February 2020
EM2020-0003

Annual Periodic Monitoring Report for the Material Disposal Area AB Monitoring Group, Ancho Canyon and Water Canyon, Revision 1

N3B Los Alamos

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EXECUTIVE SUMMARY

This annual periodic monitoring report (PMR) presents results for the Material Disposal Area (MDA) AB monitoring group of the Newport News Nuclear BWXT-Los Alamos, LLC, groundwater monitoring program that have not been previously reported. All monitoring work reported in this PMR was conducted pursuant to the "Interim Facility-Wide Groundwater Monitoring Plan for the 2019 Monitoring Year, October 2018–September 2019," prepared in accordance with the Compliance Order on Consent. The revision includes an updated Table C-1 with all applicable standards, clarifying language to the groundwater results, updated methods and procedures text, and analytical data text.

All active monitoring locations in the MDA AB monitoring group are located within the Ancho Canyon and Water Canyon watersheds. The MDA AB monitoring group includes the monitoring of groundwater well or well screen locations. There are no surface-water monitoring locations in this monitoring group.

This PMR presents monitoring results for one periodic monitoring event (PME) conducted during the second quarter of the 2019 monitoring year. In addition to results from the current PME, results are reported for the previous four PMEs as well as earlier MDA AB monitoring group PMEs that have not yet been reported because the validated laboratory data were not available at the time of the previous PMR's publication.

Groundwater samples collected during the PME were analyzed for the following analytical groups as specified in the Interim Facility-Wide Groundwater Monitoring Plan for the 2019 monitoring year: general inorganic chemicals, including perchlorate; metals; semivolatile organic compounds; volatile organic compounds; radionuclides, including low-level tritium; explosive compounds; and field parameters, including dissolved oxygen, flow (in gallons per minute), oxidation-reduction potential, pH, specific conductance, temperature, and turbidity.

No detected groundwater analytical results reported in this PMR were above the applicable screening value.

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Acronyms and Abbreviations

µS/cm	microsiemens per centimeter
AOC	area of concern
ARSL	American Radiation Services, Inc.
COC	chain of custody
Consent Order	Compliance Order on Consent
deg C	degrees Celsius
DOE	Department of Energy (U.S.)
~~DQO~~	~~data quality objective~~
~~EDD~~	~~electronic data deliverables~~
EIM	environmental information management system
EPA	Environmental Protection Agency (U.S.)
EQB	equipment rinsate blank
FB	field blank
FD	field duplicate
FTB	field trip blank
GELC	GEL Laboratories, LLC
gpm	gallons per minute
HE	high explosives
HMX	Her Majesty's Explosive
ID	identification
IFGMP	Interim Facility-Wide Groundwater Monitoring Plan
LANL	Los Alamos National Laboratory
MCL	maximum contaminant level (EPA)
MDA	material disposal area
MDL	method detection limit
mV	millivolts
MY	monitoring year
N	no (best value flag code)
n/a	not applicable
N3B	Newport News Nuclear BWXT-Los Alamos, LLC
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Control Commission

NTU	nephelometric turbidity unit
PEB	performance evaluation blank
PME	periodic monitoring event
PMR	periodic monitoring report
QA	quality assurance
QC	quality control
Rad	radiochemistry (not gamma)
RDX	Royal Demolition Explosive
SOP	standard operating procedure
SU	standard unit
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TA	technical area
TNT	2,4,6-trinitrotoluene
UTL	upper tolerance limit
VOC	volatile organic compound
WCSF	waste characterization strategy form
WG	groundwater
Y	yes (best value flag code)

1.0 INTRODUCTION

This revised annual periodic monitoring report (PMR) for the Material Disposal Area (MDA) AB monitoring group provides documentation of the following groundwater periodic monitoring event (PME) conducted by Newport News Nuclear BWXT-Los Alamos, LLC (N3B):

Watersheds	PMEs Reported in this PMR		PME Field Sampling	
	Monitoring Year	Quarter	Begin	End
Ancho Canyon and Water Canyon	2019	2	02/05/2019	02/08/2019

The annual MDA AB monitoring group PMR is submitted to the New Mexico Environment Department (NMED) every August. This PMR includes results from the MDA AB monitoring group PME performed through the second quarter of the 2019 monitoring year. In addition to results from the PME listed in the table above, results are reported for the previous four PMEs as well as data from ~~for~~ earlier MDA AB monitoring group PMEs that have not yet been reported because the validated laboratory data were not available at the time of the previous PMR's publication.

