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Interim Facility-Wide Groundwater Monitoring Plan for the 2018 Monitoring Year, October 2017–September 2018

Prepared by the Associate Directorate for Environmental Management

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EXECUTIVE SUMMARY

This Interim Facility-Wide Groundwater Monitoring Plan (hereafter, the Interim Plan) fulfills a requirement of the Compliance Order on Consent (hereafter, the Consent Order). Los Alamos National Laboratory (LANL or the Laboratory) 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 Interim Plan is updated annually and submitted to the New Mexico Environment Department (NMED) for approval. The 2018 Interim Plan applies to the 2018 monitoring year from October 1, 2017, to September 30, 2018. The monitoring conducted under this plan is designed to enhance the understanding of groundwater within and beneath 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 Interim Plan 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 2017 Interim Plan. 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 the Laboratory are reviewed monthly, and constituents exceeding any of the six screening criteria in Section XXVI of the 2016 Consent Order are reported monthly to the NMED Hazardous Waste Bureau.

CONTENTS

Figures

Tables

Appendixes

Plate

1.0 INTRODUCTION

The monitoring year (MY) 2018 Interim Facility-Wide Groundwater Monitoring Plan (hereafter, the Interim Plan) for Los Alamos National Laboratory (LANL or the Laboratory) fulfills the groundwater monitoring requirement in Section XII of the 2016 Compliance Order on Consent (the Consent Order). Section XII requires the Interim Plan 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 Interim Plan applies to MY2018, from October 1, 2017, to September 30, 2018.

Groundwater monitoring has been conducted at 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 has 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 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.

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 February 2015 and a map illustrating the geology at the water table.

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 Interim Plan 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,
- meet groundwater discharge permit requirements, and
- meet monitoring requirements of DOE Orders 436.1 and 458.1.

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

In addition, monitoring produces data required to evaluate risk and to assess regulatory compliance. Although the Interim Plan 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 Interim Plan 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 Interim Plan, 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 1.6 summarizes basic sets of analytical suites and frequencies for locations assigned to area-specific monitoring groups or to general surveillance monitoring in each watershed.

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 interim plans

1.2 Scope

The Interim Plan 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 rather 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 Interim Plan.

Monitoring under the Interim Plan 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. To ensure water leaving the Laboratory boundaries does not pose an unacceptable risk, 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 1.2-1 shows the areas addressed in this Interim Plan.

The Interim Plan 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 Interim Plan. Regulatory input from NMED is also considered.

1.3 Reporting

Analytical results obtained from groundwater, base-flow, and spring samples collected under this Interim Plan 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, and 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 1.3-1 presents the anticipated PMR submittal schedule for MY2018. The PMR submittal dates presented in Table 1.3-1 are subject to change based on the actual completion dates of the quarterly sampling events that are reported in the PMRs.

The Laboratory 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 six 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 at 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 between the DOE/National Nuclear Security Administration 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.

1.4 Regulatory Context

This Interim Plan fulfills groundwater monitoring requirements of the Consent Order as described in section 1.0. In addition to the Consent Order, the Laboratory is required to perform groundwater monitoring to satisfy other regulatory requirements, as summarized below. The Laboratory 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 Interim Plan.

1.4.1 DOE 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, the Laboratory 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 [MOU] for Environmental Monitoring” among 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.

1.4.2 RCRA 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 Interim Plan.

1.5 Integration of Groundwater Monitoring at the Laboratory

All groundwater monitoring under the Interim Plan 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, the Laboratory 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). The Laboratory 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 contract laboratories the general QA guidelines and includes specific requirements and guidelines for analyzing water samples. The 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-1.0 and B-2.0) and to measure field parameters (section B-3.0). 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-4.0. The management of IDW is discussed in section B-5.0.

1.6 Approach to Monitoring Network Design

The interim nature of this monitoring plan reflects an evolving monitoring network at the Laboratory. 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 analyte suites for at least four rounds.

Table 1.6-1 presents applicable standards for surface water and groundwater quality, which are used as screening levels for evaluating monitoring results. Table 1.6-2 lists analytes, field preparation (filtered or unfiltered samples), and analytical methods used by EPA Contract Laboratory laboratories for samples collected under the Interim Plan. Table 1.6-3 lists analytes, field preparation, and analytical methods used to conduct screening-level analysis for samples collected under the Interim Plan.

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

1.7 Sampling Frequency and Schedule

The Interim Plan proposes monitoring frequencies for each monitoring group 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 MY is designated by Q for quarterly, S for semiannually, and A for annually. Some suites may be sampled less frequently than annually based on their limited mobility (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 MY during which the samples will be collected is listed in the superscript following the B, T, or V sampling frequency designator.

Sampling under this Interim Plan will be conducted in MY2018, from October 2017 to September 2018. Table 1.7-1 presents a proposed sampling schedule. Following submittal of this Interim Plan 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 Interim Plan, 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 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.

1.8 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 purge 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 Interim Plan (Table 1.8-1) 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.

1.9 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 1.8-1). 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 Interim Plan. 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.

1.10 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 Interim Plan 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 Interim Plan.

- 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 Interim Plan.
- 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), the Laboratory will work to reestablish access and to sample 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 TA-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 the 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 weapons 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. They 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 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 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 Interim Plan 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 Interim Plan, 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 MY2018 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.

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

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.

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 of 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 wells R-28, R-42, 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 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.

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). Lateral migration from Los Alamos Canyon sources [including Outfall 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).

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 its concentration exceeds groundwater standards in the regional aquifer. The objective for the Chromium Investigation monitoring group in MY2018 addresses a shift from monitoring constituent fate and transport within the plume to performance monitoring associated with the IM and plume-center characterization activities.

Pumping and injection under the IM began in late 2016 and is currently ongoing. The IM involves pumping contaminated groundwater from extraction wells, treatment at the surface using ion exchange, and reinjection into 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 include R-50, R-45, and R-44 because it is anticipated that contaminant concentrations at those wells will decrease as a result of IM actions. Monitoring well SIMR-2 is expected to stay well below the 50 ppb standard for chromium under the IM. To monitor performance of the IM and to optimize understanding of the plume response to the IM actions, these four wells will be monitored monthly (see section 3.4 and Table 3.4-1). Other wells within the Chromium Investigation monitoring group may be more directly affected by plume-center characterization activities that primarily involve pumping from extraction wells located just downgradient of the plume centroid to assess chromium mass removal and capture zone analysis. For the objective of monitoring plume-center pumping, all other wells within the Chromium Investigation monitoring group will retain the quarterly monitoring frequency of previous years. Field pilot tests using amendments to assess potential in situ remediation strategies at R-28 and R-42 are planned for summer 2017. Monitoring at those wells will be conducted under a separate pilot test work plan submitted to NMED for approval. The pilot test work plan will also utilize existing regional aquifer piezometers for water-quality data to support the IM and plume-center characterization.

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 8.0). Data from these monitoring locations should provide sufficient information to continue verifying decreasing trends in contaminant concentrations in alluvial groundwater.

The predominant contaminants in the Chromium Investigation monitoring group include chromium, nitrate, sulfate, perchlorate, 1,4-dioxane, and tritium.

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 analytical suites and frequencies specified are based on the results of applicable IRs, previous reviews of monitoring data, and performance monitoring objectives.

4.0 MDA 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 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 Interim Plan, 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 TA-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 does stream flow because some downcanyon lateral flow occurs within the alluvium. Alluvial groundwater acts as a source of water percolating into the deeper tuff units 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 analytical suites and frequencies specified 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 Interim Plan, 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 TA-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 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 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 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 as well as 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, (4) and 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).

Recent data for deep groundwater show elevated RDX concentrations in both perched-intermediate and regional groundwater. RDX concentrations in 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. 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 tapwater screening level of 7.02 µg/L, with RDX at approximately 8.8 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, and to collect data to assess potential corrective action alternatives for RDX in groundwater. 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.

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.

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 listed in the Watch List in Appendix E. Well R-25b will continue to be sampled in MY2018, but the samples will be categorized as screening samples until the geochemistry is more representative.

7.0 MDA 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) 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 comprise 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 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 Interim Plan, 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 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 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 concentrations) and Vine Tree Spring (to meet monitoring requirements under the MOU). Semiannual monitoring is also proposed at PCI-2 and WCO-1r. Quarterly monitoring is proposed at R-34 to meet monitoring requirements under the MOU. Well R-12 screen 1 shows reducing conditions, as indicated by low dissolved oxygen and oxidation-reduction potential and will be monitored for low-level tritium only annually. R-12 screen 2 data also show possible reducing conditions, with elevated manganese concentrations and low dissolved oxygen concentrations. Screen 2 will continue to be sampled annually rather than biennially to reduce the potential for stagnation around the well screen between sampling events. 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 plan. No nearby alluvial wells can serve as a replacement for these wells in the Interim Plan.

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, Sacred, 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 appendix. Parenthetical information following each reference provides the author(s), publication date, and ERID or ESHID. This information is also included in text citations. ERIDs were assigned by the Associate Directorate for Environmental Management's (ADEM's) Records Processing Facility (IDs through 599999), and ESHIDs are assigned by the Environment, Safety, and Health Directorate (IDs 600000 and above). IDs are used to locate documents in the Laboratory's Electronic Document Management System and in the Master Reference Set. The NMED Hazardous Waste Bureau and ADEM 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), July 2015. "Work Plan for a Tracer Test at Consolidated Unit 16-021(c)-99, Technical Area 16, Revision 1," Los Alamos National Laboratory document LA-UR-15-24089, Los Alamos, New Mexico. (LANL 2015, 600535)

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LANL (Los Alamos National Laboratory), January 2017. "Field Summary Report for Alluvial Piezometers in Sandia Canyon," Los Alamos National Laboratory document LA-UR-17-20200, Los Alamos, New Mexico. (LANL 2017, 602134)

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LANL (Los Alamos National Laboratory), April 2017. "Summary Report for Intermediate Groundwater System Characterization Activities at Consolidated Unit 16-02l(c)-99," Los Alamos National Laboratory document LA-UR-17-22550, Los Alamos, New Mexico. (LANL 2017, 602288)

NMED (New Mexico Environment Department), May 21, 2012. "Approval with Modifications, 2011 Interim Facility-Wide Groundwater Monitoring Plan, Revision 1," New Mexico Environment Department letter to P. Maggiore (DOE-LASO) and M.J. Graham (LANL) from J.E. Kieling (NMED-HWB), Santa Fe, New Mexico. (NMED 2012, 520410)

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NMED (New Mexico Environment Department), March 2017. "Risk Assessment Guidance for Site Investigations and Remediation, Volume 2, Soil Screening Guidance for Ecological Risk Assessments," Hazardous Waste Bureau and Ground Water Quality Bureau, Santa Fe, New Mexico. (NMED 2017, 602274)

9.2 Map Data Sources

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.

Road Centerlines for the County of Los Alamos; County of Los Alamos, Information Services; as published 04 March 2009.

Drainage; ER-ES, As published, GIS projects folder 16-0033;\\slip\gis\GIS\Projects\16-Projects\16-0033\project_data.gdb; drainage features; 2017.

Monitoring group; As published, GIS projects folder 16-0033;\\slip\gis\GIS\Projects\16-Projects\16-0033\project_data.gdb; convex_hull; 2016.

LANL Areas Used and Occupied; Los Alamos National Laboratory, Site Planning & Project Initiation Group, Infrastructure Planning Office; as published; 2017.

Technical Area Boundaries; Los Alamos National Laboratory, Site Planning & Project Initiation Group, Infrastructure Planning Office; September 2007; as published 13 August 2010.

Structures; County of Los Alamos, Information Services; as published 29 October 2007.

World Shaded Relief; ArcGIS Map Service; http://services.arcgisonline.com/ArcGIS/service; 2017.

Watersheds; Los Alamos National Laboratory, ENV Environmental Remediation and Surveillance Program; EP2006-0942; 1:2,500 Scale Data; 27 October 2006.

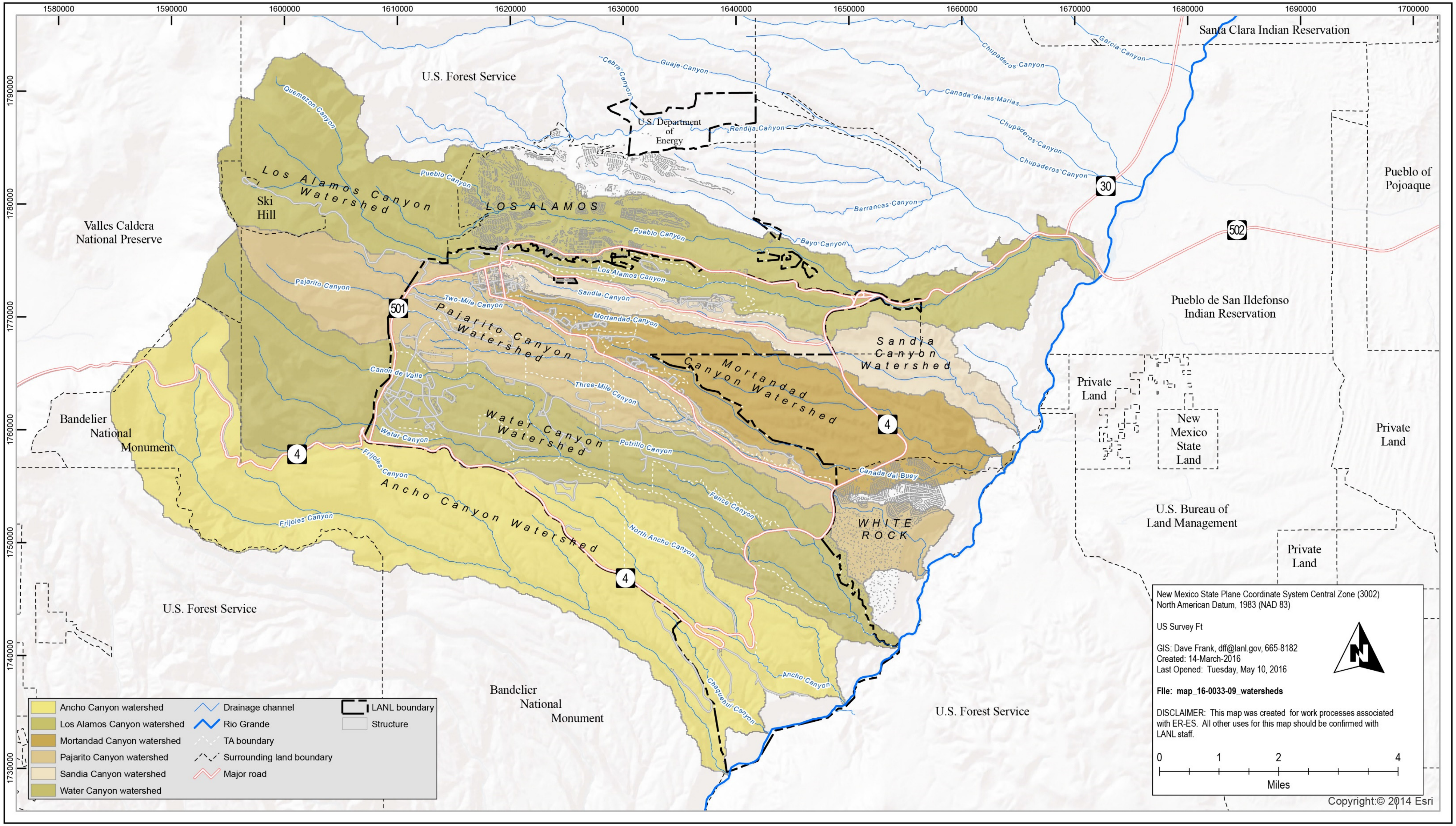


Figure 1.2-1 Watersheds at Los Alamos National Laboratory

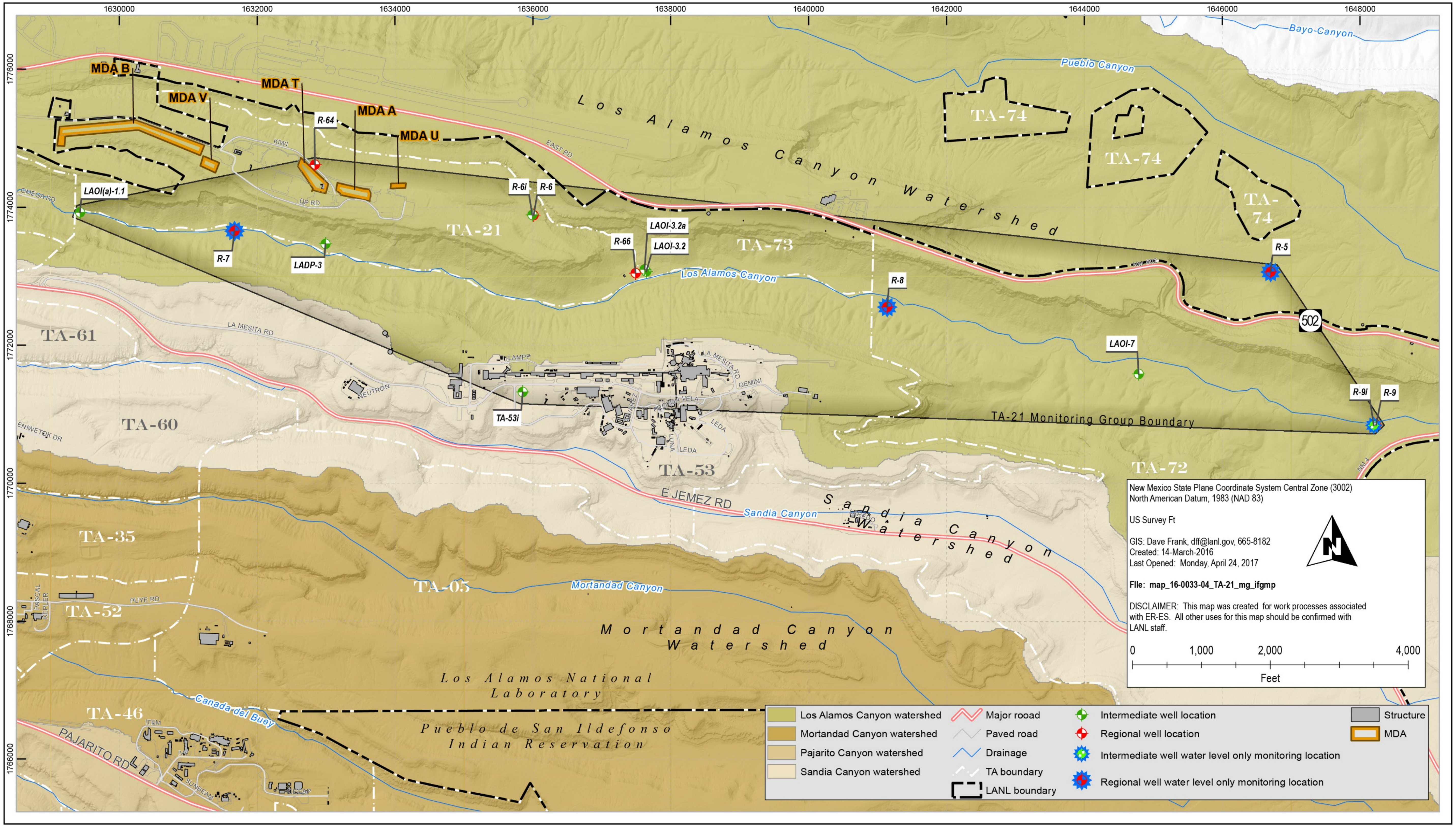
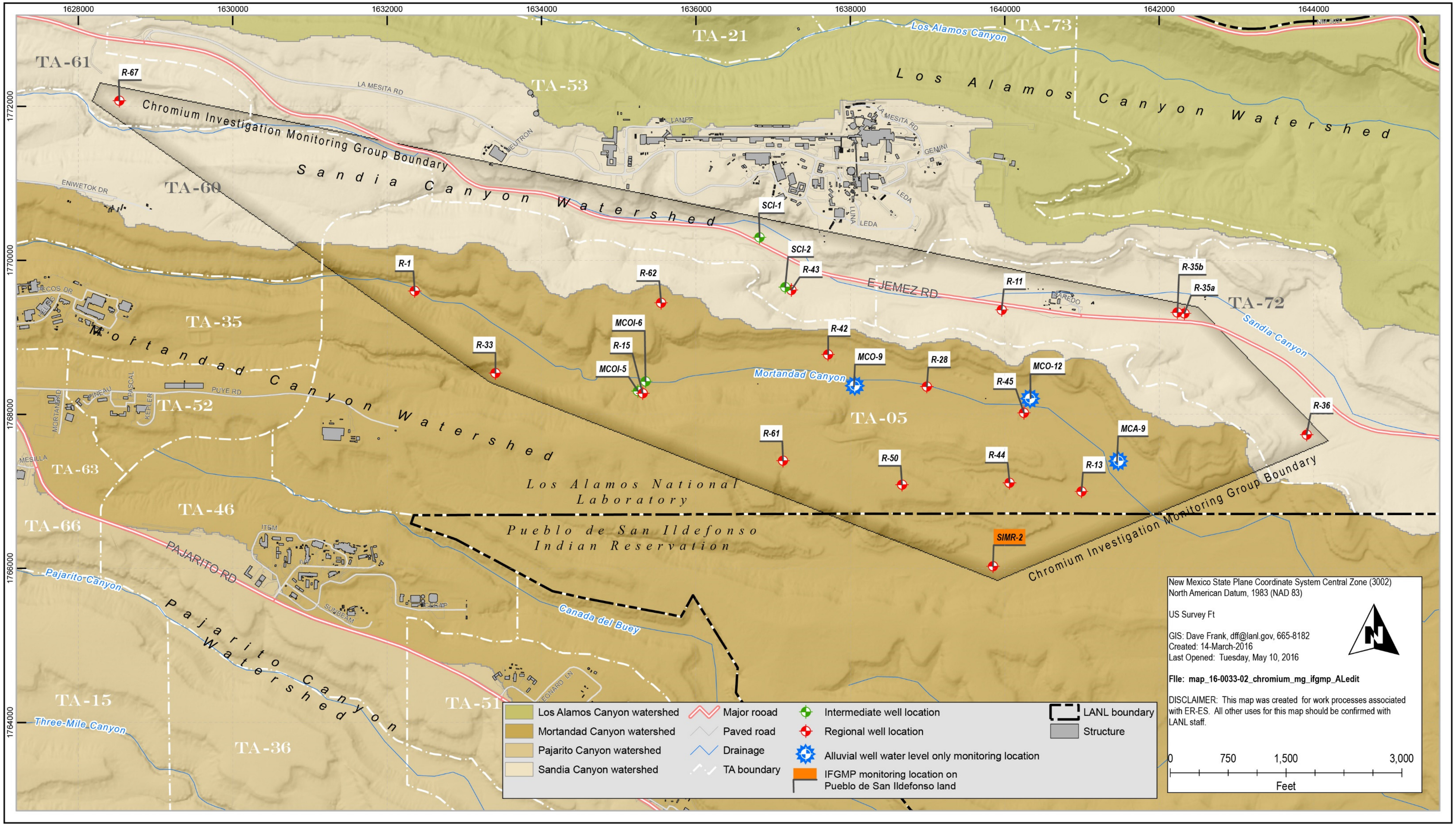


Figure 2.1-1 **TA-21 monitoring group**



New Mexico State Plane Coordinate System Central Zone (3002)
North American Datum, 1983 (NAD 83)

US Survey Ft

GIS: Dave Frank, dff@lanl.gov, 665-8182
Created: 14-March-2016
Last Opened: Tuesday, May 10, 2016

File: map_16-0033-02_chromium_mg_ifgmp_ALedit

DISCLAIMER: This map was created for work processes associated with ER-ES. All other uses for this map should be confirmed with LANL staff.

