exceed screening values in regional groundwater	• Annual and biennial sampling of intermediate and regional wells	• Metals, radionuclides, tritium (or low-level tritium), and general inorganics analyses annually for most wells • VOC and SVOCs sampled annually in select wells and biennially in other wells	• Focus on mobile constituents and radionuclides
Chromium Investigation	• Nature and extent of groundwater contamination generally understood • Chromium (Cr) concentrations in regional aquifer exceed New Mexico Groundwater Standard (NM GW STD) • Cr concentrations are increasing at two plume-edge wells. Interim measure and plume-center characterization underway in support of pending CME.	• Quarterly sampling of intermediate and regional wells with Cr concentrations exceeding 25 µg/L (half the NM GW STD) • Quarterly sampling of intermediate and regional wells with significant rate of change in Cr concentrations • Quarterly sampling of R-35a, R-35b, R-44 screen 1 (S1), and R-44 S2 to provide “early warning” of possible contamination for supply well PM-3 • Monthly sampling at select Mortandad regional wells (R-44 S1 and S2, R-45 S1 and S2, R-50 S1 and S2, R-61 S1 and SIMR-2)	• The focus is on metals (Cr), and related contaminants; tritium, and general inorganics (nitrate, perchlorate, sulfate) for all samples • Semiannual VOC and SVOC analysis for samples from Mortandad Canyon intermediate wells with consistently detected 1,4-dioxane • Biennial analyses for VOCs and SVOCs in select regional wells and one Sandia Canyon intermediate well • Annual analysis for radionuclides at intermediate wells; biennial for regional wells except new wells that undergo full suite for first year • Analysis of monthly samples collected from select regional wells for metals and general inorganics and, in some cases, tracers	• Monthly sampling and analysis at select regional wells to assess interim measure performance • Quarterly sampling at the remainder of the wells to monitor potential changes in the plume associated with ambient groundwater flow, and potential effects of Interim Measure and Plume Center Characterization activities

Table C-1 (continued)

Monitoring Group	Background*	Proposed Frequency	Proposed Analyte Suites	Objectives
Material Disposal Area (MDA) C	• Current data sufficient to support remedy selection for MDA C CME, submitted to NMED in 2012 (LANL 2012, 222830) • No concentrations of constituents exceed screening values in regional groundwater • Determination that groundwater is protected is supported by vapor-phase VOC sampling conducted to date	• Annual sampling of all wells	• Annual metals, VOC, SVOC, PCB, radionuclides, low-level tritium, and general inorganics analyses for all samples • Quinquennial analysis for high explosives (HEXP analytical suite) at all locations	• Focus highest frequency analysis for mobile constituents known to be present beneath MDA C
TA-54	• CMEs for MDAs G, H, and L submitted to NMED in 2011 (LANL 2011, 205756; LANL 2011, 206319; LANL 2011, 206324) and DOE withdrew the three CMEs in 2016 (DOE 2016, 601899). No constituent concentrations exceed screening values in regional groundwater • Determination that groundwater is protected is supported by vapor-phase VOC sampling conducted to date	• Annual sampling of most intermediate and regional wells for metals, SVOCs, radionuclides, and general inorganics • Semiannual sampling for VOCs and low-level tritium at key wells located downgradient of MDAs • Semiannual monitoring of VOCs and low-level tritium at R-55 S1 and R-23, located downgradient of MDAs at Los Alamos County boundary	• Semiannual sampling for VOCs and low-level tritium at key wells located down-gradient of MDAs (R-23, R-37 S1 and S2, R-39, R-41 S2, R-55 S1, R-56 S1, and R-57 S1) • Semiannual VOC and low-level tritium analyses for most other wells • Semiannual SVOC analysis for R-37 S1 (1,4-dioxane consistently detected) • VOCs and low-level tritium analysis only at R-40 S1 because of low yield • Annual metals, SVOCs, radionuclides, and general inorganics for all other locations • Quinquennial analysis for PCBs and HEXP at most locations	• Focus highest frequency analysis for mobile constituents known to be present beneath TA-54 MDAs

Table C-1 (continued)

Monitoring Group	Background*	Proposed Frequency	Proposed Analyte Suites	Objectives
TA-16 260	• Nature and extent of groundwater contamination generally understood • RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine) concentrations exceed the NMED tap water screening level in intermediate groundwater • RDX concentrations exceed the NMED tap water screening level in regional groundwater	• Semiannual monitoring at most TA-16 260 monitoring group locations to support CME	• Metals, VOC, HEXMOD, and general inorganics analyses semiannually for most locations • Quarterly analysis for HEs and RDX degradation products (i.e., HEXMOD) and tracers (naphthalene sulfonate compounds and bromide) in select wells • Biennial analysis for radionuclides and SVOCs for most locations; annual analysis for low-level tritium in springs and in intermediate and regional wells • Quinquennial sampling for PCBs and dioxins/furans at shallow sampling locations (base flow, springs, and alluvial wells)	• Collect data to support TA-16 260 CME and to further refine site conceptual model
MDA AB	• No constituent concentrations exceed screening values in regional groundwater	• Annual sampling of intermediate and regional wells • Annual sampling of regional wells R-29 and R-30 to monitor MDA AB	• Metals, VOC, SVOC, radionuclide, low-level tritium, and general inorganics analyses for all samples HEs also included for R-29 and R-30)	• General analyte suite for constituents that may have been released from MDA AB

Table C-1 (continued)

Monitoring Group	Background*	Proposed Frequency	Proposed Analyte Suites	Objectives
General Surveillance and White Rock Canyon	• Number of outfalls significantly reduced and remaining outfalls have improved water quality • Nature and extent of groundwater contamination generally understood • Canyons investigations are complete and show contribution to risk from surface water is low and within acceptable limits • Constituent concentrations generally below screening values • Decades of annual monitoring at springs in White Rock Canyon show little evidence of Laboratory contaminants. • Focused monitoring around MDAs and areas of known groundwater contamination along with generally low groundwater velocities support proposing a biennial sampling frequency at White Rock Canyon springs.	• Annual monitoring at key alluvial monitoring wells, springs, and base-flow locations to capture unexpected near-surface conditions • Annual sampling of all intermediate and regional wells • Semiannual monitoring at R-10a to monitor groundwater at Laboratory boundary • Annual sampling at select White Rock Canyon springs and base-flow locations to monitor groundwater at Laboratory boundary • Biennial sampling at other White Rock Canyon base-flow locations and springs	• Metals, radionuclide, and general inorganics analyses for most locations • HEXP analysis for southern watersheds • VOC analysis semiannually, annually, or biennially and SVOC analysis semiannually, annually, biennially, or triennially at most locations • Low-level tritium analysis annually or biennially at select base-flow and well locations and annually at all springs • Quinquennial sampling for PCBs and dioxins/furans at base-flow locations and alluvial wells • Annual sampling for metals, VOCs, SVOCs, radionuclides, low-level tritium, and general inorganics at all White Rock Canyon springs; annual, biennial, or triennial sampling for HEXP at all White Rock Canyon springs	• Focus highest frequency analysis for mobile constituents known to be present in particular watershed • Limit monitoring in the alluvial groundwater because of limited contamination • Focus on intermediate and regional locations for groundwater protection

* Constituents discussed in this column do not include detections of spurious organic constituents, naturally occurring constituents, or constituents related to well corrosion or to potential drilling effects.

Appendix D

Field Quality Assurance/Quality Control Samples

Sample Type	Summary
General	This appendix summarizes field quality assurance/quality control (QA/QC) samples to be collected during activities conducted under the Interim Facility-Wide Groundwater Monitoring Plan. Field QA/QC samples are collected in accordance with the Compliance Order on Consent, Appendix F, Section I.B.5.f, and include field blanks, equipment rinsate blanks, performance evaluation blanks (PEBs), field duplicates, and field trip blanks. Field QA/QC samples are used to detect possible field or analytical laboratory contamination and to track analytical laboratory performance. Differences in analytical results between field duplicate samples, for example, may indicate the samples were not uniform or significant variation occurred during analyses. Detection of analytes in deionized water field blanks may indicate contamination of the deionized water source or sample bottles or contamination from the analytical laboratory. This appendix also addresses how field QA/QC results are used and the types of corrective actions that may be taken to address exceedances of target measures for each QA/QC sample type. Field QA/QC samples are not required for samples collected for screening-level laboratory analysis.
Field Blanks	Field blanks are used to monitor for contamination during sampling and are collected at a minimum frequency of 10% of all samples collected in a sampling campaign. Field blanks should be assigned to locations where samples for organic constituents are collected. Field blanks are collected by filling sample containers in the field with deionized water to check for sources of sample contamination in the field. Field blanks are analyzed for the same suites of organic analytes for which primary samples are analyzed at the specific location to which the field blank is assigned, except for high explosive compounds, which are not analyzed in field or equipment rinsate blanks. Field blank results are evaluated as part of the secondary data validation process by using the results to validate the associated sample results. If any analytes are detected in the field blank, the result from the associated sample is qualified as undetected if the result is less than 5 times the amount for the analyte found in the associated field blank. A validation reason code is also assigned to explain why the data were qualified.
Equipment Rinsate Blanks	Equipment rinsate blanks are used to detect any contamination resulting from contaminated equipment or poor decontamination techniques. The equipment rinsate blank is prepared by passing deionized water through unused or decontaminated sampling equipment, including Westbay sample bottles. Equipment rinsate blanks are collected before a well is sampled with a nondedicated pump. An equipment rinsate blank is also collected before each well equipped with a Westbay sampling system is sampled for which samples are collected for off-site analysis. Equipment rinsate blanks are not required for wells equipped with Westbay sampling systems from which samples are collected for on-site analysis only. Equipment rinsate blanks are analyzed for the organic constituents sampled for in the associated well, with the exception of high explosive compounds, which are not analyzed in rinsate blanks. During the secondary data validation process, equipment rinsate blanks are evaluated in the same manner as field blanks, and any detected analytes are qualified in the samples associated with the equipment rinsate blank.
Performance Evaluation Blanks	PEBs are deionized water blanks submitted as regular samples, without any indication they are QC samples. PEBs are used to evaluate the reagent-grade deionized water used to decontaminate sampling equipment and to prepare the blank samples discussed above. One PEB is collected per sampling campaign and analyzed for total organic carbon and for the full suite of constituents analyzed during the sampling campaign. PEBs are not analyzed for stable isotopes or specialized analytes that may be requested for the sampling campaign.

Sample Type	Summary
Field Duplicates	Field duplicates are split samples that provide information about field variation of sampling results as well as analytical laboratory variation. They may reveal sampling techniques with poor reproducibility and provide information on the reproducibility of the sampling process. Field duplicates are collected at a rate of 10% of all samples collected during a sampling campaign. Field duplicate samples should be distributed proportionally among surface water, alluvial groundwater, and intermediate/regional groundwater to the relative number of samples collected for each type of media. Field duplicate samples are selected from robust sampling locations requiring full analytical suites and yielding plenty of sample volume. Field duplicate samples should be analyzed for the same suite of analytes for which the primary samples are analyzed. However, field duplicate samples need not be analyzed for specialized nonroutine analytes that may be requested for a sampling campaign unless directed by the project leader. These analytes include stable isotopes and parameters for which microfiltration is requested. Field duplicate results are compared with the associated sample results, and a relative percent difference is calculated. The acceptable threshold for relative percent differences is 20% for data greater than 5 times the reporting limit.
Field Trip Blanks	Field trip blanks accompany samples collected for volatile organic compound (VOC) analyses and are used to identify potential VOC contamination that may occur during sample handling, shipping, and storage or at the analytical laboratory. Field trip blanks consist of organic-free deionized water prepared by an independent off-site laboratory and are analyzed for VOCs only. A minimum of one trip blank is required for each cooler containing samples for VOC analyses. However, to facilitate data validation and verification, one trip blank may be included with each sample submitted for VOC analysis. During the secondary data validation process, field trip blanks are evaluated the same as field blanks, and any detected analytes are qualified in the samples associated with the trip blank. If any analytes are detected in the field trip blank, the result from the associated sample is qualified as undetected if the result is less than 5 times the amount of the concentration of the analyte detected in the associated field blank. These results are given a validation reason code to describe why the data were qualified.
QA/QC Corrective Actions	Exceedances of target measures for each of the QA/QC sections summarized above triggers any number of potential corrective actions. Potential corrective actions are considered on a case-by-case basis and generally follow a graded approach. Corrective actions to be considered include the following. **Data review/focused validation** A typical first step is to review field paperwork (e.g., chains-of-custody forms, sample collection logs) to ensure sample identifiers align with analytical results. Detailed data review and focused validation may also provide insights into improper use of sample preservatives and other similar errors in sample collection. **Reanalysis** Review of QA/QC results sometimes detects problems that occur with sample analysis. In these instances, reanalysis of an aliquot of the original sample may be requested of the analytical laboratory, assuming no holding-time issues are associated with the sample aliquot. **Resampling** If the QA/QC problem is not resolved using the approaches described above, resampling may be necessary. The decision to resample depends largely on the schedule for the subsequent sampling round. For instance, if a site is sampled quarterly, the sample collected for that round should suffice in filling the data gap. If the site is sampled annually, it may be necessary to resample after the discovery of a QA/QC concern if it would result in an important data gap. If an unacceptable QA/QC condition persists, then determining the source of the problem and making root-level corrections in a specific portion of the process will be initiated. For example, corrections or modifications may be made to an equipment decontamination process.

Appendix E

Protocols for Assessing the Performance of Deep Groundwater Monitoring Wells

E-1.0 OBJECTIVES AND SCOPE

This appendix establishes a "watch list" that identifies perched-intermediate and regional groundwater monitoring wells (hereafter referred to as the deep monitoring wells) for which water-quality data for certain constituents are nonrepresentative or are of questionable representativeness because of limited water availability, and it describes the approaches used to address potential data-quality issues. These deep monitoring wells are sampled under the Interim Facility-Wide Groundwater Monitoring Plan (IFGMP). Table E-1.0-1 presents the watch list of deep monitoring wells for monitoring year (MY) 2019.

This appendix is organized as follows:

- Section E-1.0 summarizes the objectives of groundwater monitoring in deep wells.
- Section E-2.0 identifies deep monitoring wells that are purged less than 3 casing volumes (CVs).
- Section E-3.0 defines a protocol for assigning deep monitoring wells to watch lists with appropriate follow-up actions when questions arise concerning the reliability and representativeness of water-quality data from those wells.
- Section E-4.0 outlines an approach for conducting reliability assessments of deep monitoring wells to determine their capability for producing representative water-quality samples and to identify any potential effects of well installation, rehabilitation, or sampling protocol on data quality.

One well is also included on the watch list because of possible construction issues. In addition to wells described in Table E-1.0-1, the representativeness of new water-quality samples from other wells is continually reviewed for possible addition to the watch list. The results from newly drilled wells and recently converted Westbay wells are part of this evaluation.

Inclusion of a well on the watch list is intended to be used as a general indicator of data quality and should not be construed as a definitive identification of data usability. The watch list is also dynamic insofar as it is updated as conditions evolve. Changes occur when additional water-quality data justify the removal or addition of wells from the list.

E-2.0 DEEP WELLS WITH LIMITED PURGE VOLUMES

Water that remains in a monitoring well for a period of time may not be representative of formation water because of physical, chemical, or biological changes that may occur as the water remains in contact with the well casing, dedicated sampling equipment, and the air space in the upper casing. This stagnant water may not represent formation water at the time of sampling. To ensure samples collected from a monitoring well are representative of formation water, stagnant water in the casing is generally removed (i.e., purged) from the sampling zone within the well before it is sampled. As prescribed in Standard Operating Procedure (SOP) ER-SOP-20032, "Groundwater Sampling," standard practice is to purge perched-intermediate and regional wells a minimum of 3 CVs plus the volume of the drop pipe and to continue purging until water-quality parameters stabilize. Once the parameters stabilize, it is assumed all stagnant water has been removed from the well and fresh formation water is available for sampling.

However, purging 3 CVs is not always possible or feasible, particularly in low-producing monitoring wells that purge dry at low pumping rates. ER-SOP-20032 allows deviation from the 3-CV purge requirement for such conditions. However, data users may want to be aware of deep monitoring wells at which the 3-CV purge requirement generally cannot be met to consider potential impacts for data reliability. Table E-1.0-1 lists deep well screens that cannot meet the 3-CV purge requirement and describes the reason for this condition.

E-3.0 WATCH LIST ASSIGNMENTS

This section discusses additional watch list criteria for deep monitoring wells in this IFGMP for which the representativeness of water-quality data is questionable.

Data examined for the assessment includes field parameters monitored during purging before sample collection, field parameters associated with samples at the time of collection, major-ion concentrations, trace-metal concentrations, and detections of organic constituents. The assessments are based on site-specific geochemical criteria. The assessment may result in recommendations concerning the well's configuration, sampling protocols (such as purging volumes), extension or limitation of the analytical suites to be collected from the well screen, or caveats about data usability.

The specific objective of a reliability assessment is to determine the current reliability of a well (including its sampling system) as it relates to the water-quality data objectives of the specific monitoring network to which it is assigned. In general, reliability assessments may be conducted for a subset of the wells assigned to the watch list described in the preceding section or for deep wells within the context of a specific monitoring network.

The watch list presented in Table E-1.0-1 includes deep well screens for which field parameters monitored during purging consistently fail to meet stability criteria as well as deep well screens that show anomalous chemistry data, suggesting groundwater in the screened interval may not be fully equilibrated following construction or rehabilitation. Table E-1.0-1 also provides the rationale for each listed well screen and lists recommended follow-up actions.

E-4.0 RELIABILITY ASSESSMENT PROTOCOL

The specific objective of a reliability assessment is to determine the current reliability of a well (including its sampling system) as it relates to the water-quality data objectives of the specific monitoring network to which it is assigned. In general, reliability assessments may be conducted for a subset of the wells assigned to the watch lists described in the preceding section or for deep wells within the context of a specific monitoring network.