The PME reported in this PMR includes sampling of groundwater well and well screen locations pursuant to the "Interim Facility-Wide Groundwater Monitoring Plan for the 2019 Monitoring Year, October 2018–September 2019" (2019 IFGMP) (N3B 2018, 700000), prepared in accordance with the Compliance Order on Consent (the Consent Order).

Section IX of the Consent Order describes the role of data screening in the corrective action process. Screening values are used to identify the *potential* for unacceptable risk resulting from the presence of contaminants in groundwater and surface water. Screening values for evaluating IFGMP monitoring data include New Mexico Water Quality Control Commission (NMWQCC) groundwater standards, U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs), ~~EPA regional screening levels for tap water, and~~ NMED screening levels for tap water, and EPA regional screening levels for tap water. Additional risk evaluation is required to determine the potential need for cleanup (corrective action) if results indicate that contaminants are present at concentrations above screening values.

This report presents the following information:

- general background information on the MDA AB monitoring group
- field-measurement monitoring results
- water-quality monitoring results
- screening analysis results
- a summary based on the monitoring data and the results of screening analysis

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

1.1 Background

Groundwater monitoring is conducted at MDA AB to support the corrective measures process for solid waste management units (SWMUs) and areas of concern (AOCs) under the Consent Order. The MDA AB monitoring group includes both intermediate-perched and regional groundwater monitoring wells in the near vicinity of MDA AB. Other downgradient wells have general relevance to MDA AB and other upgradient sources but are not considered part of the MDA AB monitoring network and are not included in the monitoring group.

The MDA AB monitoring group is located in Technical Area 49 (TA-49). TA-49, also known as the Frijoles Mesa Site, is located on a mesa in the upper portion of the Ancho Canyon drainage, and part of the TA drains into Water Canyon. The canyons in the Ancho watershed are mainly dry with little alluvial and no known intermediate groundwater.

MDA AB was the site of underground nuclear weapons component testing from 1959 to 1961 (Purtymun and Stoker 1987, 006688; LANL 1988, 223036). The tests involved insufficient high explosives (HEs) and fissionable material to produce a nuclear reaction. The testing consisted of criticality, equation-of-state, and calibration experiments involving special nuclear materials. The testing involved large inventories of radioactive and hazardous materials, including isotopes of uranium and plutonium; lead; beryllium; HEs, such as TNT (2,4,6-trinitrotoluene), RDX (Royal Demolition Explosive), and HMX (Her Majesty's Explosive); 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 can be found in recent Los Alamos National Laboratory (LANL or the Laboratory) reports (LANL 2010, 109318; LANL 2010, 109319).

2.0 SCOPE OF ACTIVITIES

All active monitoring locations in the MDA AB monitoring group are located within Ancho Canyon and Water Canyon watersheds. Monitoring locations include one perched-intermediate well and three groundwater wells completed within the deep regional.

Groundwater samples collected during the PME were analyzed for the following analytical groups as specified in the ~~, which was conducted pursuant to the~~ 2019 IFGMP (N3B 2018, 700000)~~: were analyzed for~~ general inorganic chemicals, including perchlorate; metals; semivolatile organic compounds (SVOCs); volatile organic compounds (VOCs); radionuclides, including low-level tritium; explosive compounds; and field parameters, including dissolved oxygen, flow (in gallons per minute), oxidation-reduction potential, pH, specific conductance, temperature, and turbidity.

Purge water is managed and characterized in accordance with the relevant version of the waste characterization strategy form (WCSF) "WCSF-Interim Facility-Wide Groundwater Monitoring" (LANL 2016, 601812). Purge water is stored until characterization is complete. If requirements are met, the purge water can be land applied in accordance with the standard operating procedure (SOP) "Land Application of Groundwater" (N3B-EPC-CP-QP-010 Rev 4) and standing order "Land Application of Groundwater" (N3B-SOP-ER-0003), which implement the NMED-approved decision tree for land application of drilling, development, rehabilitation, and purge water.