Figure 3.1-1 Chromium Investigation monitoring group

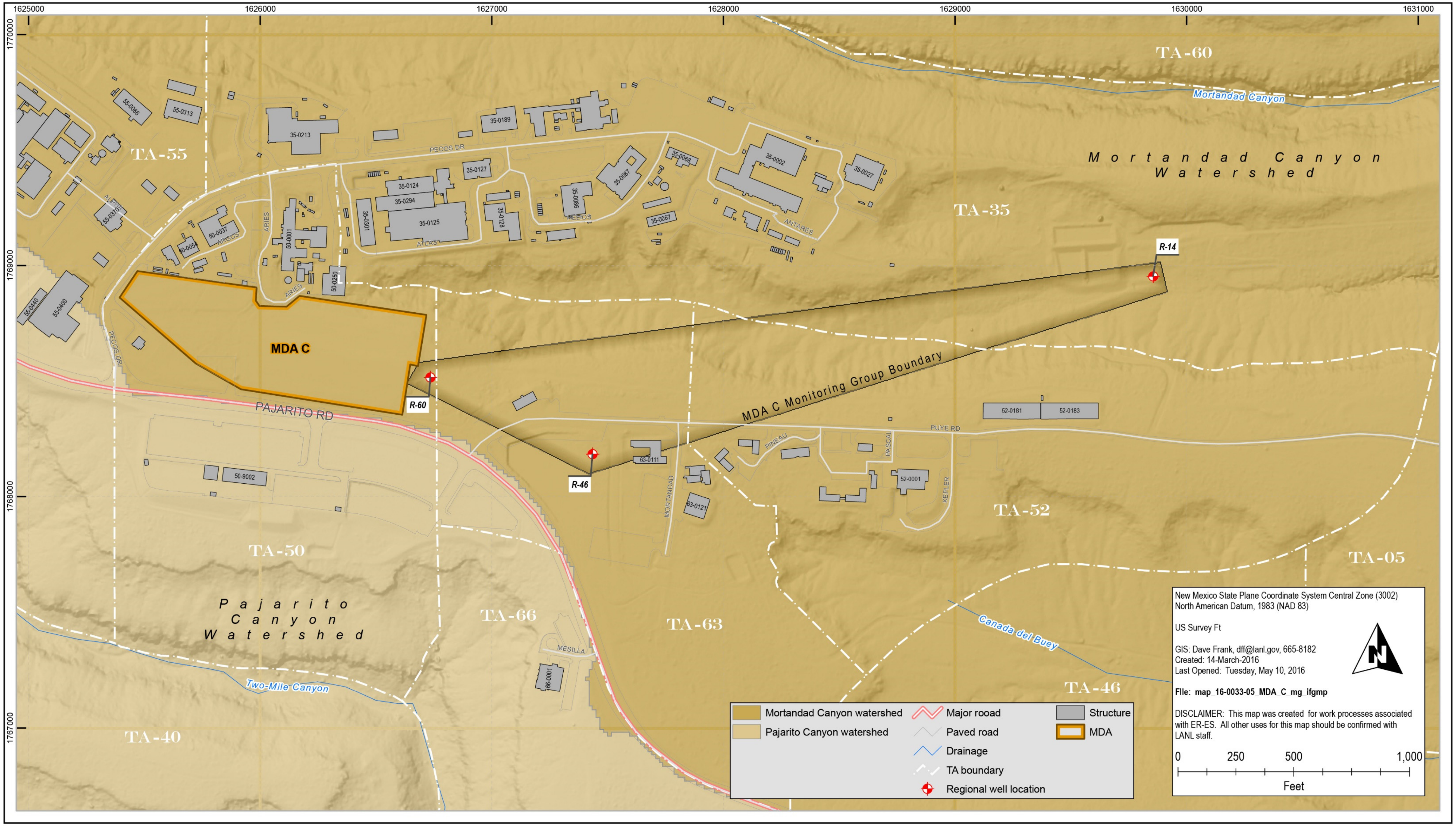


Figure 4.1-1 MDA C monitoring group

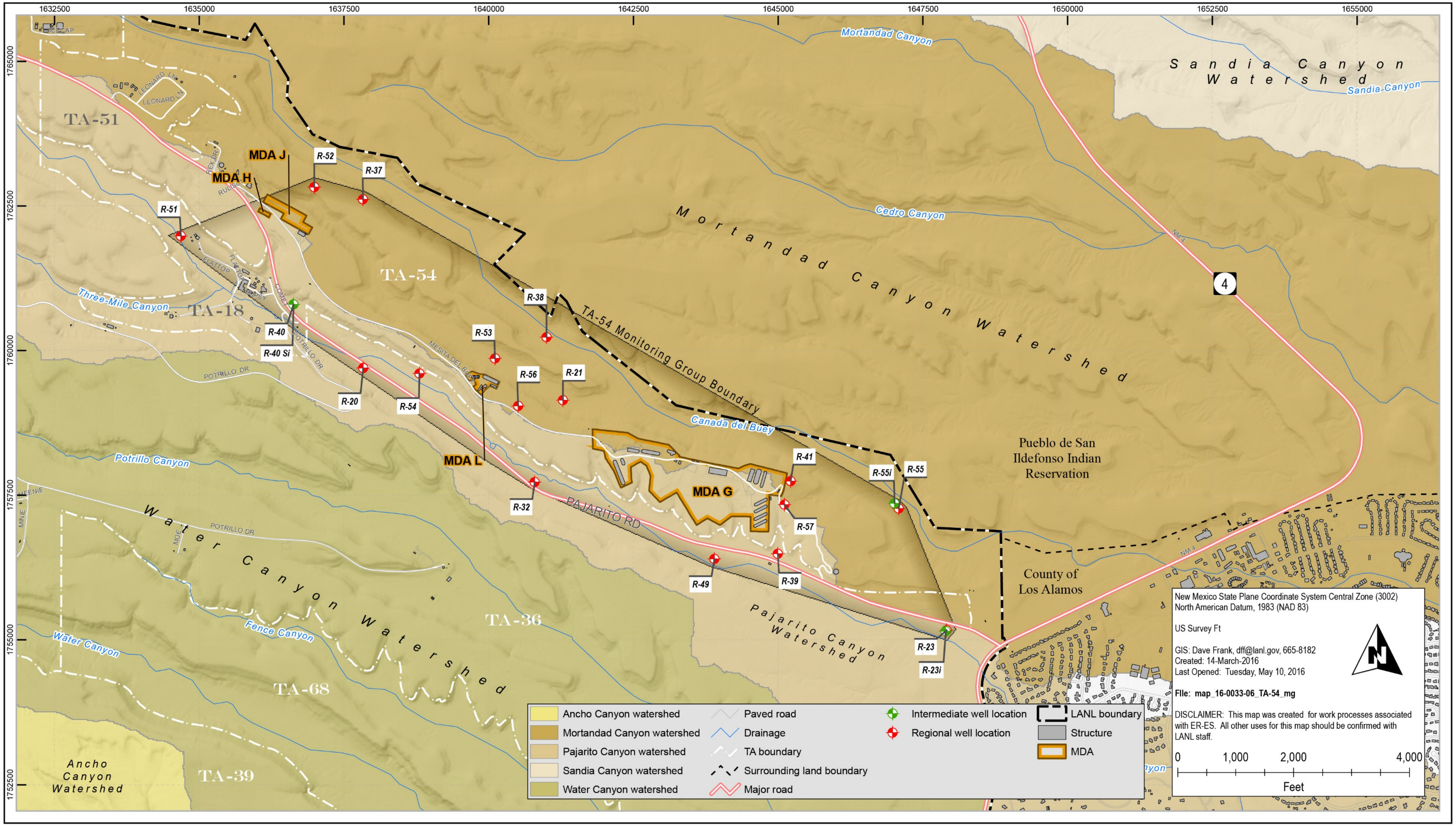


Figure 5.1-1 TA-54 monitoring group

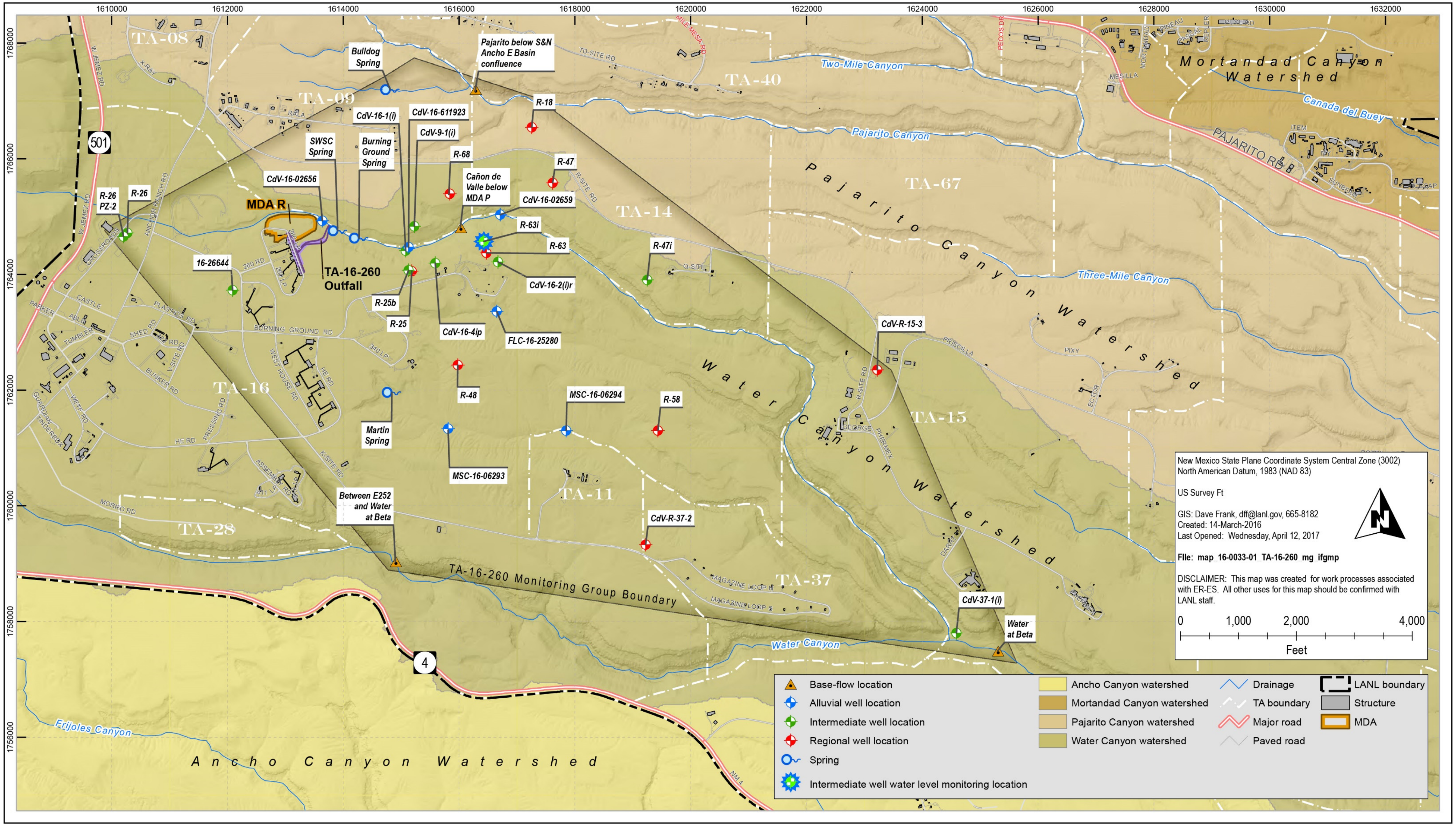


Figure 6.1-1 TA-16 260 monitoring group

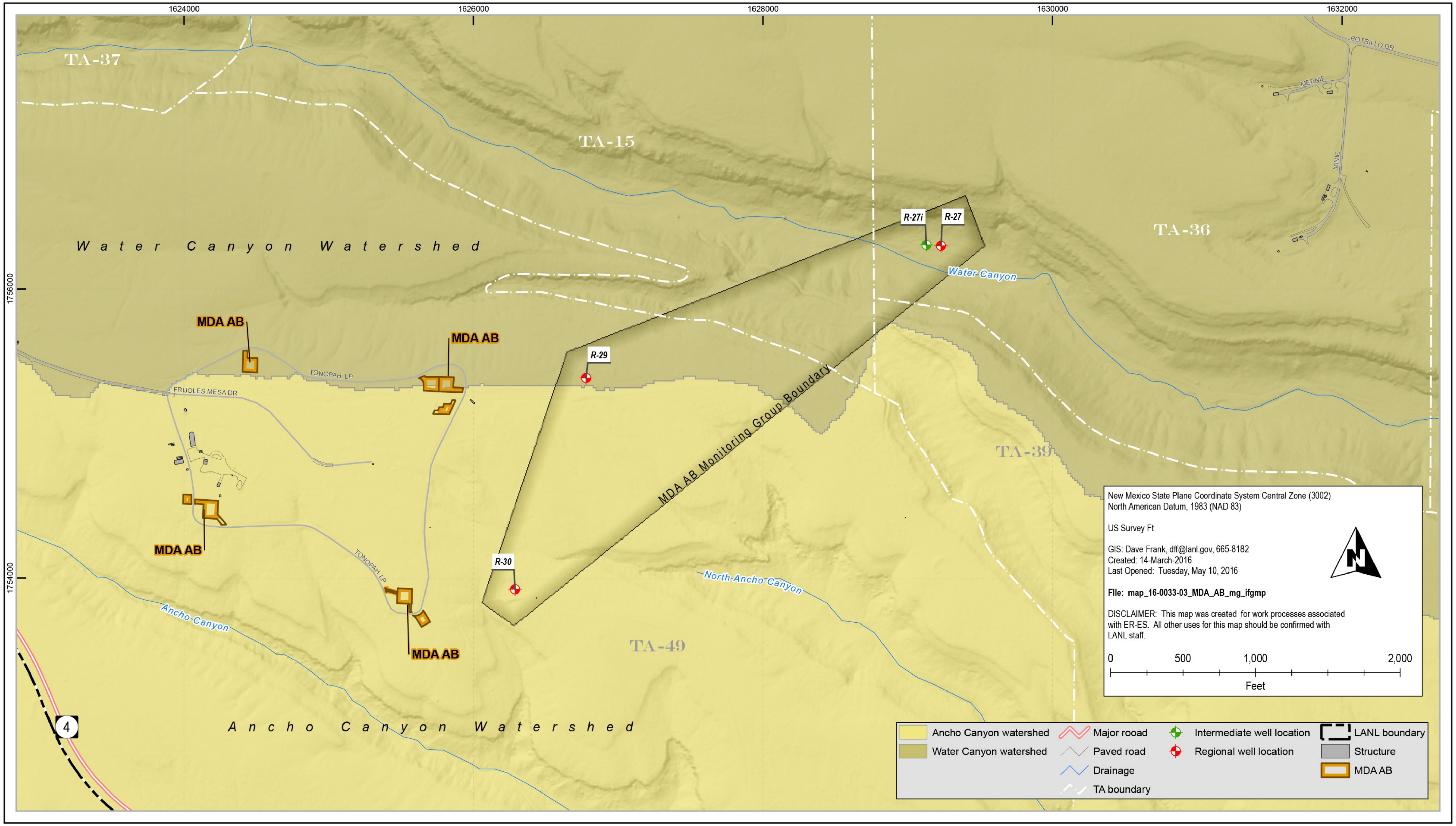


Figure 7.1-1 MDA AB monitoring group

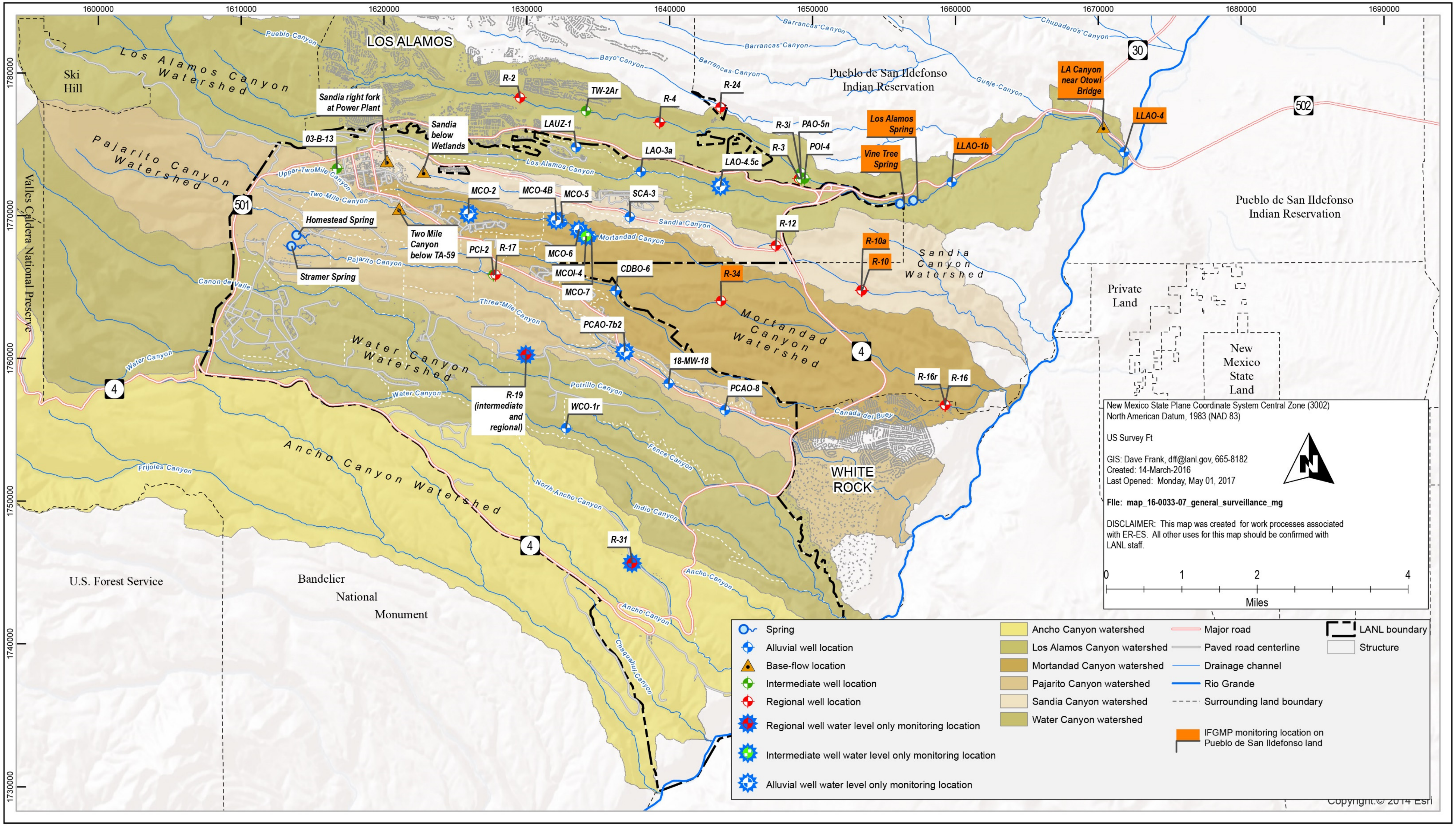


Figure 8.1-1 General surveillance monitoring group (watersheds within the Laboratory)

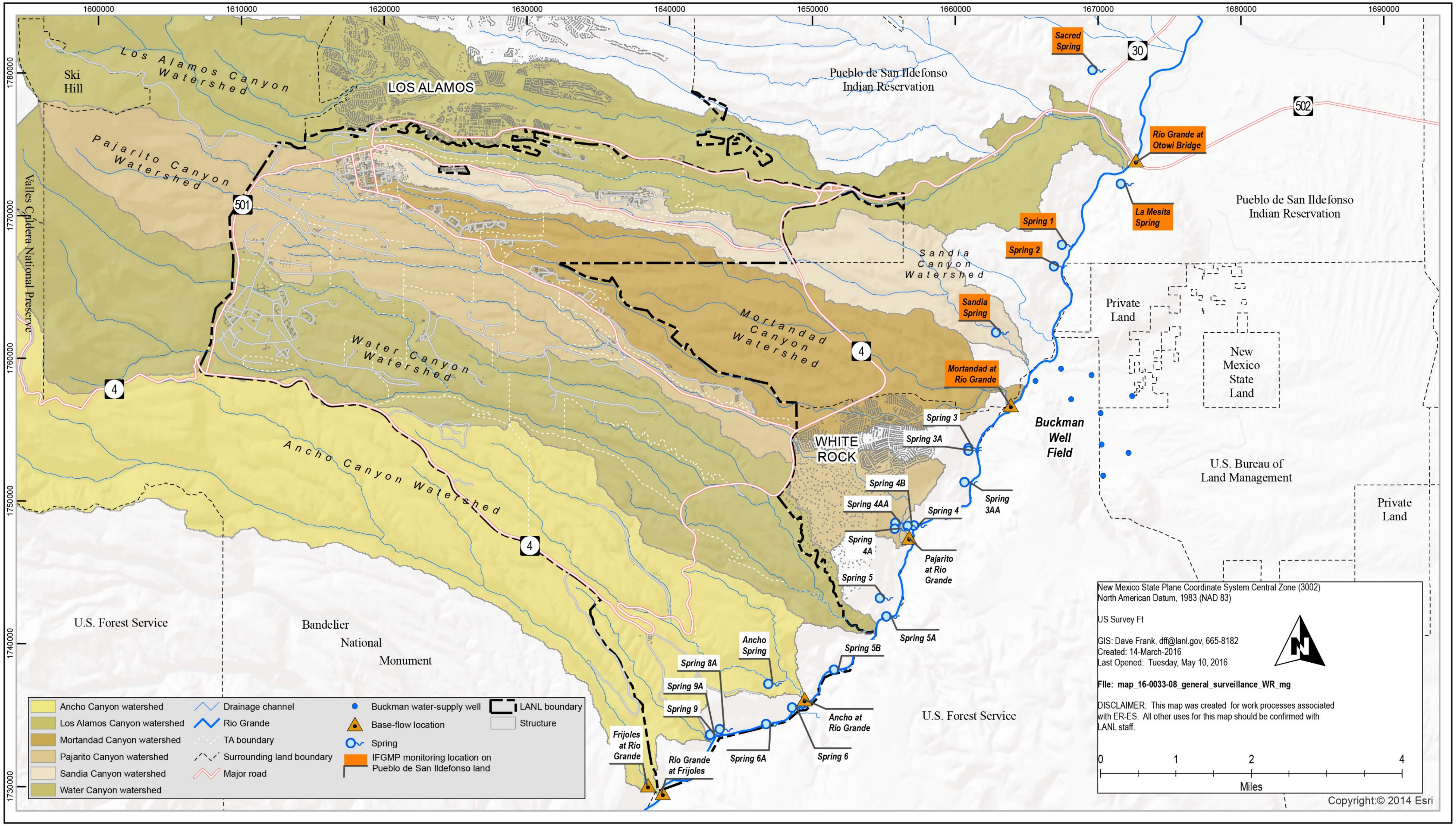


Figure 8.1-2 General surveillance monitoring group (White Rock Canyon)

Table 1.3-1
Periodic Monitoring Report Submittal Schedule for MY2018

Monitoring Group PMR	Quarterly Sampling Events Reported in PMR	PMR Submittal Date
General Surveillance		November 30, 2017
Watershed sampling events included in PMR:		
• Los Alamos/Pueblo	MY 2017: Q1, Q3	
• Mortandad/Sandia	MY 2016: Q4 MY 2017: Q1, Q2, Q3	
• Water	MY 2016: Q4 MY 2017: Q2	
• White Rock Canyon	MY 2017: Q1	
• Ancho	None	
• Pajarito	MY 2017 Q1, Q3	
TA-21	MY 2017: Q2, Q4	February 28, 2018
Chromium Investigation	MY 2017: Q2, Q3, Q4 MY 2018: Q1	May 31, 2018
MDA C	MY 2017: Q3 MY 2018: Q1	
TA-54	MY 2017: Q2, Q3, Q4 MY 2018: Q1	
TA-16 260	MY 2017: Q3, Q4 My 2018: Q1, Q2	August 31, 2018
MDA AB	MY 2017: Q4 MY 2018: Q2	

Orange highlighting 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 1.6-1
Potentially Applicable Standards and SLs Used to Select Base-Flow and Groundwater SVs

Type	Source	Description	Potential Applicability[a]	
			Surface Water	Groundwater (Includes Springs)
New Mexico				
Standard	20 NMAC 6.4.900.F	Livestock Watering	X	—
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 SL 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] SLs 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 1.6-2
Analytes, Field Preparation, and Analytical Methods Used by EPA Contract Laboratory Program Laboratories for Samples Collected under the Interim Plan

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, calcium, cobalt, copper, iron, magnesium, manganese, potassium, silicon dioxide, sodium, strontium, tin, vanadium, zinc
			SW-846:6020	Antimony, arsenic, boron, 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 1.6-2 (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, gross gamma, 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 1.6-3
Analytes, Field Preparation, and Analytical Methods Used for Screening Samples Collected under the Interim Plan

Analytical Suite	Analytical Group	Field Prep	Analytical Method	Analytes
Chromium Isotopes	WSP-CR52/53	Filtered	SW-846:6020	Chromium-53/52
$^{15}N/^{18}O$ Isotopes in Nitrate	WSP-N15/O18-NO3	Filtered	Generic: Nitrogen and oxygen isotope ratios	Nitrogen-15/nitrogen-14 ratio and oxygen-18/oxygen-16 ratio from nitrate
Anions	WSP-EES6-Anions	Filtered	EPA:300.0	Bromide, chloride, fluoride, nitrate, nitrate as nitrogen, nitrite, nitrite as nitrogen, oxalate, phosphorus, orthophosphate (expressed as PO4), sulfate
Cations	WSP-EES6-Met	Filtered	EPA:200.7, EPA:200.8	Aluminum, antimony, arsenic, arsenite, barium, beryllium, boron, cadmium, calcium, cesium, chromium, cobalt, copper, iron, lead, lithium, magnesium, manganese, mercury, molybdenum, nickel, potassium, rhenium, selenium, silicon dioxide, silver, sodium, strontium, thallium, tin, titanium, uranium, vanadium, zinc
Alkalinity and pH	WSP-EES6-Alk	Filtered	EPA:150.1	Acidity/Alkalinity of a solution (i.e., pH)
			EPA:310.1	Alkalinity-CO_3, alkalinity-CO_3+HCO_3
Sodium Bromide Tracer	WSP-EES-Br	Unfiltered	EPA:300.0	Sodium bromide (returned as bromide)
Naphthalene Sulfonate Tracers	WSP-EES-Tracers	Unfiltered	SW-846:8330, Generic polyaromatic sulfonates	Sodium 1-naphthalenesulfonate
				Sodium 2-naphthalenesulfonate
				Sodium 1,5-naphthalenedisulfonate
				Sodium 1,6-naphthalenedisulfonate
				Sodium 2,6-naphthalenedisulfonate
				Sodium 2,7-naphthalenedisulfonate
				Sodium 1,3,5-naphthalenetrisulfonate
				Sodium 1,3,6-naphthalenetrisulfonate
Deuterated Water Tracer	WSP-EES-D_2H	Unfiltered	Generic: Deuterium Ratio	Deuterium ratio
Sodium Perrhenate Tracer	WSP-EES-$NaReO_4$	Unfiltered	EPA:200.8	Sodium perrhenate ($NaReO_4$) (returned as rhenium)
RDX/HMX/TNT	WSP-EES-RDX	Unfiltered	SW-846:8330	RDX, HMX, trinitrotoluene[2,4,6-]

Table 1.7-1
Sampling Schedule for MY2018: October 1, 2017–September 30, 2018

Primary Watershed/ Monitoring Group	Sampling Table	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
		Oct–Dec 2017	Jan–Mar 2018	Apr–Jun 2018	Jul–Sep 2018
Pajarito Watershed					
TA-54	Table 5.4-1	A, S	—[a]	S	—
General Surveillance	Table 8.3-1	S	—	A, S	—
Mortandad and Sandia Canyons					
Chromium Investigation	Table 3.4-1	B^{2018}, A, S, Q	Q[b]	S, Q	Q
MDA C	Table 4.4-1	A	—	—	—
General Surveillance	Table 8.3-1	T^{2018}, A[c], S	—	S	B^{2018}, A
Los Alamos and Pueblo Canyons					
TA-21	Table 2.4-1	—	—	—	B^{2018}, A
General Surveillance	Table 8.3-1	T^{2018}, A[d], S	—	B^{2018}, A, S	—
Water/ Cañon de Valle Watershed[e]					
TA-16 260	Table 6.4-1	Q	B^{2018}, A, S, Q	Q	S, Q
General Surveillance	Table 8.3-1	—	S	—	B^{2018}, A, S
Ancho Watershed					
MDA AB	Table 7.4-1	—	A	—	—
White Rock Canyon					
General Surveillance	Table 8.3-1	T^{2018}, B^{2018}, A	—	—	—
Characterization					
All Watersheds	Characterization	Q	Q	Q	Q

Notes: Sampling frequencies: 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] An 8-h extended purge will be conducted at R-62 during the second quarter (January–March) of MY2018.

[c] R-10 S1, R-10 S2, R-34.

[d] LA Canyon near Otowi Bridge, Vine Spring.

[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 1.8-1
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 wets up.	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

Table 1.8-1 (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	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 1.8-1 (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 S2, 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
	R-63i	Completed in deep perched-intermediate groundwater just above the regional aquifer. Monitor water levels only because of limited yield.	Intermediate	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 measurement 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 (2018)[a]	B (2018)	—[b]	—	—	A	—	B (2018)	A
LAOI(a)-1.1	Los Alamos	TA-21	Intermediate	A	B (2018)	B (2018)	—	—	—	A	—	B (2018)	A
LAOI-3.2	Los Alamos	TA-21	Intermediate	A	B (2018)	B (2018)	—	—	—	A	A	—	A
LAOI-3.2a	Los Alamos	TA-21	Intermediate	A	B (2018)	B (2018)	—	—	—	A	A	—	A
LAOI-7	Los Alamos	TA-21	Intermediate	A	B (2018)	B (2018)	—	—	—	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 (2018)	—	—	—	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 (2018)	B (2018)	—	—	—	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] 2018 = Samples scheduled to be collected during implementation of MY2018 Interim Plan.

[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 Sulfonates	Sodium Bromide Tracer	Sodium Perrhenate Tracer	Deuterated Water Tracer
MCOI-5	Mortandad	Chromium	Intermediate	Q	S	S	—[a]	—	—	A	A	—	Q	S	A	—	—	—	—
MCOI-6	Mortandad	Chromium	Intermediate	Q	S	S	B (2018)[b]	—	—	A	A	—	Q	S	A	—	—	—	—
SCI-1	Sandia	Chromium	Intermediate	S	B (2018)	B (2018)	B (2018)	—	—	A	—	A	S	A	A	—	—	—	—
SCI-2	Sandia	Chromium	Intermediate	Q	B (2018)	B (2018)	B (2018)	—	—	A	A	—	Q	S	A	—	—	—	—
R-1	Mortandad	Chromium	Regional	S	B (2018)	B (2018)	B (2018)	—	—	B (2018)	—	A	S	A	A	—	—	—	—
R-11	Sandia	Chromium	Regional	Q	B (2018)	B (2018)	—	—	—	B (2018)	—	B (2018)	Q	A	A	—	—	—	—
R-13	Mortandad	Chromium	Regional	Q	B (2018)	B (2018)	—	—	—	B (2018)	—	A	Q	A	A	—	—	—	—
R-15	Mortandad	Chromium	Regional	Q	B (2018)	B (2018)	—	—	—	B (2018)	—	B (2018)	Q	A	A	—	—	—	—
R-28[c]	Mortandad	Chromium	Regional	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
R-33 S1	Mortandad	Chromium	Regional	Q	B (2018)	B (2018)	—	—	—	B (2018)	—	A	Q	A	A	—	—	—	—
R-33 S2	Mortandad	Chromium	Regional	Q	B (2018)	B (2018)	—	—	—	B (2018)	—	A	Q	A	A	—	—	—	—
R-35a	Sandia	Chromium	Regional	Q	B (2018)	B (2018)	—	—	—	B (2018)	—	A	Q	A	A	—	—	—	—
R-35b	Sandia	Chromium	Regional	Q	B (2018)	B (2018)	—	—	—	B (2018)	—	A	Q	A	A	—	—	—	—
R-36	Sandia	Chromium	Regional	Q	B (2018)	B (2018)	—	—	—	B (2018)	—	B (2018)	Q	A	A	—	—	—	—
R-42[c]	Mortandad	Chromium	Regional	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
R-43 S1	Sandia	Chromium	Regional	Q	B (2018)	B (2018)	—	—	—	B (2018)	—	A	Q	Q	A	—	—	—	—
R-43 S2	Sandia	Chromium	Regional	Q	B (2018)	B (2018)	—	—	—	B (2018)	—	A	Q	A	A	—	—	—	—
R-44 S1	Mortandad	Chromium	Regional	M	B (2018)	B (2018)	—	—	—	B (2018)	—	A	M	S	S	M	M	M	M
R-44 S2	Mortandad	Chromium	Regional	M	B (2018)	B (2018)	—	—	—	B (2018)	—	A	M	A	A	M	M	M	M
R-45 S1	Mortandad	Chromium	Regional	M	B (2018)	B (2018)	—	—	—	B (2018)	—	A	M	S	S	M	M	M	M
R-45 S2	Mortandad	Chromium	Regional	M	B (2018)	B (2018)	—	—	—	B (2018)	—	A	M	S	S	M	M	M	M
R-50 S1	Mortandad	Chromium	Regional	M	B (2018)	B (2018)	—	—	—	B (2018)	—	S	M	S	A	M	—	—	—
R-50 S2	Mortandad	Chromium	Regional	M	B (2018)	B (2018)	—	—	—	B (2018)	—	S	M	A	A	M	—	—	—
R-61 S1	Mortandad	Chromium	Regional	M	—	—	—	—	—	—	—	—	M	S	—	—	—	—	—
R-62[d]	Mortandad	Chromium	Regional	Q	B (2018)	B (2018)	—	—	—	B (2018)	—	A	Q	S	A	—	—	—	—
R-67	Sandia	Chromium	Regional	Q	B (2018)	B (2018)	—	—	—	B (2018)	—	S	Q	S	A	—	—	—	—
SIMR-2[e]	Mortandad	Chromium	Regional	M	B (2018)	B (2018)	—	—	—	B (2018)	—	S	M	S	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 2018 = Samples scheduled to be collected during implementation of MY2018 Interim Plan.

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

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

e 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 Interim Plan.

[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-40 S2	Pajarito	TA-54	Regional	A	S	A	V (2020)	V (2020)	—	A	—	S	A
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 Interim Plan.

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

[c] The Interim Plan 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 stipulated by EPC-CP-QP-205.

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 Sulfonates	Sodium Bromide Tracer	$^{15}N/^{18}O$ Isotopes in Nitrate
Canon de Valle below MDA P	Water	TA-16 260	Base flow	S	S	B (2018)[a]	V (2020)[b]	S	V (2020)	B (2018)	—[c]	—	S	—	—	—
Between E252 and Water at Beta	Water	TA-16 260	Base flow	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	—
Water at Beta	Water	TA-16 260	Base flow	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	—
Pajarito below S&N Ancho E Basin Confluence	Pajarito	TA-16 260	Base flow	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	—
Bulldog Spring	Pajarito	TA-16 260	Spring	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	A
SWSC Spring	Water	TA-16 260	Spring	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	A
Burning Ground Spring	Water	TA-16 260	Spring	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	A	S	—	—	A
Martin Spring	Water	TA-16 260	Spring	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	A	S	—	—	A
FLC-16-25280	Water	TA-16 260	Alluvial	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	—
CdV-16-02656	Water	TA-16 260	Alluvial	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	—
CdV-16-02657r	Water	TA-16 260	Alluvial	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	—
CdV-16-02659	Water	TA-16 260	Alluvial	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	—
CdV-16-611923	Water	TA-16 260	Alluvial	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	—
MSC-16-06293	Water	TA-16 260	Alluvial	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	—
MSC-16-06294	Water	TA-16 260	Alluvial	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	—
PRB Alluvial Seep	Water	TA-16 260	Alluvial	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	—
CdV-16-611937	Water	TA-16 260	Alluvial	S	S	B (2018)	V (2020)	S	V (2020)	B (2018)	—	—	S	—	—	—
16-26644	Water	TA-16 260	Intermediate	S	S	B (2018)	—	Q	—	B (2018)	—	A	S	—	—	A
CdV-9-1(i) S1	Water	TA-16 260	Intermediate	S	S	B (2018)	V (2020)	Q	A	A	—	A	S	Q	Q	A
CdV-16-1(i)	Water	TA-16 260	Intermediate	S	S	B (2018)	—	Q	—	B (2018)	—	A	S	Q	Q	A
CdV-16-2(i)r	Water	TA-16 260	Intermediate	S	S	B (2018)	—	Q	—	B (2018)	—	A	S	Q	Q	A
CdV-16-4ip S1	Water	TA-16 260	Intermediate	S	S	B (2018)	V (2020)	Q	V (2020)	B (2018)	—	A	S	Q	—	A
CdV-37-1(i)	Water	TA-16 260	Intermediate	S	S	B (2018)	—	S	—	B (2018)	—	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 (2018)	—	Q	—	B (2018)	—	A	S	Q	Q	—
R-26 PZ-2	Water	TA-16 260	Intermediate	S	S	B (2018)	—	S	—	B (2018)	—	A	S	—	—	—
R-26 S1	Water	TA-16 260	Intermediate	S	S	B (2018)	—	S	—	B (2018)	—	A	S	—	—	—
R-47i	Water	TA-16 260	Intermediate	S	S	B (2018)	—	Q	—	B (2018)	—	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 Sulfonates	Sodium Bromide Tracer	$^{15}N/^{18}O$ Isotopes in Nitrate
R-47	Water	TA-16 260	Regional	S	Q	B (2018)	V (2020)	Q	V (2020)	B (2018)	—	A	S	Q	Q	A
CdV-R-15-3 S4	Water	TA-16 260	Regional	S	S	B (2018)	—	S	—	B (2018)	—	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 (2018)	—	Q	—	B (2018)	—	A	S	Q	Q	A
R-25 S5	Water	TA-16 260	Regional	—	—	—	—	—	—	—	—	—	—	Q	Q	A
R-48	Water	TA-16 260	Regional	S	S	B (2018)	—	Q	—	B (2018)	—	A	S	Q	Q	A
R-58	Water	TA-16 260	Regional	Q	Q	B (2018)	V (2020)	Q	V (2020)	B (2018)	—	S	Q	Q	Q	A
R-63	Water	TA-16 260	Regional	S	S	B (2018)	—	Q	—	B (2018)	—	A	S	Q	Q	—
R-68[d]	Water	TA-16 260	Regional	Q1	Q1	Q1	—	Q1	Q1	Q1	—	Q1	Q1	Q1	Q1	Q1
R-68[e]	Water	TA-16 260	Regional	S	Q	S	—	Q	—	B (2018)	—	A	S	Q	Q	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); Q1 = Monitor Year 2018 Q1 only.