Data examined for the assessment includes field parameters monitored during purging before sample collection, field parameters associated with samples at the time of collection, major ion concentrations, trace-metal concentrations, and detections of organic constituents. The assessments are based on site-specific geochemical criteria and generally focus on data obtained for the four most recent sampling events. The assessment may result in recommendations concerning the well's configuration, sampling protocols (such as purging volumes), extension or limitation of the analytical suites to be collected from the well screen, or caveats about data usability.

Field parameters. Time-series data for field parameters monitored during purging before sample collection are examined for attainment of stable values by the end of purging. Stabilization criteria are prescribed in ER-SOP-20032, "Groundwater Sampling," and are derived from the stabilization criteria recommended by the U.S. Environmental Protection Agency (EPA) (Yeskis and Zavala 2002, 204429) and from the Compliance Order on Consent. The most sensitive indicator parameters are dissolved oxygen (DO) and turbidity. Other parameters such as water temperature, specific conductance, pH, and oxidation-reduction potential (ORP) are also monitored but are considered less sensitive indicators of formation water.

Field parameters are examined for stability during individual sampling events, and trends are compared for a sequence of events at the same location. Final field-parameter values associated with the sample at the time of collection are compared with the range observed in background locations for perched-intermediate groundwater and regional groundwater.

Inorganic analytes. Analytical data for common inorganic ions and trace metals are examined for stability and for excursions from background concentrations as follows:

- trends in concentrations of key indicators for the presence of the specific materials used in the screened interval, such as sodium, sulfate, and total organic carbon;
- trends in relative concentrations of major ions; and
- comparison of concentrations for major ions and selected trace metals with lower and upper concentration ranges for plateau-scale and site-specific background groundwater, as described below.

Concentration trends may be depicted using time-series plots, standard trilinear diagrams, or modified Schoeller plots.

- Trilinear diagrams, also called Piper plots, show major ions as percentages of milliequivalents (meq) in two base triangles. The total cations and the total anions are set equal to 100%, and the data points in the two triangles are projected onto an adjacent grid. The main purpose of the Piper diagram is to show clustering of data points to indicate samples with similar compositions.
- Schoeller plots are semilogarithmic diagrams originally developed to represent major ion analyses in meq/L and to demonstrate different hydrochemical water types on the same diagram. This type of graphical representation has the advantage that, unlike the trilinear diagrams, actual sample concentrations are displayed and compared. The modified Schoeller plot used for the reliability assessment represents analyses as mg/L or µg/L to avoid the need to make assumptions about ion speciation, which may be particularly problematic for trace metals.

Organic analytes. Detections of volatile organic compounds (VOCs) and semivolatile organic compounds are compiled for examination of temporal trends and comparison against area-specific chemicals of potential concern.

Field documentation. As appropriate, field notes, groundwater sampling logs, and sample collection logs for each sampling event are also examined for observations about unusual odors, colors, or other indications of impacted water samples.

Plateau-scale background values for assessment. For naturally occurring analytes, statistical summaries of water-quality data for background groundwater locations establish a range of concentrations against which data from the assessed wells are compared for a preliminary assessment step. Lower and upper bounds of plateau-scale background ranges used in the reliability assessments are derived primarily from statistical tables in the most recent New Mexico Environment Department– (NMED-) approved "Groundwater Background Investigation Report."

Site-specific background values for assessment. Representativeness may be assessed with greater specificity by comparing analytical concentrations with those in groundwater from other deep wells in sufficiently similar hydrogeologic settings and at which effects from downhole materials or local contaminants are known to be absent or negligible. The approach allows for the inclusion of wells not hydraulically upgradient of the well being assessed. This is similar to the interwell comparison approach described in sections 5.2.4 and 6.3.2 of the EPA guidance document, "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities" ("Unified Guidance") (EPA 2009, 110369). The development and use of site-specific background values is illustrated in the "Reliability Assessment of Well R-47i" (LANL 2011, 201564).

Under some conditions, some or all of the constituents measured in the sample collected at the end of development may also be appropriate to use as the basis of site-specific background values or to augment the background data set compiled for the interwell comparison, similar to the intrawell comparison approach described in sections 5.2.4 and 6.3.2 of EPA's Unified Guidance (EPA 2009, 110369).

E-5.0 REFERENCES

The following reference list includes documents cited in this appendix. Parenthetical information following each reference provides the author(s), publication date, and ERID, ESHID, or EMID. This information is also included in text citations. ERIDs were assigned by the Laboratory's Associate Directorate for Environmental Management (IDs through 599999); ESHIDs were assigned by the Laboratory's Associate Directorate for Environment, Safety, and Health (IDs 600000 through 699999); and EMIDs are assigned by N3B (IDs 700000 and above). IDs are used to locate documents in N3B's Records Management System and in the Master Reference Set. The NMED Hazardous Waste Bureau and N3B maintain copies of the Master Reference Set. The set ensures that NMED has the references to review documents. The set is updated when new references are cited in documents.

EPA (U.S. Environmental Protection Agency), March 2009. "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance," EPA 530-R-09-007, Office of Resource Conservation and Recovery, Washington, D.C. (EPA 2009, 110369)

LANL (Los Alamos National Laboratory), March 2011. "Reliability Assessment for Well R-47i," Los Alamos National Laboratory document LA-UR-11-0933, Los Alamos, New Mexico. (LANL 2011, 201564)

LANL (Los Alamos National Laboratory), February 2017. "Status Report for the Tracer Tests at Consolidated Unit 16-02l(c)-99, Technical Area 16," Los Alamos National Laboratory document LA-UR-17-20782, Los Alamos, New Mexico. (LANL 2017, 602161)

Yeskis, D., and B. Zavala, May 2002. "Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers," a *Ground Water Forum Issue Paper*, EPA 542-S-02-001, Office of Solid Waste and Emergency Response, Washington, D.C. (Yeskis and Zavala 2002, 204429)

Table E-1.0-1
Watch List for Deep Monitoring Wells

Location	Monitoring Group	Watch List Rationale	Description of Condition	Action
Limited Water Volume				
MCOI-4	Chromium Investigation	Limited water volume	Well no longer yields sufficient water for sampling.	Monitor water levels only.
SCI-1	Chromium Investigation	Limited water volume	Limited volume of water and extremely low recovery rate. Field parameters do not stabilize.	Collect samples in accordance with the prioritized sampling suite list for SCI-1 after 1 CV plus drop-pipe volume is purged regardless of field parameter stability.
R-26 PZ-2	TA-16 260	Limited water volume	Sampled with bailer. Insufficient water available to bail more than 1 CV. High turbidity.	Purge (by bailing) 1 CV or until dry, allow for recharge, and collect a prioritized analytical suite the same day regardless of field parameter stability.
R-63i	TA-16 260	Limited water volume	Formation has limited yield.	Initiated sampling and analysis in MY2018. Bail dry at the beginning of sampling campaign and monitor recharge behavior. Collect a prioritized sample suite as necessary as soon as possible after well recharges. Code analytical results as “screening level” in database. Measure and record one set of field parameter data prior to sample collection.
R-40 Screen 1 (S1)	TA-54	Limited water volume	Extremely low yield and recovery rate. Approximately 2 wk required to recover water levels after 1 CV purge.	Sample for VOCs, low-level tritium, metals and general inorganics. Collect samples after 1 CV plus drop-pipe volume is purged regardless of field parameter stability. Semiannual sampling for metals and general inorganics supports the tertiary validation process for reducing conditions.
R-25b	TA-16 260	Tracers persist in monitoring well.	Samples collected from monitoring well R-25b continue to show the presence of the tracers introduced into the well in November 2015 (LANL 2017, 602161), indicating that sampling and analysis data for R-25b are not representative of surrounding groundwater chemistry.	Collect samples in accordance with ER-SOP-20032. Code analytical results as “screening level” in database until the geochemistry provides representative samples.

Location	Monitoring Group	Watch List Rationale	Description of Condition	Action
CdV-R-37-2 S2	TA-16 260	Reducing conditions	Water-quality and field parameter data indicate CdV-R-37-2 S2 does not produce representative samples, even with extended purging. Elevated iron and manganese are present.	Collect samples in accordance with ER-SOP-20032. Sample for low-level tritium, high explosives, metals, and general inorganics annually. Code analytical results for constituents other than tritium as “screening level” in database. Annual sampling for metals and general inorganics support continued assessment of well conditions.
R-40 Si (formerly R-40i)	TA-54	Reducing conditions	Samples showed residual drilling foam and reducing conditions. Elevated iron and manganese present. Recent data suggest improving trends, with increasing DO and decreasing iron and manganese concentrations.	Collect samples in accordance with ER-SOP-20032. Sample only for low-level tritium, general inorganics, and metals. Code analytical results for constituents other than tritium as “screening level” in database.
R-54 S1	TA-54	Reducing conditions	Reducing conditions appear to persist from residual drilling lubricants. Elevated iron and manganese are present.	Sample for low-level tritium only.
R-55i	TA-54	Reducing conditions	Reducing conditions appear to persist from residual drilling lubricants. Elevated iron and manganese are present.	Sample for low-level tritium only.
R-12 S1	General Surveillance (Sandia Watershed)	Reducing conditions	Reducing conditions appear to persist from residual drilling fluids as indicated by low DO and elevated iron and manganese. Reducing conditions yield nonrepresentative data.	Sample for low-level tritium only.

Appendix F

Geologic Cross-Sections

The transect location map and geologic cross-section maps presented in this appendix show the relationship of sampling locations in this Interim Facility-Wide Groundwater Monitoring Plan to the hydrogeologic setting of the Los Alamos National Laboratory (LANL or the Laboratory) site. The transect location map (Figure F-1), which presents an overview of the cross-section locations, one east-west geologic cross-section map (Figure F-3), and one north-south geologic cross-section map (Figure F-10) were updated to include one new groundwater monitoring well (R-69).

The east-west cross-sections follow the stream channel in the following canyons:

- A–A' Water Canyon/Cañon de Valle (Figure F-2)
- B–B' Pajarito Canyon (Figure F-3)
- C–C' Mortandad Canyon (Figure F-4)
- D–D' Sandia Canyon (Figure F-5)
- E–E' Los Alamos Canyon (Figure F-6)
- F–F' Pueblo Canyon (Figure F-7)

The north-south cross-sections are distributed across the Laboratory site and include the following:

- G–G' in the eastern part of the Laboratory (Figure F-8)
- H–H' in the central part of the Laboratory (Figure F-9)
- I–I' in the western part of the Laboratory (Figure F-10)

The cross-sections are based on a three-dimensional geologic framework model (GFM) for the Laboratory developed from borehole and outcrop stratigraphic data. The GFM used in this report is an updated version of the Laboratory's fiscal year 2009 GFM (Cole et al. 2010, 106101). It was developed in 2010 by Weston Solutions, Inc., and was subsequently updated in 2011 and 2012 using the geospatial modeling software EarthVision by Dynamic Graphics. The current GFM version is designated WC12b and incorporates new regional and perched-intermediate wells installed since the previous GFM update (WC11c), reinterpretation of stratigraphic contacts in a few existing well logs, edits to the shape of volcanic flows, and edits to the displacement of various units across the Pajarito fault zone. The WC12b GFM attempts to depict the most current understanding of geology beneath the Laboratory and is the same model used to develop the geologic map intersecting the regional water table discussed in Appendix G.

The cross-sections show sampling locations that fall within a 1500-ft buffer on both sides of the respective transect lines. Perched-intermediate and regional monitoring wells are shown as vertical lines, and the locations of well screens are shown as boxes presented to actual scale. Wells located within 500 ft of transects are indicated by solid lines, and wells offset more than 500 ft are demarcated by a dashed pattern. Because of their offset from the transect, some well screens in the outer portions of the buffer zones may not appear to plot within the proper geologic unit because of dipping geologic contacts. The relative positions of alluvial wells, surface-water sampling stations, and springs located along the transects are arrayed horizontally above the cross-sections to show the spatial relationship between the shallow, intermediate, and deep water-quality monitoring network and the GFM. The cross-sections are based on the WC12b model update described above.

REFERENCE

The following reference list includes documents cited in this appendix. Parenthetical information following each reference provides the author(s), publication date, and ERID, ESHID, or EMID. This information is also included in text citations. ERIDs were assigned by the Laboratory's Associate Directorate for Environmental Management (IDs through 599999); ESHIDs were assigned by the Laboratory's Associate Directorate for Environment, Safety, and Health (IDs 600000 through 699999); and EMIDs are assigned by N3B (IDs 700000 and above). IDs are used to locate documents in N3B's Records Management System and in the Master Reference Set. The NMED Hazardous Waste Bureau and N3B maintain copies of the Master Reference Set. The set ensures that NMED has the references to review documents. The set is updated when new references are cited in documents.

Cole, G., D. Coblentz, E. Jacobs, D. Koning, D. Broxton, D. Vaniman, F. Goff, and G. WoldeGabriel, April 2010. "The 2009 Three-Dimensional Geologic Models of the Los Alamos National Laboratory Site, Southern Española Basin, and Española Basin," Los Alamos National Laboratory document LA-UR-09-3701, Los Alamos, New Mexico. (Cole et al. 2010, 106101)