Table 2.0-1 provides the location name and watershed; monitoring year and quarter of the sampling event; sample collection date; the well screened interval and top and bottom screen depths; and casing volume, purge volume, and purge or flow rate for each sampling event. Figure 2.0-1 is an MDA AB vicinity map. Monitoring locations are shown in Figure 2.0-2.

2.1 DEVIATIONS FROM PLANNED SCOPE

Table 2.1-1 summarizes the observations and deviations from the planned monitoring scope for this annual PMR.

3.0 REGULATORY CRITERIA

Regulatory criteria related to groundwater quality form the basis for the screening values to which groundwater monitoring results are compared in this PMR. These criteria include the NMWQCC groundwater standards effective December 21, 2018, EPA MCLs, EPA regional screening levels for tap water, and NMED screening levels for tap water. These criteria are used to screen results in accordance with the process specified in Section IX of the Consent Order, as listed in Table 3.0-1.

Monitoring data are evaluated using the screening process described below. The sources for standards and screening levels from which specific screening values are established are listed in Table 3.0-1.

- Base flow monitoring locations are assigned to one of two screening categories based upon hydrology of the water body being monitored: perennial or intermittent-ephemeral. Along with a hardness value, this category determines the screening values used for data at each monitoring location. Hardness-dependent screening values used to screen data at each base flow monitoring location are determined from the 20.6.4.900 New Mexico Administrative Code (NMAC) "Water Quality Standards for Interstate and Intrastate Surface Waters." Hardness acute and chronic aquatic life criteria for metals are calculated using the hardness-dependent equations at 20.6.4.900.I NMAC. Hardness-dependent acute and chronic criteria were used for total recoverable aluminum and dissolved cadmium, chromium, copper, lead, manganese, nickel, silver, and zinc in accordance with the requirements therein.
- For each individual substance, the lower concentration of the NMWQCC groundwater standard or EPA MCL is used as the screening value.
- If ~~the~~ an NMWQCC groundwater standard or an MCL has not been established for a specific substance for which toxicological information is published, the NMED screening level for tap water is used as the groundwater screening value. NMED screening levels are established for either a cancer- or noncancer-risk type. For the cancer-risk type, screening levels are based on a 10–5 excess cancer risk. This report was prepared using the 2019 NMED Risk Assessment Guidance for Site Investigations and Remediation (NMED 2019, 700550).
- If the NMED screening level for tap water has not been established for a specific substance for which toxicological information is published, the EPA regional screening level for tap water is used as the groundwater screening value. The EPA screening levels are established for either a cancer- or noncancer-risk type. For the cancer-risk type, the Consent Order specifies screening at a 10^{-5} excess cancer risk. The EPA screening levels for tap water are at 10^{-6} excess cancer risk; therefore, 10 times the EPA 10^{-6} screening levels are used in the screening process. This report was prepared using the May 2019 EPA regional screening levels for tap water (http://www.epa.gov/risk/risk-based-screening-table-generic-tables).
- The NMWQCC groundwater standards apply to the dissolved (filtered) portion of specified contaminants; however, the standards for mercury, organic compounds, and nonaqueous-phase liquids apply to the total unfiltered concentrations of the contaminants. For this report, EPA MCLs are applied to both filtered and unfiltered sample results.

4.0 MONITORING RESULTS

4.1 Methods and Procedures

All methods and procedures used to perform the field activities associated with the data reported in this PMR are documented in the 2019 IFGMP (N3B 2018, 700000).

4.2 Comparison of Target Analytes and Method Detection Limits

Table 4.2-1 presents a list of target analytes with analytical method detection limits (MDLs) equal to or greater than screening values. Several analytes ~~were measured using more than one analytical method, leading to~~have a range of MDLs. For some of these analytes, the MDL is much lower than for earlier analyses. Table 4.2-2 presents a list of analytes with MDLs below screening values. The tables apply to the results with the lowest MDL, so the analytical method and analytical laboratory are included in the tables for reference.