[a] 2018 = Samples scheduled to be collected during implementation of MY2018 Interim Plan.

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

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

[d] R-68 sampling plan for MY2018 first quarter (Q1) only. This Q1 sampling plan for R-68 produces the fourth “full analytical suite” sampling round (out of four required) for this new regional well.

[e] R-68 sampling frequencies for MY2018 quarters 2, 3, and 4. The specified sampling frequencies are used in conjunction with Table 1.7-1 to develop the R-68 sampling plan for MY2018 quarters 2, 3, and 4.

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	A	A	A	V (2020)[b]	T (2018)[c]	V (2020)	A	—[d]	A	A
Los Alamos Spring	Los Alamos	General Surveillance	Spring	A	A	T (2018)	T (2018)	T (2018)	V (2020)	A	—	A	A
Vine Tree Spring	Los Alamos	General Surveillance	Spring	S	S	T (2018)	T (2018)	T (2018)	V (2020)	A	—	A	S
LLAO-1b	Los Alamos	General Surveillance	Alluvial	A	A	T (2018)	T (2018)	T (2018)	V (2020)	A	—	—	A
LLAO-4	Los Alamos	General Surveillance	Alluvial	A	A	T (2018)	T (2018)	T (2018)	V (2020)	A	—	—	A
LAO-3a	Los Alamos	General Surveillance	Alluvial	A	B (2018)	B (2018)	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 (2018)	B (2018)	V (2020)	—	V (2020)	A	—	—	A
POI-4	Pueblo	General Surveillance	Intermediate	A	B (2018)	B (2018)	—	—	—	A	—	B (2018)	A
R-3i	Pueblo	General Surveillance	Intermediate	A	B (2018)	B (2018)	—	—	—	A	—	B (2018)	A
TW-2Ar	Pueblo	General Surveillance	Intermediate	A	B (2018)	B (2018)	—	—	—	A	—	B (2018)	A
R-2	Pueblo	General Surveillance	Regional	A	B (2018)	B (2018)	—	—	—	A	—	A	A
R-24	Pueblo	General Surveillance	Regional	A	B (2018)	B (2018)	—	—	—	A	—	B (2018)	A
R-3	Pueblo	General Surveillance	Regional	A	B (2018)	B (2018)	—	—	—	A	—	B (2018)	A
R-4	Pueblo	General Surveillance	Regional	A	A	A	—	—	—	A	—	B (2018)	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	—	—	—	—	—	—	—	—	B (2019)	—
R-10 S1	Sandia	General Surveillance	Regional	A	A	A	T (2018)	T (2018)	—	A	—	A	A
R-10 S2	Sandia	General Surveillance	Regional	A	A	A	T (2018)	T (2018)	—	A	—	A	A
R-10a	Sandia	General Surveillance	Regional	S	S	S	T (2018)	T (2018)	—	S	—	S	S
CDBO-6	Mortandad	General Surveillance	Alluvial	B (2018)	B (2018)	B (2018)	V (2020)	—	V (2020)	A	—	—	B (2018)
MCO-5	Mortandad	General Surveillance	Alluvial	A	B (2018)	B (2018)	V (2020)	—	V (2020)	A	—	B (2018)	A
MCO-7	Mortandad	General Surveillance	Alluvial	A	A	A	A	—	V (2020)	A	—	B (2018)	A
R-16 S2	Mortandad	General Surveillance	Regional	A	B (2018)	B (2018)	—	—	—	A	—	A	A
R-16 S4	Mortandad	General Surveillance	Regional	A	B (2018)	B (2018)	—	—	—	A	—	A	A
R-16r	Mortandad	General Surveillance	Regional	A	B (2018)	B (2018)	—	—	—	A	—	A	A
R-34	Mortandad	General Surveillance	Regional	A	A	A	T (2018)	T (2018)	—	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	A	B (2019)	B (2019)	V (2020)	V (2020)	V (2020)	A	—	B (2019)	A
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 (2018)	B (2018)	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 (2018)	B (2018)	B (2018)	B (2018)	B (2018)	B (2018)	B (2018)	—	—	B (2018)
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 (2018)	T (2018)	—	A	—	A	A
Lower La Mesita Spring	White Rock and Rio Grande	General Surveillance	Spring	A	A	A	T (2018)	T (2018)	—	A	—	A	A
Sacred Spring	White Rock and Rio Grande	General Surveillance	Spring	A	A	A	T (2018)	T (2018)	—	A	—	A	A
Sandia Spring	White Rock and Rio Grande	General Surveillance	Spring	A	A	A	B (2018)	B (2018)	—	A	—	A	A
Lower Sandia Spring	White Rock and Rio Grande	General Surveillance	Spring	A	A	A	B (2018)	B (2018)	—	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 (2018)	B (2018)	—	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

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 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
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 Interim Plan.

[c] 2018 = Samples scheduled to be collected during implementation of MY2018 Interim Plan.

[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 Interim Plan.

[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 per EPC-CP-QP-205. 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

ADEM	Associate Directorate for Environmental Management’
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.)
EPA	Environmental Protection Agency (U.S.)
GFM	geologic framework model
GGRL	Geochemistry and Geomaterials Research Laboratories
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
Interim Plan	Interim Facility-Wide Groundwater Monitoring Plan
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
NIST	National Institute of Standards and Technology
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Control Commission
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
SL	screening level
SMO	Sample Management Office
SOP	standard operating procedure
SU	Standard Unit
SV	screening value
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 Los Alamos National Laboratory (LANL or the Laboratory) 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 (the Interim Plan). The SOPs are listed at http://www.lanl.gov/environment/plans-procedures.php and are available at the Los Alamos National Laboratory Public Reading Room at eprr.lanl.gov.

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-10094	Handling, Packaging, and Transporting Field Samples	Procedure for sample packaging and shipping
ER-SOP-10095	Shipping/Receiving of Environmental Samples by the Sample Management Office (SMO)	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		
EP-DIR-SOP-10021	Characterization and Management of Environmental Program Waste	Procedure 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 Interim Plan 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
• EP-DIR-SOP-10021, Characterization and Management of Environmental Programs Waste
• 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 Interim Plan. 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 Interim Plan. 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 Interim Plan. 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-10095, Shipping/Receiving of Environmental Samples by the Sample Management Office (SMO)	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 Interim Facility-Wide Groundwater Monitoring Plan	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 18th, 19th, 20th 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 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 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 1.6-2 and B-4.1-1. The 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 at 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 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 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 average MDLs and PQLs for groundwater and base-flow samples collected during the 5-yr period from 2008 to 2012. For comparison, these tables also include the lowest applicable groundwater cleanup levels or base-flow screening values, as appropriate.

B-4.2 Analyses by On-Site Laboratories

Regulatory analyses that support Laboratory’s characterization, cleanup, and monitoring programs are provided by external contract analytical laboratories. However, in some specific situations, samples are most appropriately submitted for on-site analysis by the Geochemistry and Geomaterials Research Laboratories (GGRL) in the Laboratory’s Earth Systems Observations Group. In-house analyses are often used in the following cases:

- When rapid turnaround data (e.g., less than 24 h) are required to support activities such as drilling, well development, or well rehabilitation. Such rapid turnaround analyses are not available (at reasonable cost) from external laboratories.
- When special studies are undertaken to develop and refine conceptual models for contaminant transport in the environment. Examples of such studies include studies of stable isotopes and of contaminant concentration trends during long-term aquifer testing and rebound.
- When a well screen is impacted by the residual effects of drilling and construction and is not producing reliable or representative water-quality data that fully meet monitoring objectives.

Table B-4.2-1 lists the analytical methods, PQLs, and MDLs for analytes reported by GGRL in recent data packages submitted to the Laboratory. The analytical methods used by GGRL are the most recent EPA and industry-accepted extraction and analytical methods for chemical analyses of these analytes.

B-5.0 INVESTIGATION-DERIVED WASTE MANAGEMENT

This section describes how investigation-derived waste (IDW) generated during the groundwater monitoring activities conducted under this Interim Plan 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 has potentially come into contact with contaminants. IDW generated during implementation of the Interim Plan will be managed to protect human health and the environment, comply with applicable regulatory requirements, and adhere to Laboratory waste minimization goals.

All IDW generated during groundwater-monitoring activities will be managed in accordance with applicable Environmental Programs Directorate SOPs, which incorporate the requirements of all applicable EPA and NMED regulations, U.S. Department of Energy (DOE) orders, and Laboratory requirements. The SOP applicable to the characterization and management of IDW is

- EP-DIR-SOP-10021, Characterization and Management of Environmental Programs Waste.

The most current version of the Los Alamos National Security, LLC, “2016 Hazardous Waste Minimization Report” (LANL 2016, 602030) will be implemented during groundwater monitoring to minimize waste generation. This document is updated annually as a requirement of section 2.9 of the Laboratory’s Hazardous Waste Facility Permit.

The IDW waste streams associated with groundwater monitoring are identified in the 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 Interim Plan are summarized in Table B-5.0-1.

A waste characterization strategy form (WCSF) will be prepared and approved per requirements of EP-DIR-SOP-10021. The WCSF will provide 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, surface soil, subsurface soil). 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 will be detailed in the WCSF and approved before the waste is generated. Transportation and disposal requirements will also be detailed 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. The Laboratory 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. The Laboratory expects most of these wastes to be nonhazardous liquid waste or radioactive liquid waste that will be sent to one of its wastewater treatment facilities or a Laboratory-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 or ESHID. This information is also included in text citations. ERIDs were assigned by the Associate Directorate for Environmental Management's (ADEM's) Records Processing Facility (IDs through 599999), and ESHIDs are assigned by the Environment, Safety, and Health Directorate (IDs 600000 and above). IDs are used to locate documents in the Laboratory's Electronic Document Management System and in the Master Reference Set. The NMED Hazardous Waste Bureau and ADEM 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), November 29, 2016. "2016 Hazardous Waste Minimization Report," Los Alamos National Laboratory document LA-UR-16-38635, Los Alamos, New Mexico. (LANL 2016, 602030)

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 Interim Plan

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-]
38998-75-3	Heptachlorodibenzofurans (Total)

Table B-4.1-1 (continued)

Symbol or CAS No.	Analyte
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 1.6-2 and serves to complete the analyte lists in Table 1.6-2.
* DNX, MNX, and TNX are RDX degradation products.

Table B-4.1-2
Analytes and MDLs and PQLs Obtained for Groundwater Samples by Contract Laboratories and Analyte Detection Statistics from 2008 to 2012

Suite	Symbol or CAS No.	Analyte	Unit	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	GW Std	GW Std Type
Alpha Spec	Am-241	Americium-241	pCi/L	1960	13	0.7	—*	—	0.0302	0.34344	3.81	1.2	DOE DW DCG
Alpha Spec	Np-237	Neptunium-237	pCi/L	62	0	0	—	—	—	—	—	1.2	DOE DW DCG
Alpha Spec	Pu-238	Plutonium-238	pCi/L	1960	6	0.3	—	—	0.026	0.70805	4.02	1.6	DOE DW DCG
Alpha Spec	Pu-239/240	Plutonium-239/240	pCi/L	1960	23	1	—	—	0.0281	0.42688	4.38	1.2	DOE DW DCG
Alpha Spec	Th-228	Thorium-228	pCi/L	178	16	9	—	—	0.0808	0.32136	1.1	—	—
Alpha Spec	Th-230	Thorium-230	pCi/L	178	13	7	—	—	0.0664	0.23225	0.746	—	—
Alpha Spec	Th-232	Thorium-232	pCi/L	177	21	12	—	—	0.0377	0.24046	1.23	—	—
Alpha Spec	U-234	Uranium-234	pCi/L	1966	1713	87	—	—	0.0403	0.75042	29.7	20	DOE DW DCG
Alpha Spec	U-235/236	Uranium-235/236	pCi/L	1966	223	11	—	—	0.0244	0.11502	1.2	24	DOE DW DCG
Alpha Spec	U-238	Uranium-238	pCi/L	1966	1712	87	—	—	0.0284	0.42167	17.3	24	DOE DW DCG
Diox/Fur	1746-01-6	Tetrachlorodibenzodioxin[2,3,7,8-]	µg/L	498	0	0	0.0000012	0.0000063	—	—	—	0.00003	EPA MCL
Diox/Fur	19408-74-3	Hexachlorodibenzodioxin[1,2,3,7,8,9-]	µg/L	498	0	0	0.000004	0.00003	—	—	—	—	—
Diox/Fur	30402-15-4	Pentachlorodibenzofurans (Totals)	µg/L	498	3	0.6	0.000004	0.000025	6.7E-07	3.3E-06	7.4E-06	—	—
Diox/Fur	3268-87-9	Octachlorodibenzodioxin[1,2,3,4,6,7,8,9-]	µg/L	496	53	11	0.00000954	0.000068	1.4E-06	1.7E-05	0.00012	—	—
Diox/Fur	34465-46-8	Hexachlorodibenzodioxins (Total)	µg/L	498	2	0.4	0.000004	0.000025	9.7E-06	1.2E-05	1.4E-05	—	—
Diox/Fur	35822-46-9	Heptachlorodibenzodioxin[1,2,3,4,6,7,8-]	µg/L	498	26	5	0.0000046	0.000032	4.9E-07	6.3E-06	4.4E-05	—	—
Diox/Fur	36088-22-9	Pentachlorodibenzodioxins (Total)	µg/L	498	0	0	0.000004	0.000025	—	—	—	—	—
Diox/Fur	37871-00-4	Heptachlorodibenzodioxins (Total)	µg/L	498	42	8	0.0000047	0.000028	4.9E-07	7.9E-06	7.7E-05	—	—
Diox/Fur	38998-75-3	Heptachlorodibenzofurans (Total)	µg/L	498	17	3	0.000004	0.000025	4E-07	5.7E-06	2.7E-05	—	—
Diox/Fur	39001-02-0	Octachlorodibenzofuran[1,2,3,4,6,7,8,9-]	µg/L	498	18	4	0.0000079	0.000063	6.2E-07	5.3E-06	2.4E-05	—	—
Diox/Fur	39227-28-6	Hexachlorodibenzodioxin[1,2,3,4,7,8-]	µg/L	498	0	0	0.000004	0.00003	—	—	—	—	—
Diox/Fur	40321-76-4	Pentachlorodibenzodioxin[1,2,3,7,8-]	µg/L	498	0	0	0.000004	0.00003	—	—	—	—	—
Diox/Fur	41903-57-5	Tetrachlorodibenzodioxins (Total)	µg/L	498	0	0	0.0000012	0.0000052	—	—	—	—	—
Diox/Fur	51207-31-9	Tetrachlorodibenzofuran[2,3,7,8-]	µg/L	498	0	0	0.000001	0.0000063	—	—	—	—	—
Diox/Fur	55673-89-7	Heptachlorodibenzofuran[1,2,3,4,7,8,9-]	µg/L	498	0	0	0.000046	0.00003	—	—	—	—	—
Diox/Fur	55684-94-1	Hexachlorodibenzofurans (Total)	µg/L	498	8	2	0.0000038	0.000025	5.6E-07	4.5E-06	9.6E-06	—	—
Diox/Fur	55722-27-5	Tetrachlorodibenzofurans (Totals)	µg/L	498	3	0.6	0.000001	0.0000052	9.7E-07	1.9E-06	3.4E-06	—	—
Diox/Fur	57117-31-4	Pentachlorodibenzofuran[2,3,4,7,8-]	µg/L	498	0	0	0.0000038	0.00003	—	—	—	—	—
Diox/Fur	57117-41-6	Pentachlorodibenzofuran[1,2,3,7,8-]	µg/L	498	2	0.4	0.0000038	0.00003	6.7E-07	8.9E-07	1.1E-06	—	—
Diox/Fur	57117-44-9	Hexachlorodibenzofuran[1,2,3,6,7,8-]	µg/L	498	0	0	0.0000037	0.00003	—	—	—	—	—
Diox/Fur	57653-85-7	Hexachlorodibenzodioxin[1,2,3,6,7,8-]	µg/L	498	0	0	0.000004	0.00003	—	—	—	—	—
Diox/Fur	60851-34-5	Hexachlorodibenzofuran[2,3,4,6,7,8-]	µg/L	498	0	0	0.0000037	0.00003	—	—	—	—	—
Diox/Fur	67562-39-4	Heptachlorodibenzofuran[1,2,3,4,6,7,8-]	µg/L	498	15	3	0.000004	0.00003	4E-07	4E-06	1.5E-05	—	—
Diox/Fur	70648-26-9	Hexachlorodibenzofuran[1,2,3,4,7,8-]	µg/L	498	5	1	0.0000037	0.00003	1.3E-06	2.2E-06	2.9E-06	—	—
Diox/Fur	72918-21-9	Hexachlorodibenzofuran[1,2,3,7,8,9-]	µg/L	498	0	0	0.0000038	0.00003	—	—	—	—	—

Table B-4.1-2 (continued)

Suite	Symbol or CAS No.	Analyte	Unit	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	GW Std	GW Std Type
Gamma	Ac-228	Actinium-228	pCi/L	66	0	0	—	—	—	—	—	—	—
Gamma	Am-241	Americium-241	pCi/L	69	0	0	—	—	—	—	—	1.2	DOE DW DCG
Gamma	Bi-212	Bismuth-212	pCi/L	66	0	0	—	—	—	—	—	—	—
Gamma	Bi-214	Bismuth-214	pCi/L	59	8	14	—	—	19.3	46.7625	90.2	—	—
Gamma	Co-60	Cobalt-60	pCi/L	1958	0	0	—	—	—	—	—	200	DOE DW DCG
Gamma	Cs-134	Cesium-134	pCi/L	66	0	0	—	—	—	—	—	—	—
Gamma	Cs-137	Cesium-137	pCi/L	1952	1	0.1	—	—	43.1	43.1	43.1	120	DOE DW DCG
Gamma	GROSSG	Gross gamma	pCi/L	1560	148	9	—	—	3	109.222	469	—	—
Gamma	K-40	Potassium-40	pCi/L	1912	6	0.3	—	—	49.7	75.9667	98.5	280	DOE DW DCG
Gamma	Na-22	Sodium-22	pCi/L	1959	0	0	—	—	—	—	—	400	DOE DW DCG
Gamma	Np-237	Neptunium-237	pCi/L	1878	0	0	—	—	—	—	—	1.2	DOE DW DCG
Gamma	Pa-234m	Protactinium-234m	pCi/L	66	0	0	—	—	—	—	—	—	—
Gamma	Pb-212	Lead-212	pCi/L	64	1	2	—	—	14.5	14.5	14.5	—	—
Gamma	Pb-214	Lead-214	pCi/L	62	5	8	—	—	25.3	66.02	105	—	—
Gamma	Th-234	Thorium-234	pCi/L	65	0	0	—	—	—	—	—	—	—
Gamma	Tl-208	Thallium-208	pCi/L	66	0	0	—	—	—	—	—	—	—
Gamma	U-235	Uranium-235	pCi/L	66	0	0	—	—	—	—	—	—	—
Geninorg	SPEC_CONDC	Specific Conductance	µS/cm	2456	2456	100	—	—	1.73	273.146	25700	—	—
Geninorg	HARDNESS	Hardness	mg/L	4403	4401	100	0.4	1.24	6.36	73.0381	956	—	—
Geninorg	pH	pH	SU	2413	2413	100	—	—	4.14	7.70114	11.8	—	—
Geninorg	SSC	Suspended Sediment Concentration	mg/L	288	151	52	2	8	1.2	30.0524	664	—	—
Geninorg	TDS	Total Dissolved Solids	mg/L	86	86	100	2.4	10	102	198.047	745	—	—
Geninorg	TDS	Total Dissolved Solids	mg/L	2329	2328	100	2.4	10	47.1	203.324	6180	1000	NM GW STD
Geninorg	TSS	Total Suspended Solids	mg/L	10	5	50	2	8	2	12.36	27.2	—	—
Geninorg	OIL_GREASE	Oil and Grease	mg/L	2	2	100	—	—	1.63	1.855	2.08	—	—
Geninorg	Br(-1)	Bromide	mg/L	2449	741	30	0.067	0.2	0.048	0.22869	1.8	—	—
Geninorg	C2O4	Oxalate	mg/L	40	0	0	0.33	1	—	—	—	—	—
Geninorg	Cl(-1)	Chloride	mg/L	142	142	100	0.1254	0.38	1.51	11.5181	128	—	—
Geninorg	Cl(-1)	Chloride	mg/L	2327	2317	100	0.1254	0.38	0.341	25.7969	3300	250	NM GW STD
Geninorg	F(-1)	Fluoride	mg/L	122	120	98	0.033	0.1	0.078	0.3081	1	—	—
Geninorg	F(-1)	Fluoride	mg/L	2329	2318	100	0.033	0.1	0.046	0.33685	8.75	1.6	NM GW STD
Geninorg	SO4(-2)	Sulfate	mg/L	142	141	99	0.097	0.4	1.29	6.63894	40.6	-	-
Geninorg	SO4(-2)	Sulfate	mg/L	2327	2309	99	0.097	0.4	0.473	10.714	148	600	NM GW STD
Geninorg	ALK-CO3	Alkalinity-CO3	mg/L	2462	147	6	0.73	1	0.953	5.92929	38.1	—	—
Geninorg	ALK-CO3+HCO3	Alkalinity-CO3+HCO3	mg/L	2462	2460	100	0.7	1	9.83	75.454	500	—	—
Geninorg	CN(TOTAL)	Cyanide (Total)	mg/L	1	0	0	0.0016	0.005	—	—	—	—	—
Geninorg	CN(TOTAL)	Cyanide (Total)	mg/L	1575	132	8	0.0016	0.005	-0.0021	0.00685	0.304	0.2	EPA MCL
Geninorg	NH3-N	Ammonia as Nitrogen	mg/L	2443	605	25	0.023	5.4	0.016	0.12738	10.3	—	—

Table B-4.1-2 (continued)

Suite	Symbol or CAS No.	Analyte	Unit	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	GW Std	GW Std Type
Geninorg	TKN	Total Kjeldahl Nitrogen	mg/L	2442	660	27	0.042	0.13	0.029	0.27796	6.67	—	—
Geninorg	NO3	Nitrate	mg/L	2	2	100	—	—	1.32	1.37	1.42	—	—
Geninorg	NO3+NO2-N	Nitrate-Nitrite as Nitrogen	mg/L	2408	2130	88	0.04	0.2	0.0207	1.28833	20.2	10	EPA MCL
Geninorg	P	Total Phosphorus	mg/L	2	2	100	—	—	0.0689	0.07135	0.0738	—	—
Geninorg	PO4-P	Total Phosphate as Phosphorus	mg/L	2379	893	38	0.017	0.05	0.015	0.36989	19.1	—	—
Geninorg	SURFACTANTS	Surfactants	mg/L	2	0	0	0.016	0.05	—	—	—	—	—
Geninorg	ClO3	Chlorate	mg/L	21	6	29	0.0007	0.003	0.0047	0.04128	0.15	—	—
Geninorg	TOC	Total Organic Carbon	mg/L	2331	1924	83	—	—	0.33	2.24097	138	—	—
Gross AB	GROSSA	Gross alpha	pCi/L	1280	147	11	—	—	1.05	6.69476	62.8	15	EPA MCL
Gross AB	GROSSAB	Gross alpha/beta	pCi/L	4	0	0	—	—	—	—	—	—	—
Gross AB	GROSSB	Gross beta	pCi/L	1280	598	47	—	—	1.07	8.29271	241	50	EPA SEC DW LVL
Herb	120-36-5	Dichlorprop	µg/L	154	0	0	0.09	0.28	—	—	—	—	—
Herb	1918-00-9	Dicamba	µg/L	151	0	0	0.09	0.28	—	—	—	1100	EPA TAP SCRN LVL
Herb	75-99-0	Dalapon	µg/L	153	0	0	1.3	5.6	—	—	—	200	EPA MCL
Herb	88-85-7	Dinoseb	µg/L	151	0	0	0.09	0.2	—	—	—	7	EPA MCL
Herb	93-65-2	MCPP	µg/L	153	0	0	11	56	—	—	—	37	EPA TAP SCRN LVL
Herb	93-72-1	TP[2,4,5-]	µg/L	154	0	0	0.09	0.28	—	—	—	50	EPA MCL
Herb	93-76-5	T[2,4,5-]	µg/L	154	0	0	0.09	0.28	—	—	—	370	EPA TAP SCRN LVL
Herb	94-74-6	MCPA	µg/L	154	0	0	12	56	—	—	—	18	EPA TAP SCRN LVL
Herb	94-75-7	D[2,4-]	µg/L	154	0	0	0.09	0.28	—	—	—	70	EPA MCL
Herb	94-82-6	DB[2,4-]	µg/L	154	0	0	0.09	0.28	—	—	—	290	EPA TAP SCRN LVL
HEXP	118-96-7	Trinitrotoluene[2,4,6-]	µg/L	1484	38	3	0.092	0.33	0.0853	1.53185	8.58	22	EPA TAP SCRN LVL
HEXP	121-14-2	Dinitrotoluene[2,4-]	µg/L	1485	21	1	0.1	0.33	0.041	0.29643	0.804	2	EPA TAP SCRN LVL
HEXP	121-82-4	RDX	µg/L	1485	268	18	0.1	0.33	0.114	22.5425	265	6.1	EPA TAP SCRN LVL
HEXP	19406-51-0	Amino-2,6-dinitrotoluene[4-]	µg/L	1481	129	9	0.1	0.33	0.107	1.18962	5.3	30	EPA TAP SCRN LVL
HEXP	2691-41-0	HMX	µg/L	1485	237	16	0.1	0.33	0.0895	8.95455	352	780	EPA TAP SCRN LVL
HEXP	3058-38-6	TATB	µg/L	1483	2	0.1	0.4	1.3	0.436	0.6545	0.873	—	—
HEXP	35572-78-2	Amino-4,6-dinitrotoluene[2-]	µg/L	1485	105	7	0.1	0.33	0.1	1.0889	4	30	EPA TAP SCRN LVL
HEXP	479-45-8	Tetryl	µg/L	1414	3	0.2	0.13	0.64	0.055	0.245	0.57	63	EPA TAP SCRN LVL
HEXP	55-63-0	Nitroglycerin	µg/L	31	2	6	0.21	1	0.22	0.47	0.72	3.7	EPA TAP SCRN LVL
HEXP	59229-75-3	2,6-Diamino-4-nitrotoluene	µg/L	1471	14	1	0.34	1.6	0.033	0.33071	1.1	—	—
HEXP	606-20-2	Dinitrotoluene[2,6-]	µg/L	1484	6	0.4	0.1	0.33	0.053	0.14033	0.4	15	EPA TAP SCRN LVL
HEXP	618-87-1	3,5-Dinitroaniline	µg/L	1484	39	3	0.47	1.3	0.032	0.50159	0.988	—	—
HEXP	6629-29-4	2,4-Diamino-6-nitrotoluene	µg/L	1471	20	1	0.4	1.6	0.026	1.01095	3.6	—	—
HEXP	78-11-5	PETN	µg/L	1483	3	0.2	0.1	1.2	0.076	0.27533	0.59	160	EPA TAP SCRN LVL
HEXP	78-30-8	Tris (o-cresyl) phosphate	µg/L	1475	0	0	0.3	1.3	—	—	—	—	—
HEXP	88-72-2	Nitrotoluene[2-]	µg/L	1484	6	0.4	0.1	0.33	0.194	0.53217	1.24	2.7	EPA TAP SCRN LVL
HEXP	98-95-3	Nitrobenzene	µg/L	1484	4	0.3	0.1	0.33	0.11	0.1745	0.31	1.2	EPA TAP SCRN LVL

Table B-4.1-2 (continued)

Suite	Symbol or CAS No.	Analyte	Unit	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	GW Std	GW Std Type
HEXP	99-08-1	Nitrotoluene[3-]	µg/L	1470	1	0.1	0.1	0.34	0.28	0.28	0.28	1.3	EPA TAP SCRN LVL
HEXP	99-35-4	Trinitrobenzene[1,3,5-]	µg/L	1484	74	5	0.1	0.33	0.095	1.31977	23	460	EPA TAP SCRN LVL
HEXP	99-65-0	Dinitrobenzene[1,3-]	µg/L	1484	3	0.2	0.1	0.33	0.088	0.19167	0.32	1.5	EPA TAP SCRN LVL
HEXP	99-99-0	Nitrotoluene[4-]	µg/L	1449	1	0.1	0.1	0.65	0.327	0.327	0.327	37	EPA TAP SCRN LVL
HEXP	DNX	DNX	µg/L	59	11	19	0.089	0.28	0.103	0.16282	0.311	—	—
HEXP	MNX	MNX	µg/L	59	12	20	0.089	0.277	0.159	0.35983	0.72	—	—
HEXP	TNX	TNX	µg/L	59	12	20	0.089	0.28	0.115	0.22567	0.502	—	—
HEXP	DNX	DNX	µg/L	958	42	4	0.073	0.5	0.11	0.53548	2.3	—	—
HEXP	MNX	MNX	µg/L	926	90	10	0.091	0.5	0.096	0.70884	2.3	—	—
HEXP	TNX	TNX	µg/L	961	63	7	0.082	0.5	0.11	0.79254	8.2	—	—
Metals	Al	Aluminum	µg/L	2094	747	36	70	200	68.1	2443.29	65800	—	—
Metals	Al	Aluminum	µg/L	2305	428	19	70	200	69	1382.76	24400	5000	NM GW STD
Metals	B	Boron	µg/L	2111	1322	63	15	50	10	49.5654	1500	—	—
Metals	B	Boron	µg/L	2303	1412	61	15	50	10	50.5719	1550	750	NM GW STD
Metals	Ba	Barium	µg/L	2093	2091	100	1	5	1.7	218.599	49200	—	—
Metals	Ba	Barium	µg/L	2303	2293	100	1	5	1.51	228.773	49400	1000	NM GW STD
Metals	Be	Beryllium	µg/L	4396	46	1	1	5	1	1.69217	4.5	4	EPA MCL
Metals	Ca	Calcium	µg/L	4397	4396	100	0.05	0.2	2.08	20.994	277	—	—
Metals	Co	Cobalt	µg/L	2093	126	6	1	5	1	6.5596	98.2	—	—
Metals	Co	Cobalt	µg/L	2303	239	10	1	5	1	4.16669	51.2	50	NM GW STD
Metals	Cr	Chromium	µg/L	1	1	100	—	—	1.16	1.16	1.16	—	—
Metals	Cu	Copper	µg/L	2093	344	16	3	10	3	12.3129	272	—	—
Metals	Cu	Copper	µg/L	2303	192	8	3	10	3	8.63854	120	1000	NM GW STD
Metals	Fe	Iron	µg/L	2095	1254	60	30	100	25.1	1437.8	58700	-	-
Metals	Fe	Iron	µg/L	2305	742	32	30	100	25	1205.39	49500	1000	NM GW STD
Metals	K	Potassium	mg/L	4397	4377	100	0.05	0.15	0.222	3.40606	215	—	—
Metals	Mg	Magnesium	mg/L	4391	4379	100	0.1	0.3	0.115	5.00937	71.5	—	—
Metals	Mn	Manganese	µg/L	2091	1194	57	2	10	2	223.285	17100	—	—
Metals	Mn	Manganese	µg/L	2301	1015	44	2	10	2	260.705	17500	200	NM GW STD
Metals	Mo	Molybdenum	µg/L	47	21	45	2	10	2.1	23.1333	84.2	1000	NM GW STD
Metals	Mo	Molybdenum	µg/L	47	24	51	2	10	2.1	23.3625	82	—	—
Metals	Na	Sodium	µg/L	4397	4397	100	—	—	0.267	25.1281	1750	—	—
Metals	SiO2	Silicon Dioxide	µg/L	2415	2397	99	0.048	0.21	0.0609	59.5461	170	—	—
Metals	Sn	Tin	µg/L	4396	54	1	10	33	2.53	12.0163	122	9300	EPA TAP SCRN LVL
Metals	Sr	Strontium	µg/L	4396	4395	100	1	5	8.58	125.026	2240	9300	EPA TAP SCRN LVL
Metals	V	Vanadium	µg/L	4396	3692	84	1	5	1	6.80806	78.5	78	EPA TAP SCRN LVL
Metals	Zn	Zinc	µg/L	2094	1340	64	3	10	2	36.8229	9080	—	—
Metals	Zn	Zinc	µg/L	2303	1259	55	3	10	2	26.8437	3530	10000	NM GW STD