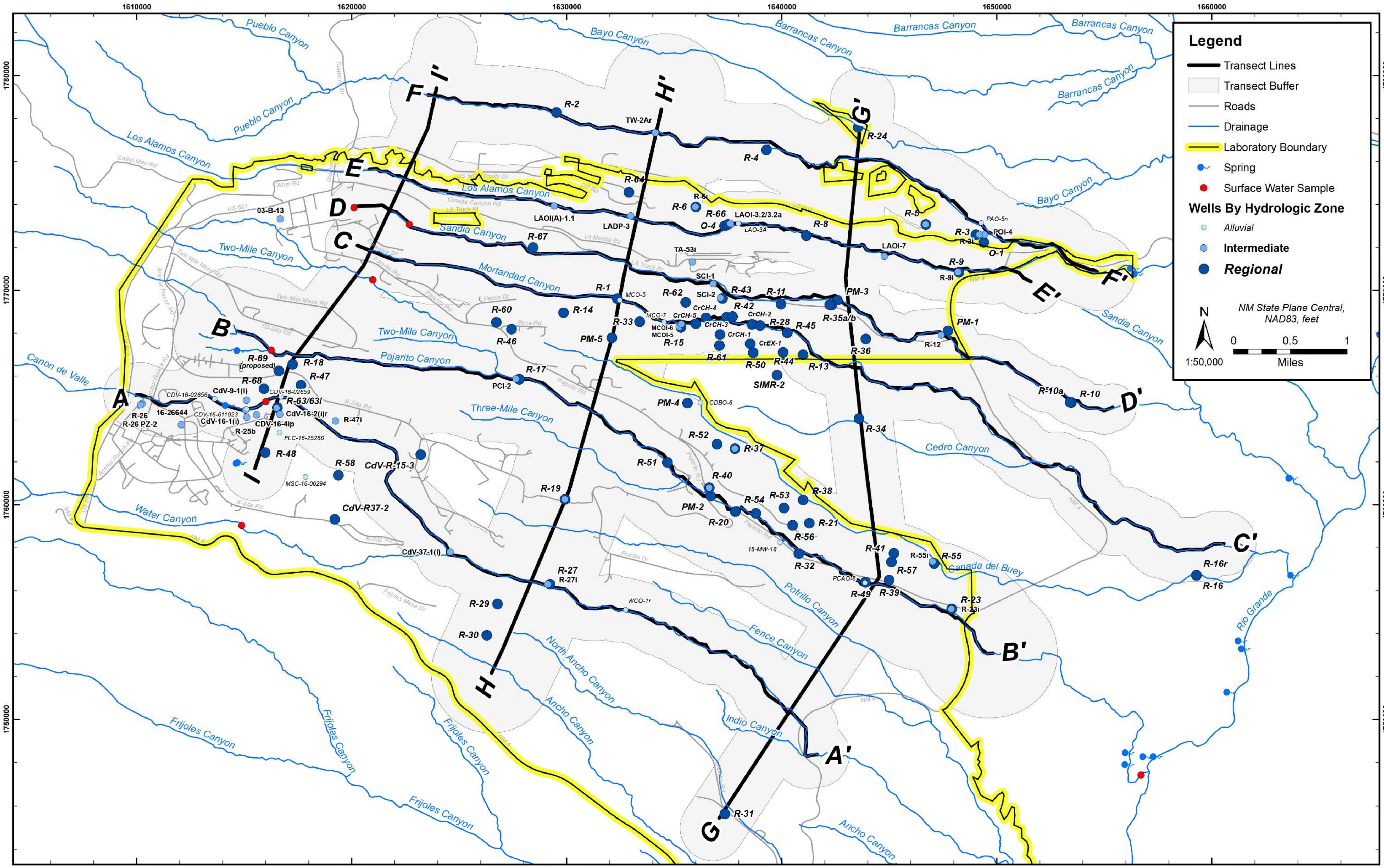


Figure F-1 Transect location map

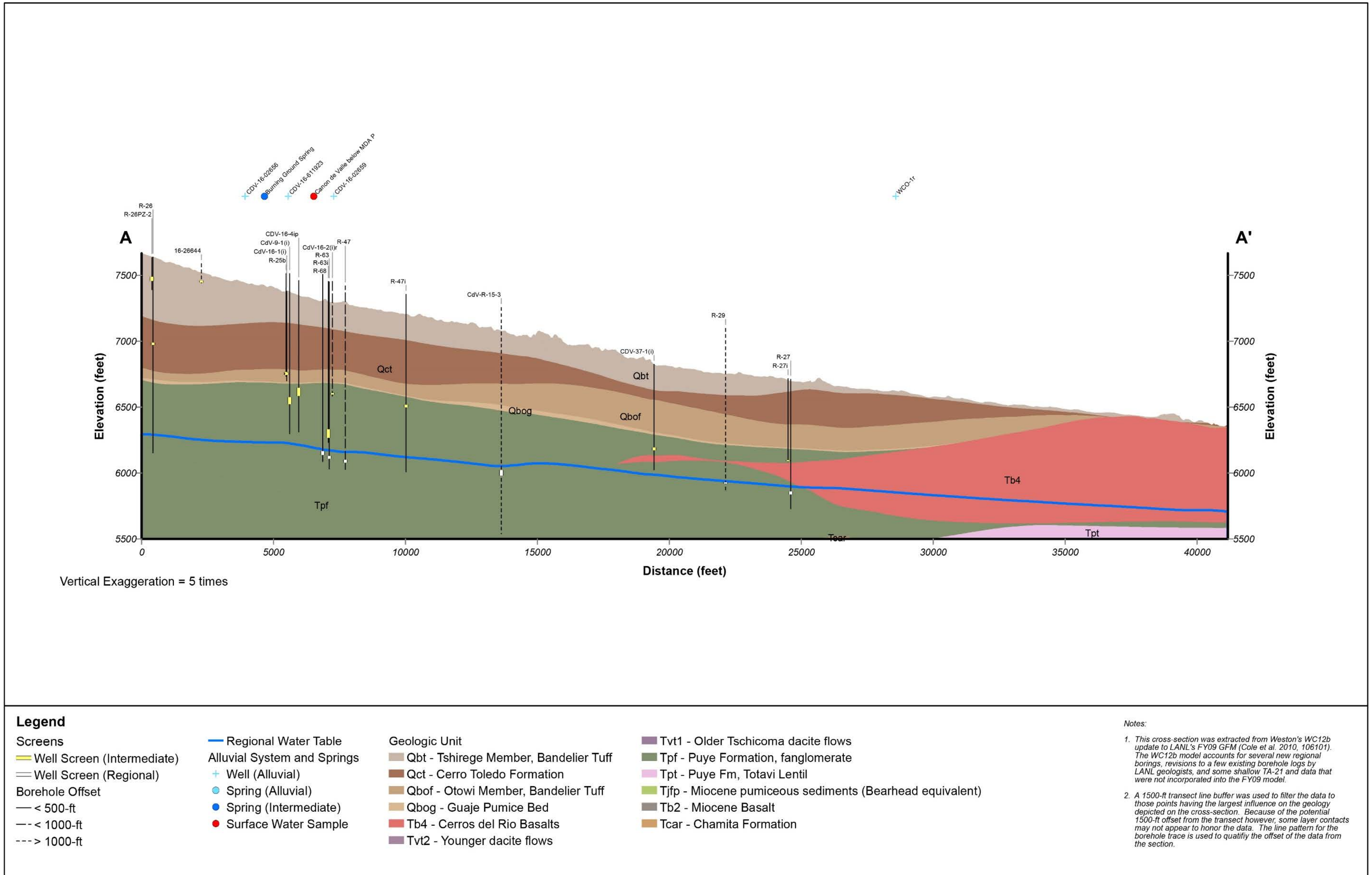
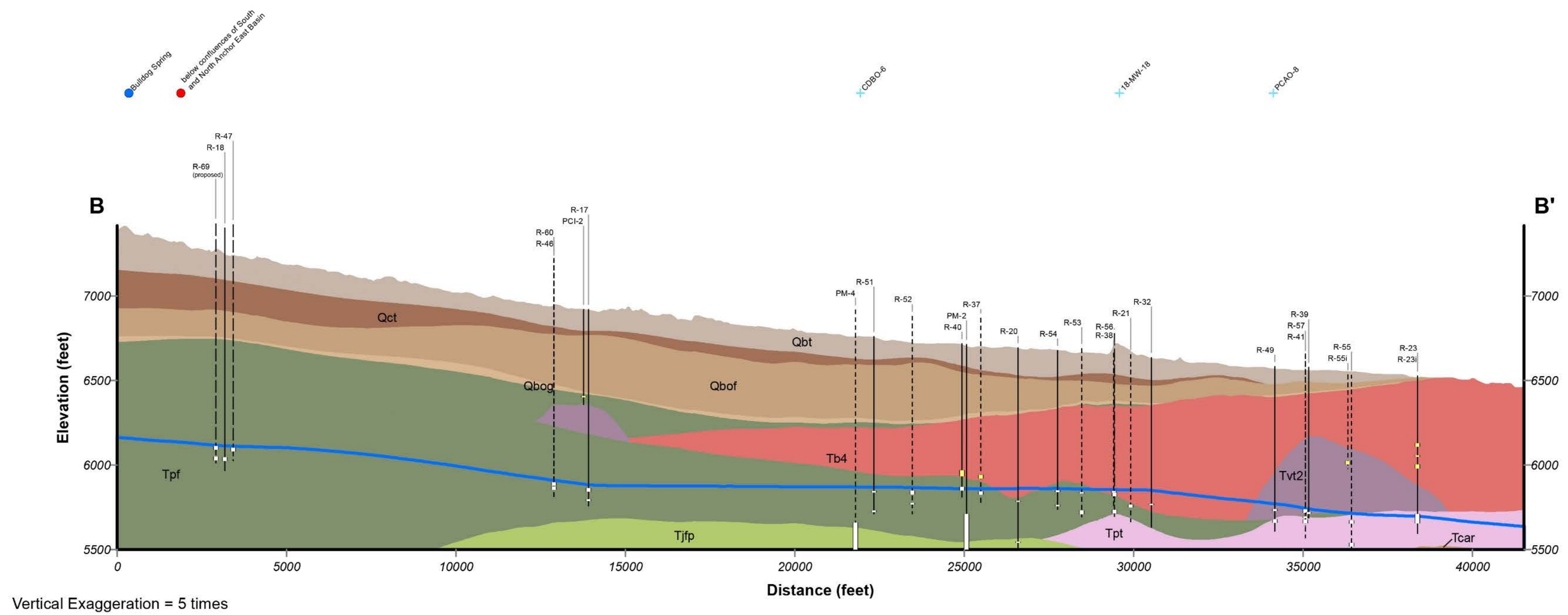


Figure F-2 Cross-section A–A′ Water Canyon/Cañon de Valle



Legend

Screens
Well Screen (Intermediate)
Well Screen (Regional)
Borehole Offset
< 500-ft
< 1000-ft
> 1000-ft

Regional Water Table
Alluvial System and Springs
Well (Alluvial)
Spring (Alluvial)
Spring (Intermediate)
Surface Water Sample

Geologic Unit
Qbt - Tshirege Member, Bandelier Tuff
Qct - Cerro Toledo Formation
Qbof - Otowi Member, Bandelier Tuff
Qbog - Guaje Pumice Bed
Tb4 - Cerros del Rio Basalts
Tvt2 - Younger dacite flows
Tvt1 - Older Tschicoma dacite flows
Tpf - Puye Formation, fanglomerate
Tpt - Puye Fm, Totavi Lentil
Tjfp - Miocene pumiceous sediments (Bearhead equivalent)
Tb2 - Miocene Basalt
Tcar - Chamita Formation

Notes:

1. *This cross-section was extracted from Weston's WC12b update to LANL's FY09 GFM (Cole et al. 2010, 106101). The WC12b model accounts for several new regional borings, revisions to a few existing borehole logs by LANL geologists, and some shallow TA-21 and data that were not incorporated into the FY09 model.*
2. *A 3000-ft transect line buffer was used to filter the data to those points having the largest influence on the geology depicted on the cross-section. Because of the potential 3000-ft offset from the transect however, some layer contacts may not appear to honor the data. The line pattern for the borehole trace is used to quatifiy the offset of the data from the section.*

Figure F-3 Cross-section B–B′ Pajarito Canyon

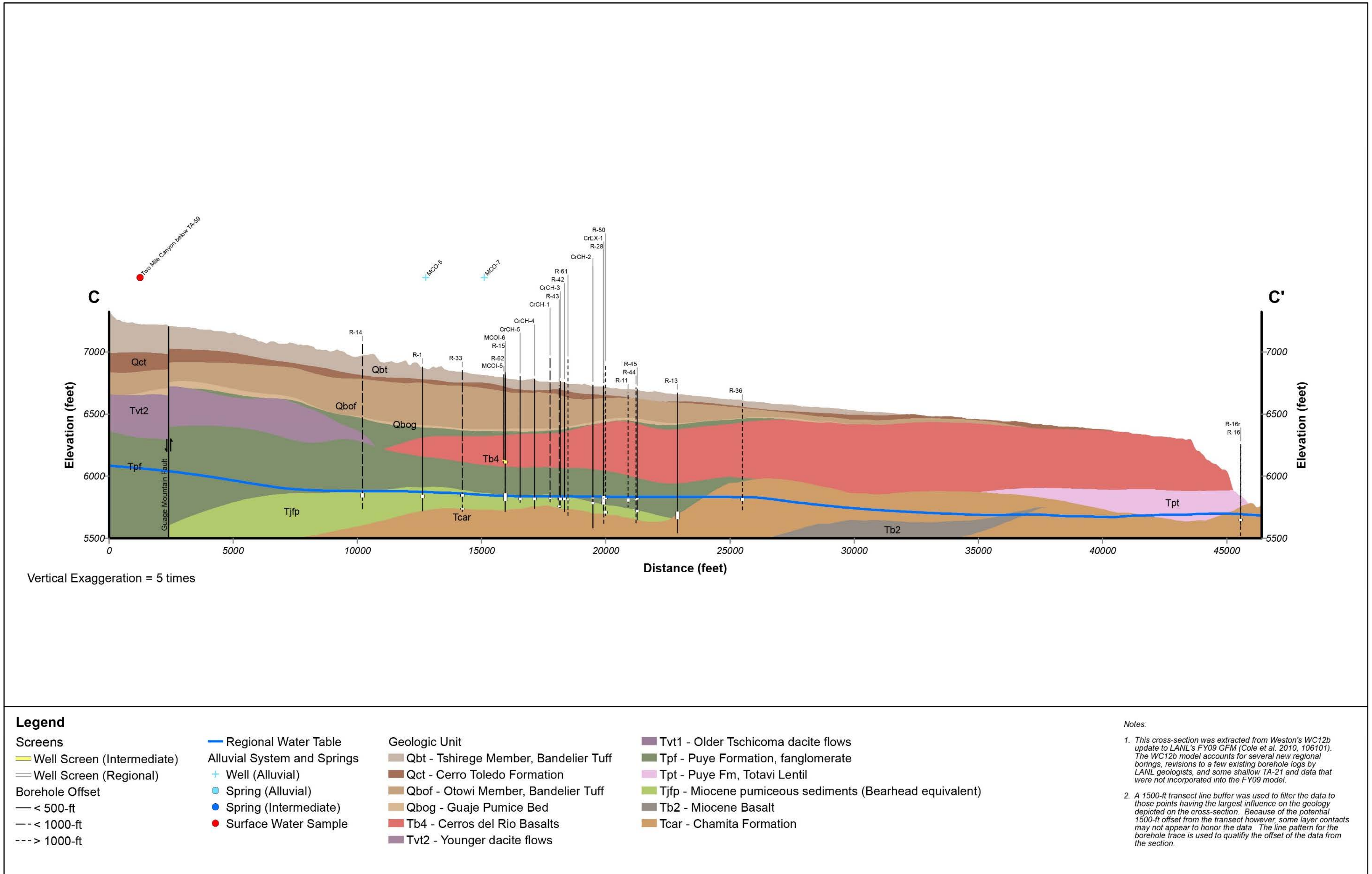
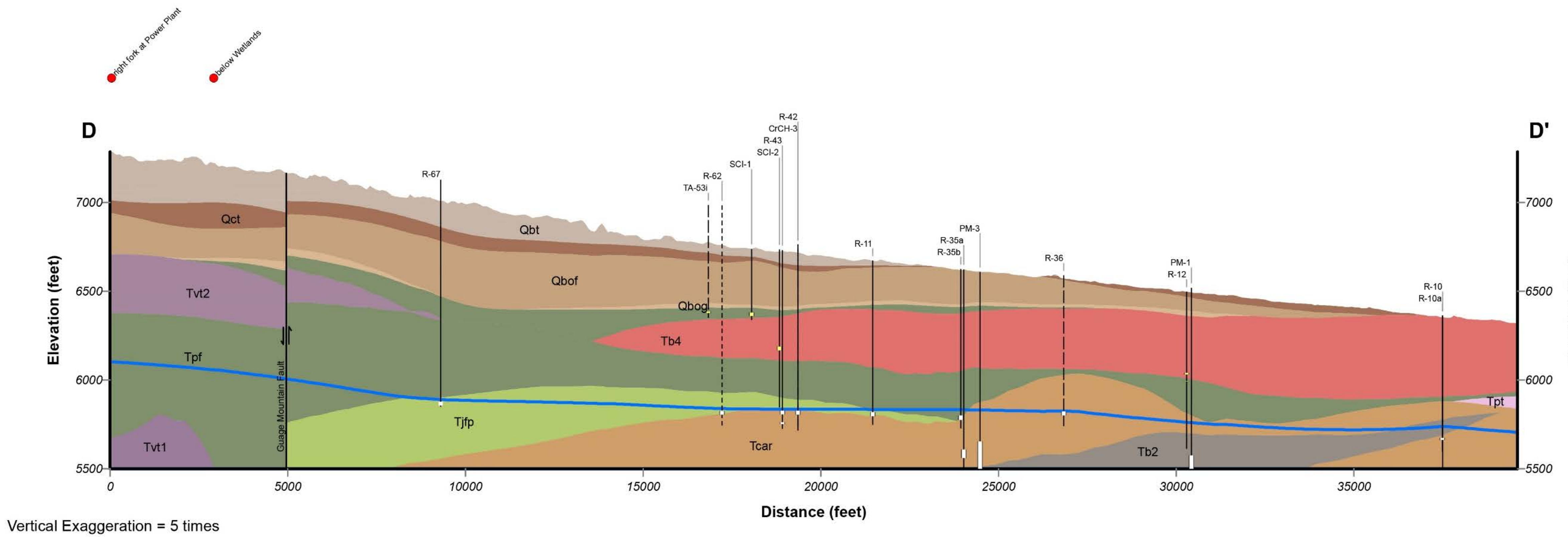


Figure F-4 Cross-section C–C′ Mortandad Canyon



Legend

Screens
- Well Screen (Intermediate)
- Well Screen (Regional)

Borehole Offset
- < 500-ft
- < 1000-ft
- > 1000-ft

- Regional Water Table

Alluvial System and Springs
- Well (Alluvial)
- Spring (Alluvial)
- Spring (Intermediate)
- Surface Water Sample

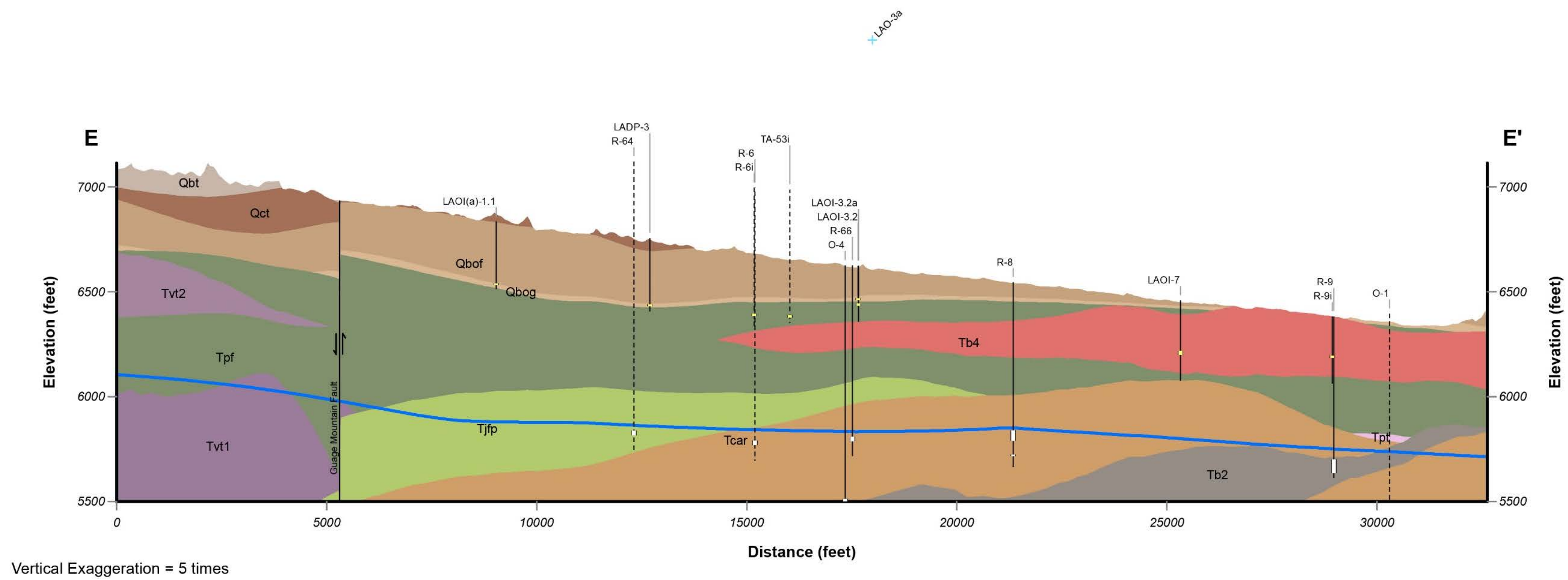
Geologic Unit
- Qbt - Tshirege Member, Bandelier Tuff
- Qct - Cerro Toledo Formation
- Qbof - Otowi Member, Bandelier Tuff
- Qbog - Guaje Pumice Bed
- Tb4 - Cerros del Rio Basalts
- Tvt2 - Younger dacite flows
- Tvt1 - Older Tschicoma dacite flows
- Tpf - Puye Formation, fanglomerate
- Tpt - Puye Fm, Totavi Lentil
- Tjfp - Miocene pumiceous sediments (Bearhead equivalent)
- Tb2 - Miocene Basalt
- Tcar - Chamita Formation