4.3 Field Parameter Results

Appendix A presents the field parameter measurements associated with the sampling and analytical data reported in this PMR, including dissolved oxygen, flow rate, oxidation-reduction potential, pH, specific conductance, temperature, and turbidity. Table 2.1-1 notes any instances where this requirement could not be met.

4.4 Groundwater Elevations

The groundwater level is measured at each groundwater monitoring location before purging and sampling that location as required by the Consent Order. Table 2.1-1 notes any instances where this requirement could not be met.

In addition to collecting groundwater-level data before purging and sampling, N3B collected groundwater-level data “continuously” (e.g., hourly, daily) for most monitoring locations, and these data are voluntarily presented in this PMR. Any gaps in the continuous groundwater-level records presented in this PMR are a result of one or more of the following conditions:

- The well is dry.
- The well is not equipped with a pressure (level) transducer.
- The water level is below the transducer.
- The transducer is not functioning properly (including failure).
- The transducer is temporarily removed from the well for maintenance and/or calibration.

Groundwater-level data from the end of the previous PME and through the end of the current PME are presented in Appendix B (on CD included with this document), and include all continuous groundwater elevation data.

Groundwater-elevation measurements are shown graphically in Figure 4.4-1. For wells equipped with transducers, the reported groundwater level was~~is~~ the first groundwater level measurement taken on each day. Figure 4.4-2 shows the elevation of the regional groundwater surface and flow directions.

5.0 ANALYTICAL DATA RESULTS

5.1 Methods and Procedures

All methods and procedures used to ~~perform~~ analyze the data reported in this PMR ~~PME analytical activities~~ are documented in the 2019 IFGMP (N3B 2018, 700000).

Sampling~~, data review,~~ and data ~~package~~ validation were conducted using SOPs that are part of a comprehensive quality assurance (QA) program. SOPs ~~Procedures~~ include the most current version of the following:

- "WCSF-Interim Facility-Wide Groundwater Monitoring" (LANL 2016, 601812)
- "Groundwater Sampling" (N3B-SOP-ER-3003)
- "Groundwater Sampling" (IWD-TPMC-LA-16-049)
- "Groundwater Sampling Using Westbay MP System" (N3B-SOP-5225)
- "Wireless Connect/Non-connected Component Plan – Standalone Wireless System Name: Groundwater Monitoring Well Data Acquisition System" (N3B-SD-016-CP-032/L2)
- "Locus Mobile Application for Groundwater Data Collection" (N3B-SOP-ER-20324)
- "Groundwater Sampling and Sample Preservation" (N3B-ER-IWD-20088)
- "Manual Groundwater Level Measurements" (N3B-SOP-ER-3001)
- "Groundwater Level Data Processing, Review, and Validation" (N3B-SOP-ER-3004)
- "Validation of Volatile Organic Compound (VOC) Analytical Data" (N3B-ER-AP-20309)
- "Validation of Semi-volatile Organic Compound Analytical Data" (N3B-ER-AP-20310)
- "Validation of LC-MS/MS High Explosive Analytical Data" (N3B-ER-AP-20316)
- "Validation of Organochlorine Pesticide and Polychlorinated Biphenyl Analytical Data" (N3B-ER-AP-20311)
- "Validation of Metals and Cyanide Analytical Data" (N3B-ER-AP-20313)
- "Validation of Gamma Spectroscopy, Chemical Separation Alpha Spectrometry, Gas Proportional Counting, and Liquid Scintillation Analytical Data" (N3B-ER-AP-20314)
- "Validation of General Chemistry Analytical Data" (N3B-ER-AP-20315)
- "Validation of Dioxin and Furan Analytical Data" (N3B-ER-AP-20320)
- "Validation of LC-MS/MS Perchlorate Analytical Data" (N3B-ER-AP-20320)

Samples to be collected are planned from tables contained in the 2019 IFGMP (N3B 2018, 700000). Sample plans include additional field collection, transportation, and field QA/quality control (QA/QC) criteria as identified in N3B/project data quality objectives and in the Consent Order. A sample collection log is created and printed to serve as a ~~collection documents field and a sample field collection plans~~document ~~are prepared, including a~~ field chain of custody (COC) ~~form, which~~ and ~~also serves as~~ an analytical request form. ~~s~~