Table B-4.1-2 (continued)

Suite	Symbol or CAS No.	Analyte	Unit	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	GW Std	GW Std Type
Metals	Ag	Silver	µg/L	2124	79	4	0.2	1	0.2	0.77138	5.8	—	—
Metals	Ag	Silver	µg/L	2332	27	1	0.2	1	0.21	0.37204	1.2	50	NM GW STD
Metals	Al	Aluminum	µg/L	29	24	83	10	30	10.7	267.838	1690	5000	NM GW STD
Metals	Al	Aluminum	µg/L	30	30	100	10	30	25	4643.2	52900	—	—
Metals	As	Arsenic	µg/L	1	0	0	1.6	5	—	—	—	—	—
Metals	As	Arsenic	µg/L	4455	971	22	1.6	5	1.5	3.22593	21.4	10	EPA MCL
Metals	B	Boron	µg/L	2	0	0	18	50	—	—	—	750	NM GW STD
Metals	B	Boron	µg/L	4	4	100	18	50	18.4	33.9	51.4	—	—
Metals	Ba	Barium	µg/L	29	29	100	—	—	38.7	9097.95	34000	1000	NM GW STD
Metals	Ba	Barium	µg/L	30	30	100	—	—	40.3	9089.91	34900	—	—
Metals	Be	Beryllium	µg/L	1	0	0	0.13	0.5	—	—	—	—	—
Metals	Be	Beryllium	µg/L	58	5	9	0.13	0.5	0.17	1.894	5.1	4	EPA MCL
Metals	Ca	Calcium	mg/L	58	58	100	—	—	17.9	25.1948	52	—	—
Metals	Cd	Cadmium	µg/L	1	0	0	0.1	1	—	—	—	—	—
Metals	Cd	Cadmium	µg/L	4455	102	2	0.1	1	0.111	0.31611	8.18	5	EPA MCL
Metals	Co	Cobalt	µg/L	29	28	97	0.24	2	0.26	3.36357	6.7	50	NM GW STD
Metals	Co	Cobalt	µg/L	30	29	97	0.24	2	0.2	3.39207	14.5	—	—
Metals	Cr	Chromium	µg/L	2125	1403	66	2.3	9	1.5	31.4693	1270	—	—
Metals	Cr	Chromium	µg/L	2541	1521	60	2.3	9	1.5	40.8081	1240	50	NM GW STD
Metals	Cu	Copper	µg/L	29	18	62	0.47	1	0.47	1.23222	2.9	1000	NM GW STD
Metals	Cu	Copper	µg/L	30	24	80	0.47	1	0.48	5.65025	41.9	—	—
Metals	Fe	Iron	µg/L	29	28	97	20	50	29.7	2706.14	8750	1000	NM GW STD
Metals	Fe	Iron	µg/L	29	29	100	20	50	52.8	5509.75	38600	—	—
Metals	K	Potassium	mg/L	58	58	100	—	—	2.48	4.12552	10.6	—	—
Metals	Mg	Magnesium	mg/L	59	59	100	—	—	4.06	6.91203	15.4	—	—
Metals	Mn	Manganese	µg/L	29	28	97	0.6	2	1.1	1298.89	3880	200	NM GW STD
Metals	Mn	Manganese	µg/L	30	30	100	0.6	2	0.82	1263.59	3700	—	—
Metals	Mo	Molybdenum	µg/L	2061	1701	83	0.1	0.5	0.1	6.51511	350	—	—
Metals	Mo	Molybdenum	µg/L	2255	1901	84	0.1	0.5	0.117	6.24262	333	1000	NM GW STD
Metals	Na	Sodium	µg/L	58	58	100	—	—	8.07	20.5702	32.4	—	—
Metals	Ni	Nickel	µg/L	2124	1750	82	0.6	2.4	0.5	5.30072	596	—	—
Metals	Ni	Nickel	µg/L	2332	1847	79	0.6	2.4	0.5	9.61497	4770	200	NM GW STD
Metals	Pb	Lead	µg/L	1	0	0	0.5	2	—	—	—	—	—
Metals	Pb	Lead	µg/L	4456	638	14	0.5	2	0.5	5.61188	526	15	EPA MCL
Metals	Sb	Antimony	µg/L	1	0	0	0.65	2.7	—	—	—	—	—
Metals	Sb	Antimony	µg/L	4454	147	3	0.65	2.7	0.5	1.8452	24.8	6	EPA MCL
Metals	Se	Selenium	µg/L	1	0	0	1	5	—	—	—	—	—
Metals	Se	Selenium	µg/L	4455	294	7	1	5	0.55	1.64861	4.6	50	EPA MCL

Table B-4.1-2 (continued)

Suite	Symbol or CAS No.	Analyte	Unit	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	GW Std	GW Std Type
Metals	Sn	Tin	µg/L	4	0	0	0.68	2	—	—	—	9300	EPA TAP SCRN LVL
Metals	Sn	Tin	µg/L	1	1	100	0.68	2	2.72	2.72	2.72	—	—
Metals	Sr	Strontium	µg/L	4	4	100	—	—	126	138.75	165	9300	EPA TAP SCRN LVL
Metals	Ti	Titanium	µg/L	1	1	100	—	—	10.5	10.5	10.5	—	—
Metals	Tl	Thallium	µg/L	1	0	0	0.35	1	—	—	—	—	—
Metals	Tl	Thallium	µg/L	4455	254	6	0.35	1	0.3	0.52761	15.7	2	EPA MCL
Metals	U	Uranium	µg/L	4401	3851	88	0.052	0.2	0.05	1.06775	52.5	30	EPA MCL
Metals	V	Vanadium	µg/L	58	18	31	3	10	3.1	12.5111	56.2	78	EPA TAP SCRN LVL
Metals	Zn	Zinc	µg/L	29	21	72	3.7	10	6.1	25.6095	144	—	—
Metals	Zn	Zinc	µg/L	29	22	76	3.7	10	5	12.8136	32.1	10000	NM GW STD
Metals	Hg	Mercury	µg/L	1	0	0	0.06	0.2	—	—	—	—	—
Metals	Hg	Mercury	µg/L	4450	58	1	0.06	0.2	0.032	0.16727	1.81	2	EPA MCL
Metals	Cr(VI)	Chromium hexavalent ion	µg/L	5	1	20	3	10	4.25	4.25	4.25	50	NM GW STD
Metals	Cr(VI)	Chromium hexavalent ion	µg/L	5	1	20	3	10	4.25	4.25	4.25	—	—
PCB	11096-82-5	Aroclor-1260	µg/L	786	4	0.5	0.036	0.1	0.054	0.0665	0.075	0.5	EPA MCL
PCB	11097-69-1	Aroclor-1254	µg/L	785	7	0.9	0.036	0.1	0.051	0.35643	2.1	0.5	EPA MCL
PCB	11104-28-2	Aroclor-1221	µg/L	787	0	0	0.036	0.1	—	—	—	0.5	EPA MCL
PCB	11141-16-5	Aroclor-1232	µg/L	787	0	0	0.036	0.1	—	—	—	0.5	EPA MCL
PCB	12672-29-6	Aroclor-1248	µg/L	787	0	0	0.036	0.1	—	—	—	0.5	EPA MCL
PCB	12674-11-2	Aroclor-1016	µg/L	786	1	0.1	0.036	0.1	0.0739	0.0739	0.0739	0.5	EPA MCL
PCB	37324-23-5	Aroclor-1262	µg/L	786	0	0	0.036	0.1	—	—	—	0.5	EPA MCL
PCB	53469-21-9	Aroclor-1242	µg/L	786	4	0.5	0.036	0.1	0.061	0.36525	1.1	0.5	EPA MCL
Perchlorate	ClO4	Perchlorate	µg/L	2503	2347	94	0.05	0.2	0.0517	2.93021	187	4	Consent Order
Pesticides	1024-57-3	Heptachlor Epoxide	µg/L	651	1	0.2	0.006	0.02	0.00668	0.00668	0.00668	0.2	EPA MCL
Pesticides	1031-07-8	Endosulfan Sulfate	µg/L	651	3	0.5	0.009	0.04	0.00671	0.01756	0.0365	—	—
Pesticides	309-00-2	Aldrin	µg/L	651	2	0.3	0.006	0.022	0.0175	0.02575	0.034	0.0021	EPA TAP SCRN LVL
Pesticides	319-84-6	BHC[alpha-]	µg/L	651	0	0	0.006	0.02	—	—	—	0.062	EPA TAP SCRN LVL
Pesticides	319-85-7	BHC[beta-]	µg/L	651	3	0.5	0.008	0.02	0.0108	0.01877	0.0338	0.22	EPA TAP SCRN LVL
Pesticides	319-86-8	BHC[delta-]	µg/L	651	2	0.3	0.006	0.02	0.0104	0.0113	0.0122	—	—
Pesticides	33213-65-9	Endosulfan II	µg/L	651	2	0.3	0.009	0.04	0.00737	0.00979	0.0122	—	—
Pesticides	50-29-3	DDT[4,4'-]	µg/L	651	3	0.5	0.01	0.04	0.0173	0.03827	0.0523	2	EPA TAP SCRN LVL
Pesticides	5103-71-9	Chlordane[alpha-]	µg/L	651	0	0	0.006	0.02	—	—	—	—	—
Pesticides	5103-74-2	Chlordane[gamma-]	µg/L	651	3	0.5	0.006	0.02	0.00564	0.0079	0.011	—	—
Pesticides	53494-70-5	Endrin Ketone	µg/L	651	0	0	0.01	0.04	—	—	—	—	—
Pesticides	58-89-9	BHC[gamma-]	µg/L	651	3	0.5	0.006	0.02	0.0101	0.01117	0.0132	0.2	EPA MCL
Pesticides	60-57-1	Dieldrin	µg/L	651	4	0.6	0.009	0.04	0.00767	0.01004	0.0119	0.015	EPA TAP SCRN LVL
Pesticides	72-20-8	Endrin	µg/L	651	2	0.3	0.009	0.04	0.00688	0.01069	0.0145	2	EPA MCL
Pesticides	72-43-5	Methoxychlor[4,4'-]	µg/L	651	0	0	0.05	0.2	—	—	—	40	EPA MCL

Table B-4.1-2 (continued)

Suite	Symbol or CAS No.	Analyte	Unit	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	GW Std	GW Std Type
Pesticides	72-54-8	DDD[4,4'-]	µg/L	651	5	0.8	0.009	0.04	0.00631	0.01965	0.0452	2.8	EPA TAP SCRN LVL
Pesticides	72-55-9	DDE[4,4'-]	µg/L	651	6	0.9	0.006	0.04	0.0139	0.03323	0.0904	2	EPA TAP SCRN LVL
Pesticides	7421-93-4	Endrin Aldehyde	µg/L	649	2	0.3	0.006	0.04	0.00624	0.00673	0.00722	—	—
Pesticides	76-44-8	Heptachlor	µg/L	651	7	1	0.006	0.02	0.0122	0.02907	0.0828	0.4	EPA MCL
Pesticides	8001-35-2	Toxaphene (Technical Grade)	µg/L	651	1	0.2	0.16	0.5	0.682	0.682	0.682	3	EPA MCL
Pesticides	959-98-8	Endosulfan I	µg/L	651	3	0.5	0.006	0.02	0.00741	0.00972	0.0134	—	—
Rad	Ra-226	Radium-226	pCi/L	642	189	29	—	—	0.298	0.92348	4.86	5	EPA MCL
Rad	Ra-228	Radium-228	pCi/L	643	202	31	—	—	0.46	1.34842	11.8	5	EPA MCL
Rad	Sr-90	Strontium-90	pCi/L	1960	103	5	—	—	0.244	13.3669	66	8	EPA MCL
Rad	H-3	Tritium	pCi/L	180	139	77	—	—	162	2703.38	12600	20000	EPA MCL
Rad	Rn-222	Radon-222	pCi/L	1	1	100	—	—	490.761	490.761	490.761	—	—
Rad	H-3	Tritium	pCi/L	1889	650	34	—	—	0.2898	55.2902	766.36	20000	EPA MCL
SVOA	100-01-6	Nitroaniline[4-]	µg/L	1799	0	0	3.3	10	—	—	—	33	EPA TAP SCRN LVL
SVOA	100-02-7	Nitrophenol[4-]	µg/L	1738	0	0	2.3	10	—	—	—	—	—
SVOA	100-51-6	Benzyl Alcohol	µg/L	1799	0	0	2.3	10	—	—	—	1500	EPA TAP SCRN LVL
SVOA	101-55-3	Bromophenyl-phenylether[4-]	µg/L	1800	0	0	2.4	10	—	—	—	—	—
SVOA	103-33-3	Azobenzene	µg/L	1	0	0	2.4	10	—	—	—	—	—
SVOA	103-33-3	Azobenzene	µg/L	1799	0	0	2.4	10	—	—	—	1	EPA TAP SCRN LVL
SVOA	105-67-9	Dimethylphenol[2,4-]	µg/L	1	0	0	2.4	10	—	—	—	—	—
SVOA	105-67-9	Dimethylphenol[2,4-]	µg/L	1778	0	0	2.4	10	—	—	—	270	EPA TAP SCRN LVL
SVOA	106-44-5	Methylphenol[4-]	µg/L	1777	4	0.2	3.3	10	3.32	3.965	4.58	1400	EPA TAP SCRN LVL
SVOA	106-46-7	Dichlorobenzene[1,4-]	µg/L	1799	0	0	2.3	10	—	—	—	75	EPA MCL
SVOA	106-47-8	Chloroaniline[4-]	µg/L	1799	0	0	2.4	10	—	—	—	3.2	EPA TAP SCRN LVL
SVOA	108-39-4	Methylphenol[3-]	µg/L	1	0	0	2.2	10	—	—	—	1800	EPA TAP SCRN LVL
SVOA	108-60-1	Oxybis(1-chloropropane)[2,2'-]	µg/L	1	0	0	2.4	10	—	—	—	—	—
SVOA	108-60-1	Oxybis(1-chloropropane)[2,2'-]	µg/L	1796	0	0	2.4	10	—	—	—	3.1	EPA TAP SCRN LVL
SVOA	108-95-2	Phenol	µg/L	3	0	0	1.4	10	—	—	—	—	—
SVOA	108-95-2	Phenol	µg/L	1776	3	0.2	1.4	10	1.99	15.0533	38.3	5	NM GW STD
SVOA	110-86-1	Pyridine	µg/L	1799	0	0	2.7	10	—	—	—	15	EPA TAP SCRN LVL
SVOA	111-44-4	Bis(2-chloroethyl)ether	µg/L	1	0	0	2.4	10	—	—	—	—	—
SVOA	111-44-4	Bis(2-chloroethyl)ether	µg/L	1799	0	0	2.4	10	—	—	—	0.12	EPA TAP SCRN LVL
SVOA	111-91-1	Bis(2-chloroethoxy)methane	µg/L	1	0	0	3.3	10	—	—	—	—	—
SVOA	111-91-1	Bis(2-chloroethoxy)methane	µg/L	1799	0	0	3.3	10	—	—	—	47	EPA TAP SCRN LVL
SVOA	117-81-7	Bis(2-ethylhexyl)phthalate	µg/L	1	0	0	2.4	10	—	—	—	—	—
SVOA	117-81-7	Bis(2-ethylhexyl)phthalate	µg/L	1799	99	6	2.4	10	0.984	9.39782	96.4	6	EPA MCL
SVOA	117-84-0	Di-n-octylphthalate	µg/L	1800	1	0.1	3.3	10	3.07	3.07	3.07	—	—
SVOA	118-74-1	Hexachlorobenzene	µg/L	1	0	0	2.4	10	—	—	—	—	—
SVOA	118-74-1	Hexachlorobenzene	µg/L	1799	0	0	2.4	10	—	—	—	1	EPA MCL

Table B-4.1-2 (continued)

Suite	Symbol or CAS No.	Analyte	Unit	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	GW Std	GW Std Type
SVOA	120-12-7	Anthracene	µg/L	1	0	0	0.24	1	—	—	—	—	—
SVOA	120-12-7	Anthracene	µg/L	1799	1	0.1	0.24	1	0.323	0.323	0.323	1300	EPA TAP SCRN LVL
SVOA	120-82-1	Trichlorobenzene[1,2,4-]	µg/L	1	0	0	2.4	10	—	—	—	—	—
SVOA	120-82-1	Trichlorobenzene[1,2,4-]	µg/L	1799	0	0	2.4	10	—	—	—	70	EPA MCL
SVOA	120-83-2	Dichlorophenol[2,4-]	µg/L	1	0	0	2.4	10	—	—	—	—	—
SVOA	120-83-2	Dichlorophenol[2,4-]	µg/L	1778	0	0	2.4	10	—	—	—	35	EPA TAP SCRN LVL
SVOA	121-14-2	Dinitrotoluene[2,4-]	µg/L	1	0	0	2.4	10	—	—	—	—	—
SVOA	121-14-2	Dinitrotoluene[2,4-]	µg/L	1799	0	0	2.4	10	—	—	—	2	EPA TAP SCRN LVL
SVOA	122-39-4	Diphenylamine	µg/L	1	0	0	3.3	10	—	—	—	—	—
SVOA	122-39-4	Diphenylamine	µg/L	1794	0	0	3.3	10	—	—	—	240	EPA TAP SCRN LVL
SVOA	123-91-1	Dioxane[1,4-]	µg/L	1799	100	6	2	10	1.15	82.7248	1190	6.7	EPA TAP SCRN LVL
SVOA	129-00-0	Pyrene	µg/L	1	0	0	0.33	1	—	—	—	—	—
SVOA	129-00-0	Pyrene	µg/L	1799	0	0	0.33	1	—	—	—	87	EPA TAP SCRN LVL
SVOA	131-11-3	Dimethyl Phthalate	µg/L	1800	0	0	2.4	10	—	—	—	—	—
SVOA	132-64-9	Dibenzofuran	µg/L	1799	0	0	2.3	10	—	—	—	5.8	EPA TAP SCRN LVL
SVOA	1912-24-9	Atrazine	µg/L	1025	0	0	3	10	—	—	—	3	EPA MCL
SVOA	191-24-2	Benzo(g,h,i)perylene	µg/L	1797	5	0.3	0.24	1	0.21	0.3888	0.489	—	—
SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	µg/L	1	0	0	0.24	1	—	—	—	—	—
SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	µg/L	1799	5	0.3	0.24	1	0.4	0.5436	0.837	0.29	EPA TAP SCRN LVL
SVOA	205-99-2	Benzo(b)fluoranthene	µg/L	1	0	0	0.25	1	—	—	—	—	—
SVOA	205-99-2	Benzo(b)fluoranthene	µg/L	1799	7	0.4	0.25	1	0.239	0.96357	3.68	0.29	EPA TAP SCRN LVL
SVOA	206-44-0	Fluoranthene	µg/L	1	0	0	0.24	1	—	—	—	—	—
SVOA	206-44-0	Fluoranthene	µg/L	1799	1	0.1	0.24	1	0.343	0.343	0.343	630	EPA TAP SCRN LVL
SVOA	207-08-9	Benzo(k)fluoranthene	µg/L	1	0	0	0.24	1	—	—	—	—	—
SVOA	207-08-9	Benzo(k)fluoranthene	µg/L	1799	6	0.3	0.24	1	0.25	0.371	0.568	2.9	EPA TAP SCRN LVL
SVOA	208-96-8	Acenaphthylene	µg/L	1800	1	0.1	0.22	1	0.283	0.283	0.283	—	—
SVOA	218-01-9	Chrysene	µg/L	1	0	0	0.24	1	—	—	—	—	—
SVOA	218-01-9	Chrysene	µg/L	1799	2	0.1	0.24	1	0.295	0.309	0.323	29	EPA TAP SCRN LVL
SVOA	50-32-8	Benzo(a)pyrene	µg/L	1	0	0	0.25	1	—	—	—	—	—
SVOA	50-32-8	Benzo(a)pyrene	µg/L	1799	7	0.4	0.25	1	0.245	0.74343	2.12	0.2	EPA MCL
SVOA	51-28-5	Dinitrophenol[2,4-]	µg/L	1	0	0	7	20	—	—	—	—	—
SVOA	51-28-5	Dinitrophenol[2,4-]	µg/L	1774	0	0	7	20	—	—	—	30	EPA TAP SCRN LVL
SVOA	534-52-1	Dinitro-2-methylphenol[4,6-]	µg/L	1	0	0	3.3	10	—	—	—	—	—
SVOA	534-52-1	Dinitro-2-methylphenol[4,6-]	µg/L	1776	0	0	3.3	10	—	—	—	1.2	EPA TAP SCRN LVL
SVOA	53-70-3	Dibenz(a,h)anthracene	µg/L	1	0	0	0.24	1	—	—	—	—	—
SVOA	53-70-3	Dibenz(a,h)anthracene	µg/L	1799	5	0.3	0.24	1	0.36	0.8548	1.63	0.029	EPA TAP SCRN LVL
SVOA	541-73-1	Dichlorobenzene[1,3-]	µg/L	1799	0	0	2.3	10	—	—	—	—	—
SVOA	55-18-5	Nitrosodiethylamine[N-]	µg/L	1798	0	0	2.3	10	—	—	—	0.0014	EPA TAP SCRN LVL

Table B-4.1-2 (continued)

Suite	Symbol or CAS No.	Analyte	Unit	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	GW Std	GW Std Type
SVOA	56-55-3	Benzo(a)anthracene	µg/L	1	0	0	0.24	1	—	—	—	—	—
SVOA	56-55-3	Benzo(a)anthracene	µg/L	1799	4	0.2	0.24	1	0.252	0.26475	0.286	0.29	EPA TAP SCRN LVL
SVOA	58-90-2	Tetrachlorophenol[2,3,4,6-]	µg/L	1778	1	0.1	2.4	10	5.1	5.1	5.1	170	EPA TAP SCRN LVL
SVOA	59-50-7	Chloro-3-methylphenol[4-]	µg/L	1	0	0	2.4	10	—	—	—	—	—
SVOA	59-50-7	Chloro-3-methylphenol[4-]	µg/L	1778	0	0	2.4	10	—	—	—	1100	EPA TAP SCRN LVL
SVOA	606-20-2	Dinitrotoluene[2,6-]	µg/L	1	0	0	2.4	10	—	—	—	—	—
SVOA	606-20-2	Dinitrotoluene[2,6-]	µg/L	1798	0	0	2.4	10	—	—	—	15	EPA TAP SCRN LVL
SVOA	608-93-5	Pentachlorobenzene	µg/L	1798	0	0	3	10	—	—	—	2.3	EPA TAP SCRN LVL
SVOA	621-64-7	Nitroso-di-n-propylamine[N-]	µg/L	1	0	0	2.4	10	—	—	—	—	—
SVOA	621-64-7	Nitroso-di-n-propylamine[N-]	µg/L	1799	0	0	2.4	10	—	—	—	0.093	EPA TAP SCRN LVL
SVOA	62-53-3	Aniline	µg/L	1799	0	0	2.8	10	—	—	—	120	EPA TAP SCRN LVL
SVOA	62-75-9	Nitrosodimethylamine[N-]	µg/L	1	0	0	2.4	10	—	—	—	—	—
SVOA	62-75-9	Nitrosodimethylamine[N-]	µg/L	1799	0	0	2.4	10	—	—	—	0.0042	EPA TAP SCRN LVL
SVOA	65-85-0	Benzoic Acid	µg/L	1661	30	2	6.6	20	8.33	21.5293	146	58000	EPA TAP SCRN LVL
SVOA	67-72-1	Hexachloroethane	µg/L	1	0	0	2.4	10	—	—	—	—	—
SVOA	67-72-1	Hexachloroethane	µg/L	1799	0	0	2.4	10	—	—	—	7.9	EPA TAP SCRN LVL
SVOA	7005-72-3	Chlorophenyl-phenyl[4-] Ether	µg/L	1800	0	0	2.4	10	—	—	—	—	—
SVOA	77-47-4	Hexachlorocyclopentadiene	µg/L	1	0	0	3	10	—	—	—	—	—
SVOA	77-47-4	Hexachlorocyclopentadiene	µg/L	1799	0	0	3	10	—	—	—	50	EPA MCL
SVOA	78-59-1	Isophorone	µg/L	1	0	0	3	10	—	—	—	—	—
SVOA	78-59-1	Isophorone	µg/L	1799	0	0	3	10	—	—	—	670	EPA TAP SCRN LVL
SVOA	83-32-9	Acenaphthene	µg/L	1	0	0	0.34	1	—	—	—	—	—
SVOA	83-32-9	Acenaphthene	µg/L	1799	0	0	0.34	1	—	—	—	400	EPA TAP SCRN LVL
SVOA	84-66-2	Diethylphthalate	µg/L	1	0	0	2.4	10	—	—	—	—	—
SVOA	84-66-2	Diethylphthalate	µg/L	1799	74	4	2.4	10	2.18	23.4128	432	11000	EPA TAP SCRN LVL
SVOA	84-74-2	Di-n-butylphthalate	µg/L	1	0	0	2.3	10	—	—	—	—	—
SVOA	84-74-2	Di-n-butylphthalate	µg/L	1799	1	0.1	2.3	10	4.01	4.01	4.01	670	EPA TAP SCRN LVL
SVOA	85-01-8	Phenanthrene	µg/L	1800	1	0.1	0.24	1	0.333	0.333	0.333	—	—
SVOA	85-68-7	Butylbenzylphthalate	µg/L	1	0	0	2.4	10	—	—	—	—	—
SVOA	85-68-7	Butylbenzylphthalate	µg/L	1799	0	0	2.4	10	—	—	—	140	EPA TAP SCRN LVL
SVOA	86-30-6	Nitrosodiphenylamine[N-]	µg/L	5	0	0	1.2	10	—	—	—	140	EPA TAP SCRN LVL
SVOA	86-73-7	Fluorene	µg/L	1	0	0	0.24	1	—	—	—	—	—
SVOA	86-73-7	Fluorene	µg/L	1799	1	0.1	0.24	1	0.303	0.303	0.303	220	EPA TAP SCRN LVL
SVOA	87-68-3	Hexachlorobutadiene	µg/L	1	0	0	2.4	10	—	—	—	—	—
SVOA	87-68-3	Hexachlorobutadiene	µg/L	1799	0	0	2.4	10	—	—	—	2.6	EPA TAP SCRN LVL
SVOA	87-86-5	Pentachlorophenol	µg/L	1	0	0	2.4	10	—	—	—	—	—
SVOA	87-86-5	Pentachlorophenol	µg/L	1778	1	0.1	2.4	10	7.01	7.01	7.01	1	EPA MCL
SVOA	88-06-2	Trichlorophenol[2,4,6-]	µg/L	1	0	0	2.4	10	—	—	—	—	—

Table B-4.1-2 (continued)