Notes:

1. *This cross-section was extracted from Weston's WC12b update to LANL's FY09 GFM (Cole et al. 2010, 106101). The WC12b model accounts for several new regional borings, revisions to a few existing borehole logs by LANL geologists, and some shallow TA-21 data and data that were not incorporated into the FY09 model.*
2. *A 1100-ft transect line buffer was used to filter the data to those points having the largest influence on the geology depicted on the cross-section. Because of the potential 1100-ft offset from the transect however, some layer contacts may not appear to honor the data. The line pattern for the borehole trace is used to quantify the offset of the data from the section.*

Modified 030816, ptm

Figure F-5 Cross-section D–D′ Sandia Canyon



Legend

Screens
- Well Screen (Intermediate)
- Well Screen (Regional)

Borehole Offset
- < 500-ft
- < 1000-ft
- > 1000-ft

- Regional Water Table

Alluvial System and Springs
- Well (Alluvial)
- Spring (Alluvial)
- Spring (Intermediate)
- Surface Water Sample

Geologic Unit
- Qbt - Tshirege Member, Bandelier Tuff
- Qct - Cerro Toledo Formation
- Qbof - Otowi Member, Bandelier Tuff
- Qbog - Guaje Pumice Bed
- Tb4 - Cerros del Rio Basalts
- Tvt2 - Younger dacite flows
- Tvt1 - Older Tschicoma dacite flows
- Tpf - Puye Formation, fanglomerate
- Tpt - Puye Fm, Totavi Lentil
- Tjfp - Miocene pumiceous sediments (Bearhead equivalent)
- Tb2 - Miocene Basalt
- Tcar - Chamita Formation

Notes:

1. *This cross-section was extracted from Weston's WC12b update to LANL's FY09 GFM (Cole et al. 2010, 106101). The WC12b model accounts for several new regional borings, revisions to a few existing borehole logs by LANL geologists, and some shallow TA-21 and data that were not incorporated into the FY09 model.*
2. *A 1500-ft transect line buffer was used to filter the data to those points having the largest influence on the geology depicted on the cross-section. Because of the potential 1500-ft offset from the transect however, some layer contacts may not appear to honor the data. The line pattern for the borehole trace is used to quatifiy the offset of the data from the section.*

Figure F-6 Cross-section E–E′ Los Alamos Canyon

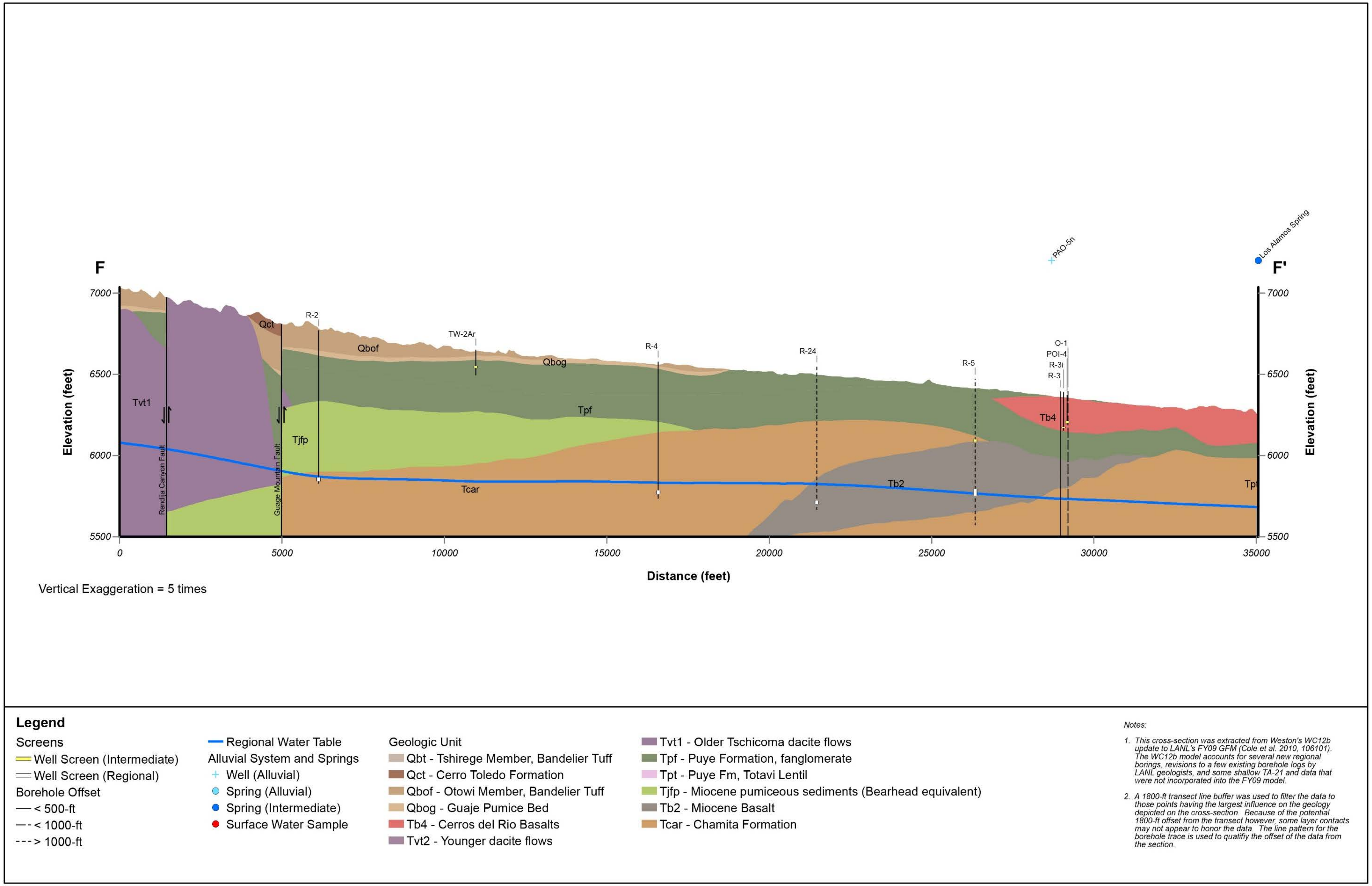


Figure F-7 Cross-section F–F′ Pueblo Canyon

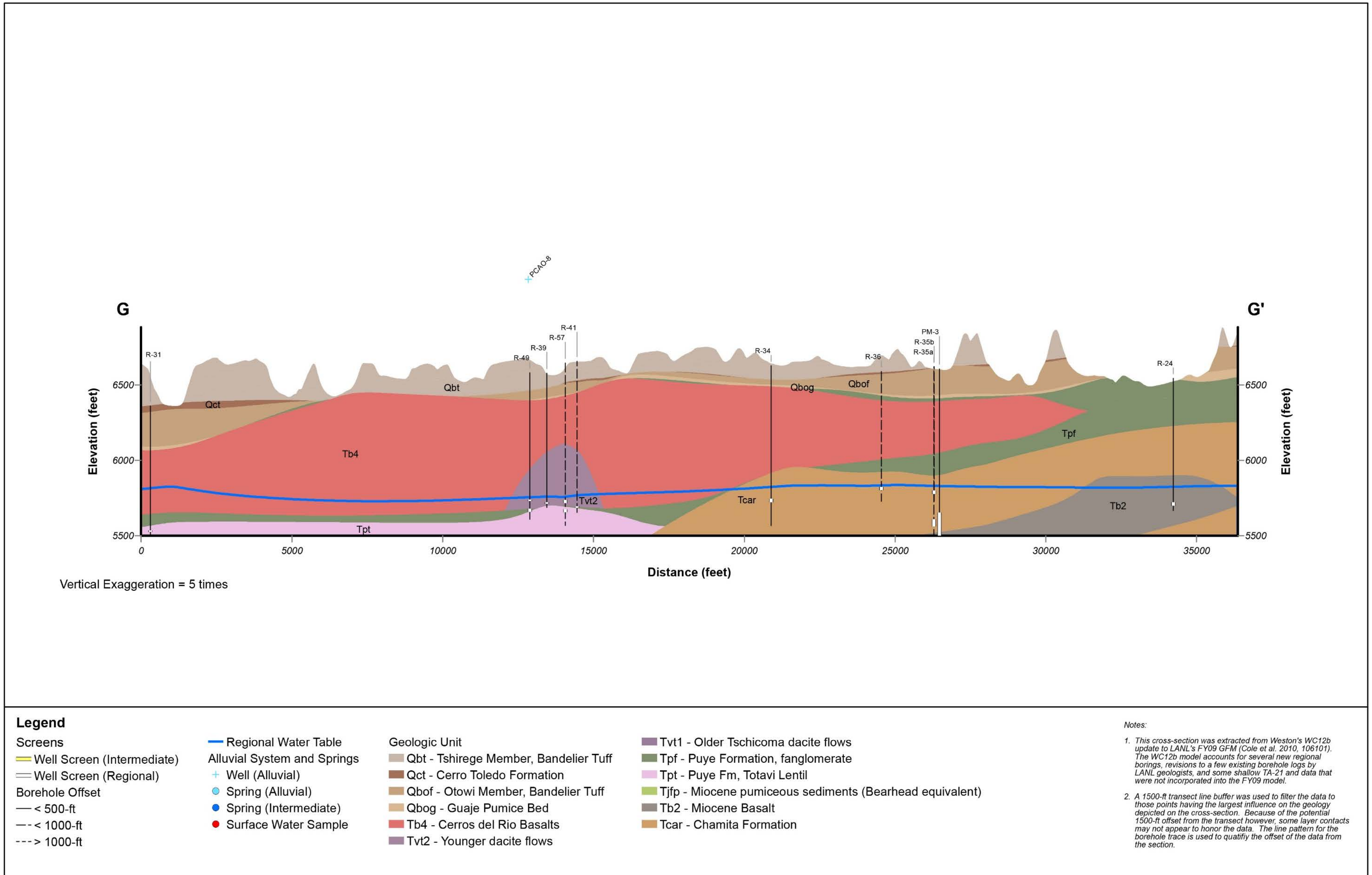
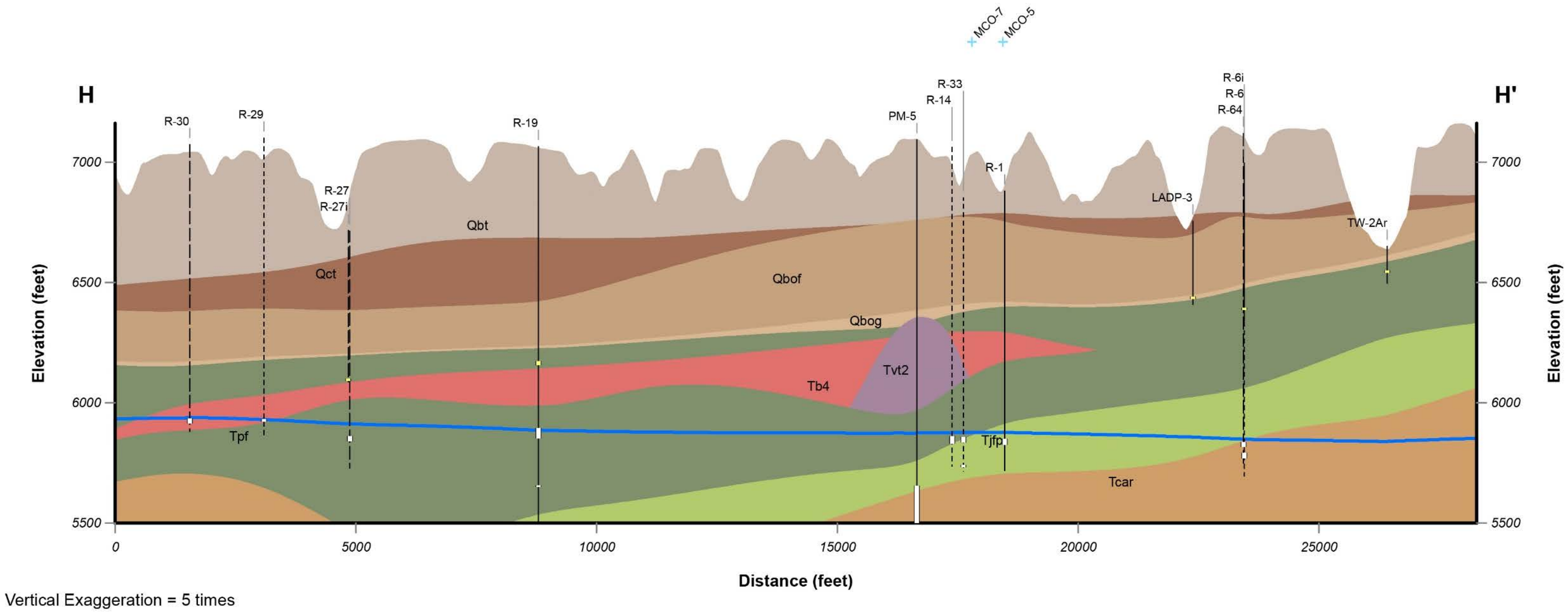


Figure F-8 Cross-section G–G′ in the eastern part of the Laboratory (north-south)



Legend

Screens
- Well Screen (Intermediate)
- Well Screen (Regional)

Borehole Offset
- < 500-ft
- < 1000-ft
- > 1000-ft

- Regional Water Table

Alluvial System and Springs
- Well (Alluvial)
- Spring (Alluvial)
- Spring (Intermediate)
- Surface Water Sample

Geologic Unit
- Qbt - Tshirege Member, Bandelier Tuff
- Qct - Cerro Toledo Formation
- Qbof - Otowi Member, Bandelier Tuff
- Qbog - Guaje Pumice Bed
- Tb4 - Cerros del Rio Basalts
- Tvt2 - Younger dacite flows
- Tvt1 - Older Tschicoma dacite flows
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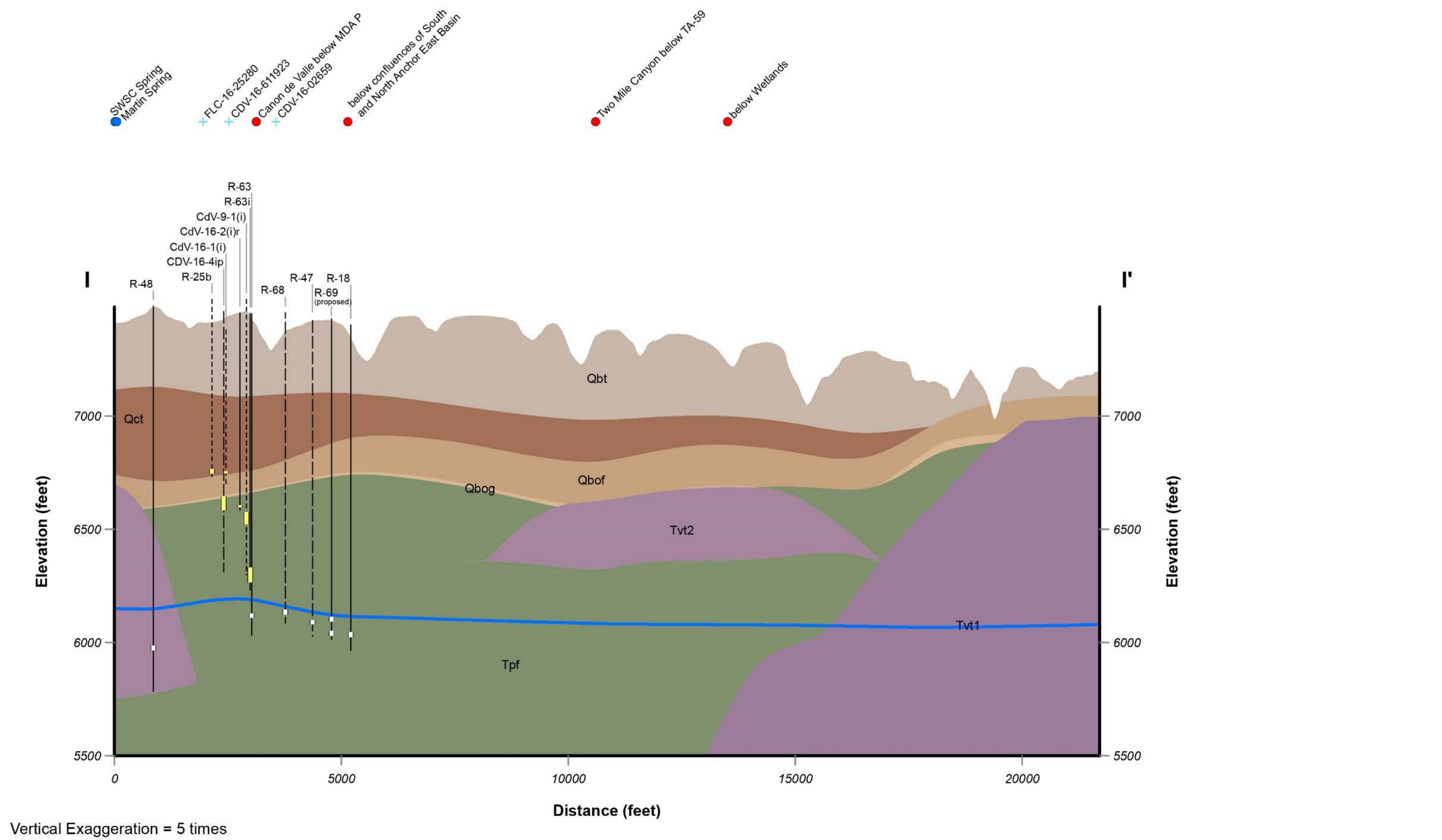
- Tpt - Puye Fm, Totavi Lentil
- Tjfp - Miocene pumiceous sediments (Bearhead equivalent)
- Tb2 - Miocene Basalt
- Tcar - Chamita Formation