Field QA/QC samples include field blanks (FBs), equipment rinsate blanks (EQBs), performance evaluation blanks (PEBs), field duplicates (FDs), and field trip blanks (FTBs), and are used to detect possible field or analytical laboratory contamination and to track analytical laboratory performance. Differences in analytical results between FD samples, for example, may indicate the samples were not

uniform or significant variation occurred during analyses. Detection of analytes in deionized water FBs may indicate contamination of the deionized water source or sample bottles, or contamination from the analytical laboratory.

FBs consist of deionized water from the Strom Water Processing Facility that is subjected to the same conditions as regular samples. FBs are used to evaluate impacts due to ambient conditions. ~~Field blanks~~FBs ~~are used to monitor for contamination during sampling and~~ are collected at a minimum frequency of 10% of all organic samples collected during the sampling campaign, and~~. Field blanks~~ are taken ~~assigned to~~ from locations where regular samples for organic constituents are collected. ~~Field blanks~~FBs ~~and primary samples from the same specific locations~~ are analyzed for the same suites of organic analytes except for HE compounds, which are not analyzed in ~~field blanks~~FBs. ~~Field duplicates are split samples that provide information about field variation of sampling results as well as analytical laboratory variation.~~

EQBs are used to detect any contamination resulting from contaminated equipment or poor decontamination techniques. The EQB is prepared by passing deionized water through unused or decontaminated sampling equipment, including Westbay sample bottles. EQBs are collected before a well is sampled with a non-dedicated pump. An EQB is also collected before each well equipped with a Westbay sampling system is sampled for off-site analysis. EQBs are not required when wells equipped with Westbay sampling systems are sampled for on-site analysis only.

PEBs are deionized water blanks from the Storm Water Processing Facility 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.

~~Field duplicates~~FDs are collected at a rate of 10% of all samples collected during a sampling campaign. ~~Field duplicates~~FDs are distributed proportionally among surface water, alluvial groundwater, and intermediate/regional groundwater ~~media~~ according to the relative number of samples collected for each type of water~~media~~. FDs 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.

FTBs consist of organic-free deionized water prepared by an independent off-site laboratory that ~~ield trip blanks~~ accompany regular samples collected for VOC analyses. FTBs ~~and~~ are used to identify potential VOC contamination that may occur during sample collection, handling, shipping, and storage, or during ~~at~~ the analytical process,~~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~~FTB ~~is required for each~~ per cooler containing samples for VOC analyses is required.~~; h~~ However, to facilitate data validation ~~and verification~~, one FTB ~~trip blank~~ may be included with each sample submitted for VOC analysis.

Following ~~sampling~~sample collection, sampling personnel deliver the ~~requested~~ samples and~~analytes sampled and~~ the field collection log ~~COC~~ to sample management personnel at the N3B Sample Management Office. An analytical COC is then created, which includes the field sample identification (ID) number, the date and time of field sample collection, the analytical parameters group code, and the number of bottles for each analytical parameters group.

~~Field collection, transportation, and analytical quality control (QC) criteria are identified in (1) the analytical method, (2) the external analytical laboratory statement of work and project data quality objectives (DQOs), and (3) the Consent Order.~~ In addition to the field QC samples, additional external laboratory batch QC samples ~~, N3B submits blind field QC samples to test the sampling, shipping, and~~

~~analytical laboratory processes. N3B data validation is an important step in the data QA process and determines the quality of an analytical data set. Data validation includes evaluation of laboratory and Consent Order-required QC samples,~~ such as matrix spikes, duplicates, ~~surrogates,~~ method blanks, and laboratory control samples are analyzed to monitor laboratory analytical processes. The laboratory QC is defined in the appropriate analytical method, the external analytical laboratory statement of work, and the Consent Order.~~ Data validation also evaluates other sample characteristics, such as holding times, which indicate the accuracy and precision of the analyses. Data validation includes evaluation of the blind field QC samples.~~

N3B data validation is performed externally from the analytical laboratory and end users of the data and applies a defined set of performance-based criteria to analytical data that may result in qualification of that data. Data validation provides a level of assurance, based on this technical evaluation, of the quality of the data. N3B validation of chemistry data includes a technical review of the analytical data package, covering the evaluation of both field and laboratory QC samples, the identification and quantitation of analytes, and the effect of QC deficiencies on analytical data, as well as other factors affecting the data quality.