Suite	Symbol or CAS No.	Analyte	Unit	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	GW Std	GW Std Type
SVOA	88-06-2	Trichlorophenol[2,4,6-]	µg/L	1778	0	0	2.4	10	—	—	—	35	EPA TAP SCRN LVL
SVOA	88-74-4	Nitroaniline[2-]	µg/L	1799	0	0	2.3	10	—	—	—	150	EPA TAP SCRN LVL
SVOA	88-75-5	Nitrophenol[2-]	µg/L	1779	0	0	2.4	10	—	—	—	—	—
SVOA	88-85-7	Dinoseb	µg/L	1777	0	0	2.4	10	—	—	—	7	EPA MCL
SVOA	90-12-0	Methylnaphthalene[1-]	µg/L	1797	0	0	0.33	1	—	—	—	9.7	EPA TAP SCRN LVL
SVOA	91-20-3	Naphthalene	µg/L	3	0	0	0.33	1	—	—	—	—	—
SVOA	91-20-3	Naphthalene	µg/L	1797	1	0.1	0.33	1	0.33	0.33	0.33	30	NM GW STD
SVOA	91-57-6	Methylnaphthalene[2-]	µg/L	1799	0	0	0.33	1	—	—	—	27	EPA TAP SCRN LVL
SVOA	91-58-7	Chloronaphthalene[2-]	µg/L	1	0	0	0.35	1	—	—	—	—	—
SVOA	91-58-7	Chloronaphthalene[2-]	µg/L	1799	0	0	0.35	1	—	—	—	550	EPA TAP SCRN LVL
SVOA	91-94-1	Dichlorobenzidine[3,3'-]	µg/L	1	0	0	2	10	—	—	—	—	—
SVOA	91-94-1	Dichlorobenzidine[3,3'-]	µg/L	1798	0	0	2	10	—	—	—	1.1	EPA TAP SCRN LVL
SVOA	924-16-3	Nitroso-di-n-butylamine[N-]	µg/L	1798	0	0	3	10	—	—	—	0.024	EPA TAP SCRN LVL
SVOA	92-87-5	Benzidine	µg/L	1	0	0	3	10	—	—	—	—	—
SVOA	92-87-5	Benzidine	µg/L	1625	0	0	3	10	—	—	—	0.00092	EPA TAP SCRN LVL
SVOA	930-55-2	Nitrosopyrrolidine[N-]	µg/L	1793	0	0	2.3	10	—	—	—	0.32	EPA TAP SCRN LVL
SVOA	95-48-7	Methylphenol[2-]	µg/L	1778	0	0	2.3	10	—	—	—	720	EPA TAP SCRN LVL
SVOA	95-50-1	Dichlorobenzene[1,2-]	µg/L	1799	0	0	2.3	10	—	—	—	600	EPA MCL
SVOA	95-57-8	Chlorophenol[2-]	µg/L	1	0	0	2.4	10	—	—	—	—	—
SVOA	95-57-8	Chlorophenol[2-]	µg/L	1778	0	0	2.4	10	—	—	—	71	EPA TAP SCRN LVL
SVOA	95-94-3	Tetrachlorobenzene[1,2,4,5]	µg/L	1799	0	0	3	10	—	—	—	1.2	EPA TAP SCRN LVL
SVOA	95-95-4	Trichlorophenol[2,4,5-]	µg/L	1778	0	0	2	10	—	—	—	890	EPA TAP SCRN LVL
SVOA	98-95-3	Nitrobenzene	µg/L	1	0	0	3.3	10	—	—	—	—	—
SVOA	98-95-3	Nitrobenzene	µg/L	1799	0	0	3.3	10	—	—	—	1.2	EPA TAP SCRN LVL
SVOA	99-09-2	Nitroaniline[3-]	µg/L	1799	0	0	2.3	10	—	—	—	—	—
TPH-DRO	TPH-DRO	TPH-DRO	µg/L	19	5	26	60	188	81.3	115.1	186	—	—
TPH-GRO	TPH-GRO	TPH-GRO	µg/L	6	0	0	12	50	—	—	—	—	—
VOA	100-41-4	Ethylbenzene	µg/L	1	0	0	0.25	1	—	—	—	—	—
VOA	100-41-4	Ethylbenzene	µg/L	2419	4	0.2	0.25	1	0.265	0.27175	0.28	700	EPA MCL
VOA	100-42-5	Styrene	µg/L	2419	3	0.1	0.25	1	0.31	1.99667	3.86	100	EPA MCL
VOA	10061-01-5	Dichloropropene[cis-1,3-]	µg/L	2420	0	0	0.25	1	—	—	—	—	—
VOA	10061-02-6	Dichloropropene[trans-1,3-]	µg/L	2420	0	0	0.25	1	—	—	—	—	—
VOA	103-65-1	Propylbenzene[1-]	µg/L	2419	1	0.04	0.25	1	0.37	0.37	0.37	530	EPA TAP SCRN LVL
VOA	104-51-8	Butylbenzene[n-]	µg/L	2419	1	0.04	0.25	1	1.1	1.1	1.1	780	EPA TAP SCRN LVL
VOA	106-43-4	Chlorotoluene[4-]	µg/L	2419	1	0.04	0.25	1	0.3	0.3	0.3	190	EPA TAP SCRN LVL
VOA	106-46-7	Dichlorobenzene[1,4-]	µg/L	1	0	0	0.25	1	—	—	—	—	—
VOA	106-46-7	Dichlorobenzene[1,4-]	µg/L	2419	0	0	0.25	1	—	—	—	75	EPA MCL
VOA	106-93-4	Dibromoethane[1,2-]	µg/L	2419	0	0	0.25	1	—	—	—	0.05	EPA MCL

Table B-4.1-2 (continued)

Suite	Symbol or CAS No.	Analyte	Unit	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	GW Std	GW Std Type
VOA	107-02-8	Acrolein	µg/L	1	0	0	1.5	5	—	—	—	—	—
VOA	107-02-8	Acrolein	µg/L	1548	1	0.1	1.5	5	1.95	1.95	1.95	0.041	EPA TAP SCRN LVL
VOA	107-05-1	Chloro-1-propene[3-]	µg/L	2419	0	0	1.8	5	—	—	—	6.3	EPA TAP SCRN LVL
VOA	107-06-2	Dichloroethane[1,2-]	µg/L	1	0	0	0.25	1	—	—	—	—	—
VOA	107-06-2	Dichloroethane[1,2-]	µg/L	2419	6	0.2	0.25	1	0.262	0.84733	1.69	5	EPA MCL
VOA	107-12-0	Propionitrile	µg/L	1281	0	0	1.5	5	—	—	—	—	—
VOA	107-13-1	Acrylonitrile	µg/L	1	0	0	1	5	—	—	—	—	—
VOA	107-13-1	Acrylonitrile	µg/L	2410	0	0	1	5	—	—	—	0.45	EPA TAP SCRN LVL
VOA	108-05-4	Vinyl acetate	µg/L	2419	0	0	1.5	5	—	—	—	410	EPA TAP SCRN LVL
VOA	108-10-1	Methyl-2-pentanone[4-]	µg/L	2419	5	0.2	1.3	5	1.52	17.71	75.8	1000	EPA TAP SCRN LVL
VOA	108-67-8	Trimethylbenzene[1,3,5-]	µg/L	2419	1	0.04	0.25	1	0.4	0.4	0.4	87	EPA TAP SCRN LVL
VOA	108-86-1	Bromobenzene	µg/L	2419	0	0	0.25	1	—	—	—	54	EPA TAP SCRN LVL
VOA	108-88-3	Toluene	µg/L	3	2	67	0.25	1	0.819	7.1595	13.5	—	—
VOA	108-88-3	Toluene	µg/L	2417	244	10	0.25	1	0.251	4.1057	119	750	NM GW STD
VOA	108-90-7	Chlorobenzene	µg/L	1	0	0	0.25	1	—	—	—	—	—
VOA	108-90-7	Chlorobenzene	µg/L	2419	1	0.04	0.25	1	0.43	0.43	0.43	100	EPA MCL
VOA	110-75-8	Chloroethyl vinyl ether[2-]	µg/L	94	0	0	1.5	5	—	—	—	—	—
VOA	120-82-1	Trichlorobenzene[1,2,4-]	µg/L	2419	2	0.1	0.3	1	0.48	0.4915	0.503	70	EPA MCL
VOA	123-91-1	Dioxane[1,4-]	µg/L	28	19	68	20	60	24.2	982.311	4790	6.7	EPA TAP SCRN LVL
VOA	124-48-1	Chlorodibromomethane	µg/L	1	0	0	0.29	1	—	—	—	—	—
VOA	124-48-1	Chlorodibromomethane	µg/L	2419	1	0.04	0.29	1	1.27	1.27	1.27	80	EPA MCL
VOA	126-98-7	Methacrylonitrile	µg/L	2417	0	0	1	5	—	—	—	0.75	EPA TAP SCRN LVL
VOA	126-99-8	Chloro-1,3-butadiene[2-]	µg/L	2419	0	0	0.3	1	—	—	—	0.16	EPA TAP SCRN LVL
VOA	127-18-4	Tetrachloroethene	µg/L	1	1	100	0.32	1	1.96	1.96	1.96	—	—
VOA	127-18-4	Tetrachloroethene	µg/L	2419	108	4	0.32	1	0.31	5.94294	200	5	EPA MCL
VOA	1330-20-7	Xylene (Total)	µg/L	2	0	0	0.071	2	-	—	—	620	NM GW STD
VOA	135-98-8	Butylbenzene[sec-]	µg/L	2419	1	0.04	0.25	1	0.66	0.66	0.66	—	—
VOA	142-28-9	Dichloropropane[1,3-]	µg/L	2419	0	0	0.28	1	—	—	—	290	EPA TAP SCRN LVL
VOA	156-59-2	Dichloroethene[cis-1,2-]	µg/L	2419	4	0.2	0.3	1	0.31	4.845	9.55	70	EPA MCL
VOA	156-60-5	Dichloroethene[trans-1,2-]	µg/L	1	0	0	0.3	1	—	—	—	—	—
VOA	156-60-5	Dichloroethene[trans-1,2-]	µg/L	2419	0	0	0.3	1	—	—	—	100	EPA MCL
VOA	1634-04-4	Methyl tert-Butyl Ether	µg/L	2419	59	2	0.25	1	0.253	0.77324	1.64	120	EPA TAP SCRN LVL
VOA	26523-64-8	Trichlorotrifluoroethane	µg/L	2	0	0	0.17	1	—	—	—	—	—
VOA	541-73-1	Dichlorobenzene[1,3-]	µg/L	2420	8	0.3	0.25	1	0.26	0.33438	0.513	—	—
VOA	56-23-5	Carbon Tetrachloride	µg/L	1	0	0	0.3	1	—	—	—	—	—
VOA	56-23-5	Carbon Tetrachloride	µg/L	2419	0	0	0.3	1	—	—	—	5	EPA MCL
VOA	563-58-6	Dichloropropene[1,1-]	µg/L	2419	0	0	0.25	1	—	—	—	—	—
VOA	591-78-6	Hexanone[2-]	µg/L	2419	1	0.04	1.4	5	4.63	4.63	4.63	34	EPA TAP SCRN LVL

Table B-4.1-2 (continued)

Suite	Symbol or CAS No.	Analyte	Unit	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	GW Std	GW Std Type
VOA	594-20-7	Dichloropropane[2,2-]	µg/L	2419	0	0	0.3	1	—	—	—	—	—
VOA	60-29-7	Diethyl Ether	µg/L	2419	6	0.2	0.3	1	0.301	0.81317	1.99	3100	EPA TAP SCRN LVL
VOA	630-20-6	Tetrachloroethane[1,1,1,2-]	µg/L	2419	0	0	0.3	1	—	—	-	5	EPA TAP SCRN LVL
VOA	67-64-1	Acetone	µg/L	2417	141	6	3	10	1.25	122.208	13700	12000	EPA TAP SCRN LVL
VOA	67-66-3	Chloroform	µg/L	1	0	0	0.25	1	—	—	—	—	—
VOA	67-66-3	Chloroform	µg/L	2419	92	4	0.25	1	0.26	0.63009	10.7	80	EPA MCL
VOA	71-36-3	Butanol[1-]	µg/L	1505	6	0.4	15	50	16	59.0833	157	1500	EPA TAP SCRN LVL
VOA	71-43-2	Benzene	µg/L	1	0	0	0.3	1	—	—	—	—	—
VOA	71-43-2	Benzene	µg/L	2419	10	0.4	0.3	1	0.318	4.1006	23.8	5	EPA MCL
VOA	71-55-6	Trichloroethane[1,1,1-]	µg/L	3	0	0	0.32	1	—	—	—	—	—
VOA	71-55-6	Trichloroethane[1,1,1-]	µg/L	2417	34	1	0.32	1	39.9	110.147	254	60	NM GW STD
VOA	74-83-9	Bromomethane	µg/L	1	0	0	0.36	1	—	—	—	—	—
VOA	74-83-9	Bromomethane	µg/L	2419	3	0.1	0.36	1	14.7	31.2	55.3	7	EPA TAP SCRN LVL
VOA	74-87-3	Chloromethane	µg/L	1	0	0	0.37	1	—	—	—	—	—
VOA	74-87-3	Chloromethane	µg/L	2419	89	4	0.37	1	0.25	0.44357	2.61	190	EPA TAP SCRN LVL
VOA	74-88-4	Iodomethane	µg/L	2419	1	0.04	1.3	5	1.66	1.66	1.66	—	—
VOA	74-95-3	Dibromomethane	µg/L	2419	0	0	0.3	1	—	—	—	7.9	EPA TAP SCRN LVL
VOA	74-97-5	Bromochloromethane	µg/L	2419	0	0	0.3	1	—	—	—	83	EPA TAP SCRN LVL
VOA	75-00-3	Chloroethane	µg/L	1	0	0	0.33	1	—	—	—	—	—
VOA	75-00-3	Chloroethane	µg/L	2419	0	0	0.33	1	—	—	—	21000	EPA TAP SCRN LVL
VOA	75-01-4	Vinyl Chloride	µg/L	3	0	0	0.48	1	—	—	—	—	—
VOA	75-01-4	Vinyl Chloride	µg/L	2417	0	0	0.48	1	—	—	—	1	NM GW STD
VOA	75-05-8	Acetonitrile	µg/L	1271	2	0.2	6.6	25	6.78	7.12	7.46	130	EPA TAP SCRN LVL
VOA	75-09-2	Methylene Chloride	µg/L	1	0	0	2.8	10	—	—	—	—	—
VOA	75-09-2	Methylene Chloride	µg/L	2419	9	0.4	2.8	10	2.11	3.59222	6.97	5	EPA MCL
VOA	75-15-0	Carbon Disulfide	µg/L	2419	7	0.3	1.3	5	1.32	16.9	107	720	EPA TAP SCRN LVL
VOA	75-25-2	Bromoform	µg/L	1	0	0	0.25	1	—	—	—	—	—
VOA	75-25-2	Bromoform	µg/L	2419	1	0.04	0.25	1	4.91	4.91	4.91	80	EPA MCL
VOA	75-27-4	Bromodichloromethane	µg/L	1	0	0	0.25	1	—	—	—	—	—
VOA	75-27-4	Bromodichloromethane	µg/L	2419	2	0.1	0.25	1	0.35	0.4685	0.587	80	EPA MCL
VOA	75-34-3	Dichloroethane[1,1-]	µg/L	3	0	0	0.3	1	—	—	—	—	—
VOA	75-34-3	Dichloroethane[1,1-]	µg/L	2417	34	1	0.3	1	0.71	2.6375	8.5	25	NM GW STD
VOA	75-35-4	Dichloroethene[1,1-]	µg/L	3	0	0	0.3	1	—	—	—	—	—
VOA	75-35-4	Dichloroethene[1,1-]	µg/L	2417	34	1	0.3	1	0.94	6.11882	19.4	5	NM GW STD
VOA	75-69-4	Trichlorofluoromethane	µg/L	2415	0	0	0.3	1	—	—	—	1100	EPA TAP SCRN LVL
VOA	75-71-8	Dichlorodifluoromethane	µg/L	2419	0	0	0.36	1	—	—	—	190	EPA TAP SCRN LVL
VOA	76-13-1	Trichloro-1,2,2-trifluoroethane[1,1,2-]	µg/L	2352	0	0	1	5	—	—	—	53000	EPA TAP SCRN LVL
VOA	78-83-1	Isobutyl alcohol	µg/L	942	1	0.1	15	50	24.9	24.9	24.9	4600	EPA TAP SCRN LVL

Table B-4.1-2 (continued)

Suite	Symbol or CAS No.	Analyte	Unit	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	GW Std	GW Std Type
VOA	78-87-5	Dichloropropane[1,2-]	µg/L	1	0	0	0.25	1	—	—	—	—	—
VOA	78-87-5	Dichloropropane[1,2-]	µg/L	2419	0	0	0.25	1	—	—	—	5	EPA MCL
VOA	78-93-3	Butanone[2-]	µg/L	2413	46	2	1.4	5	1.27	3.47087	14.5	4900	EPA TAP SCRN LVL
VOA	79-00-5	Trichloroethane[1,1,2-]	µg/L	1	0	0	0.25	1	—	—	—	—	—
VOA	79-00-5	Trichloroethane[1,1,2-]	µg/L	2419	9	0.4	0.25	1	0.251	0.57156	1.16	5	EPA MCL
VOA	79-01-6	Trichloroethene	µg/L	1	1	100	0.25	1	1.59	1.59	1.59	—	—
VOA	79-01-6	Trichloroethene	µg/L	2419	147	6	0.25	1	0.25	1.22312	11.8	5	EPA MCL
VOA	79-34-5	Tetrachloroethane[1,1,2,2-]	µg/L	3	0	0	0.25	1	—	—	—	—	—
VOA	79-34-5	Tetrachloroethane[1,1,2,2-]	µg/L	2417	0	0	0.25	1	—	—	—	10	NM GW STD
VOA	80-62-6	Methyl Methacrylate	µg/L	2419	0	0	1	5	—	—	—	1400	EPA TAP SCRN LVL
VOA	87-61-6	Trichlorobenzene[1,2,3-]	µg/L	2419	2	0.1	0.32	1	0.46	0.54	0.62	5.2	EPA TAP SCRN LVL
VOA	87-68-3	Hexachlorobutadiene	µg/L	2419	0	0	0.32	1	—	—	—	2.6	EPA TAP SCRN LVL
VOA	91-20-3	Naphthalene	µg/L	2	0	0	0.26	1	—	—	—	—	—
VOA	91-20-3	Naphthalene	µg/L	2417	7	0.3	0.26	1	0.353	1.52557	3.9	30	NM GW STD
VOA	95-47-6	Xylene[1,2-]	µg/L	2419	4	0.2	0.28	1	0.34	0.3755	0.419	190	EPA TAP SCRN LVL
VOA	95-49-8	Chlorotoluene[2-]	µg/L	2419	0	0	0.25	1	—	—	—	180	EPA TAP SCRN LVL
VOA	95-50-1	Dichlorobenzene[1,2-]	µg/L	1	0	0	0.25	1	—	—	—	—	—
VOA	95-50-1	Dichlorobenzene[1,2-]	µg/L	2419	1	0.04	0.25	1	0.26	0.26	0.26	600	EPA MCL
VOA	95-63-6	Trimethylbenzene[1,2,4-]	µg/L	2419	4	0.2	0.25	1	0.27	0.40875	0.6	15	EPA TAP SCRN LVL
VOA	96-12-8	Dibromo-3-Chloropropane[1,2-]	µg/L	2419	0	0	0.36	1	—	—	—	0.2	EPA MCL
VOA	96-18-4	Trichloropropane[1,2,3-]	µg/L	2419	0	0	0.3	1	—	—	—	0.0065	EPA TAP SCRN LVL
VOA	97-63-2	Ethyl Methacrylate	µg/L	2419	1	0.04	1	5	3.28	3.28	3.28	420	EPA TAP SCRN LVL
VOA	98-06-6	Butylbenzene[tert-]	µg/L	2419	0	0	0.25	1	—	—	—	—	—
VOA	98-82-8	Isopropylbenzene	µg/L	2419	7	0.3	0.25	1	0.252	0.33314	0.47	390	EPA TAP SCRN LVL
VOA	99-87-6	Isopropyltoluene[4-]	µg/L	2419	4	0.2	0.25	1	0.35	0.9925	1.74	—	—
VOA	Xylene[m+p]	Xylene[1,3-]+Xylene[1,4-]	µg/L	2417	22	0.9	0.44	2	0.438	1.29109	3.51	—	—

Notes: CAS = Chemical Abstracts Service; GW = groundwater; DOE DW DCG = DOE Drinking Water–Derived Concentration Guide; EPA MCL = EPA maximum contaminant level; NM GW STD = New Mexico groundwater standard; EPA SEC DW LVL = EPA secondary drinking water level; EPA TAP SCRN LVL = EPA tap water screening level.

*— = Not available.

Table B-4.1-3
Analytes, Analytical Methods, MDLs, and PQLs Obtained for Base-flow Samples by Contract Laboratories and Analyte Detection Statistics from 2008–2012

Suite	Symbol or CAS No.	Analyte	Units	Detect Flag	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	SW Std	SW Type
Alpha Spec	Am-241	Americium-241	pCi/L	Y	228	13	6	—*	—	0.042	0.991953846	5.57	400	DOE BCG WATER
Alpha Spec	Np-237	Neptunium-237	pCi/L	—	4	0	0	—	—	—	—	—	—	—
Alpha Spec	Pu-238	Plutonium-238	pCi/L	Y	228	16	7	—	—	0.03	0.4886625	2.44	—	—
Alpha Spec	Pu-239/240	Plutonium-239/240	pCi/L	Y	228	23	10	—	—	0.0371	1.286126087	8.74	200	DOE BCG WATER
Alpha Spec	Th-228	Thorium-228	pCi/L	Y	41	14	34	—	—	0.0571	0.262507143	0.738	—	—
Alpha Spec	Th-230	Thorium-230	pCi/L	Y	41	11	27	—	—	0.0571	0.180736364	0.355	—	—
Alpha Spec	Th-232	Thorium-232	pCi/L	Y	41	15	37	—	—	0.0322	0.19374	0.582	300	DOE BCG WATER
Alpha Spec	U-234	Uranium-234	pCi/L	Y	228	151	66	—	—	0.0562	0.550962252	1.94	200	DOE BCG WATER
Alpha Spec	U-235/236	Uranium-235/236	pCi/L	Y	228	23	10	—	—	0.0337	0.057930435	0.117	—	—
Alpha Spec	U-238	Uranium-238	pCi/L	Y	228	164	72	—	—	0.0273	0.319878049	1.44	200	DOE BCG WATER
Diox/Fur	1746-01-6	Tetrachlorodibenzodioxin[2,3,7,8-]	µg/L	—	30	0	0	0.0000012	0.0000063	—	—	—	0.000000051	NM HH OO
Diox/Fur	19408-74-3	Hexachlorodibenzodioxin[1,2,3,7,8,9-]	µg/L	—	30	0	0	0.000004	0.00003	—	—	—	—	—
Diox/Fur	30402-15-4	Pentachlorodibenzofurans (Totals)	µg/L	Y	30	4	13	0.000004	0.000025	0.00000251	0.000005805	0.00000872	—	—
Diox/Fur	3268-87-9	Octachlorodibenzodioxin[1,2,3,4,6,7,8,9-]	µg/L	Y	30	15	50	0.00000954	0.000068	0.00000594	0.000500749	0.00293	—	—
Diox/Fur	34465-46-8	Hexachlorodibenzodioxins (Total)	µg/L	Y	30	3	10	0.000004	0.000025	0.0000251	0.000042	0.0000748	—	—
Diox/Fur	35822-46-9	Heptachlorodibenzodioxin[1,2,3,4,6,7,8-]	µg/L	Y	30	8	27	0.0000046	0.000032	0.00000691	8.56063E-05	0.000319	—	—
Diox/Fur	36088-22-9	Pentachlorodibenzodioxins (Total)	µg/L	Y	30	2	7	0.000004	0.000025	0.00000269	0.0000053	0.00000791	—	—
Diox/Fur	37871-00-4	Heptachlorodibenzodioxins (Total)	µg/L	Y	30	14	47	0.0000047	0.000028	0.00000209	0.000105968	0.000617	—	—
Diox/Fur	38998-75-3	Heptachlorodibenzofurans (Total)	µg/L	Y	30	8	27	0.000004	0.000025	0.00000448	8.45038E-05	0.000387	—	—
Diox/Fur	39001-02-0	Octachlorodibenzofuran[1,2,3,4,6,7,8,9-]	µg/L	Y	30	9	30	0.0000079	0.000063	0.00000252	0.00007609--111	0.000319	—	—
Diox/Fur	39227-28-6	Hexachlorodibenzodioxin[1,2,3,4,7,8-]	µg/L	—	30	0	0	0.000004	0.00003	—	—	—	—	—
Diox/Fur	40321-76-4	Pentachlorodibenzodioxin[1,2,3,7,8-]	µg/L	—	30	0	0	0.000004	0.00003	—	—	—	—	—
Diox/Fur	41903-57-5	Tetrachlorodibenzodioxins (Total)	µg/L	Y	30	1	3	0.0000012	0.0000052	0.00000342	0.00000342	0.00000342	—	—
Diox/Fur	51207-31-9	Tetrachlorodibenzofuran[2,3,7,8-]	µg/L	Y	30	1	3	0.000001	0.0000063	0.000000796	0.000000796	0.000000796	—	—
Diox/Fur	55673-89-7	Heptachlorodibenzofuran[1,2,3,4,7,8,9-]	µg/L	Y	30	3	10	0.000046	0.00003	0.00000365	7.37333E-06	0.0000101	—	—
Diox/Fur	55684-94-1	Hexachlorodibenzofurans (Total)	µg/L	Y	30	7	23	0.0000038	0.000025	0.0000013	1.93557E-05	0.0000742	—	—
Diox/Fur	55722-27-5	Tetrachlorodibenzofurans (Totals)	µg/L	Y	30	1	3	0.000001	0.0000052	0.00000321	0.00000321	0.00000321	—	—
Diox/Fur	57117-31-4	Pentachlorodibenzofuran[2,3,4,7,8-]	µg/L	—	30	0	0	0.0000038	0.00003	—	—	—	—	—
Diox/Fur	57117-41-6	Pentachlorodibenzofuran[1,2,3,7,8-]	µg/L	—	30	0	0	0.0000038	0.00003	—	—	—	—	—
Diox/Fur	57117-44-9	Hexachlorodibenzofuran[1,2,3,6,7,8-]	µg/L	Y	30	1	3	0.0000037	0.00003	0.00000285	0.00000285	0.00000285	—	—
Diox/Fur	57653-85-7	Hexachlorodibenzodioxin[1,2,3,6,7,8-]	µg/L	Y	30	1	3	0.000004	0.00003	0.00000444	0.00000444	0.00000444	—	—
Diox/Fur	60851-34-5	Hexachlorodibenzofuran[2,3,4,6,7,8-]	µg/L	—	30	0	0	0.0000037	0.00003	—	—	—	—	—
Diox/Fur	67562-39-4	Heptachlorodibenzofuran[1,2,3,4,6,7,8-]	µg/L	Y	30	8	27	0.000004	0.00003	0.00000176	2.35863E-05	0.000103	—	—
Diox/Fur	70648-26-9	Hexachlorodibenzofuran[1,2,3,4,7,8-]	µg/L	—	30	0	0	0.0000037	0.00003	—	—	—	—	—
Diox/Fur	72918-21-9	Hexachlorodibenzofuran[1,2,3,7,8,9-]	µg/L	—	30	0	0	0.0000038	0.00003	—	—	—	—	—
Gamma	Am-241	Americium-241	pCi/L	—	1	0	0	—	—	—	—	—	400	DOE BCG WATER

Table B-4.1-3 (continued)

Suite	Symbol or CAS No.	Analyte	Units	Detect Flag	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	SW Std	SW Type
Gamma	Co-60	Cobalt-60	pCi/L	—	228	0	0	—	—	—	—	—	4000	DOE BCG WATER
Gamma	Cs-137	Cesium-137	pCi/L	Y	227	4	2	—	—	8.47	44.7425	89	40	DOE BCG WATER
Gamma	GROSSG	Gross gamma	pCi/L	Y	212	1	0.5	—	—	40.7	40.7	40.7	—	—
Gamma	K-40	Potassium-40	pCi/L	Y	216	2	0.9	—	—	71.3	94.15	117	—	—
Gamma	Na-22	Sodium-22	pCi/L	—	228	0	0	—	—	—	—	—	—	—
Gamma	Np-237	Neptunium-237	pCi/L	—	228	0	0	—	—	—	—	—	—	—
Geninorg	SPEC_CONDC	Specific Conductance	µS/cm	Y	220	220	100	—	—	1.25	553.5415909	19600	—	—
Geninorg	HARDNESS	Hardness	mg/L	Y	447	447	100	0.4	1.24	12.9	86.24608501	391	—	—
Geninorg	pH	pH	SU	Y	220	220	100	—	—	1.46	7.817045455	9	—	—
Geninorg	SSC	Suspended Sediment Concentration	mg/L	Y	215	162	75	2	8	1.2	22.09950617	196	—	—
Geninorg	TDS	Total Dissolved Solids	mg/L	Y	220	220	100	2.4	10	63	323.6863636	4400	—	—
Geninorg	TSS	Total Suspended Solids	mg/L	Y	8	7	88	2	8	5.6	45.74285714	97.2	—	—
Geninorg	TURB	Turbidity	NTU	Y	1	1	100	-	-	93.9	93.9	93.9	—	—
Geninorg	Br(-1)	Bromide	mg/L	Y	220	86	39	0.067	0.2	0.07	0.562073256	9.11	—	—
Geninorg	Cl(-1)	Chloride	mg/L	Y	219	219	100	0.1254	0.38	0.838	67.06352055	1820	—	—
Geninorg	F(-1)	Fluoride	mg/L	Y	220	219	100	0.033	0.1	0.0483	0.329599087	1.17	—	—
Geninorg	SO4(-2)	Sulfate	mg/L	Y	220	220	100	0.097	0.4	0.953	19.87092273	424	—	—
Geninorg	ALK-CO3	Alkalinity-CO3	mg/L	Y	220	36	16	0.73	1	1.03	10.18333333	37.4	—	—
Geninorg	ALK-CO3+HCO3	Alkalinity-CO3+HCO3	mg/L	Y	220	219	100	0.7	1	16.5	93.97808219	264	—	—
Geninorg	CN(TOTAL)	Cyanide (Total)	mg/L	Y	138	26	19	0.0016	0.005	0.00171	0.003932692	0.0245	—	—
Geninorg	NH3-N	Ammonia as Nitrogen	mg/L	Y	219	107	49	0.023	5.4	0.016	0.272753271	14	—	—
Geninorg	TKN	Total Kjeldahl Nitrogen	mg/L	Y	218	149	68	0.042	0.13	0.031	0.719061745	20	—	—
Geninorg	NO3+NO2-N	Nitrate-Nitrite as Nitrogen	mg/L	Y	13	8	62	0.04	0.2	0.0566	0.1563875	0.243	132	NM LVSTK WTR STD
Geninorg	NO3+NO2-N	Nitrate-Nitrite as Nitrogen	mg/L	Y	206	120	58	0.04	0.2	0.0115	1.017914167	7.33	—	—
Geninorg	PO4-P	Total Phosphate as Phosphorus	mg/L	Y	219	126	58	0.017	0.05	0.024	1.288821429	4.74	—	—
Geninorg	TOC	Total Organic Carbon	mg/L	Y	220	219	100	—	—	0.624	6.788726027	96.6	—	—
Gross AB	GROSSA	Gross alpha	pCi/L	Y	106	23	22	—	—	2.06	7.512608696	23.2	15	NM LVSTK WTR STD
Gross AB	GROSSB	Gross beta	pCi/L	Y	106	81	76	—	—	2.38	15.1708642	202	—	—
Herb	120-36-5	Dichlorprop	µg/L	—	2	0	0	0.09	0.28	—	—	—	—	—
Herb	1918-00-9	Dicamba	µg/L	—	2	0	0	0.09	0.28	—	—	—	—	—
Herb	75-99-0	Dalapon	µg/L	—	2	0	0	1.3	5.6	—	—	—	—	—
Herb	88-85-7	Dinoseb	µg/L	—	2	0	0	0.09	0.2	—	—	—	—	—
Herb	93-65-2	MCPP	µg/L	—	2	0	0	11	56	—	—	—	—	—
Herb	93-72-1	TP[2,4,5-]	µg/L	—	2	0	0	0.09	0.28	—	—	—	—	—
Herb	93-76-5	T[2,4,5-]	µg/L	—	2	0	0	0.09	0.28	—	—	—	—	—
Herb	94-74-6	MCPA	µg/L	—	2	0	0	12	56	—	—	—	—	—
Herb	94-75-7	D[2,4-]	µg/L	—	2	0	0	0.09	0.28	—	—	—	—	—
Herb	94-82-6	DB[2,4-]	µg/L	—	2	0	0	0.09	0.28	—	—	—	—	—

Table B-4.1-3 (continued)