Notes:

1. *This cross-section was extracted from Weston's WC12b update to LANL's FY09 GFM (Cole et al. 2010, 106101). The WC12b model accounts for several new regional borings, revisions to a few existing borehole logs by LANL geologists, and some shallow TA-21 and data that were not incorporated into the FY09 model.*
2. *A 2800-ft transect line buffer was used to filter the data to those points having the largest influence on the geology depicted on the cross-section. Because of the potential 2800-ft offset from the transect however, some layer contacts may not appear to honor the data. The line pattern for the borehole trace is used to quatifiy the offset of the data from the section.*

Figure F-9 Cross-section H–H′ in the central part of the Laboratory (north-south)



Legend

Screens
- Well Screen (Intermediate)
- Well Screen (Regional)

Borehole Offset
- < 500-ft
- < 1000-ft
- > 1000-ft

- Regional Water Table

Alluvial System and Springs
- Well (Alluvial)
- Spring (Alluvial)
- Spring (Intermediate)
- Surface Water Sample

Geologic Unit
- Qbt - Tshirege Member, Bandelier Tuff
- Qct - Cerro Toledo Formation
- Qbof - Otowi Member, Bandelier Tuff
- Qbog - Guaje Pumice Bed
- Tb4 - Cerros del Rio Basalts
- Tvt2 - Younger dacite flows
- Tvt1 - Older Tschicoma dacite flows
- Tpf - Puye Formation, fanglomerate
- Tpt - Puye Fm, Totavi Lentil
- Tjfp - Miocene pumiceous sediments (Bearhead equivalent)
- Tb2 - Miocene Basalt
- Tcar - Chamita Formation

Notes:

1. *This cross-section was extracted from Weston's WC12b update to LANL's FY09 GFM (Cole et al. 2010, 106101). The WC12b model accounts for several new regional borings, revisions to a few existing borehole logs by LANL geologists, and some shallow TA-21 and data that were not incorporated into the FY09 model.*
2. *A 1500-ft transect line buffer was used to filter the data to those points having the largest influence on the geology depicted on the cross-section. Because of the potential 1500-ft offset from the transect however, some layer contacts may not appear to honor the data. The line pattern for the borehole trace is used to quatifiy the offset of the data from the section.*

Figure F-10 Cross-section I–I′ in the western part of the Laboratory (north-south)

Appendix G

Geology Intersecting the Regional Water Table

This appendix presents a map of the geology intersecting the regional water table beneath the sampling network for the 2019 Interim Facility-Wide Groundwater Monitoring Plan for the Los Alamos National Laboratory (LANL or the Laboratory) site.

The map is based on a three-dimensional geologic framework model (GFM) for the Laboratory developed from borehole and outcrop stratigraphic data. The GFM used in this plan is an updated version of the Laboratory's fiscal year 2009 GFM (Cole et al. 2010, 106101). It was developed in 2010 by Weston Solutions, Inc., and was subsequently updated in 2011 and 2012 using the geospatial modeling software EarthVision by Dynamic Graphics. The current GFM version is designated WC12b and incorporates new regional and perched-intermediate wells installed since the previous GFM update (WC11c), reinterpretation of stratigraphic contacts in a few existing well logs, edits to the shape of volcanic flows, and edits to the displacement of various units across the Pajarito fault zone. The WC12b GFM attempts to depict the most current understanding of geology beneath the Laboratory and is the same model used to develop the cross-sections provided in Appendix F.

The water-table surface was modeled numerically based on regional water-level data measured in November 2017 as input for the potentiometric surface. The water table in Figure G-1 is depicted using 20-ft contour intervals superimposed on the underlying geology. The transect lines and regional wells from Appendix F are also provided in this appendix to link the geologic map and the geologic cross-sections.

REFERENCE

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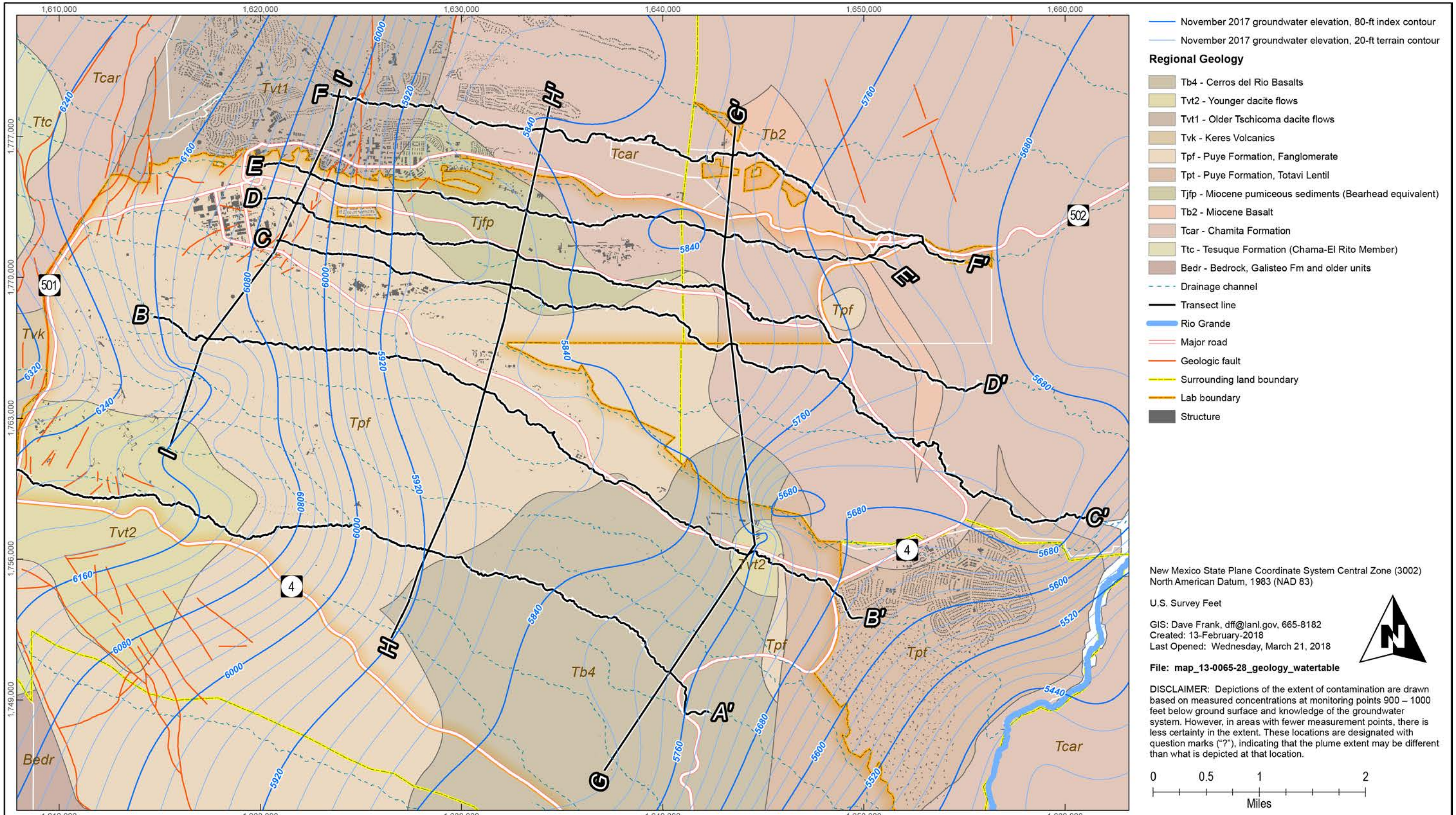

Figure G-1 Water table superimposed on the underlying geology

Appendix H

Crosswalks for the
Monitoring Year 2018 versus Monitoring Year 2019
Interim Facility-Wide Groundwater Monitoring Plans

Tables H-1 through H-7 present comparisons of the Monitoring Year (MY) 2018 and MY2019 interim monitoring plans for each monitoring group and correspond respectively to Tables 2.4-1, 3.4-1, 4.4-1, 5.4-1, 6.4-1, 7.4-1, and 8.3-1 in the MY2018 Interim Facility-Wide Groundwater Monitoring Plan (IFGMP) (LANL 2017, 602406) and MY2019 IFGMP. Changes from the MY2018 IFGMP to the MY2019 IFGMP are identified by red text and were based on examination of the most recent 5 yr of monitoring data available at the time the MY2019 IFGMP was prepared. This data set can be created by bounding the extraction from a sample date of January 1, 2013, to a data validation date of January 11, 2018, and including regular (REG) and field duplicate (FD) data that are coded with the best value flag. The rationale for the changes from the MY2018 IFGMP to the MY2019 IFGMP is presented in the last column of each crosswalk table.

Monitoring objectives for each of the monitoring groups are presented in the following sections of the MY2019 IFGMP:

Monitoring Group	Section Reference for Monitoring Objectives
TA-21	Section 2.3
Chromium Investigation	Section 3.3
MDA C	Section 4.3
TA-54	Section 5.3
TA-16 260	Section 6.3
MDA AB	Section 7.3
General Surveillance	Section 8.2

REFERENCES

The following reference list includes documents cited in this appendix. Parenthetical information following each reference provides the author(s), publication date, and ERID, ESHID, or EMID. This information is also included in text citations. ERIDs were assigned by the Laboratory's Associate Directorate for Environmental Management (IDs through 599999); ESHIDs were assigned by the Laboratory's Associate Directorate for Environment, Safety, and Health (IDs 600000 through 699999); and EMIDs are assigned by N3B (IDs 700000 and above). IDs are used to locate documents in N3B's Records Management System and in the Master Reference Set. The NMED Hazardous Waste Bureau and N3B maintain copies of the Master Reference Set. The set ensures that NMED has the references to review documents. The set is updated when new references are cited in documents.

LANL (Los Alamos National Laboratory), September 2016. "Groundwater Investigation Work Plan for Consolidated Unit 16-021(c)-99, Including Drilling Work Plans for Wells R-68 and R-69," Los Alamos National Laboratory document LA-UR-16-26493, Los Alamos, New Mexico. (LANL 2016, 601779)

LANL (Los Alamos National Laboratory), October 27, 2016. "Groundwater Background Investigation Report, Revision 5," Los Alamos National Laboratory document LA-UR-16-27907, Los Alamos, New Mexico. (LANL 2016, 601920)

LANL (Los Alamos National Laboratory), May 2017. "Interim Facility-Wide Groundwater Monitoring Plan for the 2018 Monitoring Year, October 2017–September 2018," Los Alamos National Laboratory document LA-UR-16-24070, Los Alamos, New Mexico. (LANL 2017, 602406)

Table H-1
Crosswalk for the MY2018 versus MY2019 Interim Monitoring Plans for the TA-21 Monitoring Group

Location	Interim Plan Monitoring Year	Surface Water Body or Source Aquifer	Metals	VOCs[a]	SVOCs[b]	PCBs[c]	HEXP[d]	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics	Rationale for Changes (MY2018 to MY2019)
LADP-3	2018	Intermediate	A	B (2018)[e]	B (2018)	—[f]	—	—	A	—	B (2018)	A	n/a[g]
	2019		A	B (2020)[h]	B (2020)	—	—	—	A	—	B (2020)	A	
LAOI(a)-1.1	2018	Intermediate	A	B (2018)	B (2018)	—	—	—	A	—	B (2018)	A	n/a
	2019		A	B (2020)	B (2020)	—	—	—	A	—	B (2020)	A	
LAOI-3.2	2018	Intermediate	A	B (2018)	B (2018)	—	—	—	A	A	—	A	n/a
	2019		A	B (2020)	B (2020)	—	—	—	A	A	—	A	
LAOI-3.2a	2018	Intermediate	A	B (2018)	B (2018)	—	—	—	A	A	—	A	n/a
	2019		A	B (2020)	B (2020)	—	—	—	A	A	—	A	
LAOI-7	2018	Intermediate	A	B (2018)	B (2018)	—	—	—	A	A	—	A	n/a
	2019		A	B (2020)	B (2020)	—	—	—	A	A	—	A	
R-6i	2018	Intermediate	A	A	A	—	—	—	A	A	—	A	n/a
	2019		A	A	A	—	—	—	A	A	—	A	
TA-53i	2018	Intermediate	A	A	A	—	—	—	A	—	A	A	n/a
	2019		A	A	A	—	—	—	A	—	A	A	
R-6** [i]	2018	Regional	A	A	B (2018)	—	—	—	A	—	A	A	n/a
	2019		A	A	B (2020)	—	—	—	A	—	A	A	
R-64	2018	Regional	A	A	A	—	—	—	A	—	A	A	n/a
	2019		A	A	A	—	—	—	A	—	A	A	
R-66	2018	Regional	A	A	A	—	—	—	A	—	A	A	n/a
	2019		A	A	A	—	—	—	A	—	A	A	
R-9	2018	Regional	A	B (2018)	B (2018)	—	—	—	A	—	A	A	n/a
	2019		A	B (2020)	B (2020)	—	—	—	A	—	A	A	

Notes: Table H-1 is a crosswalk from Table 2.4-1 in the MY2018 IFGMP (LANL 2017, 602406) to Table 2.4-1 in the MY2019 IFGMP. Sampling suites and frequencies: M = monthly (12 times/yr); Q = quarterly (4 times/yr); S = semiannual (2 times/yr); A = annual (1 time/yr); B = biennial (1 time/2 yr); T = triennial (1 time/3 yr); V = quinquennial (1 time/5 yr).

[a] VOCs = Volatile organic compounds.

[b] SVOCs = Semivolatile organic compounds.

[c] PCBs = Polychlorinated biphenyls.

[d] HEXP = Analytical suite for analysis of samples for high explosives by SW-846:8330B.

[e] 2018 = Samples scheduled to be collected during implementation of MY2018 IFGMP.

[f] — = This analytical suite is not scheduled to be collected for this type of water at locations assigned to this monitoring group.

[g] n/a = Not applicable.

[h] 2020 = Samples scheduled to be collected during implementation of MY2020 IFGMP.

[i] Double asterisks (**) indicate background monitoring location as specified in the Groundwater Background Investigation Report, Revision 5 (LANL 2016, 601920).

Table H-2
Crosswalk for the MY2018 versus MY2019 Interim Monitoring Plans for the Chromium Investigation Monitoring Group

Location	Interim Plan Monitoring Year	Surface Water Body or Source Aquifer	Metals	VOCs[a]	SVOCs[b]	PCBs[c]	HEXP[d]	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics	Chromium Isotopes	$^{15}N/^{18}O$ Isotopes in Nitrate	Naphthalene Sulfonate Tracers	Sodium Bromide Tracer	Sodium Perrhenate Tracer	Deuterated Water Tracer	Rationale for Changes (MY2018 to MY2019)
MCOI-5	2018	Intermediate	Q	S	S	—[e]	—	—	A	A	—	Q	S	A	—	—	—	—	Sampling and analysis for the chromium-52/53 isotope ratio is being discontinued. Data collected to date show that the resolution of the isotope ratio analysis technique is not sufficient to accurately determine if small amounts of natural attenuation of hexavalent chromium are occurring in the regional aquifer. As shown throughout the remainder of this crosswalk table, chromium isotope ratio analytical work is being discontinued for all monitoring locations in the Chromium Investigation monitoring group. However, the rationale for this change is only noted once in this first row of this "Rationale for Changes" column.
	2019		Q	S	S	—	—	—	A	A	—	Q	—	A	—	—	—	—	
MCOI-6	2018	Intermediate	Q	S	S	B (2018)[f]	—	—	A	A	—	Q	S	A	—	—	—	—	n/a[g]
	2019		Q	S	S	B (2020)[h]	—	—	A	A	—	Q	—	A	—	—	—	—	
SCI-1	2018	Intermediate	S	B (2018)	B (2018)	B (2018)	—	—	A	—	A	S	A	A	—	—	—	—	n/a
	2019		S	B (2020)	B (2020)	B (2020)	—	—	A	—	A	S	—	A	—	—	—	—	
SCI-2	2018	Intermediate	Q	B (2018)	B (2018)	B (2018)	—	—	A	A	—	Q	S	A	—	—	—	—	n/a
	2019		Q	B (2020)	B (2020)	B (2020)	—	—	A	A	—	Q	—	A	—	—	—	—	
R-1	2018	Regional	S	B (2018)	B (2018)	B (2018)	—	—	B (2018)	—	A	S	A	A	—	—	—	—	n/a
	2019		S	B (2020)	B (2020)	B (2020)	—	—	B (2020)	—	A	S	—	A	—	—	—	—	
R-11	2018	Regional	Q	B (2018)	B (2018)	—	—	—	B (2018)	—	B (2018)	Q	A	A	—	—	—	—	Pumping and/or injection associated with the chromium plume interim measure has the potential to manifest in R-11. The monitoring frequency for metals, general inorganics, and all tracers at R-11 is being increased to monthly for more timely assessment of any effects. The monitoring frequency for tritium is also being increased to quarterly for more timely assessment of any effects.
	2019		M	B (2020)	B (2020)	—	—	—	B (2020)	—	Q	M	—	A	M	M	M	M	
R-13** [i]	2018	Regional	Q	B (2018)	B (2018)	—	—	—	B (2018)	—	A	Q	A	A	—	—	—	—	n/a
	2019		Q	B (2020)	B (2020)	—	—	—	B (2020)	—	A	Q	—	A	—	—	—	—	
R-15	2018	Regional	Q	B (2018)	B (2018)	—	—	—	B (2018)	—	B (2018)	Q	A	A	—	—	—	—	n/a
	2019		Q	B (2020)	B (2020)	—	—	—	B (2020)	—	B (2020)	Q	—	A	—	—	—	—	
R-28[i]	2018	Regional	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	n/a
	2019		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
R-33 S1**	2018	Regional	Q	B (2018)	B (2018)	—	—	—	B (2018)	—	A	Q	A	A	—	—	—	—	n/a
	2019		Q	B (2020)	B (2020)	—	—	—	B (2020)	—	A	Q	—	A	—	—	—	—	
R-33 S2**	2018	Regional	Q	B (2018)	B (2018)	—	—	—	B (2018)	—	A	Q	A	A	—	—	—	—	n/a
	2019		Q	B (2020)	B (2020)	—	—	—	B (2020)	—	A	Q	—	A	—	—	—	—	
R-35a	2018	Regional	Q	B (2018)	B (2018)	—	—	—	B (2018)	—	A	Q	A	A	—	—	—	—	Pumping and/or injection associated with the chromium plume interim measure has the potential to manifest in R-35a. The sampling frequency for metals, general inorganics, and selected tracers is being changed to monitor performance of the actions. The sampling frequency for tritium is also being changed from annual to quarterly to monitor performance of the actions.
	2019		M	B (2020)	B (2020)	—	—	—	B (2020)	—	Q	M	—	A	M	—	M	M	