Suite	Symbol or CAS No.	Analyte	Units	Detect Flag	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	SW Std	SW Type
HEXP	118-96-7	Trinitrotoluene[2,4,6-]	µg/L	—	94	0	0	0.092	0.33	—	—	—	—	—
HEXP	121-14-2	Dinitrotoluene[2,4-]	µg/L	—	94	0	0	0.1	0.33	—	—	—	34	NM HH OO
HEXP	121-82-4	RDX	µg/L	Y	94	23	24	0.1	0.33	0.13	7.094086957	42	—	—
HEXP	19406-51-0	Amino-2,6-dinitrotoluene[4-]	µg/L	Y	94	11	12	0.1	0.33	0.106	0.350363636	1.02	—	—
HEXP	2691-41-0	HMX	µg/L	Y	94	34	36	0.1	0.33	0.106	4.030647059	35.7	—	—
HEXP	3058-38-6	TATB	µg/L	—	94	0	0	0.4	1.3	—	—	—	—	—
HEXP	35572-78-2	Amino-4,6-dinitrotoluene[2-]	µg/L	Y	94	11	12	0.1	0.33	0.102	0.303818182	1.07	—	—
HEXP	479-45-8	Tetryl	µg/L	—	94	0	0	0.13	0.64	—	—	—	—	—
HEXP	55-63-0	Nitroglycerin	µg/L	—	1	0	0	0.21	1	—	—	—	—	—
HEXP	59229-75-3	2,6-Diamino-4-nitrotoluene	µg/L	—	93	0	0	0.34	1.6	—	—	—	—	—
HEXP	606-20-2	Dinitrotoluene[2,6-]	µg/L	—	94	0	0	0.1	0.33	—	—	—	—	—
HEXP	618-87-1	3,5-Dinitroaniline	µg/L	Y	94	1	1	0.47	1.3	0.403	0.403	0.403	—	—
HEXP	6629-29-4	2,4-Diamino-6-nitrotoluene	µg/L	—	93	0	0	0.4	1.6	—	—	—	—	—
HEXP	78-11-5	PETN	µg/L	—	94	0	0	0.1	1.2	—	—	—	—	—
HEXP	78-30-8	Tris (o-cresyl) phosphate	µg/L	—	94	0	0	0.3	1.3	—	—	—	—	—
HEXP	88-72-2	Nitrotoluene[2-]	µg/L	—	94	0	0	0.1	0.33	—	—	—	—	—
HEXP	98-95-3	Nitrobenzene	µg/L	—	94	0	0	0.1	0.33	—	—	—	690	NM HH OO
HEXP	99-08-1	Nitrotoluene[3-]	µg/L	—	94	0	0	0.1	0.34	—	—	—	—	—
HEXP	99-35-4	Trinitrobenzene[1,3,5-]	µg/L	—	94	0	0	0.1	0.33	—	—	—	—	—
HEXP	99-65-0	Dinitrobenzene[1,3-]	µg/L	—	94	0	0	0.1	0.33	—	—	—	—	—
HEXP	99-99-0	Nitrotoluene[4-]	µg/L	—	94	0	0	0.1	0.65	—	—	—	—	—
HEXP	DNX	DNX	µg/L	—	5	0	0	0.089	0.28	—	—	—	—	—
HEXP	MNX	MNX	µg/L	Y	5	1	20	0.089	0.277	0.217	0.217	0.217	—	—
HEXP	TNX	TNX	µg/L	—	5	0	0	0.089	0.28	—	—	—	—	—
HEXP	DNX	DNX	µg/L	Y	60	5	8	0.073	0.5	0.14	0.23	0.29	—	—
HEXP	MNX	MNX	µg/L	Y	54	7	13	0.091	0.5	0.28	0.785714286	1.7	—	—
HEXP	TNX	TNX	µg/L	Y	60	4	7	0.082	0.5	0.14	0.385	0.68	—	—
Metals	Al	Aluminum	µg/L	Y	227	108	48	70	200	68.4	1407.567593	14000	—	—
Metals	Al	Aluminum	µg/L	Y	220	190	86	70	200	69	2258.71	68700	2099	NM Aqu Acute 70 mg/L hardness
Metals	B	Boron	µg/L	Y	220	157	71	15	50	10.3	61.1	414	—	—
Metals	B	Boron	µg/L	Y	227	157	69	15	50	11.2	59.57898089	412	5000	NM LVSTK WTR STD
Metals	Ba	Barium	µg/L	Y	447	447	100	1	5	9.9	191.65434	5740	—	—
Metals	Be	Beryllium	µg/L	Y	447	9	2	1	5	1.03	1.634444444	3.35	—	—
Metals	Ca	Calcium	µg/L	Y	447	447	100	0.05	0.2	4.22	24.9052349	129	—	—
Metals	Co	Cobalt	µg/L	Y	220	23	10	1	5	1.02	2.384782609	6.07	—	—
Metals	Co	Cobalt	µg/L	Y	227	44	19	1	5	1	2.257954545	7.8	1000	NM LVSTK WTR STD
Metals	Cu	Copper	µg/L	Y	227	76	33	3	10	3	7.132631579	49.6	10	NM Aqu Acute 70 mg/L hardness
Metals	Cu	Copper	µg/L	Y	220	92	42	3	10	3.01	10.20380435	84.6	—	—

Table B-4.1-3 (continued)

Suite	Symbol or CAS No.	Analyte	Units	Detect Flag	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	SW Std	SW Type
Metals	Fe	Iron	µg/L	Y	447	381	85	30	100	25.6	909.5220472	36600	—	—
Metals	K	Potassium	mg/L	Y	447	447	100	0.05	0.15	1.59	12.71794183	599	—	—
Metals	Mg	Magnesium	mg/L	Y	447	447	100	0.1	0.3	0.564	5.84685906	46.6	—	—
Metals	Mn	Manganese	µg/L	Y	227	198	87	2	10	2.1	91.185	2590	2651	NM Aqu Acute 70 mg/L hardness
Metals	Mn	Manganese	µg/L	Y	220	210	95	2	10	2	103.0787619	2640	—	—
Metals	Mo	Molybdenum	µg/L	Y	22	15	68	2	10	2.2	11.67333333	51.7	—	—
Metals	Na	Sodium	mg/L	Y	447	447	100	-	-	3.96	60.94561521	1160	—	—
Metals	SiO2	Silicon Dioxide	mg/L	Y	220	220	100	0.048	0.21	14.5	61.37136364	196	—	—
Metals	Sn	Tin	µg/L	-	447	0	0	10	33	—	—	—	—	—
Metals	Sr	Strontium	µg/L	Y	447	447	100	1	5	20.5	143.8935123	688	—	—
Metals	V	Vanadium	µg/L	Y	227	182	80	1	5	1.1	8.241648352	38	100	NM LVSTK WTR STD
Metals	V	Vanadium	µg/L	Y	220	189	86	1	5	1.07	9.662645503	67.2	—	—
Metals	Zn	Zinc	µg/L	Y	227	144	63	3	10	2	20.16208333	245	116	NM Aqu Acute 70 mg/L hardness
Metals	Zn	Zinc	µg/L	Y	220	163	74	3	10	2.3	26.41411043	275	—	—
Metals	Ag	Silver	µg/L	Y	227	10	4	0.2	1	0.21	0.335	0.88	1.7	NM Aqu Acute 70 mg/L hardness
Metals	Ag	Silver	µg/L	Y	220	24	11	0.2	1	0.21	0.524	1.4	—	—
Metals	As	Arsenic	µg/L	Y	227	69	30	1.6	5	1.5	3.09173913	9.39	9	NM HH OO
Metals	As	Arsenic	µg/L	Y	220	70	32	1.6	5	1.5	3.242	15	—	—
Metals	Cd	Cadmium	µg/L	Y	227	13	6	0.1	1	0.118	0.290769231	1.4	1.22	NM Aqu Acute 70 mg/L hardness
Metals	Cd	Cadmium	µg/L	Y	220	26	12	0.1	1	0.11	0.259269231	1.7	—	—
Metals	Cr	Chromium	µg/L	Y	231	109	47	2.3	9	1.5	7.988073394	146	430	NM Aqu Acute 70 mg/L hardness
Metals	Cr	Chromium	µg/L	Y	220	124	56	2.3	9	1.7	12.37395161	452	—	—
Metals	Mo	Molybdenum	µg/L	Y	425	360	85	0.1	0.5	0.15	6.213091667	113	—	—
Metals	Ni	Nickel	µg/L	Y	227	190	84	0.6	2.4	0.514	2.151026316	13	350	NM Aqu Acute 70 mg/L hardness
Metals	Ni	Nickel	µg/L	Y	220	193	88	0.6	2.4	0.5	2.693284974	19.5	—	—
Metals	Pb	Lead	µg/L	Y	227	38	17	0.5	2	0.5	1.715736842	10.9	44	NM Aqu Acute 70 mg/L hardness
Metals	Pb	Lead	µg/L	Y	220	119	54	0.5	2	0.509	2.478	35.1	—	—
Metals	Sb	Antimony	µg/L	Y	227	15	7	0.65	2.7	0.51	1.507466667	7.24	640	NM HH OO
Metals	Sb	Antimony	µg/L	Y	220	16	7	0.65	2.7	0.5	1.419625	7.27	—	—
Metals	Se	Selenium	µg/L	Y	220	14	6	1	5	1	2.994285714	15.3	5	NMWQCC WLDLF HAB
Metals	Se	Selenium	µg/L	Y	227	15	7	1	5	1.1	3.172666667	18.6	50	NM LVSTK WTR STD
Metals	Tl	Thallium	µg/L	Y	227	19	8	0.35	1	0.32	0.472578947	0.77	0.47	NM HH OO
Metals	Tl	Thallium	µg/L	Y	220	28	13	0.35	1	0.301	0.5025	0.85	—	—
Metals	U	Uranium	µg/L	Y	447	358	80	0.052	0.2	0.05	0.758636872	3.63	—	—
Metals	Hg	Mercury	µg/L	Y	227	2	0.9	0.06	0.2	0.03	0.0305	0.031	1.4	NM Aqu Acute
Metals	Hg	Mercury	µg/L	Y	220	4	2	0.06	0.2	0.074	0.0965	0.15	0.77	NMWQCC WLDLF HAB
PCB	11096-82-5	Aroclor-1260	µg/L	—	9	0	0	0.036	0.1	—	—	—	—	—
PCB	11096-82-5	Aroclor-1260	µg/L	Y	110	1	0.9	0.036	0.1	0.087	0.087	0.087	0.00064	NM HH OO

Table B-4.1-3 (continued)

Suite	Symbol or CAS No.	Analyte	Units	Detect Flag	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	SW Std	SW Type
PCB	11097-69-1	Aroclor-1254	µg/L	—	9	0	0	0.036	0.1	—	—	—	—	—
PCB	11097-69-1	Aroclor-1254	µg/L	Y	110	1	0.9	0.036	0.1	0.086	0.086	0.086	0.00064	NM HH OO
PCB	11104-28-2	Aroclor-1221	µg/L	—	9	0	0	0.036	0.1	—	—	—	—	—
PCB	11104-28-2	Aroclor-1221	µg/L	—	110	0	0	0.036	0.1	—	—	—	0.00064	NM HH OO
PCB	11141-16-5	Aroclor-1232	µg/L	—	9	0	0	0.036	0.1	—	—	—	—	—
PCB	11141-16-5	Aroclor-1232	µg/L	—	110	0	0	0.036	0.1	—	—	—	0.00064	NM HH OO
PCB	12672-29-6	Aroclor-1248	µg/L	—	9	0	0	0.036	0.1	—	—	—	—	—
PCB	12672-29-6	Aroclor-1248	µg/L	—	110	0	0	0.036	0.1	—	—	—	0.00064	NM HH OO
PCB	12674-11-2	Aroclor-1016	µg/L	—	9	0	0	0.036	0.1	—	—	—	—	—
PCB	12674-11-2	Aroclor-1016	µg/L	—	110	0	0	0.036	0.1	—	—	—	0.00064	NM HH OO
PCB	37324-23-5	Aroclor-1262	µg/L	—	9	0	0	0.036	0.1	—	—	—	—	—
PCB	37324-23-5	Aroclor-1262	µg/L	—	110	0	0	0.036	0.1	—	—	—	0.00064	NM HH OO
PCB	53469-21-9	Aroclor-1242	µg/L	—	9	0	0	0.036	0.1	—	—	—	—	—
PCB	53469-21-9	Aroclor-1242	µg/L	—	110	0	0	0.036	0.1	—	—	—	0.00064	NM HH OO
PCB Congeners	13029-08-8	PCB-4	µg/L	—	29	0	0	—	—	—	—	—	—	—
PCB Congeners	1336-36-3	Total PCB	µg/L	Y	9	7	78	—	—	0.00000435	0.000104521	0.00027	—	—
PCB Congeners	1336-36-3	Total PCB	µg/L	Y	30	22	73	—	—	0.0000385	0.006457423	0.0512	0.00064	NM HH OO
PCB Congeners	15862-07-4	PCB-29	µg/L	—	26	0	0	—	—	—	—	—	—	—
PCB Congeners	15968-05-5	PCB-54	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	16605-91-7	PCB-5	µg/L	Y	39	1	3	—	—	0.0000556	0.0000556	0.0000556	—	—
PCB Congeners	16606-02-3	PCB-31	µg/L	Y	39	9	23	—	—	0.000007	2.59444E-05	0.0000569	—	—
PCB Congeners	2050-67-1	PCB-11	µg/L	Y	39	3	8	—	—	0.0000416	0.000134267	0.000316	—	—
PCB Congeners	2050-68-2	PCB-15	µg/L	Y	39	4	10	—	—	0.00000872	0.000013205	0.0000167	—	—
PCB Congeners	2051-24-3	PCB-209	µg/L	Y	39	2	5	—	—	0.00000832	0.00002316	0.000038	—	—
PCB Congeners	2051-60-7	PCB-1	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	2051-61-8	PCB-2	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	2051-62-9	PCB-3	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	2136-99-4	PCB-202	µg/L	Y	39	6	15	—	—	0.0000117	0.0000468	0.000124	—	—
PCB Congeners	2437-79-8	PCB-47	µg/L	Y	26	3	12	—	—	0.0000418	0.0000599	0.0000899	—	—
PCB Congeners	25323-68-6	Total triCB	µg/L	Y	39	11	28	—	—	0.0000105	0.000101264	0.000289	—	—
PCB Congeners	25429-29-2	Total pentaCB	µg/L	Y	39	19	49	—	—	0.00000435	0.001716433	0.0106	—	—
PCB Congeners	25512-42-9	Total diCB	µg/L	Y	39	8	21	—	—	0.0000163	9.13625E-05	0.000372	—	—
PCB Congeners	25569-80-6	PCB-6	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	26601-64-9	Total hexaCB	µg/L	Y	39	19	49	—	—	0.0000193	0.003214511	0.0216	—	—
PCB Congeners	26914-33-0	Total tetraCB	µg/L	Y	39	21	54	—	—	0.0000325	0.00035881	0.00245	—	—
PCB Congeners	27323-18-8	Total monoCB	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	28655-71-2	Total heptaCB	µg/L	Y	39	16	41	—	—	0.0000308	0.002029213	0.0134	—	—
PCB Congeners	31508-00-6	PCB-118	µg/L	Y	13	9	69	—	—	0.0000475	0.000493067	0.00192	—	—

Table B-4.1-3 (continued)

Suite	Symbol or CAS No.	Analyte	Units	Detect Flag	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	SW Std	SW Type
PCB Congeners	32598-10-0	PCB-66	µg/L	Y	13	7	54	—	—	0.0000134	0.000113314	0.000351	—	—
PCB Congeners	32598-13-3	PCB-77	µg/L	Y	39	7	18	—	—	0.00000428	1.76771E-05	0.0000524	—	—
PCB Congeners	32598-14-4	PCB-105	µg/L	Y	39	11	28	—	—	0.00000258	0.000126098	0.000539	—	—
PCB Congeners	32690-93-0	PCB-74	µg/L	—	26	0	0	—	—	—	—	—	—	—
PCB Congeners	32774-16-6	PCB-169	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	33025-41-1	PCB-60	µg/L	Y	13	4	31	—	—	0.00000723	1.69075E-05	0.0000283	—	—
PCB Congeners	33091-17-7	PCB-197	µg/L	—	26	0	0	—	—	—	—	—	—	—
PCB Congeners	33146-45-1	PCB-10	µg/L	—	13	0	0	—	—	—	—	—	—	—
PCB Congeners	33284-50-3	PCB-7	µg/L	—	29	0	0	—	—	—	—	—	—	—
PCB Congeners	33284-52-5	PCB-80	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	33284-53-6	PCB-61	µg/L	Y	16	1	6	—	—	0.0000542	0.0000542	0.0000542	—	—
PCB Congeners	33284-54-7	PCB-65	µg/L	—	26	0	0	—	—	—	—	—	—	—
PCB Congeners	33979-03-2	PCB-155	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	34883-39-1	PCB-9	µg/L	—	13	0	0	—	—	—	—	—	—	—
PCB Congeners	34883-41-5	PCB-14	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	34883-43-7	PCB-8	µg/L	Y	13	2	15	—	—	0.00000894	0.00001232	0.0000157	—	—
PCB Congeners	35065-27-1	PCB-153	µg/L	Y	26	7	27	—	—	0.0000294	0.000314429	0.00177	—	—
PCB Congeners	35065-28-2	PCB-138	µg/L	Y	16	4	25	—	—	0.0000324	0.00059715	0.00214	—	—
PCB Congeners	35065-29-3	PCB-180	µg/L	Y	26	6	23	—	—	0.0000308	0.000190983	0.000791	—	—
PCB Congeners	35065-30-6	PCB-170	µg/L	Y	39	11	28	—	—	0.0000483	0.000360127	0.0014	—	—
PCB Congeners	35693-92-6	PCB-30	µg/L	—	26	0	0	—	—	—	—	—	—	—
PCB Congeners	35693-99-3	PCB-52	µg/L	Y	29	11	38	—	—	0.000031	0.000188627	0.000691	—	—
PCB Congeners	35694-04-3	PCB-133	µg/L	Y	29	3	10	—	—	0.0000436	0.0000623	0.0000806	—	—
PCB Congeners	35694-06-5	PCB-137	µg/L	Y	39	5	13	—	—	0.00000721	0.000073142	0.000139	—	—
PCB Congeners	35694-08-7	PCB-194	µg/L	Y	39	10	26	—	—	0.0000127	0.0001664	0.000619	—	—
PCB Congeners	36559-22-5	PCB-42	µg/L	Y	29	2	7	—	—	0.0000421	0.0000526	0.0000631	—	—
PCB Congeners	37680-65-2	PCB-18	µg/L	Y	26	1	4	—	—	0.000046	0.000046	0.000046	—	—
PCB Congeners	37680-66-3	PCB-17	µg/L	Y	39	3	8	—	—	0.00000994	0.00001428	0.0000187	—	—
PCB Congeners	37680-68-5	PCB-34	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	37680-69-6	PCB-35	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	38379-99-6	PCB-95	µg/L	Y	29	12	41	—	—	0.0000452	0.0004	0.00154	—	—
PCB Congeners	38380-01-7	PCB-99	µg/L	Y	39	10	26	—	—	0.0000274	0.00022029	0.000839	—	—
PCB Congeners	38380-02-8	PCB-87	µg/L	Y	16	1	6	—	—	0.00017	0.00017	0.00017	—	—
PCB Congeners	38380-03-9	PCB-110	µg/L	Y	26	5	19	—	—	0.0000383	0.00028006	0.00118	—	—
PCB Congeners	38380-05-1	PCB-132	µg/L	Y	29	12	41	—	—	0.0000175	0.000339958	0.00145	—	—
PCB Congeners	38380-07-3	PCB-128	µg/L	Y	16	1	6	—	—	0.000441	0.000441	0.000441	—	—
PCB Congeners	38380-08-4	PCB-156	µg/L	Y	26	4	15	—	—	0.00000579	2.89725E-05	0.0000856	—	—
PCB Congeners	38411-22-2	PCB-136	µg/L	Y	39	10	26	—	—	0.0000205	0.00014473	0.000489	—	—

Table B-4.1-3 (continued)

Suite	Symbol or CAS No.	Analyte	Units	Detect Flag	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	SW Std	SW Type
PCB Congeners	38411-25-5	PCB-174	µg/L	Y	39	13	33	—	—	0.0000135	0.000408477	0.00204	—	—
PCB Congeners	38444-73-4	PCB-19	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	38444-76-7	PCB-27	µg/L	—	13	0	0	—	—	—	—	—	—	—
PCB Congeners	38444-77-8	PCB-32	µg/L	Y	13	2	15	—	—	0.0000132	0.0000143	0.0000154	—	—
PCB Congeners	38444-78-9	PCB-16	µg/L	Y	13	2	15	—	—	0.00000904	0.00001302	0.000017	—	—
PCB Congeners	38444-81-4	PCB-26	µg/L	—	26	0	0	—	—	—	—	—	—	—
PCB Congeners	38444-84-7	PCB-20	µg/L	Y	16	1	6	—	—	0.0000391	0.0000391	0.0000391	—	—
PCB Congeners	38444-85-8	PCB-22	µg/L	Y	39	6	15	—	—	0.00000694	1.23333E-05	0.0000241	—	—
PCB Congeners	38444-87-0	PCB-36	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	38444-88-1	PCB-39	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	38444-90-5	PCB-37	µg/L	Y	39	5	13	—	—	0.00000705	0.00001554	0.0000293	—	—
PCB Congeners	38444-93-8	PCB-40	µg/L	—	26	0	0	—	—	—	—	—	—	—
PCB Congeners	39485-83-1	PCB-100	µg/L	—	26	0	0	—	—	—	—	—	—	—
PCB Congeners	39635-31-9	PCB-189	µg/L	Y	39	5	13	—	—	0.0000074	0.00002192	0.0000539	—	—
PCB Congeners	39635-32-0	PCB-111	µg/L	—	29	0	0	—	—	—	—	—	—	—
PCB Congeners	39635-33-1	PCB-127	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	39635-34-2	PCB-162	µg/L	—	13	0	0	—	—	—	—	—	—	—
PCB Congeners	39635-35-3	PCB-159	µg/L	Y	39	1	3	—	—	0.0000244	0.0000244	0.0000244	—	—
PCB Congeners	40186-70-7	PCB-175	µg/L	Y	39	4	10	—	—	0.00000901	2.36775E-05	0.0000431	—	—
PCB Congeners	40186-71-8	PCB-201	µg/L	Y	39	5	13	—	—	0.0000105	0.00003824	0.0000979	—	—
PCB Congeners	40186-72-9	PCB-206	µg/L	Y	39	9	23	—	—	0.0000114	4.72889E-05	0.000142	—	—
PCB Congeners	41411-61-4	PCB-142	µg/L	—	13	0	0	—	—	—	—	—	—	—
PCB Congeners	41411-62-5	PCB-160	µg/L	—	13	0	0	—	—	—	—	—	—	—
PCB Congeners	41411-63-6	PCB-166	µg/L	—	26	0	0	—	—	—	—	—	—	—
PCB Congeners	41411-64-7	PCB-190	µg/L	Y	39	9	23	—	—	0.0000119	8.84556E-05	0.000304	—	—
PCB Congeners	41464-39-5	PCB-44	µg/L	Y	26	2	8	—	—	0.0000308	0.000032	0.0000332	—	—
PCB Congeners	41464-41-9	PCB-53	µg/L	—	26	0	0	—	—	—	—	—	—	—
PCB Congeners	41464-42-0	PCB-72	µg/L	Y	13	2	15	—	—	0.00000956	0.00000998	0.0000104	—	—
PCB Congeners	41464-43-1	PCB-56	µg/L	Y	29	8	28	—	—	0.0000139	0.0000391	0.000115	—	—
PCB Congeners	41464-47-5	PCB-46	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	41464-48-6	PCB-79	µg/L	Y	39	2	5	—	—	0.0000119	0.00001545	0.000019	—	—
PCB Congeners	41464-49-7	PCB-58	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	41464-51-1	PCB-97	µg/L	Y	26	1	4	—	—	0.000179	0.000179	0.000179	—	—
PCB Congeners	42740-50-1	PCB-196	µg/L	Y	29	11	38	—	—	0.00000881	0.000101274	0.000372	—	—
PCB Congeners	51908-16-8	PCB-146	µg/L	Y	29	10	34	—	—	0.000025	0.000214	0.000924	—	—
PCB Congeners	52663-58-8	PCB-64	µg/L	Y	13	7	54	—	—	0.0000102	3.55143E-05	0.0000979	—	—
PCB Congeners	52663-59-9	PCB-41	µg/L	Y	29	2	7	—	—	0.0000144	0.0000237	0.000033	—	—
PCB Congeners	52663-60-2	PCB-84	µg/L	Y	29	10	34	—	—	0.0000183	0.00013983	0.000522	—	—

Table B-4.1-3 (continued)

Suite	Symbol or CAS No.	Analyte	Units	Detect Flag	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	SW Std	SW Type
PCB Congeners	52663-61-3	PCB-92	µg/L	Y	13	9	69	—	—	0.0000181	0.000121767	0.000483	—	—
PCB Congeners	52663-62-4	PCB-82	µg/L	Y	39	9	23	—	—	0.0000101	5.42556E-05	0.000183	—	—
PCB Congeners	52663-63-5	PCB-151	µg/L	Y	26	2	8	—	—	0.0000501	0.00019655	0.000343	—	—
PCB Congeners	52663-64-6	PCB-179	µg/L	Y	39	11	28	—	—	0.0000202	0.000164927	0.000684	—	—
PCB Congeners	52663-65-7	PCB-176	µg/L	Y	39	9	23	—	—	0.00000765	0.00005657--111	0.0002	—	—
PCB Congeners	52663-66-8	PCB-130	µg/L	Y	39	8	21	—	—	0.0000136	8.89625E-05	0.000267	—	—
PCB Congeners	52663-67-9	PCB-178	µg/L	Y	39	7	18	—	—	0.0000122	9.06286E-05	0.000337	—	—
PCB Congeners	52663-68-0	PCB-187	µg/L	Y	13	10	77	—	—	0.0000151	0.00045245	0.00184	—	—
PCB Congeners	52663-69-1	PCB-183	µg/L	Y	26	2	8	—	—	0.0000429	0.00010895	0.000175	—	—
PCB Congeners	52663-70-4	PCB-177	µg/L	Y	39	10	26	—	—	0.0000453	0.0002755	0.00103	—	—
PCB Congeners	52663-71-5	PCB-171	µg/L	Y	26	1	4	—	—	0.000103	0.000103	0.000103	—	—
PCB Congeners	52663-72-6	PCB-167	µg/L	Y	39	10	26	—	—	0.00000282	0.000045289	0.000165	—	—
PCB Congeners	52663-73-7	PCB-200	µg/L	—	26	0	0	—	—	—	—	—	—	—
PCB Congeners	52663-74-8	PCB-172	µg/L	Y	39	9	23	—	—	0.000012	0.0000792	0.00027	—	—
PCB Congeners	52663-75-9	PCB-199	µg/L	Y	26	2	8	—	—	0.0000664	0.0001232	0.00018	—	—
PCB Congeners	52663-76-0	PCB-203	µg/L	Y	13	9	69	—	—	0.00000943	0.000109414	0.000429	—	—
PCB Congeners	52663-77-1	PCB-208	µg/L	Y	39	2	5	—	—	0.0000108	0.00001835	0.0000259	—	—
PCB Congeners	52663-78-2	PCB-195	µg/L	Y	39	9	23	—	—	0.0000156	7.69889E-05	0.000295	—	—
PCB Congeners	52663-79-3	PCB-207	µg/L	Y	39	1	3	—	—	0.0000195	0.0000195	0.0000195	—	—
PCB Congeners	52704-70-8	PCB-134	µg/L	Y	29	4	14	—	—	0.0000381	0.000123775	0.000223	—	—
PCB Congeners	52712-04-6	PCB-141	µg/L	Y	39	12	31	—	—	0.0000111	0.000248883	0.00114	—	—
PCB Congeners	52712-05-7	PCB-185	µg/L	Y	26	1	4	—	—	0.0000399	0.0000399	0.0000399	—	—
PCB Congeners	52744-13-5	PCB-135	µg/L	Y	26	1	4	—	—	0.000267	0.000267	0.000267	—	—
PCB Congeners	53555-66-1	PCB-38	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	53742-07-7	Total nonaCB	µg/L	Y	39	9	23	—	—	0.0000114	0.0000536	0.000188	—	—
PCB Congeners	54230-22-7	PCB-62	µg/L	—	26	0	0	—	—	—	—	—	—	—
PCB Congeners	55215-17-3	PCB-88	µg/L	Y	39	4	10	—	—	0.0000152	0.0001243	0.000173	—	—
PCB Congeners	55215-18-4	PCB-129	µg/L	Y	26	1	4	—	—	0.000109	0.000109	0.000109	—	—
PCB Congeners	55312-69-1	PCB-86	µg/L	—	26	0	0	—	—	—	—	—	—	—
PCB Congeners	55702-45-9	PCB-24	µg/L	—	29	0	0	—	—	—	—	—	—	—
PCB Congeners	55712-37-3	PCB-25	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	55720-44-0	PCB-23	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	55722-26-4	Total octaCB	µg/L	Y	39	11	28	—	—	0.0000512	0.000635109	0.00272	—	—
PCB Congeners	56030-56-9	PCB-139	µg/L	Y	16	4	25	—	—	0.000057	0.00042455	0.00141	—	—
PCB Congeners	56558-16-8	PCB-104	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	56558-17-9	PCB-119	µg/L	—	26	0	0	—	—	—	—	—	—	—
PCB Congeners	56558-18-0	PCB-121	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	57465-28-8	PCB-126	µg/L	Y	39	1	3	—	—	0.0000113	0.0000113	0.0000113	—	—

Table B-4.1-3 (continued)

Suite	Symbol or CAS No.	Analyte	Units	Detect Flag	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	SW Std	SW Type
PCB Congeners	59291-64-4	PCB-140	µg/L	—	26	0	0	—	—	—	—	—	—	—
PCB Congeners	59291-65-5	PCB-168	µg/L	—	26	0	0	—	—	—	—	—	—	—
PCB Congeners	60145-20-2	PCB-83	µg/L	Y	39	3	8	—	—	0.0000078	8.12667E-05	0.000128	—	—
PCB Congeners	60145-21-3	PCB-103	µg/L	Y	39	2	5	—	—	0.0000146	0.00001935	0.0000241	—	—
PCB Congeners	60145-22-4	PCB-154	µg/L	Y	39	2	5	—	—	0.0000348	0.0000545	0.0000742	—	—
PCB Congeners	60145-23-5	PCB-182	µg/L	Y	29	3	10	—	—	0.0000357	0.000191567	0.000417	—	—
PCB Congeners	61798-70-7	PCB-131	µg/L	Y	39	2	5	—	—	0.0000238	0.000031	0.0000382	—	—
PCB Congeners	62796-65-0	PCB-50	µg/L	—	26	0	0	—	—	—	—	—	—	—
PCB Congeners	65510-44-3	PCB-123	µg/L	Y	39	1	3	—	—	0.00000301	0.00000301	0.00000301	—	—
PCB Congeners	65510-45-4	PCB-85	µg/L	Y	16	1	6	—	—	0.000174	0.000174	0.000174	—	—
PCB Congeners	68194-04-7	PCB-51	µg/L	Y	26	7	27	—	—	0.0000325	0.000110514	0.00027	—	—
PCB Congeners	68194-07-0	PCB-90	µg/L	Y	16	5	31	—	—	0.0000286	0.00017606	0.000708	—	—
PCB Congeners	68194-08-1	PCB-150	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	68194-09-2	PCB-152	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	68194-10-5	PCB-113	µg/L	—	26	0	0	—	—	—	—	—	—	—
PCB Congeners	68194-12-7	PCB-120	µg/L	Y	39	1	3	—	—	0.0000074	0.0000074	0.0000074	—	—
PCB Congeners	68194-13-8	PCB-147	µg/L	Y	26	1	4	—	—	0.0000558	0.0000558	0.0000558	—	—
PCB Congeners	68194-14-9	PCB-144	µg/L	Y	39	9	23	—	—	0.0000089	0.0000597---	0.000202	—	—
PCB Congeners	68194-15-0	PCB-143	µg/L	—	13	0	0	—	—	—	—	—	—	—
PCB Congeners	68194-16-1	PCB-173	µg/L	—	26	0	0	—	—	—	—	—	—	—
PCB Congeners	68194-17-2	PCB-198	µg/L	—	26	0	0	—	—	—	—	—	—	—
PCB Congeners	69782-90-7	PCB-157	µg/L	Y	26	1	4	—	—	0.0000496	0.0000496	0.0000496	—	—
PCB Congeners	69782-91-8	PCB-193	µg/L	Y	26	1	4	—	—	0.0000416	0.0000416	0.0000416	—	—
PCB Congeners	7012-37-5	PCB-28	µg/L	Y	26	1	4	—	—	0.0000583	0.0000583	0.0000583	—	—
PCB Congeners	70362-41-3	PCB-108	µg/L	Y	16	1	6	—	—	0.0000281	0.0000281	0.0000281	—	—
PCB Congeners	70362-45-7	PCB-45	µg/L	—	26	0	0	—	—	—	—	—	—	—
PCB Congeners	70362-46-8	PCB-43	µg/L	Y	29	1	3	—	—	0.000029	0.000029	0.000029	—	—
PCB Congeners	70362-47-9	PCB-48	µg/L	Y	29	1	3	—	—	0.0000116	0.0000116	0.0000116	—	—
PCB Congeners	70362-48-0	PCB-76	µg/L	Y	16	1	6	—	—	0.0000387	0.0000387	0.0000387	—	—
PCB Congeners	70362-49-1	PCB-78	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	70362-50-4	PCB-81	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	70424-67-8	PCB-57	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	70424-68-9	PCB-107	µg/L	Y	29	5	17	—	—	0.00000854	0.000059748	0.000146	—	—
PCB Congeners	70424-69-0	PCB-106	µg/L	Y	29	3	10	—	—	0.00000832	0.00011204	0.000301	—	—
PCB Congeners	70424-70-3	PCB-124	µg/L	Y	26	1	4	—	—	0.000029	0.000029	0.000029	—	—
PCB Congeners	73575-52-7	PCB-68	µg/L	Y	39	1	3	—	—	0.0000342	0.0000342	0.0000342	—	—
PCB Congeners	73575-53-8	PCB-67	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	73575-54-9	PCB-96	µg/L	—	39	0	0	—	—	—	—	—	—	—

Table B-4.1-3 (continued)

Suite	Symbol or CAS No.	Analyte	Units	Detect Flag	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	SW Std	SW Type
PCB Congeners	73575-55-0	PCB-94	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	73575-56-1	PCB-93	µg/L	—	26	0	0	—	—	—	—	—	—	—
PCB Congeners	73575-57-2	PCB-89	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	74338-23-1	PCB-73	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	74338-24-2	PCB-55	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	74472-34-7	PCB-63	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	74472-36-9	PCB-112	µg/L	—	13	0	0	—	—	—	—	—	—	—
PCB Congeners	74472-37-0	PCB-114	µg/L	Y	39	2	5	—	—	0.0000124	0.0000157	0.000019	—	—
PCB Congeners	74472-40-5	PCB-145	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	74472-41-6	PCB-148	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	74472-42-7	PCB-158	µg/L	Y	29	10	34	—	—	0.0000118	0.00012294	0.000467	—	—
PCB Congeners	74472-43-8	PCB-161	µg/L	—	13	0	0	—	—	-	-	-	—	—
PCB Congeners	74472-45-0	PCB-164	µg/L	Y	13	9	69	—	—	0.0000102	9.93222E-05	0.000412	—	—
PCB Congeners	74472-46-1	PCB-165	µg/L	—	13	0	0	—	—	—	—	—	—	—
PCB Congeners	74472-47-2	PCB-181	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	74472-48-3	PCB-184	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	74472-49-4	PCB-186	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	74472-50-7	PCB-191	µg/L	Y	39	5	13	—	—	0.00000703	0.000023726	0.000057	—	—
PCB Congeners	74472-51-8	PCB-192	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	74472-52-9	PCB-204	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	74472-53-0	PCB-205	µg/L	Y	39	3	8	—	—	0.00000869	2.02633E-05	0.0000399	—	—
PCB Congeners	74487-85-7	PCB-188	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	76842-07-4	PCB-122	µg/L	Y	39	1	3	—	—	0.0000105	0.0000105	0.0000105	—	—
PCB Congeners	DECACB(Tot)	Total decaCB	µg/L	Y	39	2	5	—	—	0.00000832	0.00002316	0.000038	—	—
PCB Congeners	PCB-106/118	PCB-106/PCB-118	µg/L	Y	10	3	30	—	—	0.00000435	1.44833E-05	0.0000271	—	—
PCB Congeners	PCB-107/109	PCB-107/PCB-109	µg/L	—	10	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-108/112	PCB-108/PCB-112	µg/L	—	10	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-108/124	PCB-108/PCB-124	µg/L	Y	13	2	15	—	—	0.0000308	0.00004585	0.0000609	—	—
PCB Congeners	PCB-110/115	PCB-110/PCB-115	µg/L	Y	13	5	38	—	—	0.000106	0.000563	0.0019	—	—
PCB Congeners	PCB-111/115	PCB-111/PCB-115	µg/L	—	10	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-12/13	PCB-12/PCB-13	µg/L	—	39	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-128/162	PCB-128/PCB-162	µg/L	—	10	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-128/166	PCB-128/PCB-166	µg/L	Y	13	9	69	—	—	0.0000188	0.000137144	0.000523	—	—
PCB Congeners	PCB-129-163	PCB-129/PCB-138/PCB-163	µg/L	Y	13	10	77	—	—	0.0000748	0.00115038	0.00478	—	—
PCB Congeners	PCB-132/161	PCB-132/PCB-161	µg/L	—	10	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-133/142	PCB-133/PCB-142	µg/L	—	10	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-134/143	PCB-134/PCB-143	µg/L	—	10	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-135/151	PCB-135/PCB-151	µg/L	Y	13	10	77	—	—	0.0000276	0.00038357	0.00159	—	—

Table B-4.1-3 (continued)

Suite	Symbol or CAS No.	Analyte	Units	Detect Flag	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	SW Std	SW Type
PCB Congeners	PCB-138-164	PCB-138/PCB-163/PCB-164	µg/L	Y	10	3	30	—	—	0.0000395	4.24333E-05	0.0000465	—	—
PCB Congeners	PCB-139/140	PCB-139/PCB-140	µg/L	Y	13	2	15	—	—	0.0000348	0.0000477	0.0000606	—	—
PCB Congeners	PCB-139/149	PCB-139/PCB-149	µg/L	Y	10	1	10	—	—	0.0000351	0.0000351	0.0000351	—	—
PCB Congeners	PCB-146/165	PCB-146/PCB-165	µg/L	—	10	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-147/149	PCB-147/PCB-149	µg/L	Y	13	9	69	—	—	0.000127	0.000995556	0.00397	—	—
PCB Congeners	PCB-153/168	PCB-153/PCB-168	µg/L	Y	13	9	69	—	—	0.000158	0.001105778	0.00418	—	—
PCB Congeners	PCB-156/157	PCB-156/PCB-157	µg/L	Y	13	8	62	—	—	0.0000194	0.0001237	0.000424	—	—
PCB Congeners	PCB-158/160	PCB-158/PCB-160	µg/L	—	10	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-16/32	PCB-16/PCB-32	µg/L	Y	26	1	4	—	—	0.0000323	0.0000323	0.0000323	—	—
PCB Congeners	PCB-171/173	PCB-171/PCB-173	µg/L	Y	13	8	62	—	—	0.0000228	0.000145063	0.0005	—	—
PCB Congeners	PCB-18/30	PCB-18/PCB-30	µg/L	Y	13	5	38	—	—	0.0000199	0.00002836	0.0000396	—	—
PCB Congeners	PCB-180/193	PCB-180/PCB-193	µg/L	Y	13	4	31	—	—	0.0000191	0.001376775	0.00358	—	—
PCB Congeners	PCB-182/187	PCB-182/PCB-187	µg/L	—	10	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-183/185	PCB-183/PCB-185	µg/L	Y	13	6	46	—	—	0.0000561	0.000381717	0.00103	—	—
PCB Congeners	PCB-196/203	PCB-196/PCB-203	µg/L	—	10	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-197/200	PCB-197/PCB-200	µg/L	—	13	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-198/199	PCB-198/PCB-199	µg/L	Y	13	9	69	—	—	0.0000203	0.000195189	0.000743	—	—
PCB Congeners	PCB-20/21/33	PCB-20/PCB-21/PCB-33	µg/L	—	10	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-20/28	PCB-20/PCB-28	µg/L	Y	13	8	62	—	—	0.0000145	3.47125E-05	0.0000943	—	—
PCB Congeners	PCB-21/33	PCB-21/PCB-33	µg/L	Y	13	1	8	—	—	0.0000144	0.0000144	0.0000144	—	—
PCB Congeners	PCB-24/27	PCB-24/PCB-27	µg/L	—	10	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-26/29	PCB-26/PCB-29	µg/L	—	13	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-4/10	PCB-4/PCB-10	µg/L	—	10	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-40/71	PCB-40/PCB-71	µg/L	Y	13	2	15	—	—	0.0000722	0.0000814	0.0000906	—	—
PCB Congeners	PCB-41-72	PCB-41/PCB-64/PCB-71/PCB-72	µg/L	—	10	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-42/59	PCB-42/PCB-59	µg/L	—	10	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-43/49	PCB-43/PCB-49	µg/L	—	10	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-44/47/65	PCB-44/PCB-47/PCB-65	µg/L	Y	13	1	8	—	—	0.000024	0.000024	0.000024	—	—
PCB Congeners	PCB-45/51	PCB-45/PCB-51	µg/L	Y	13	1	8	—	—	0.0000223	0.0000223	0.0000223	—	—
PCB Congeners	PCB-48/75	PCB-48/PCB-75	µg/L	—	10	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-49/69	PCB-49/PCB-69	µg/L	Y	13	7	54	—	—	0.0000154	8.23857E-05	0.000251	—	—
PCB Congeners	PCB-50/53	PCB-50/PCB-53	µg/L	Y	13	1	8	—	—	0.0000181	0.0000181	0.0000181	—	—
PCB Congeners	PCB-52/69	PCB-52/PCB-69	µg/L	—	10	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-56/60	PCB-56/PCB-60	µg/L	—	10	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-59/62/75	PCB-59/PCB-62/PCB-75	µg/L	—	13	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-61/70	PCB-61/PCB-70	µg/L	—	10	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-61-76	PCB-61/PCB-70/PCB-74/PCB-76	µg/L	Y	13	8	62	—	—	0.0000374	0.00019665	0.00061	—	—
PCB Congeners	PCB-66/76	PCB-66/PCB-76	µg/L	—	10	0	0	—	—	—	—	—	—	—

Table B-4.1-3 (continued)

Suite	Symbol or CAS No.	Analyte	Units	Detect Flag	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	SW Std	SW Type
PCB Congeners	PCB-7/9	PCB-7/PCB-9	µg/L	—	10	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-84/92	PCB-84/PCB-92	µg/L	—	10	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-85/116	PCB-85/PCB-116	µg/L	—	10	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-85-117	PCB-85/PCB-116/PCB-117	µg/L	Y	13	4	31	—	—	0.0000252	0.000129925	0.00028	—	—
PCB Congeners	PCB-86-125	PCB-86/87/97/109/119/125	µg/L	Y	13	9	69	—	—	0.0000582	0.000339856	0.00128	—	—
PCB Congeners	PCB-87-125	PCB-87/PCB-117/PCB-125	µg/L	—	10	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-90/101	PCB-90/PCB-101	µg/L	—	10	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-90-113	PCB-90/PCB-101/PCB-113	µg/L	Y	13	9	69	—	—	0.000117	0.000654444	0.00243	—	—
PCB Congeners	PCB-93/100	PCB-93/PCB-100	µg/L	—	13	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-95-102	PCB-95/PCB-98/PCB-102	µg/L	—	10	0	0	—	—	—	—	—	—	—
PCB Congeners	PCB-98/102	PCB-98/PCB-102	µg/L	Y	13	2	15	—	—	0.0000172	0.00002345	0.0000297	—	—
Perchlorate	ClO4	Perchlorate	µg/L	Y	220	189	86	0.05	0.2	0.0521	0.48662328	6.19	—	—
Pesticides	1024-57-3	Heptachlor Epoxide	µg/L	—	49	0	0	0.006	0.02	—	—	—	0.00039	NM HH OO
Pesticides	1031-07-8	Endosulfan Sulfate	µg/L	—	49	0	0	0.009	0.04	—	—	—	89	NM HH OO
Pesticides	309-00-2	Aldrin	µg/L	—	49	0	0	0.006	0.022	—	—	—	0.0005	NM HH OO
Pesticides	319-84-6	BHC[alpha-]	µg/L	—	49	0	0	0.006	0.02	—	—	—	0.049	NM HH OO
Pesticides	319-85-7	BHC[beta-]	µg/L	—	49	0	0	0.008	0.02	—	—	—	0.17	NM HH OO
Pesticides	319-86-8	BHC[delta-]	µg/L	Y	49	1	2	0.006	0.02	0.00859	0.00859	0.00859	—	—
Pesticides	33213-65-9	Endosulfan II	µg/L	—	49	0	0	0.009	0.04	—	—	—	0.22	NM Aqu Acute
Pesticides	50-29-3	DDT[4,4'-]	µg/L	Y	49	1	2	0.01	0.04	0.0147	0.0147	0.0147	0.001	NMWQCC WLDLF HAB
Pesticides	5103-71-9	Chlordane[alpha-]	µg/L	—	49	0	0	0.006	0.02	—	—	—	0.0081	NM HH OO
Pesticides	5103-74-2	Chlordane[gamma-]	µg/L	—	49	0	0	0.006	0.02	—	—	—	0.0081	NM HH OO
Pesticides	53494-70-5	Endrin Ketone	µg/L	—	49	0	0	0.01	0.04	—	—	—	—	—
Pesticides	58-89-9	BHC[gamma-]	µg/L	—	49	0	0	0.006	0.02	—	—	—	0.95	NM Aqu Acute
Pesticides	60-57-1	Dieldrin	µg/L	—	49	0	0	0.009	0.04	—	—	—	0.00054	NM HH OO
Pesticides	72-20-8	Endrin	µg/L	—	49	0	0	0.009	0.04	—	—	—	0.06	NM HH OO
Pesticides	72-43-5	Methoxychlor[4,4'-]	µg/L	—	49	0	0	0.05	0.2	—	—	—	—	—
Pesticides	72-54-8	DDD[4,4'-]	µg/L	Y	49	1	2	0.009	0.04	0.0103	0.0103	0.0103	0.001	NMWQCC WLDLF HAB
Pesticides	72-55-9	DDE[4,4'-]	µg/L	Y	49	1	2	0.006	0.04	0.00563	0.00563	0.00563	0.001	NMWQCC WLDLF HAB
Pesticides	7421-93-4	Endrin Aldehyde	µg/L	Y	49	1	2	0.006	0.04	0.011	0.011	0.011	0.3	NM HH OO
Pesticides	76-44-8	Heptachlor	µg/L	—	49	0	0	0.006	0.02	—	—	—	0.00079	NM HH OO
Pesticides	8001-35-2	Toxaphene (Technical Grade)	µg/L	—	49	0	0	0.16	0.5	—	—	—	0.0028	NM HH OO
Pesticides	959-98-8	Endosulfan I	µg/L	—	49	0	0	0.006	0.02	—	—	—	0.22	NM Aqu Acute
Rad	Ra-226	Radium-226	pCi/L	Y	39	7	18	—	—	0.375	0.721571429	1.68	30	NM LVSTK WTR STD
Rad	Ra-228	Radium-228	pCi/L	Y	39	8	21	—	—	0.612	0.96475	1.83	30	NM LVSTK WTR STD
Rad	Sr-90	Strontium-90	pCi/L	Y	228	38	17	—	—	0.509	19.23763158	136	300	DOE BCG WATER
Rad	H-3	Tritium	pCi/L	Y	3	2	67	—	—	1880	2375	2870	20000	NM LVSTK WTR STD
Rad	H-3	Tritium	pCi/L	Y	59	56	95	—	—	2.1896	34.25516071	589.26	20000	NM LVSTK WTR STD

Table B-4.1-3 (continued)

Suite	Symbol or CAS No.	Analyte	Units	Detect Flag	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	SW Std	SW Type
SVOA	100-01-6	Nitroaniline[4-]	µg/L	—	142	0	0	3.3	10	—	—	—	—	—
SVOA	100-02-7	Nitrophenol[4-]	µg/L	—	130	0	0	2.3	10	—	—	—	—	—
SVOA	100-51-6	Benzyl Alcohol	µg/L	—	142	0	0	2.3	10	—	—	—	—	—
SVOA	101-55-3	Bromophenyl-phenylether[4-]	µg/L	Y	142	1	0.7	2.4	10	2.78	2.78	2.78	—	—
SVOA	103-33-3	Azobenzene	µg/L	—	142	0	0	2.4	10	—	—	—	—	—
SVOA	105-67-9	Dimethylphenol[2,4-]	µg/L	—	134	0	0	2.4	10	—	—	—	850	NM HH OO
SVOA	106-44-5	Methylphenol[4-]	µg/L	—	134	0	0	3.3	10	—	—	—	—	—
SVOA	106-46-7	Dichlorobenzene[1,4-]	µg/L	—	142	0	0	2.3	10	—	—	—	190	NM HH OO
SVOA	106-47-8	Chloroaniline[4-]	µg/L	—	142	0	0	2.4	10	—	—	—	—	—
SVOA	108-60-1	Oxybis(1-chloropropane)[2,2'-]	µg/L	—	142	0	0	2.4	10	—	—	—	65000	NM HH OO
SVOA	108-95-2	Phenol	µg/L	—	134	0	0	1.4	10	—	—	—	860000	NM HH OO
SVOA	110-86-1	Pyridine	µg/L	—	142	0	0	2.7	10	—	—	—	—	—
SVOA	111-44-4	Bis(2-chloroethyl)ether	µg/L	—	142	0	0	2.4	10	—	—	—	5.3	NM HH OO
SVOA	111-91-1	Bis(2-chloroethoxy)methane	µg/L	—	142	0	0	3.3	10	—	—	—	—	—
SVOA	117-81-7	Bis(2-ethylhexyl)phthalate	µg/L	Y	142	4	3	2.4	10	2	2.655	3.34	22	NM HH OO
SVOA	117-84-0	Di-n-octylphthalate	µg/L	—	142	0	0	3.3	10	—	—	—	—	—
SVOA	118-74-1	Hexachlorobenzene	µg/L	—	142	0	0	2.4	10	—	—	—	0.0029	NM HH OO
SVOA	120-12-7	Anthracene	µg/L	Y	142	1	0.7	0.24	1	0.236	0.236	0.236	40000	NM HH OO
SVOA	120-82-1	Trichlorobenzene[1,2,4-]	µg/L	—	142	0	0	2.4	10	—	—	—	70	NM HH OO
SVOA	120-83-2	Dichlorophenol[2,4-]	µg/L	—	134	0	0	2.4	10	—	—	—	290	NM HH OO
SVOA	121-14-2	Dinitrotoluene[2,4-]	µg/L	—	142	0	0	2.4	10	—	—	—	34	NM HH OO
SVOA	122-39-4	Diphenylamine	µg/L	—	142	0	0	3.3	10	—	—	—	—	—
SVOA	123-91-1	Dioxane[1,4-]	µg/L	Y	142	3	2	2	10	2.21	8.08	14.5	—	—
SVOA	129-00-0	Pyrene	µg/L	—	142	0	0	0.33	1	—	—	—	4000	NM HH OO
SVOA	131-11-3	Dimethyl Phthalate	µg/L	—	142	0	0	2.4	10	—	—	—	1100000	NM HH OO
SVOA	132-64-9	Dibenzofuran	µg/L	—	142	0	0	2.3	10	—	—	—	—	—
SVOA	1912-24-9	Atrazine	µg/L	—	50	0	0	3	10	—	—	—	—	—
SVOA	191-24-2	Benzo(g,h,i)perylene	µg/L	Y	142	1	0.7	0.24	1	0.288	0.288	0.288	—	—
SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	µg/L	Y	142	1	0.7	0.24	1	0.26	0.26	0.26	0.18	NM HH OO
SVOA	205-99-2	Benzo(b)fluoranthene	µg/L	—	142	0	0	0.25	1	—	—	—	0.18	NM HH OO
SVOA	206-44-0	Fluoranthene	µg/L	Y	142	1	0.7	0.24	1	0.276	0.276	0.276	140	NM HH OO
SVOA	207-08-9	Benzo(k)fluoranthene	µg/L	Y	142	2	1	0.24	1	0.241	0.3735	0.506	0.18	NM HH OO
SVOA	208-96-8	Acenaphthylene	µg/L	—	142	0	0	0.22	1	—	—	—	—	—
SVOA	218-01-9	Chrysene	µg/L	Y	142	1	0.7	0.24	1	0.239	0.239	0.239	0.18	NM HH OO
SVOA	50-32-8	Benzo(a)pyrene	µg/L	Y	142	1	0.7	0.25	1	0.237	0.237	0.237	0.18	NM HH OO
SVOA	51-28-5	Dinitrophenol[2,4-]	µg/L	—	134	0	0	7	20	—	—	—	5300	NM HH OO
SVOA	534-52-1	Dinitro-2-methylphenol[4,6-]	µg/L	—	134	0	0	3.3	10	—	—	—	280	NM HH OO
SVOA	53-70-3	Dibenz(a,h)anthracene	µg/L	—	142	0	0	0.24	1	—	—	—	0.18	NM HH OO

Table B-4.1-3 (continued)

Suite	Symbol or CAS No.	Analyte	Units	Detect Flag	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	SW Std	SW Type
SVOA	541-73-1	Dichlorobenzene[1,3-]	µg/L	—	142	0	0	2.3	10	—	—	—	960	NM HH OO
SVOA	55-18-5	Nitrosodiethylamine[N-]	µg/L	—	142	0	0	2.3	10	—	—	—	—	—
SVOA	56-55-3	Benzo(a)anthracene	µg/L	Y	142	2	1	0.24	1	0.25	0.3265	0.403	0.18	NM HH OO
SVOA	58-90-2	Tetrachlorophenol[2,3,4,6-]	µg/L	—	134	0	0	2.4	10	—	—	—	—	—
SVOA	59-50-7	Chloro-3-methylphenol[4-]	µg/L	—	134	0	0	2.4	10	—	—	—	—	—
SVOA	606-20-2	Dinitrotoluene[2,6-]	µg/L	—	142	0	0	2.4	10	—	—	—	—	—
SVOA	608-93-5	Pentachlorobenzene	µg/L	—	142	0	0	3	10	—	—	—	—	—
SVOA	621-64-7	Nitroso-di-n-propylamine[N-]	µg/L	—	142	0	0	2.4	10	—	—	—	5.1	NM HH OO
SVOA	62-53-3	Aniline	µg/L	—	142	0	0	2.8	10	—	—	—	—	—
SVOA	62-75-9	Nitrosodimethylamine[N-]	µg/L	—	142	0	0	2.4	10	—	—	—	30	NM HH OO
SVOA	65-85-0	Benzoic Acid	µg/L	Y	127	2	2	6.6	20	7.52	11.16	14.8	—	—
SVOA	67-72-1	Hexachloroethane	µg/L	—	142	0	0	2.4	10	—	—	—	33	NM HH OO
SVOA	7005-72-3	Chlorophenyl-phenyl[4-] Ether	µg/L	—	142	0	0	2.4	10	—	—	—	—	—
SVOA	77-47-4	Hexachlorocyclopentadiene	µg/L	—	142	0	0	3	10	—	—	—	1100	NM HH OO
SVOA	78-59-1	Isophorone	µg/L	—	142	0	0	3	10	—	—	—	9600	NM HH OO
SVOA	83-32-9	Acenaphthene	µg/L	—	142	0	0	0.34	1	—	—	—	990	NM HH OO
SVOA	84-66-2	Diethylphthalate	µg/L	Y	142	3	2	2.4	10	2.91	11.29	24.8	44000	NM HH OO
SVOA	84-74-2	Di-n-butylphthalate	µg/L	—	142	0	0	2.3	10	—	—	—	4500	NM HH OO
SVOA	85-01-8	Phenanthrene	µg/L	Y	142	2	1	0.24	1	0.26	0.4825	0.705	—	—
SVOA	85-68-7	Butylbenzylphthalate	µg/L	—	142	0	0	2.4	10	—	—	—	1900	NM HH OO
SVOA	86-73-7	Fluorene	µg/L	Y	142	1	0.7	0.24	1	0.226	0.226	0.226	5300	NM HH OO
SVOA	87-68-3	Hexachlorobutadiene	µg/L	—	142	0	0	2.4	10	—	—	—	180	NM HH OO
SVOA	87-86-5	Pentachlorophenol	µg/L	—	134	0	0	2.4	10	—	—	—	19	NM Aqu Acute
SVOA	88-06-2	Trichlorophenol[2,4,6-]	µg/L	—	134	0	0	2.4	10	—	—	—	24	NM HH OO
SVOA	88-74-4	Nitroaniline[2-]	µg/L	—	142	0	0	2.3	10	—	—	—	—	—
SVOA	88-75-5	Nitrophenol[2-]	µg/L	—	134	0	0	2.4	10	—	—	—	—	—
SVOA	88-85-7	Dinoseb	µg/L	—	134	0	0	2.4	10	—	—	—	—	—
SVOA	90-12-0	Methylnaphthalene[1-]	µg/L	—	142	0	0	0.33	1	—	—	—	—	—
SVOA	91-20-3	Naphthalene	µg/L	—	142	0	0	0.33	1	—	—	—	—	—
SVOA	91-57-6	Methylnaphthalene[2-]	µg/L	—	142	0	0	0.33	1	—	—	—	—	—
SVOA	91-58-7	Chloronaphthalene[2-]	µg/L	—	142	0	0	0.35	1	—	—	—	1600	NM HH OO
SVOA	91-94-1	Dichlorobenzidine[3,3'-]	µg/L	—	142	0	0	2	10	—	—	—	0.28	NM HH OO
SVOA	924-16-3	Nitroso-di-n-butylamine[N-]	µg/L	—	142	0	0	3	10	—	—	—	—	—
SVOA	92-87-5	Benzidine	µg/L	—	130	0	0	3	10	—	—	—	0.002	NM HH OO
SVOA	930-55-2	Nitrosopyrrolidine[N-]	µg/L	—	141	0	0	2.3	10	—	—	—	—	—
SVOA	95-48-7	Methylphenol[2-]	µg/L	—	134	0	0	2.3	10	—	—	—	—	—
SVOA	95-50-1	Dichlorobenzene[1,2-]	µg/L	—	142	0	0	2.3	10	—	—	—	1300	NM HH OO
SVOA	95-57-8	Chlorophenol[2-]	µg/L	—	134	0	0	2.4	10	—	—	—	150	NM HH OO

Table B-4.1-3 (continued)

Suite	Symbol or CAS No.	Analyte	Units	Detect Flag	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	SW Std	SW Type
SVOA	95-94-3	Tetrachlorobenzene[1,2,4,5]	µg/L	—	142	0	0	3	10	—	—	—	—	—
SVOA	95-95-4	Trichlorophenol[2,4,5-]	µg/L	—	134	0	0	2	10	—	—	—	—	—
SVOA	98-95-3	Nitrobenzene	µg/L	—	142	0	0	3.3	10	—	—	—	690	NM HH OO
SVOA	99-09-2	Nitroaniline[3-]	µg/L	—	142	0	0	2.3	10	—	—	—	—	—
TPH-DRO	TPH-DRO	TPH-DRO	µg/L	Y	1	1	100	60	188	90.6	90.6	90.6	—	—
VOA	100-41-4	Ethylbenzene	µg/L	—	185	0	0	0.25	1	—	—	—	2100	NM HH OO
VOA	100-42-5	Styrene	µg/L	Y	185	1	0.5	0.25	1	0.5	0.5	0.5	—	—
VOA	10061-01-5	Dichloropropene[cis-1,3-]	µg/L	—	185	0	0	0.25	1	—	—	—	—	—
VOA	10061-02-6	Dichloropropene[trans-1,3-]	µg/L	—	185	0	0	0.25	1	—	—	—	—	—
VOA	103-65-1	Propylbenzene[1-]	µg/L	—	185	0	0	0.25	1	—	—	—	—	—
VOA	104-51-8	Butylbenzene[n-]	µg/L	—	185	0	0	0.25	1	—	—	—	—	—
VOA	106-43-4	Chlorotoluene[4-]	µg/L	—	185	0	0	0.25	1	—	—	—	—	—
VOA	106-46-7	Dichlorobenzene[1,4-]	µg/L	—	185	0	0	0.25	1	—	—	—	190	NM HH OO
VOA	106-93-4	Dibromoethane[1,2-]	µg/L	—	185	0	0	0.25	1	—	—	—	—	—
VOA	107-02-8	Acrolein	µg/L	—	103	0	0	1.5	5	—	—	—	9	NM HH OO
VOA	107-05-1	Chloro-1-propene[3-]	µg/L	—	185	0	0	1.8	5	—	—	—	—	—
VOA	107-06-2	Dichloroethane[1,2-]	µg/L	—	185	0	0	0.25	1	—	—	—	370	NM HH OO
VOA	107-12-0	Propionitrile	µg/L	—	71	0	0	1.5	5	—	—	—	—	—
VOA	107-13-1	Acrylonitrile	µg/L	—	184	0	0	1	5	—	—	—	2.5	NM HH OO
VOA	108-05-4	Vinyl acetate	µg/L	—	185	0	0	1.5	5	—	—	—	—	—
VOA	108-10-1	Methyl-2-pentanone[4-]	µg/L	—	185	0	0	1.3	5	—	—	—	—	—
VOA	108-67-8	Trimethylbenzene[1,3,5-]	µg/L	—	185	0	0	0.25	1	—	—	—	—	—
VOA	108-86-1	Bromobenzene	µg/L	—	185	0	0	0.25	1	—	—	—	—	—
VOA	108-88-3	Toluene	µg/L	Y	185	2	1	0.25	1	0.398	0.974	1.55	15000	NM HH OO
VOA	108-90-7	Chlorobenzene	µg/L	—	185	0	0	0.25	1	—	—	—	1600	NM HH OO
VOA	110-75-8	Chloroethyl vinyl ether[2-]	µg/L	—	24	0	0	1.5	5	—	—	—	—	—
VOA	120-82-1	Trichlorobenzene[1,2,4-]	µg/L	—	185	0	0	0.3	1	—	—	—	70	NM HH OO
VOA	123-91-1	Dioxane[1,4-]	µg/L	Y	1	1	100	20	60	30.4	30.4	30.4	—	—
VOA	124-48-1	Chlorodibromomethane	µg/L	Y	185	9	5	0.29	1	0.73	2.852222222	4.94	130	NM HH OO
VOA	126-98-7	Methacrylonitrile	µg/L	—	184	0	0	1	5	—	—	—	—	—
VOA	126-99-8	Chloro-1,3-butadiene[2-]	µg/L	—	185	0	0	0.3	1	—	—	—	—	—
VOA	127-18-4	Tetrachloroethene	µg/L	—	185	0	0	0.32	1	—	—	—	33	NM HH OO
VOA	1330-20-7	Xylene (Total)	µg/L	—	1	0	0	0.071	2	—	—	—	—	—
VOA	135-98-8	Butylbenzene[sec-]	µg/L	—	185	0	0	0.25	1	—	—	—	—	—
VOA	142-28-9	Dichloropropane[1,3-]	µg/L	—	185	0	0	0.28	1	—	—	—	—	—
VOA	156-59-2	Dichloroethene[cis-1,2-]	µg/L	—	185	0	0	0.3	1	—	—	—	—	—
VOA	156-60-5	Dichloroethene[trans-1,2-]	µg/L	—	185	0	0	0.3	1	—	—	—	10000	NM HH OO
VOA	1634-04-4	Methyl tert-Butyl Ether	µg/L	—	185	0	0	0.25	1	—	—	—	—	—