Table H-2 (continued)

Location	Interim Plan Monitoring Year	Surface Water Body or Source Aquifer	Metals	VOCs[a]	SVOCs[b]	PCBs[c]	HEXP[d]	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics	Chromium Isotopes	$^{15}N/^{18}O$ Isotopes in Nitrate	Naphthalene Sulfonate Tracers	Sodium Bromide Tracer	Sodium Perrhenate Tracer	Deuterated Water Tracer	Rationale for Changes (MY2018 to MY2019)
R-35b	2018	Regional	Q	B (2018)	B (2018)	—	—	—	B (2018)	—	A	Q	A	A	—	—	—	—	Pumping and/or injection associated with the chromium plume interim measure has the potential to manifest in R-35b. The sampling frequency for metals, general inorganics, and selected tracers is being changed to monitor performance of the actions. The sampling frequency for tritium is also being changed from annual to quarterly to monitor performance of the actions.
	2019		M	B (2020)	B (2020)	—	—	—	B (2020)	—	Q	M	—	A	M	—	M	M	
R-36	2018	Regional	Q	B (2018)	B (2018)	—	—	—	B (2018)	—	B (2018)	Q	A	A	—	—	—	—	Although R-36 is downgradient of the chromium plume, data suggest that this monitoring location may be detecting contamination from a Los Alamos/Pueblo Canyon source that contains tritium. The tritium sampling and analysis frequency at R-36 is being increased from biennial to semiannual to support the conceptual model.
	2019		Q	B (2020)	B (2020)	—	—	—	B (2020)	—	S	Q	—	A	—	—	—	—	
R-42[j]	2018	Regional	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	n/a
	2019		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
R-43 S1	2018	Regional	Q	B (2018)	B (2018)	—	—	—	B (2018)	—	A	Q	Q	A	—	—	—	—	n/a
	2019		Q	B (2020)	B (2020)	—	—	—	B (2020)	—	A	Q	—	A	—	—	—	—	
R-43 S2	2018	Regional	Q	B (2018)	B (2018)	—	—	—	B (2018)	—	A	Q	A	A	—	—	—	—	n/a
	2019		Q	B (2020)	B (2020)	—	—	—	B (2020)	—	A	Q	—	A	—	—	—	—	
R-44 S1	2018	Regional	M	B (2018)	B (2018)	—	—	—	B (2018)	—	A	M	S	S	M	M	M	M	Treated water from chromium interim measure extraction wells may contain higher tritium concentrations than the concentrations in groundwater around the injection wells. This allows tritium to potentially serve as a tracer. As such, the sampling and analysis frequency for tritium is being increased from annual to quarterly to take advantage of tritium as a potential tracer. Tracers retained for sampling and analysis are based on the proximity of individual tracer deployment locations. In the case of R-44 S1, for example, sodium bromide and deuterium are being eliminated from the interim monitoring plan because they are not expected to reach R-44 S1 based on their deployment locations.
	2019		M	B (2020)	B (2020)	—	—	—	B (2020)	—	Q	M	—	S	M	—	M	—	
R-44 S2	2018	Regional	M	B (2018)	B (2018)	—	—	—	B (2018)	—	A	M	A	A	M	M	M	M	The sampling and analysis frequency for tritium is being increased from annual to quarterly to take advantage of the potentially higher concentrations of tritium in injected water relative to tritium in injection area groundwater (i.e., tritium as a potential tracer). Tracers retained for sampling and analysis are based on the proximity of individual tracer deployment locations.
	2019		M	B (2020)	B (2020)	—	—	—	B (2020)	—	Q	M	—	A	M	—	M	—	
R-45 S1	2018	Regional	M	B (2018)	B (2018)	—	—	—	B (2018)	—	A	M	S	S	M	M	M	M	The sampling and analysis frequency for tritium is being increased from annual to quarterly to take advantage of the potentially higher concentrations of tritium in injected water relative to tritium in injection area groundwater (i.e., tritium as a potential tracer).
	2019		M	B (2020)	B (2020)	—	—	—	B (2020)	—	Q	M	—	S	M	M	M	M	
R-45 S2	2018	Regional	M	B (2018)	B (2018)	—	—	—	B (2018)	—	A	M	S	S	M	M	M	M	The sampling and analysis frequency for tritium is being increased from annual to quarterly to take advantage of the potentially higher concentrations of tritium in injected water relative to tritium in injection area groundwater (i.e., tritium as a potential tracer).
	2019		M	B (2020)	B (2020)	—	—	—	B (2020)	—	Q	M	—	S	M	M	M	M	
R-50 S1	2018	Regional	M	B (2018)	B (2018)	—	—	—	B (2018)	—	S	M	S	A	M	—	—	—	The sampling and analysis frequency for tritium is being increased from semiannual to quarterly to take advantage of the potentially higher concentrations of tritium in injected water relative to tritium in injection area groundwater (i.e., tritium as a potential tracer).
	2019		M	B (2020)	B (2020)	—	—	—	B (2020)	—	Q	M	—	A	M	—	—	—	

Table H-2 (continued)

Location	Interim Plan Monitoring Year	Surface Water Body or Source Aquifer	Metals	VOCs[a]	SVOCs[b]	PCBs[c]	HEXP[d]	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics	Chromium Isotopes	$^{15}N/^{18}O$ Isotopes in Nitrate	Naphthalene Sulfonate Tracers	Sodium Bromide Tracer	Sodium Perrhenate Tracer	Deuterated Water Tracer	Rationale for Changes (MY2018 to MY2019)
R-50 S2**	2018	Regional	M	B (2018)	B (2018)	—	—	—	B (2018)	—	S	M	A	A	M	—	—	—	The sampling and analysis frequency for tritium is being increased from semiannual to quarterly to take advantage of the potentially higher concentrations of tritium in injected water relative to tritium in injection area groundwater (i.e., tritium as a potential tracer).
	2019		M	B (2020)	B (2020)	—	—	—	B (2020)	—	Q	M	—	A	M	—	—	—	
R-61 S1	2018	Regional	M	—	—	—	—	—	—	—	—	M	S	—	—	—	—	—	Quarterly sampling and analysis for tritium is being added to take advantage of the potentially higher concentrations of tritium in injected water relative to tritium in injection area groundwater (i.e., tritium as a potential tracer).
	2019		M	—	—	—	—	—	—	—	Q	M	—	—	—	—	—	—	
R-62[k]	2018	Regional	Q	B (2018)	B (2018)	—	—	—	B (2018)	—	A	Q	S	A	—	—	—	—	n/a
	2019		Q	B (2020)	B (2020)	—	—	—	B (2020)	—	A	Q	—	A	—	—	—	—	
R-67	2018	Regional	Q	B (2018)	B (2018)	—	—	—	B (2018)	—	S	Q	S	A	—	—	—	—	n/a
	2019		Q	B (2020)	B (2020)	—	—	—	B (2020)	—	S	Q	—	A	—	—	—	—	
SIMR-2[l]	2018	Regional	M	B (2018)	B (2018)	—	—	—	B (2018)	—	S	M	S	A	M	—	—	—	The sampling and analysis frequency for tritium is being increased from semiannual to quarterly to take advantage of the potentially higher concentrations of tritium in injected water relative to tritium in injection area groundwater (i.e., tritium as a potential tracer).
	2019		M	B (2020)	B (2020)	—	—	—	B (2020)	—	Q	M	—	A	M	—	—	—	

Notes: Table H-2 is a crosswalk from Table 3.4-1 in the MY2018 IFGMP (LANL 2017, 602406) to Table 3.4-1 in the MY2019 IFGMP. Sampling suites and frequencies: M = monthly (12 times/yr); Q = quarterly (4 times/yr); S = semiannual (2 times/yr); A = annual (1 time/yr); B = biennial (1 time/2 yr); T = triennial (1 time/3 yr); V = quinquennial (1 time/5 yr).

[a] VOCs = Volatile organic compounds.

[b] SVOCs = Semivolatile organic compounds.

[c] PCBs = Polychlorinated biphenyls.

[d] HEXP = Analytical suite for analysis of samples for high explosives by SW-846:8330B.

[e] — = This analytical suite is not scheduled to be collected for this type of water at locations assigned to this monitoring group.

[f] 2018 = Samples scheduled to be collected during implementation of MY2018 IFGMP.

[g] n/a = Not applicable.

[h] 2020 = Samples scheduled to be collected during implementation of MY2020 IFGMP.

[i] Double asterisks (**) indicate background monitoring location as specified in the Groundwater Background Investigation Report, Revision 5 (LANL 2016, 601920).

[j] Gray shading indicates wells that are included in the pilot amendments test and will be sampled per the NMED-approved work plan.

[k] Conduct an 8-h extended purge at R-62 during the second quarter (January–March) of MY2018.

[l] Orange shading indicates sampling location is on Pueblo de San Ildefonso land.

Table H-3
Crosswalk for the MY2018 versus MY2019 Interim Monitoring Plans for the MDA C Monitoring Group

Location	Interim Plan Monitoring Year	Surface Water Body or Source Aquifer	Metals	VOCs[a]	SVOCs[b]	PCBs[c]	HEXP[d]	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics	Chromium Isotopes	$^{15}N/^{18}O$ Isotopes in Nitrate	Rationale for Changes (MY2018 to MY2019)
R-14 S1** [e]	2018	Regional	A	A	A	A	V (2020)[f]	—[g]	A	—	A	A	—	—	n/a[h]
	2019		A	A	A	A	V (2020)	—	A	—	A	A	—	—	
R-46**	2018	Regional	A	A	A	A	V (2020)	—	A	—	A	A	—	—	n/a
	2019		A	A	A	A	V (2020)	—	A	—	A	A	—	—	
R-60**	2018	Regional	A	A	A	A	V (2020)	—	A	—	A	A	—	—	n/a
	2019		A	A	A	A	V (2020)	—	A	—	A	A	—	—	

Notes: Table H-3 is a crosswalk from Table 4.4-1 in the MY2018 IFGMP (LANL 2017, 602406) to Table 4.4-1 in the MY2019 IFGMP. Sampling suites and frequencies: M = monthly (12 times/yr); Q = quarterly (4 times/yr); S = semiannual (2 times/yr); A = annual (1 time/yr); B = biennial (1 time/2 yr); T = triennial (1 time/3 yr); V = quinquennial (1 time/5 yr).

[a] VOCs = Volatile organic compounds.

[b] SVOCs = Semivolatile organic compounds.

[c] PCBs = Polychlorinated biphenyls.

[d] HEXP = Analytical suite for analysis of samples for high explosives by SW-846:8330B.

[e] Double asterisks (**) indicate background monitoring location as specified in the Groundwater Background Investigation Report, Revision 5 (LANL 2016, 601920).

[f] 2020 = Samples scheduled to be collected during implementation of MY2020 IFGMP.

[g] — = This analytical suite is not scheduled to be collected for this type of water at locations assigned to this monitoring group.

[h] n/a = Not applicable.

Table H-4
Crosswalk for the MY2018 versus MY2019 Interim Monitoring Plans for the TA-54 Monitoring Group

Location	Interim Plan Monitoring Year	Surface Water Body or Source Aquifer	Metals	VOCs[a]	SVOCs[b]	PCBs[c]	HEXP[d]	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics	Rationale for Changes (MY2018 to MY2019)
R-23i S1	2018	Intermediate	A	S	A	V (2020)[e]	V (2020)	—[f]	A	—	A	A	n/a[g]
	2019		A	S	A	V (2020)	V (2020)	—	A	—	A	A	
R-23i S2	2018	Intermediate	A	S	A	V (2020)	V (2020)	—	A	—	A	A	n/a
	2019		A	S	A	V (2020)	V (2020)	—	A	—	A	A	
R-23i S3	2018	Intermediate	A	S	A	V (2020)	V (2020)	—	A	—	A	A	n/a
	2019		A	S	A	V (2020)	V (2020)	—	A	—	A	A	
R-37 S1	2018	Intermediate	A	S	S	V (2020)	V (2020)	—	A	—	S	A	n/a
	2019		A	S	S	V (2020)	V (2020)	—	A	—	S	A	
R-40 Si	2018	Intermediate	A	—	—	—	—	—	—	—	S	A	n/a
	2019		A	—	—	—	—	—	—	—	S	A	
R-40 S1	2018	Intermediate	S	S	—	—	—	—	—	—	S	S	n/a
	2019		S	S	—	—	—	—	—	—	S	S	
R-55i	2018	Intermediate	—	—	—	—	—	—	—	—	S	—	n/a
	2019		—	—	—	—	—	—	—	—	S	—	
R-20 S1	2018	Regional	A	A	A	V (2020)	V (2020)	—	A	—	A	A	n/a
	2019		A	A	A	V (2020)	V (2020)	—	A	—	A	A	
R-20 S2	2018	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A	n/a
	2019		A	S	A	V (2020)	V (2020)	—	A	—	S	A	
R-21** [h]	2018	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A	n/a
	2019		A	S	A	V (2020)	V (2020)	—	A	—	S	A	
R-23	2018	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A	n/a
	2019		A	S	A	V (2020)	V (2020)	—	A	—	S	A	
R-32 S1	2018	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A	n/a
	2019		A	S	A	V (2020)	V (2020)	—	A	—	S	A	
R-37 S2**	2018	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A	n/a
	2019		A	S	A	V (2020)	V (2020)	—	A	—	S	A	
R-38**	2018	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A	n/a
	2019		A	S	A	V (2020)	V (2020)	—	A	—	S	A	
R-39**	2018	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A	n/a
	2019		A	S	A	V (2020)	V (2020)	—	A	—	S	A	
R-40 S2**	2018	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A	n/a
	2019		A	S	A	V (2020)	V (2020)	—	A	—	S	A	
R-41 S2	2018	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A	n/a
	2019		A	S	A	V (2020)	V (2020)	—	A	—	S	A	

Table H-4 (continued)

Location	Interim Plan Monitoring Year	Surface Water Body or Source Aquifer	Metals	VOCs[a]	SVOCs[b]	PCBs[c]	HEXP[d]	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics	Rationale for Changes (MY2018 to MY2019)
R-49 S1**	2018	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A	n/a
	2019		A	S	A	V (2020)	V (2020)	—	A	—	S	A	
R-49 S2**	2018	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A	n/a
	2019		A	S	A	V (2020)	V (2020)	—	A	—	S	A	
R-51 S1**	2018	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A	n/a
	2019		A	S	A	V (2020)	V (2020)	—	A	—	S	A	
R-51 S2**	2018	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A	n/a
	2019		A	S	A	V (2020)	V (2020)	—	A	—	S	A	
R-52 S1**	2018	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A	n/a
	2019		A	S	A	V (2020)	V (2020)	—	A	—	S	A	
R-52 S2**	2018	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A	n/a
	2019		A	S	A	V (2020)	V (2020)	—	A	—	S	A	
R-53 S1**	2018	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A	n/a
	2019		A	S	A	V (2020)	V (2020)	—	A	—	S	A	
R-53 S2**	2018	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A	n/a
	2019		A	S	A	V (2020)	V (2020)	—	A	—	S	A	
R-54 S1	2018	Regional	—	—	—	—	—	—	—	—	S	—	n/a
	2019		—	—	—	—	—	—	—	—	S	—	
R-54 S2**	2018	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A	n/a
	2019		A	S	A	V (2020)	V (2020)	—	A	—	S	A	
R-55 S1	2018	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A	n/a
	2019		A	S	A	V (2020)	V (2020)	—	A	—	S	A	
R-55 S2	2018	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A	n/a
	2019		A	S	A	V (2020)	V (2020)	—	A	—	S	A	
R-56 S1**	2018	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A	n/a
	2019		A	S	A	V (2020)	V (2020)	—	A	—	S	A	
R-56 S2**	2018	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A	n/a
	2019		A	S	A	V (2020)	V (2020)	—	A	—	S	A	

Table H-4 (continued)

Location	Interim Plan Monitoring Year	Surface Water Body or Source Aquifer	Metals	VOCs[a]	SVOCs[b]	PCBs[c]	HEXP[d]	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics	Rationale for Changes (MY2018 to MY2019)
R-57 S1[i]**	2018	Regional	A	S	A	A	V (2020)	A	A	—	S	A	n/a
	2019		A	S	A	A	V (2020)	A	A	—	S	A	
R-57 S2[i]**	2018	Regional	A	S	A	A	V (2020)	A	A	—	S	A	n/a
	2019		A	S	A	A	V (2020)	A	A	—	S	A	

Notes: Table H-4 is a crosswalk from Table 5.4-1 in the MY2018 IFGMP (LANL 2017, 602406) to Table 5.4-1 in the MY2019 IFGMP. Sampling suites and frequencies: M = monthly (12 times/yr); Q = quarterly (4 times/yr); S = semiannual (2 times/yr); A = annual (1 time/yr); B = biennial (1 time/2 yr); T = triennial (1 time/3 yr); V = quinquennial (1 time/5 yr).