Table B-4.1-3 (continued)

Suite	Symbol or CAS No.	Analyte	Units	Detect Flag	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	SW Std	SW Type
VOA	541-73-1	Dichlorobenzene[1,3-]	µg/L	—	185	0	0	0.25	1	—	—	—	960	NM HH OO
VOA	56-23-5	Carbon Tetrachloride	µg/L	—	185	0	0	0.3	1	—	—	—	16	NM HH OO
VOA	563-58-6	Dichloropropene[1,1-]	µg/L	—	185	0	0	0.25	1	—	—	—	—	—
VOA	591-78-6	Hexanone[2-]	µg/L	—	185	0	0	1.4	5	—	—	—	—	—
VOA	594-20-7	Dichloropropane[2,2-]	µg/L	—	185	0	0	0.3	1	—	—	—	—	—
VOA	60-29-7	Diethyl Ether	µg/L	Y	185	2	1	0.3	1	0.433	0.5435	0.654	—	—
VOA	630-20-6	Tetrachloroethane[1,1,1,2-]	µg/L	—	185	0	0	0.3	1	—	—	—	—	—
VOA	67-64-1	Acetone	µg/L	Y	184	20	11	3	10	1.35	3.5245	11	—	—
VOA	67-66-3	Chloroform	µg/L	Y	185	12	6	0.25	1	0.289	4.131916667	7.63	4700	NM HH OO
VOA	71-36-3	Butanol[1-]	µg/L	—	93	0	0	15	50	—	—	—	—	—
VOA	71-43-2	Benzene	µg/L	Y	185	2	1	0.3	1	0.32	0.425	0.53	510	NM HH OO
VOA	71-55-6	Trichloroethane[1,1,1-]	µg/L	—	185	0	0	0.32	1	—	—	—	—	—
VOA	74-83-9	Bromomethane	µg/L	—	185	0	0	0.36	1	—	—	—	1500	NM HH OO
VOA	74-87-3	Chloromethane	µg/L	Y	185	2	1	0.37	1	0.33	0.345	0.36	—	—
VOA	74-88-4	Iodomethane	µg/L	—	185	0	0	1.3	5	—	—	—	—	—
VOA	74-95-3	Dibromomethane	µg/L	—	185	0	0	0.3	1	—	—	—	—	—
VOA	74-97-5	Bromochloromethane	µg/L	—	185	0	0	0.3	1	—	—	—	—	—
VOA	75-00-3	Chloroethane	µg/L	—	185	0	0	0.33	1	—	—	—	—	—
VOA	75-01-4	Vinyl Chloride	µg/L	—	185	0	0	0.48	1	—	—	—	24	NM HH OO
VOA	75-05-8	Acetonitrile	µg/L	—	75	0	0	6.6	25	—	—	—	—	—
VOA	75-09-2	Methylene Chloride	µg/L	—	185	0	0	2.8	10	—	—	—	5900	NM HH OO
VOA	75-15-0	Carbon Disulfide	µg/L	Y	185	1	0.5	1.3	5	1.43	1.43	1.43	—	—
VOA	75-25-2	Bromoform	µg/L	Y	185	5	3	0.25	1	0.272	1.07	2.99	1400	NM HH OO
VOA	75-27-4	Bromodichloromethane	µg/L	Y	185	8	4	0.25	1	1.4	5.41875	7.99	170	NM HH OO
VOA	75-34-3	Dichloroethane[1,1-]	µg/L	—	185	0	0	0.3	1	—	—	—	—	—
VOA	75-35-4	Dichloroethene[1,1-]	µg/L	—	185	0	0	0.3	1	—	—	—	7100	NM HH OO
VOA	75-69-4	Trichlorofluoromethane	µg/L	—	185	0	0	0.3	1	—	—	—	—	—
VOA	75-71-8	Dichlorodifluoromethane	µg/L	—	185	0	0	0.36	1	—	—	—	—	—
VOA	76-13-1	Trichloro-1,2,2-trifluoroethane[1,1,2-]	µg/L	—	179	0	0	1	5	—	—	—	—	—
VOA	78-83-1	Isobutyl Alcohol	µg/L	—	47	0	0	15	50	—	—	—	—	—
VOA	78-87-5	Dichloropropane[1,2-]	µg/L	—	185	0	0	0.25	1	—	—	—	150	NM HH OO
VOA	78-93-3	Butanone[2-]	µg/L	Y	184	2	1	1.4	5	1.92	2.315	2.71	—	—
VOA	79-00-5	Trichloroethane[1,1,2-]	µg/L	—	185	0	0	0.25	1	—	—	—	160	NM HH OO
VOA	79-01-6	Trichloroethene	µg/L	—	185	0	0	0.25	1	—	—	—	300	NM HH OO
VOA	79-34-5	Tetrachloroethane[1,1,2,2-]	µg/L	—	185	0	0	0.25	1	—	—	—	40	NM HH OO
VOA	80-62-6	Methyl Methacrylate	µg/L	—	185	0	0	1	5	—	—	—	—	—
VOA	87-61-6	Trichlorobenzene[1,2,3-]	µg/L	—	185	0	0	0.32	1	—	—	—	—	—
VOA	87-68-3	Hexachlorobutadiene	µg/L	—	185	0	0	0.32	1	—	—	—	180	NM HH OO

Table B-4.1-3 (continued)

Suite	Symbol or CAS No.	Analyte	Units	Detect Flag	Number of Analyses	Number of Detects	Percent Detected %	Average MDL	Average PQL	Minimum Detected Value	Average Detected Value	Maximum Detected Value	SW Std	SW Type
VOA	91-20-3	Naphthalene	µg/L	Y	185	1	0.5	0.26	1	1.51	1.51	1.51	—	—
VOA	95-47-6	Xylene[1,2-]	µg/L	—	185	0	0	0.28	1	—	—	—	—	—
VOA	95-49-8	Chlorotoluene[2-]	µg/L	—	185	0	0	0.25	1	—	—	—	—	—
VOA	95-50-1	Dichlorobenzene[1,2-]	µg/L	—	185	0	0	0.25	1	—	—	—	1300	NM HH OO
VOA	95-63-6	Trimethylbenzene[1,2,4-]	µg/L	—	185	0	0	0.25	1	—	—	—	—	—
VOA	96-12-8	Dibromo-3-Chloropropane[1,2-]	µg/L	—	185	0	0	0.36	1	—	—	—	—	—
VOA	96-18-4	Trichloropropane[1,2,3-]	µg/L	—	185	0	0	0.3	1	—	—	—	—	—
VOA	97-63-2	Ethyl Methacrylate	µg/L	—	185	0	0	1	5	—	—	—	—	—
VOA	98-06-6	Butylbenzene[tert-]	µg/L	—	185	0	0	0.25	1	—	—	—	—	—
VOA	98-82-8	Isopropylbenzene	µg/L	—	185	0	0	0.25	1	—	—	—	—	—
VOA	99-87-6	Isopropyltoluene[4-]	µg/L	—	185	0	0	0.25	1	—	—	—	—	—
VOA	Xylene[m+p]	Xylene[1,3-]+Xylene[1,4-]	µg/L	—	184	0	0	0.44	2	—	—	—	—	—

Notes: CAS = Chemical Abstracts Service; SW = surface water; DOE BCG WATER = DOE Biota Concentration Guide; NM HH OO = New Mexico human health organism only; NM LVSTK WTR STD = New Mexico livestock water standard; NM Aqu Acute= New Mexico aquatic acute; NMWQCC WLDLF HAB = New Mexico Water Quality Control Commission wildlife habitat.

*— = Not available.

Table B-4.2-1
Analytical Methods, PQLs, and MDLs for Analytes Reported by GGRL

Analyte	Analytical Method	Method Description	MDL	PQL	Unit
General Inorganics					
Alkalinity-CO_3	EPA:310.1	Titrimetric	0.8	4	mg/L
Alkalinity-CO_3+HCO_3	EPA:310.1	Titrimetric	0.8	4	mg/L
Ammonia as Nitrogen	EPA:350.3	Ion selective electrode	0.1	0.5	mg/L
Bromide	EPA:300.0	Ion chromatography	0.01	0.05	mg/L
Calcium	EPA:200.7	ICP-AES[a]	0.01	0.05	mg/L
Chloride	EPA:300.0	Ion chromatography	0.01	0.05	mg/L
Fluoride	EPA:300.0	Ion chromatography	0.01	0.05	mg/L
Magnesium	EPA:200.7	ICP-AES	0.01	0.05	mg/L
Nitrite as Nitrogen	EPA:300.0	Ion chromatography	0.003	0.015	mg/L
Nitrate as Nitrogen	EPA:300.0	Ion chromatography	0.002	0.01	mg/L
Oxalate	EPA:300.0	Ion chromatography	0.01	0.05	mg/L
Perchlorate	EPA:314.0	Ion chromatography	2	10	µg/L
pH	EPA:150.1	pH meter	—[b]	—	SU
Phosphorus, Orthophosphate (Expressed as PO_4)	EPA:300.0	Ion chromatography	0.01	—	mg/L
Potassium	EPA:200.7	ICP-AES	0.01	—	mg/L
Sodium	EPA:200.7	ICP-AES	0.01	0.05	mg/L
Sulfate	EPA:300.0	Ion chromatography	0.01	0.05	mg/L
Total Organic Carbon	SW-846:9060	Carbonaceous analyzer	0.2	1	mg/L
Sulfide, Total	Standard Methods 4500-S2-G	Ion selective electrode	0.03	0.15	mg/L

Table B-4.2-1 (continued)

Analyte	Analytical Method	Method Description	MDL	PQL	Unit
Metals					
Aluminum	EPA:200.7	ICP-AES	1	5	µg/L
Antimony	EPA:200.8	ICP-MS[c]	1	5	µg/L
Arsenic	EPA:200.8	ICP-MS	0.2	1	µg/L
Barium	EPA:200.7	ICP-AES	1	5	µg/L
Beryllium	EPA:200.8	ICP-MS	1	5	µg/L
Boron	EPA:200.7	ICP-AES	2	10	µg/L
Cadmium	EPA:200.8	ICP-MS	1	5	µg/L
Cesium	EPA:200.8	ICP-MS	1	5	µg/L
Chromium	EPA:200.8	ICP-MS	1	5	µg/L
Chromium Hexavalent Ion	SW-846:7199	Ultraviolet–visible spectrophotometry	1	0.5	µg/L
Cobalt	EPA:200.8	ICP-MS	1	5	µg/L
Copper	EPA:200.8	ICP-MS	1	5	µg/L
Iron	EPA:200.7	ICP-AES	10	50	µg/L
Lithium	EPA:200.7	ICP-AES	1	5	µg/L
Lead	EPA:200.8	ICP-MS	0.2	1	µg/L
Manganese	EPA:200.7	ICP-AES	1	5	µg/L
Mercury	EPA:200.8	ICP-MS	0.05	0.25	µg/L
Molybdenum	EPA:200.8	ICP-MS	1	5	µg/L
Nickel	EPA:200.8	ICP-MS	1	5	µg/L
Selenium	EPA:200.8	ICP-MS	1	5	µg/L
Silicon Dioxide	EPA:200.7	ICP-AES	0.0214	0.107	mg/L
Silver	EPA:200.8	ICP-MS	1	5	µg/L
Strontium	EPA:200.7	ICP-AES	1	5	µg/L
Thallium	EPA:200.8	ICP-MS	1	5	µg/L
Tin	EPA:200.8	ICP-MS	1	5	µg/L
Titanium	EPA:200.7	ICP-AES	2	10	µg/L

Table B-4.2-1 (continued)

Analyte	Analytical Method	Method Description	MDL	PQL	Unit
Uranium	EPA:200.8	ICP-MS	0.2	1	μg/L
Vanadium	EPA:200.8	ICP-MS	1	5	μg/L
Zinc	EPA:200.7	ICP-AES	1	5	μg/L
Isotopes					
Deuterium Ratio	Generic:Deuterium Ratio	Isotope ratio mass spectrometry	—	—	permil
Oxygen-18/Oxygen-16 Ratio	Generic:Oxygen Isotope Ratio	Isotope ratio mass spectrometry	—	—	permil
Nitrogen-15/Nitrogen-14 Ratio	Generic:Nitrogen Isotope Ratio	Isotope ratio mass spectrometry	—	—	permil
Tracers for the Chromium Investigation Tracer Study					
Sodium bromide	EPA:300.0	Ion Chromatography	0.01	0.05	mg/L
Sodium 1-naphthalenesulfonate	SW-846:8330, generic poly aromatic sulfonates	HPLC[d]	0.002	0.010	mg/L
Sodium 2-naphthalenesulfonate	SW-846:8330, generic poly aromatic sulfonates	HPLC	0.002	0.010	mg/L
Sodium 1,5-naphthalenedisulfonate	SW-846:8330, generic poly aromatic sulfonates	HPLC	0.002	0.010	mg/L
Sodium 2,6-naphthalenedisulfonate	SW-846:8330, generic poly aromatic sulfonates	HPLC	0.002	0.010	mg/L
Sodium 2,7-naphthalenedisulfonate	SW-846:8330, generic poly aromatic sulfonates	HPLC	0.002	0.010	mg/L
Deuterated Water (D_2O)	Generic:Deuterium Ratio	Isotope ratio mass spectrometry	—	—	permil
Sodium Perrhenate ($NaReO_4$)	EPA:200.8	ICP-MS	0.1	0.5	ug/L
Sodium Bicarbonate ($NaHCO_3$)	EPA:310.1	Titrimetric	1	5	mg/L
Sodium Carbonate ($NaCO_3$)	EPA:310.1	Titrimetric	0.8	4	mg/L
Tracers for the TA-16 260 Tracer Study					
Sodium bromide	EPA:300.0	Ion chromatography	0.01	0.05	mg/L
Sodium 1-naphthalenesulfonate	SW-846:8330, generic poly aromatic sulfonates	HPLC	0.002	0.010	mg/L
Sodium 2-naphthalenesulfonate	SW-846:8330, generic poly aromatic sulfonates	HPLC	0.002	0.010	mg/L

Table B-4.2-1 (continued)

Analyte	Analytical Method	Method Description	MDL	PQL	Unit
Sodium 1,5-naphthalenedisulfonate	SW-846:8330, generic poly aromatic sulfonates	HPLC	0.002	0.010	mg/L
Sodium 1,6-naphthalenedisulfonate	SW-846:8330, generic poly aromatic sulfonates	HPLC	0.002	0.010	mg/L
Sodium 2,6-naphthalenedisulfonate	SW-846:8330, generic poly aromatic sulfonates	HPLC	0.002	0.010	mg/L
Sodium 2,7-naphthalenedisulfonate	SW-846:8330, generic poly aromatic sulfonates	HPLC	0.002	0.010	mg/L
Sodium 1,3,5-naphthalenetrisulfonate	SW-846:8330, generic poly aromatic sulfonates	HPLC	0.002	0.010	mg/L
Sodium 1,3,6-naphthalenetrisulfonate	SW-846:8330, generic poly aromatic sulfonates	HPLC	0.002	0.010	mg/L

[a] ICP-AES = Inductively coupled plasma atomic emission spectroscopy.

[b] — = Not applicable.

[c] ICP-MS = Inductively coupled plasma mass spectrometry.

[d] HPLC = High-performance liquid chromatography.

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 on-site or Laboratory-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 (the Interim Plan) 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 Interim Plans
- 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 inorganics 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 interim 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 of the Interim Plan.

REFERENCES

The following reference list includes documents cited in this appendix. Parenthetical information following each reference provides the author(s), publication date, and ERID or ESHID. This information is also included in text citations. ERIDs were assigned by the Associate Directorate for Environmental Management's (ADEM's) Records Processing Facility (IDs through 599999), and ESHIDs are assigned by the Environment, Safety, and Health Directorate (IDs 600000 and above). IDs are used to locate documents in the Laboratory's Electronic Document Management System and in the Master Reference Set. The NMED Hazardous Waste Bureau and ADEM 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 2011. "Corrective Measures Evaluation Report for Material Disposal Area H, Solid Waste Management Unit 54-004, at Technical Area 54, Revision 1," Los Alamos National Laboratory document LA-UR-11-5079, Los Alamos, New Mexico. (LANL 2011, 206319)

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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 (SVs) 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 SVs 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 SVs 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	• Increased runoff following Las Conchas fire impacted near-surface hydrology • 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 (SL) in intermediate groundwater • RDX concentrations exceed the NMED tap water SL 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 SVs 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 SVs • 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 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 the representativeness of water-quality data for certain constituents is questionable, and it describes the approaches used to track the performance of deep monitoring wells. These deep monitoring wells are sampled at Los Alamos National Laboratory (LANL or the Laboratory) under the Interim Facility-Wide Groundwater Monitoring Plan (the Interim Plan). Table E-1.0-1 lists the preliminary watch list of deep monitoring wells for the monitoring year (MY) Interim Plan, and describes the reason for this condition.

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,” the Laboratory’s 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 Interim Plan 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 or ESHID. This information is also included in text citations. ERIDs were assigned by the Associate Directorate for Environmental Management’s (ADEM’s) Records Processing Facility (IDs through 599999), and ESHIDs are assigned by the Environment, Safety, and Health Directorate (IDs 600000 and above). IDs are used to locate documents in the Laboratory’s Electronic Document Management System and in the Master Reference Set. The NMED Hazardous Waste Bureau and ADEM 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	Low volume of water and extremely low recovery rate. Field parameters do not stabilize.	Collect Interim Plan 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 and does not provide representative samples.	Monitor water levels only.
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 and low-level tritium. Collect Interim Plan samples after 1 CV plus drop-pipe volume is purged regardless of field parameter stability.
R-25b	TA-16 260	Tracers persist in monitoring well.	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.	Collect Interim Plan samples in accordance with ER-SOP-20032. Code analytical results as “screening level” in database until the geochemistry provides representative samples.
CdV-R-37-2 S2	TA-16 260	High iron and manganese; reducing conditions in vicinity of well screen	Water-quality and field parameter data indicate CdV-R-37-2 S2 does not produce representative samples, even with extended purging.	Collect Interim Plan samples in accordance with ER-SOP-20032. Sample for low-level tritium and high explosives annually. Code analytical results as “screening level” in database.
R-40 Si (formerly R-40i)	TA-54	Screen showed drilling foam and reducing conditions in the past, with high iron and manganese.	Recent data suggest improving trends, with increasing DO and decreasing iron and manganese concentrations.	Collect Interim Plan samples in accordance with ER-SOP-20032 and code analytical results as “screening level” in database. Sample only for low-level tritium, general inorganics, and metals.

Location	Monitoring Group	Watch List Rationale	Description of Condition	Action
R-54 S1	TA-54	Reducing conditions persist in vicinity of well screen.	Reducing conditions appear to persist from residual drilling lubricants. Reducing conditions yield nonrepresentative data.	Sample for low-level tritium only.
R-55i	TA-54	Reducing conditions persist.	Reducing conditions appear to persist from residual drilling lubricants. Reducing conditions yield nonrepresentative data.	Sample for low-level tritium only.
R-12 S1	General Surveillance (Sandia Watershed)	Screen shows reducing conditions, as indicated by low DO and ORP.	Well screen shows low DO and ORP during purging.	Sample for low-level tritium only.
R-12 S2	General Surveillance (Sandia Watershed)	Sampling data suggest the possibility of reducing conditions.	Manganese concentrations are elevated; dissolved chromium concentrations and DO are low.	Sample-level tritium only with the intent of reducing the potential for stagnation around the well screen between sampling events. Collect Interim Plan samples in accordance with ER-SOP-20032. This recommended action is based on evaluation of data collected during the extended purge conducted at R-12 S2 on July 22, 2015.

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 (the Interim 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-2), and one north-south geologic cross-section map (Figure F-10) were updated to include one new groundwater monitoring well (R-68).

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 or ESHID. This information is also included in text citations. ERIDs were assigned by the Associate Directorate for Environmental Management's (ADEM's) Records Processing Facility (IDs through 599999), and ESHIDs are assigned by the Environment, Safety, and Health Directorate (IDs 600000 and above). IDs are used to locate documents in the Laboratory's Electronic Document Management System and in the Master Reference Set. The New Mexico Environment Department (NMED) Hazardous Waste Bureau and ADEM 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)

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 2018 Interim Facility-Wide Groundwater Monitoring Plan of 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 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 cross-sections provided in Appendix F.

The February 2014 water table surface was used for extraction of the map from the GFM. The water table surface was modeled numerically based on regional water-level data measured in February 2014 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. This surface was also depicted on each of the cross-sections in Appendix F. 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

The following reference list includes documents cited in this appendix. Parenthetical information following each reference provides the author(s), publication date, and ERID or ESHID. This information is also included in text citations. ERIDs were assigned by the Associate Directorate for Environmental Management's (ADEM's) Records Processing Facility (IDs through 599999), and ESHIDs are assigned by the Environment, Safety, and Health Directorate (IDs 600000 and above). IDs are used to locate documents in the Laboratory's Electronic Document Management System and in the Master Reference Set. The New Mexico Environment Department (NMED) Hazardous Waste Bureau and ADEM 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)

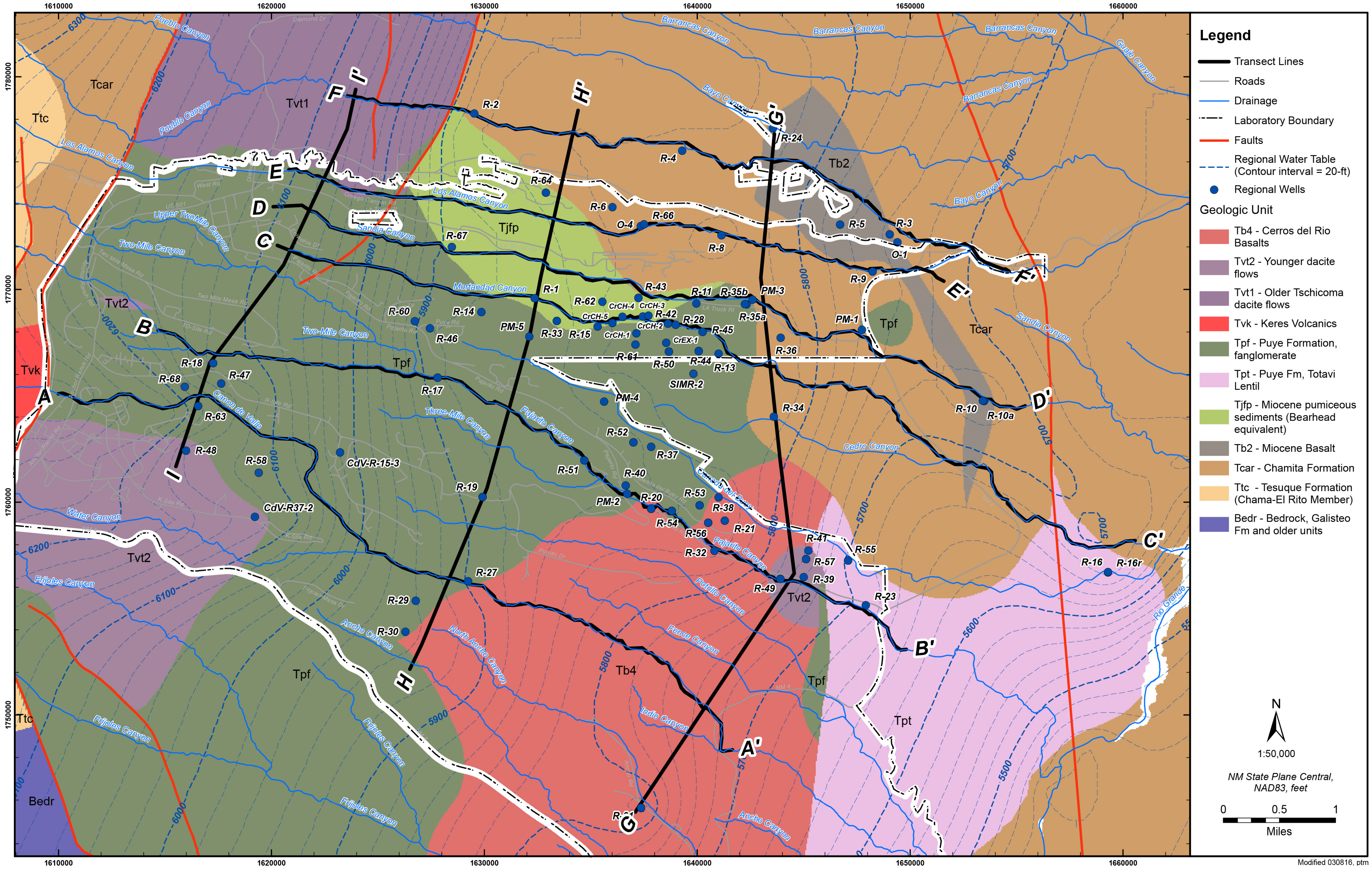
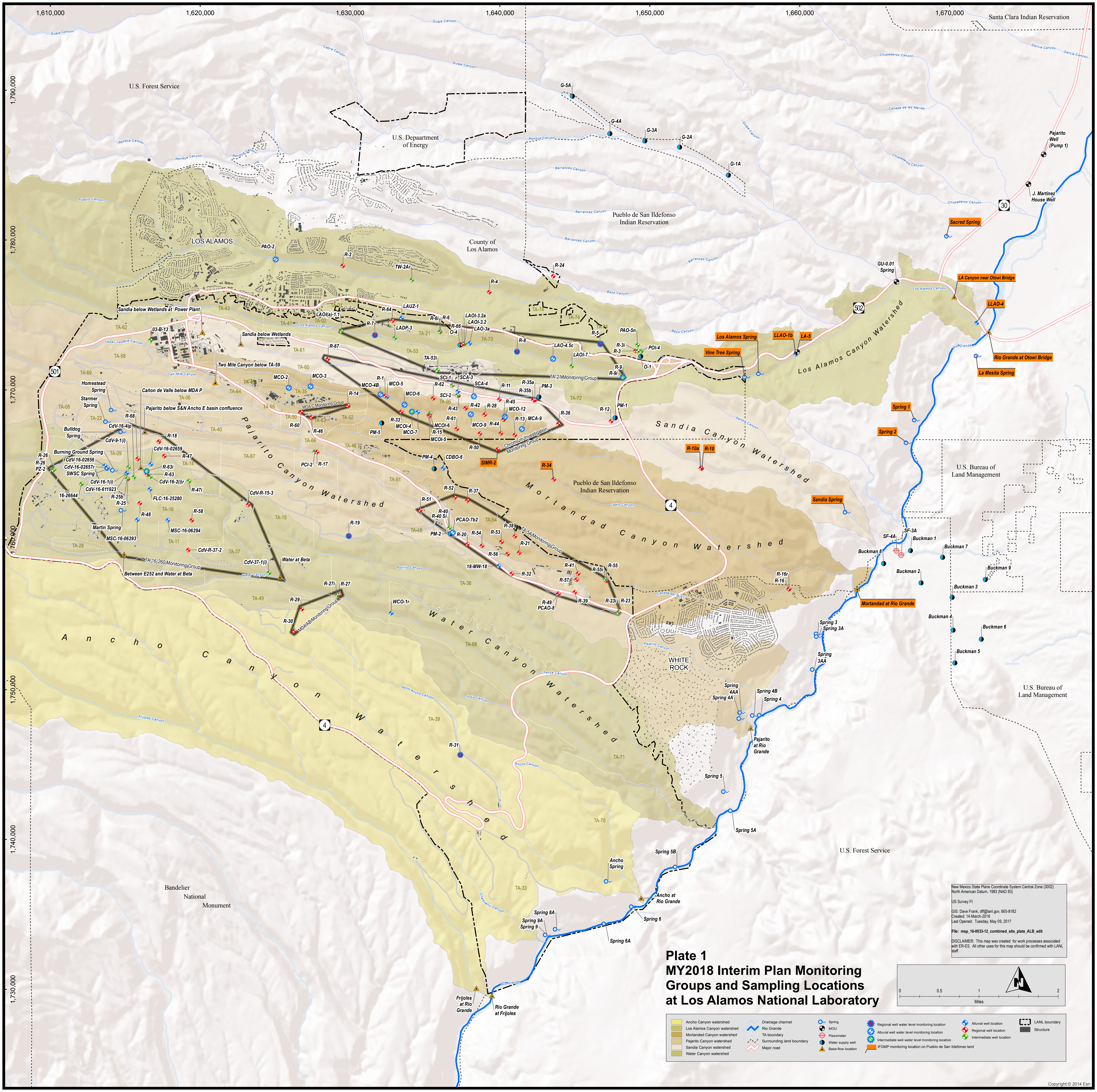


Figure G-1 Water table superimposed on the underlying geology



New Mexico State Plane Coordinate System Central Zone (3002)
North American Datum, 1983 (NAD 83)

US Survey Ft

GIS: Dave Frank, dff@lanl.gov, 665-8182
Created: 14-March-2016
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File: map_16-0033-12_combined_site_plate_ALB_edit

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Plate 1
MY2018 Interim Plan Monitoring Groups and Sampling Locations at Los Alamos National Laboratory

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