[a] VOCs = Volatile organic compounds.

[b] SVOCs = Semivolatile organic compounds.

[c] PCBs = Polychlorinated biphenyls.

[d] HEXP = Analytical suite for analysis of samples for high explosives by SW-846:8330B.

[e] 2020 = Samples scheduled to be collected during implementation of MY2020 IFGMP.

[f] — = This analytical suite is not scheduled to be collected for this type of water at locations assigned to this monitoring group.

[g] n/a = Not applicable.

[h] Double asterisks (**) indicate background monitoring location as specified in the Groundwater Background Investigation Report, Revision 5 (LANL 2016, 601920).

[i] The IFGMP sampling and analysis specified for R-57 S1 and R-57 S2 for analysis of VOCs, SVOCs, and PCBs also satisfies the TA-54 Area G PCB compliance monitoring requirements.

Table H-5
Crosswalk for the MY2018 versus MY2019 Interim Monitoring Plans for the TA-16 260 Monitoring Group

Location	Interim Plan Monitoring Year	Surface Water Body or Source Aquifer	Metals	VOCs[a]	SVOCs[b]	PCBs[c]	HEXMOD[d]	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics	Naphthalene Sulfonate Tracers	Sodium Bromide Tracer	$^{15}N/^{18}O$ Isotopes in Nitrate	Rationale for Changes (MY2018 to MY2019)
Canon de Valle below MDA P	2018	Base flow	S	S	B (2018)[e]	V (2020)[f]	S	V (2020)	B (2018)	—[g]	—	S	—	—	—	n/a[h]
	2019		S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	—	
Between E252 and Water at Beta	2018	Base flow	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	—	n/a
	2019		S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	—	
Water at Beta	2018	Base flow	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	—	n/a
	2019		S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	—	
Pajarito below S&N Ancho E Basin Confluence	2018	Base flow	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	—	n/a
	2019		S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	—	
Bulldog Spring	2018	Spring	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	A	n/a
	2019		S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	A	
SWSC Spring	2018	Spring	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	A	n/a
	2019		S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	A	
Burning Ground Spring	2018	Spring	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	A	S	—	—	A	n/a
	2019		S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	A	S	—	—	A	
Martin Spring	2018	Spring	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	A	S	—	—	A	n/a
	2019		S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	A	S	—	—	A	
16-61439 (alias: PRB Alluvial Seep)	2018	Spring	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	—	n/a
	2019		S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	—	
FLC-16-25280	2018	Alluvial	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	—	n/a
	2019		S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	—	
CdV-16-02656	2018	Alluvial	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	—	n/a
	2019		S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	—	
CdV-16-02657r	2018	Alluvial	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	—	n/a
	2019		S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	—	
CdV-16-02659	2018	Alluvial	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	—	n/a
	2019		S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	—	
CdV-16-611923	2018	Alluvial	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	—	n/a
	2019		S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	—	
MSC-16-06293	2018	Alluvial	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	—	n/a
	2019		S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	—	
MSC-16-06294	2018	Alluvial	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	—	n/a
	2019		S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	—	

Table H-5 (continued)

Location	Interim Plan Monitoring Year	Surface Water Body or Source Aquifer	Metals	VOCs[a]	SVOCs[b]	PCBs[c]	HEXMOD[d]	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics	Naphthalene Sulfonate Tracers	Sodium Bromide Tracer	$^{15}N/^{18}O$ Isotopes in Nitrate	Rationale for Changes (MY2018 to MY2019)
CdV-16-611937	2018	Alluvial	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	—	n/a
	2019		S	S	B (2020)	V (2020)	S	V (2020)	B (2020)	—	—	S	—	—	—	
16-26644	2018	Intermediate	S	S	B (2018)	—	Q	—	B (2018)	—	A	S	—	—	A	n/a
	2019		S	S	B (2020)	—	Q	—	B (2020)	—	A	S	—	—	A	
CdV-9-1(i) S1	2018	Intermediate	S	S	B (2018)	V (2020)	Q	A	A	—	A	S	Q	Q	A	Analysis of samples collected from CdV-9-1(i) S1 during the period of May 2015 to March 2017 for radionuclides shows consistent and low activities of uranium-234 (0.49 pCi/L to 0.684 pCi/L) and uranium-238 (0.252 pCi/L to 0.406 pCi/L). These activities are at background levels and are not trending. Activities of gross alpha and gross beta are low as well. There was one detection of potassium-40 (69 pCi/L) in six analyses made during this period. The detection was from the sample collected in March 2017, and the associated field duplicate sample showed no activity for potassium-40. The radionuclide sampling frequency for CdV-9-1(i) is being changed from annual to biennial based on the data presented above.
	2019		S	S	B (2020)	V (2020)	Q	A	B (2020)	—	A	S	Q	Q	A	
CdV-16-1(i)	2018	Intermediate	S	S	B (2018)	—	Q	—	B (2018)	—	A	S	Q	Q	A	n/a
	2019		S	S	B (2020)	—	Q	—	B (2020)	—	A	S	Q	Q	A	
CdV-16-2(i)r	2018	Intermediate	S	S	B (2018)	—	Q	—	B (2018)	—	A	S	Q	Q	A	n/a
	2019		S	S	B (2020)	—	Q	—	B (2020)	—	A	S	Q	Q	A	
CdV-16-4ip S1	2018	Intermediate	S	S	B (2018)	V (2020)	Q	V (2020)	B (2018)	—	A	S	Q	—	A	n/a
	2019		S	S	B (2020)	V (2020)	Q	V (2020)	B (2020)	—	A	S	Q	—	A	
CdV-37-1(i)** [i]	2018	Intermediate	S	S	B (2018)	—	S	—	B (2018)	—	A	S	—	—	—	n/a
	2019		S	S	B (2020)	—	S	—	B (2020)	—	A	S	—	—	—	
R-25 S1	2018	Intermediate	—	—	—	—	—	—	—	—	—	—	Q	Q	—	n/a
	2019		—	—	—	—	—	—	—	—	—	—	Q	Q	—	
R-25 S2	2018	Intermediate	—	—	—	—	—	—	—	—	—	—	Q	Q	—	n/a
	2019		—	—	—	—	—	—	—	—	—	—	Q	Q	—	
R-25 S4	2018	Intermediate	—	—	—	—	—	—	—	—	—	—	Q	Q	—	n/a
	2019		—	—	—	—	—	—	—	—	—	—	Q	Q	—	
R-25b	2018	Intermediate	S	S	B (2018)	—	Q	—	B (2018)	—	A	S	Q	Q	—	As noted in the Appendix E watch list, the presence of tracers in R-25b indicates a nonrepresentative condition. Semiannual sampling for HEXMOD analytes is sufficient to monitor the status of R-25b (i.e., nonrepresentative versus representative). Semiannual sampling for tracers is sufficient to support the conceptual model.
	2019		S	S	B (2020)	—	S	—	B (2020)	—	A	S	S	S	—	
R-26 PZ-2	2018	Intermediate	S	S	B (2018)	—	S	—	B (2018)	—	A	S	—	—	—	n/a
	2019		S	S	B (2020)	—	S	—	B (2020)	—	A	S	—	—	—	
R-26 S1**	2018	Intermediate	S	S	B (2018)	—	S	—	B (2018)	—	A	S	—	—	—	n/a
	2019		S	S	B (2020)	—	S	—	B (2020)	—	A	S	—	—	—	
R-47i**	2018	Intermediate	S	S	B (2018)	—	Q	—	B (2018)	—	A	S	Q	Q	A	n/a
	2019		S	S	B (2020)	—	Q	—	B (2020)	—	A	S	Q	Q	A	
R-63i	2018	Intermediate	S	S	—	—	S	—	A	—	A	S	S	S	A	n/a
	2019		S	S	—	—	S	—	A	—	A	S	S	S	A	

Table H-5 (continued)

Location	Interim Plan Monitoring Year	Surface Water Body or Source Aquifer	Metals	VOCs[a]	SVOCs[b]	PCBs[c]	HEXMOD[d]	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics	Naphthalene Sulfonate Tracers	Sodium Bromide Tracer	$^{15}N/^{18}O$ Isotopes in Nitrate	Rationale for Changes (MY2018 to MY2019)
16-612309 (alias: Surge Bed Monitoring Well)	2018	Intermediate	S	S	S	—	S	—	—	—	—	S	—	—	—	n/a
	2019		S	S	S	—	S	—	—	—	—	S	—	—	—	
R-47**	2018	Regional	S	Q	B (2018)	V (2020)	Q	V (2020)	B (2018)	—	A	S	Q	Q	A	n/a
	2019		S	Q	B (2020)	V (2020)	Q	V (2020)	B (2020)	—	A	S	Q	Q	A	
CdV-R-15-3 S4	2018	Regional	S	S	B (2018)	—	S	—	B (2018)	—	A	S	—	—	—	n/a
	2019		S	S	B (2020)	—	S	—	B (2020)	—	A	S	—	—	—	
CdV-R-37-2 S2	2018	Regional	A	—	—	—	A	—	—	—	A	A	—	—	—	n/a
	2019		A	—	—	—	A	—	—	—	A	A	—	—	—	
R-18	2018	Regional	S	Q	B (2018)	—	Q	—	B (2018)	—	A	S	Q	Q	A	n/a
	2019		S	Q	B (2020)	—	Q	—	B (2020)	—	A	S	Q	Q	A	
R-25 S5	2018	Regional	—	—	—	—	—	—	—	—	—	—	Q	Q	A	The groundwater monitoring program is limiting the sampling of all R-25 screens (i.e., nonpurgeable monitoring locations) to only tracer analysis. Sampling for nitrogen and oxygen isotopes is therefore being eliminated for R-25 S5.
	2019		—	—	—	—	—	—	—	—	—	—	Q	Q	—	
R-48**	2018	Regional	S	S	B (2018)	—	Q	—	B (2018)	—	A	S	Q	Q	A	n/a
	2019		S	S	B (2020)	—	Q	—	B (2020)	—	A	S	Q	Q	A	
R-58	2018	Regional	Q	Q	B (2018)	V (2020)	Q	V (2020)	B (2018)	—	S	Q	Q	Q	A	R-58 is a relatively new groundwater monitoring well. The first IFGMP sample was collected from R-58 in the second quarter of MY2016. All R-58 samples collected during the period from January 2016 to September 2017 (i.e., six regular samples and one field duplicate sample) were nondetect for tritium. All seven analyses were performed by the low-level tritium analytical method. The sampling frequency and analysis for low-level tritium is being changed from semiannual to annual based on the nondetect data set. R-58 samples collected during the period from January 2016 to December 2017 show the presence of a number of metal and general inorganic suite analytes but at relatively low concentrations. The vanadium and zinc data sets show slight concentration uptrends. All other metal and general inorganic analyte data sets show either no trend or slight downtrends in reported concentrations. The sample frequency for the metal and general inorganic suites is being changed from quarterly to semiannual based on the R-58 data accumulated through December 2017.
	2019		S	Q	B (2020)	V (2020)	Q	V (2020)	B (2020)	—	A	S	Q	Q	A	
R-63	2018	Regional	S	S	B (2018)	—	Q	—	B (2018)	—	A	S	Q	Q	—	n/a
	2019		S	S	B (2020)	—	Q	—	B (2020)	—	A	S	Q	Q	—	

Table H-5 (continued)

Location	Interim Plan Monitoring Year	Surface Water Body or Source Aquifer	Metals	VOCs[a]	SVOCs[b]	PCBs[c]	HEXMOD[d]	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics	Naphthalene Sulfonate Tracers	Sodium Bromide Tracer	$^{15}N/^{18}O$ Isotopes in Nitrate	Rationale for Changes (MY2018 to MY2019)
R-68	2018	Regional	S	Q	S	—	Q	—	B (2018)	—	A	S	Q	Q	A	n/a
	2019		S	Q	S	—	Q	—	B (2020)	—	A	S	Q	Q	A	
R-69 (Proposed)	2018	Regional	—	—	—	—	—	—	—	—	—	—	—	—	—	A new well is being added to support regional aquifer characterization in accordance with the groundwater investigation work plan (LANL 2016, 601779). R-69 is expected to be ready for IFGMP sampling in the first quarter of MY2019.
	2019		Q	Q	Q	Q	Q	Q	Q	—	Q	Q	Q	Q	Q	

Notes: Table H-5 is a crosswalk from Table 6.4-1 in the MY2018 IFGMP (LANL 2017, 602406) to Table 6.4-1 in the MY2019 IFGMP. Sampling suites and frequencies: M = monthly (12 times/yr); Q = quarterly (4 times/yr); S = semiannual (2 times/yr); A = annual (1 time/yr); B = biennial (1 time/2 yr); T = triennial (1 time/3 yr); V = quinquennial (1 time/5 yr); Q1 = Monitor Year 2018 Q1 only.

[a] VOCs = Volatile organic compounds.

[b] SVOCs = Semivolatile organic compounds.

[c] PCBs = Polychlorinated biphenyls.

[d] HEXMOD = Analytical suite for analysis of samples for high explosives and RDX-(hexahydro-1,3,5-trinitro-1,3,5-triazine) degradation products by SW-846:8330B.

[e] 2018 = Samples scheduled to be collected during implementation of MY2018 IFGMP.

[f] 2020 = Samples scheduled to be collected during implementation of MY2020 IFGMP.

[g] — = This analytical suite is not scheduled to be collected for this type of water at locations assigned to this monitoring group.

[h] n/a = Not applicable.

[i] Double asterisks (**) indicate background monitoring location as specified in the Groundwater Background Investigation Report, Revision 5 (LANL 2016, 601920).

Table H-6
Crosswalk for the MY2018 versus MY2019 Interim Monitoring Plans for the MDA AB Monitoring Group

Location	Interim Plan Monitoring Year	Surface Water Body or Source Aquifer	Metals	VOCs[a]	SVOCs[b]	PCBs[c]	HEXP[d]	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics	Rationale for Changes (MY2018 to MY2019)
R-27i** [e]	2018	Intermediate	A	A	A	—[f]	—	—	A	—	A	A	n/a[g]
	2019		A	A	A	—	—	—	A	—	A	A	
R-27**	2018	Regional	A	A	A	—	—	—	A	—	A	A	n/a
	2019		A	A	A	—	—	—	A	—	A	A	
R-29	2018	Regional	A	A	A	—	A	—	A	—	A	A	n/a
	2019		A	A	A	—	A	—	A	—	A	A	
R-30**	2018	Regional	A	A	A	—	A	—	A	—	A	A	n/a
	2019		A	A	A	—	A	—	A	—	A	A	

Notes: Table H-6 is a crosswalk from Table 7.4-1 in the MY2018 IFGMP (LANL 2017, 602406) to Table 7.4-1 in the MY2019 IFGMP. Sampling suites and frequencies: M = monthly (12 times/yr); Q = quarterly (4 times/yr); S = semiannual (2 times/yr); A = annual (1 time/yr); B = biennial (1 time/2 yr); T = triennial (1 time/3 yr); V = quinquennial (1 time/5 yr).

[a] VOCs = Volatile organic compounds.

[b] SVOCs = Semivolatile organic compounds.

[c] PCBs = Polychlorinated biphenyls.

[d] HEXP = Analytical suite for analysis of samples for high explosives by SW-846:8330B.

[e] Double asterisks (**) indicate background monitoring location as specified in the Groundwater Background Investigation Report, Revision 5 (LANL 2016, 601920).

[f] — = This analytical suite is not scheduled to be collected for this type of water at locations assigned to this monitoring group.

[g] n/a = Not applicable.

Table H-7
Crosswalk for the MY2018 versus MY2019 Interim Monitoring Plans for the General Surveillance Monitoring Group

Location	Interim Plan Monitoring Year	Surface Water Body or Source Aquifer	Metals	VOCs[a]	SVOCs[b]	PCBs[c]	HEXP[d]	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics	Rationale for Changes (MY2018 to MY2019)
LA Canyon near Otowi Bridge[e]	2018	Base flow	A	A	A	V (2020)[f]	T (2018)[g]	V (2020)	A	—[h]	A	A	The indicated sampling frequency changes are being made to eliminate footnote d for "LA Canyon Near Otowi Bridge" in Table 1.7-1 of the MY2018 IFGMP. The sole purpose of these changes is to simplify presentation of the sampling and analysis plan for LA Canyon Near Otowi Bridge. There is no change in the sampling and analysis specified for LA Canyon Near Otowi Bridge from MY2018 to MY2019.
	2019		S	S	S	V (2020)	T (2021)[i]	V (2020)	S	—	S	S	
Los Alamos Spring	2018	Spring	A	A	T (2018)	T (2018)	T (2018)	V (2020)	A	—	A	A	n/a[j]
	2019		A	A	T (2021)	T (2021)	T (2021)	V (2020)	A	—	A	A	
Vine Tree Spring	2018	Spring	S	S	T (2018)	T (2018)	T (2018)	V (2020)	A	—	A	S	The indicated sampling frequency changes are being made to eliminate footnote d for "Vine Tree Spring" in Table 1.7-1 of the MY2018 IFGMP. The sole purpose of these changes is to simplify presentation of the sampling and analysis plan for Vine Tree Spring. There is no change in the sampling and analysis specified for Vine Tree Spring from MY2018 to MY2019.
	2019		S	S	T (2021)	T (2021)	T (2021)	V (2020)	S	—	S	S	
LLAO-1b	2018	Alluvial	A	A	T (2018)	T (2018)	T (2018)	V (2020)	A	—	—	A	n/a
	2019		A	A	T (2021)	T (2021)	T (2021)	V (2020)	A	—	—	A	
LLAO-4	2018	Alluvial	A	A	T (2018)	T (2018)	T (2018)	V (2020)	A	—	—	A	n/a
	2019		A	A	T (2021)	T (2021)	T (2021)	V (2020)	A	—	—	A	
LAO-3a	2018	Alluvial	A	B (2018)	B (2018)	V (2020)	—	V (2020)	A	—	—	A	n/a
	2019		A	B (2020)	B (2020)	V (2020)	—	V (2020)	A	—	—	A	
LAUZ-1	2018	Alluvial	A	A	A	—	A	—	A	—	A	A	n/a
	2019		A	A	A	—	A	—	A	—	A	A	
PAO-5n	2018	Alluvial	A	B (2018)	B (2018)	V (2020)	—	V (2020)	A	—	—	A	n/a
	2019		A	B (2020)	B (2020)	V (2020)	—	V (2020)	A	—	—	A	
POI-4	2018	Intermediate	A	B (2018)	B (2018)	—	—	—	A	—	B (2018)	A	n/a
	2019		A	B (2020)	B (2020)	—	—	—	A	—	B (2020)	A	
R-3i	2018	Intermediate	A	B (2018)	B (2018)	—	—	—	A	—	B (2018)	A	n/a
	2019		A	B (2020)	B (2020)	—	—	—	A	—	B (2020)	A	
TW-2Ar	2018	Intermediate	A	B (2018)	B (2018)	—	—	—	A	B (2018)	—	A	n/a
	2019		A	B (2020)	B (2020)	—	—	—	A	B (2020)	—	A	
R-2** [k]	2018	Regional	A	B (2018)	B (2018)	—	—	—	A	—	A	A	n/a
	2019		A	B (2020)	B (2020)	—	—	—	A	—	A	A	
R-24	2018	Regional	A	B (2018)	B (2018)	—	—	—	A	—	B (2018)	A	n/a
	2019		A	B (2020)	B (2020)	—	—	—	A	—	B (2020)	A	
R-3	2018	Regional	A	B (2018)	B (2018)	—	—	—	A	—	B (2018)	A	n/a
	2019		A	B (2020)	B (2020)	—	—	—	A	—	B (2020)	A	
R-4	2018	Regional	A	A	A	—	—	—	A	—	B (2018)	A	n/a
	2019		A	A	A	—	—	—	A	—	B (2020)	A	
Sandia Right Fork at Pwr Plant	2018	Base flow	A	A	A	A	V (2020)	V (2020)	A	—	—	A	n/a
	2019		A	A	A	A	V (2020)	V (2020)	A	—	—	A	

Table H-7 (continued)

Location	Interim Plan Monitoring Year	Surface Water Body or Source Aquifer	Metals	VOCs[a]	SVOCs[b]	PCBs[c]	HEXP[d]	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics	Rationale for Changes (MY2018 to MY2019)
Sandia below Wetlands	2018	Base flow	A	A	A	A	V (2020)	V (2020)	A	—	—	A	n/a
	2019		A	A	A	A	V (2020)	V (2020)	A	—	—	A	
R-12 S1	2018	Intermediate	—	—	—	—	—	—	—	—	B (2019)[l]	—	n/a
	2019		—	—	—	—	—	—	—	—	B (2019)	—	
R-12 S2	2018	Intermediate	—	—	—	—	—	—	—	—	B (2019)	—	Recent monitoring data suggest that R-12 S2 may be producing representative data. The R-12 S2 sampling and analysis plan specified for MY2019 mirrors the sampling and analysis plans for perched-intermediate screens in the TA-21 monitoring group because of the potential for R-12 being located along the same groundwater pathway.
	2019		A	B (2020)	B (2020)	—	—	—	A	—	A	A	
R-10 S1	2018	Regional	A	A	A	T (2018)	T (2018)	—	A	—	A	A	n/a
	2019		A	A	A	T (2021)	T (2021)	—	A	—	A	A	
R-10 S2	2018	Regional	A	A	A	T (2018)	T (2018)	—	A	—	A	A	n/a
	2019		A	A	A	T (2021)	T (2021)	—	A	—	A	A	
R-10a	2018	Regional	S	S	S	T (2018)	T (2018)	—	S	—	S	S	n/a
	2019		S	S	S	T (2021)	T (2021)	—	S	—	S	S	
CDBO-6	2018	Alluvial	B (2018)	B (2018)	B (2018)	V (2020)	—	V (2020)	A	—	—	B (2018)	n/a
	2019		B (2020)	B (2020)	B (2020)	V (2020)	—	V (2020)	A	—	—	B (2020)	
MCO-5	2018	Alluvial	A	B (2018)	B (2018)	V (2020)	—	V (2020)	A	—	B (2018)	A	All tritium data for MCO-5 in the 5-yr data set are nondetect. All of these data were a result of analysis by the standard EPA:906.0 method. The groundwater monitoring program switched from standard to low-level tritium analysis for samples collected from MCO-5 in MY2018. The tritium sampling frequency is being changed from biennial to annual to build a low-level tritium data set for MCO-5.
	2019		A	B (2020)	B (2020)	V (2020)	—	V (2020)	A	—	A	A	
MCO-7	2018	Alluvial	A	A	A	A	—	V (2020)	A	—	B (2018)	A	The 5-yr data set includes the following tritium data obtained by the standard EPA:906.0 method: 381 pCi/L and 269 pCi/L for samples collected in July 2014 and August 2017, respectively, and nondetect results for samples collected in July 2016 and August 2017. The nondetect results were reported as 177 pCi/L (U) and 118 pCi/L (U), respectively. The groundwater monitoring program switched from standard to low-level tritium analysis for samples collected from MCO-7 in MY2018. The tritium sampling frequency is being changed from biennial to annual to build a low-level tritium data set for MCO-7.
	2019		A	A	A	A	—	V (2020)	A	—	A	A	
R-16 S2	2018	Regional	A	B (2018)	B (2018)	—	—	—	A	—	A	A	n/a
	2019		A	B (2020)	B (2020)	—	—	—	A	—	A	A	
R-16 S4	2018	Regional	A	B (2018)	B (2018)	—	—	—	A	—	A	A	n/a
	2019		A	B (2020)	B (2020)	—	—	—	A	—	A	A	
R-16r**	2018	Regional	A	B (2018)	B (2018)	—	—	—	A	—	A	A	n/a
	2019		A	B (2020)	B (2020)	—	—	—	A	—	A	A	
R-34	2018	Regional	A	A	A	T (2018)	T (2018)	—	A	—	A	A	n/a
	2019		A	A	A	T (2021)	T (2021)	—	A	—	A	A	
Two Mile Canyon Below TA-59	2018	Base flow	A	A	A	V (2020)	A	V (2020)	A	—	—	A	n/a
	2019		A	A	A	V (2020)	A	V (2020)	A	—	—	A	
Homestead Spring	2018	Spring	A	A	A	—	A	—	A	—	A	A	n/a
	2019		A	A	A	—	A	—	A	—	A	A	
Starmer Spring	2018	Spring	A	A	A	—	A	—	A	—	A	A	n/a
	2019		A	A	A	—	A	—	A	—	A	A	

Table H-7 (continued)

Location	Interim Plan Monitoring Year	Surface Water Body or Source Aquifer	Metals	VOCs[a]	SVOCs[b]	PCBs[c]	HEXP[d]	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics	Rationale for Changes (MY2018 to MY2019)
18-MW-18	2018	Alluvial	A	B (2019)	B (2019)	V (2020)	V (2020)	V (2020)	A	—	B (2019)	A	The filtered chloride concentration (539 mg/L) and filtered total dissolved solids (TDS) concentration (1470 mg/L) detected at 18-MW-18 on April 6, 2017, are the highest observed to date. These concentrations were above the New Mexico Water Quality Control Commission groundwater standards (screening values) of 250 mg/L for chloride and 1000 mg/L for TDS. The range of chloride concentrations previously detected at 18-MW-18 since August 2006 is 51.3 mg/L to 354 mg/L. The range of TDS concentrations previously detected at 18-MW-18 since August 2006 is 235 mg/L to 844 mg/L. In addition, specific conductance (2321 µS/cm), barium (847 µg/L), strontium (938 µg/L), and uranium (3.49 µg/L) detected at 18-MW-18 on April 6, 2017, are also the highest values observed to date. The above analytical data in conjunction with precipitation received in Los Alamos shortly before the April 6, 2017, sampling event (0.06 in. on April 4, 2017; 0.36 in. on April 1, 2017; 0.54 in. on March 29, 2017; 0.24 in. on March 28, 2017; and 0.08 in. on March 27, 2017) support the “road salt/ion exchange” conceptual model for 18-MW-18. Specifically, the increase in cation (e.g., sodium, calcium, and magnesium) concentrations in the local environment from the dissolution of applied road salt liberates cations that are less-strongly adsorbed to soil matrices (e.g., barium, strontium, and uranium). The sampling frequency is being increased for the metal, radionuclide, and general inorganic analytical suites from annual to semiannual to provide additional data for the conceptual model.
	2019		S	B (2019)	B (2019)	V (2020)	V (2020)	V (2020)	S	—	B (2019)	S	
PCAO-8	2018	Alluvial	A	B (2019)	B (2019)	V (2020)	V (2020)	V (2020)	A	—	—	A	n/a
	2019		A	B (2019)	B (2019)	V (2020)	V (2020)	V (2020)	A	—	—	A	
03-B-13	2018	Intermediate	S	S	S	—	V (2020)	—	A	B (2019)	—	S	n/a
	2019		S	S	S	—	V (2020)	—	A	B (2019)	—	S	
PCI-2**	2018	Intermediate	S	S	S	—	S	—	A	—	A	S	n/a
	2019		S	S	S	—	S	—	A	—	A	S	
R-17 S1**	2018	Regional	A	A	A	—	A	—	A	—	A	A	n/a
	2019		A	A	A	—	A	—	A	—	A	A	
R-17 S2**	2018	Regional	A	A	A	—	A	—	A	—	A	A	n/a
	2019		A	A	A	—	A	—	A	—	A	A	
WCO-1r	2018	Alluvial	S	B (2018)	B (2018)	V (2020)	S	V (2020)	A	—	A	S	n/a
	2019		S	B (2020)	B (2020)	V (2020)	S	V (2020)	A	—	A	S	
Ancho at Rio Grande	2018	Base flow	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	—	—	B (2019)	n/a
	2019		B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	—	—	B (2019)	
Frijoles at Rio Grande	2018	Base flow	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	—	—	B (2019)	n/a
	2019		B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	—	—	B (2019)	
Mortandad at Rio Grande	2018	Base flow	B (2018)	B (2018)	B (2018)	B (2018)	B (2018)	B (2018)	B (2018)	—	—	B (2018)	n/a
	2019		B (2020)	B (2020)	B (2020)	B (2020)	B (2020)	B (2020)	B (2020)	—	—	B (2020)	
Pajarito at Rio Grande	2018	Base flow	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	—	—	B (2019)	n/a
	2019		B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	—	—	B (2019)	
Rio Grande at Frijoles	2018	Base flow	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	—	—	B (2019)	n/a
	2019		B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	B (2019)	—	—	B (2019)	

Table H-7 (continued)

Location	Interim Plan Monitoring Year	Surface Water Body or Source Aquifer	Metals	VOCs[a]	SVOCs[b]	PCBs[c]	HEXP[d]	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics	Rationale for Changes (MY2018 to MY2019)
Rio Grande at Otowi Bridge	2018	Base flow	A	A	A	A	—	A	A	—	A	A	n/a
	2019		A	A	A	A	—	A	A	—	A	A	
Ancho Spring**	2018	Spring	A	A	A	—	A	—	A	—	A	A	n/a
	2019		A	A	A	—	A	—	A	—	A	A	
La Mesita Spring	2018	Spring	A	A	A	T (2018)	T (2018)	—	A	—	A	A	n/a
	2019		A	A	A	T (2021)	T (2021)	—	A	—	A	A	
Upper La Mesita Spring	2018	Spring	A	A	A	T (2018)	T (2018)	—	A	—	A	A	n/a
	2019		A	A	A	T (2021)	T (2021)	—	A	—	A	A	
Sacred Spring	2018	Spring	A	A	A	T (2018)	T (2018)	—	A	—	A	A	n/a
	2019		A	A	A	T (2021)	T (2021)	—	A	—	A	A	
Sandia Spring	2018	Spring	A	A	A	B (2018)	B (2018)	—	A	—	A	A	n/a
	2019		A	A	A	B (2020)	B (2020)	—	A	—	A	A	
Lower Sandia Spring	2018	Spring	A	A	A	B (2018)	B (2018)	—	A	—	A	A	n/a
	2019		A	A	A	B (2020)	B (2020)	—	A	—	A	A	
Spring 1	2018	Spring	A	A	A	A	A	—	A	—	A	A	n/a
	2019		A	A	A	A	A	—	A	—	A	A	
Spring 2	2018	Spring	A	A	A	B (2018)	B (2018)	—	A	—	A	A	n/a
	2019		A	A	A	B (2020)	B (2020)	—	A	—	A	A	
Spring 3[m]	2018	Spring	A	A	A	B (2019)	A	B (2019)	A	—	B (2019)	A	n/a
	2019		A	A	A	B (2019)	A	B (2019)	A	—	B (2019)	A	
Spring 3A	2018	Spring	A	A	A	—	A	—	A	—	A	A	n/a
	2019		A	A	A	—	A	—	A	—	A	A	
Spring 3AA**	2018	Spring	A	A	A	—	A	—	A	—	A	A	n/a
	2019		A	A	A	—	A	—	A	—	A	A	
Spring 4[m]	2018	Spring	A	A	A	A	A	A	A	—	B (2019)	A	n/a
	2019		A	A	A	A	A	A	A	—	B (2019)	A	
Spring 4A	2018	Spring	A	A	A	—	A	—	A	—	A	A	n/a
	2019		A	A	A	—	A	—	A	—	A	A	
Spring 4AA	2018	Spring	A	A	A	—	A	—	A	—	A	A	n/a
	2019		A	A	A	—	A	—	A	—	A	A	
Spring 4B	2018	Spring	A	A	A	—	A	—	A	—	B (2019)	A	n/a
	2019		A	A	A	—	A	—	A	—	B (2019)	A	
Spring 5	2018	Spring	A	A	A	—	A	—	A	—	A	A	n/a
	2019		A	A	A	—	A	—	A	—	A	A	
Spring 5A	2018	Spring	A	A	A	—	A	—	A	—	B (2019)	A	n/a
	2019		A	A	A	—	A	—	A	—	B (2019)	A	

Table H-7 (continued)

Location	Interim Plan Monitoring Year	Surface Water Body or Source Aquifer	Metals	VOCs[a]	SVOCs[b]	PCBs[c]	HEXP[d]	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics	Rationale for Changes (MY2018 to MY2019)
Spring 5B	2018	Spring	A	A	A	—	A	—	A	—	A	A	n/a
	2019		A	A	A	—	A	—	A	—	A	A	
Spring 6**	2018	Spring	A	A	A	—	A	—	A	—	B (2019)	A	n/a
	2019		A	A	A	—	A	—	A	—	B (2019)	A	
Spring 6A**	2018	Spring	A	A	A	—	A	—	A	—	A	A	n/a
	2019		A	A	A	—	A	—	A	—	A	A	
Spring 8A**	2018	Spring	A	A	A	—	A	—	A	—	A	A	n/a
	2019		A	A	A	—	A	—	A	—	A	A	
Spring 9**	2018	Spring	A	A	A	—	A	—	A	—	B (2019)	A	n/a
	2019		A	A	A	—	A	—	A	—	B (2019)	A	
Spring 9A**	2018	Spring	A	A	A	—	A	—	A	—	A	A	n/a
	2019		A	A	A	—	A	—	A	—	A	A	

Notes: Table H-7 is a crosswalk from Table 8.3-1 in the MY2018 IFGMP (LANL 2017, 602406) to Table 8.3-1 in the MY2019 IFGMP. Sampling suites and frequencies: M = monthly (12 times/yr); Q = quarterly (4 times/yr); S = semiannual (2 times/yr); A = annual (1 time/yr); B = biennial (1 time/2 yr); T = triennial (1 time/3 yr); V = quinquennial (1 time/5 yr).

[a] VOCs = Volatile organic compounds.

[b] SVOCs = Semivolatile organic compounds.

[c] PCBs = Polychlorinated biphenyls.

[d] HEXP = Analytical suite for analysis of samples for high explosives by SW-846:8330B.

[e] Orange shading (both shades) indicates a sampling location is on Pueblo de San Ildefonso land.

[f] 2020 = Samples scheduled to be collected during implementation of MY2020 IFGMP.

[g] 2018 = Samples scheduled to be collected during implementation of MY2018 IFGMP.

[h] — = This analytical suite is not scheduled to be collected for this type of water at locations assigned to this monitoring group.

[i] 2021 = Samples scheduled to be collected during implementation of MY2021 IFGMP.

[j] n/a = Not applicable.

[k] Double asterisks (**) indicate background monitoring location as specified in the Groundwater Background Investigation Report, Revision 5 (LANL 2016, 601920).

[l] 2019 = Samples scheduled to be collected during implementation of MY2019 IFGMP.

[m] Springs 3 and 4 are backup locations for primary TA-54 Area G PCB compliance monitoring locations R-57 S1 and R-57 S2. The VOC, SVOC, and PCB sampling and analysis plan will be modified as necessary for Springs 3 and 4 in the event that all specified samples from R-57 S1 and/or R-57 S2 cannot be collected.