The analytical data are submitted by the external laboratory in a pdf data package format and an electronic data deliverable uploaded to the N3B Environmental Information Management System (EIM). The data are then validated manually and in the EIM autovalidation process, reviewed by an N3B chemist at the appropriate level, and then fully transferred into EIM.

This validation follows processes described in the N3B validation procedures listed above. Validation qualifiers and reason codes applied during this process are also reviewed and approved by an N3B chemist to assess data usability. The EIM data are then made available to the public in the Intellus New Mexico database (http://intellusnm.com/).

~~All external electronic laboratory analytical data loaded into the N3B Environmental Information Management (EIM) system undergoes an autovalidation process. Autovalidation follows processes described in the N3B validation procedures listed above. Following autovalidation, all analytical laboratory data in the electronic data deliverables (EDDs), as well as the qualifiers and reason codes applied during autovalidation, are reviewed by an N3B chemist to assess data usability. Before any data in the data package are available to query in the EIM, the chemist reviewing the data must manually approve each data package. Once autovalidation is complete, the data and associated data analytical packages, including the QC information, are uploaded into the N3B EIM database system. This information is then made available to the public in the Intellus New Mexico database (http://intellusnm.com/). In addition to the autovalidation and usability reviews conducted by the N3B chemist during EDD loading, N3B reviews representativeness and comparability of analytical data to identify results for targeted review of quality criteria by an N3B chemist.~~

5.2 Analytical Data

The analytical data results, ~~laboratory reports (~~including COCs ~~forms~~ and data validation forms~~,)~~ are provided in Appendix F (on CD included with this document).

Appendix C presents the analytical results for the PME reported in this PMR and from the previous four sampling events. The data were reviewed for conformance with regulatory and N3B requirements, and ~~All data collected during the PMEs (i.e., all data that have been independently reviewed for conformance with regulatory and N3B requirements)~~ are reported as follows:

- For a~~A~~ll data:

- ❖ FD results, ~~R~~reanalysi~~e~~s results, and results of the same analytes from the same sample analyzed by ~~from~~ different analytical methods are reported.
- ❖ Data that are R-qualified (data that were rejected ~~because of noncompliance regarding QC acceptance criteria~~ because of analytical problems and/or non-conformance with QC criteria during independent validation, and which are unusable) ~~) during independent validation are considered unusable but a~~are still reported.
- ❖ Laboratory~~Field duplicates are reported, all other~~ QC results, FTB data, and FB data ~~(matrix spike, matrix spike duplicates, field blanks, trip blanks, and field equipment blanks)~~, are not included in the data set.
- ❖ Tracers used for conceptual models are not reported.
- ❖ Watch list data in which water-quality data for certain constituents are non-representative or are of questionable representativeness are not reported.

- For radionuclide data:~~Radionuclides~~
  - ❖ Constituents analyzed and reported for the gamma spectroscopy suite include cesium-137, cobalt-60, neptunium-237, potassium-40, and sodium-22.
  - ❖ Americium-241 and uranium-235 data from chemical separation alpha spectroscopy are reported. ~~are reported only by chemical separation alpha spectroscopy.~~ No gamma spectroscopy results ~~are presented~~ for these analytes are presented.
  - ❖ Other than above mentioned, all results are reported at all locations.
- For n~~N~~onradionuclide data~~s~~:
  - ❖ All detected results are reported.

Multiple analyses of the same analyte in a sample, including dilutions and reanalyses, create multiple results for that analyte. ~~redundant results.~~ These multiple results for the same analyte have the same sample ID, analytical laboratory code, and analytical method. ~~The analytical and validation information is used to designate the preferred result~~Validation determines the more accurate result, which is marked with a best value flag of “Y” (yes). The other results for that analyte, which were validated to be of ~~redundant values of~~ lower quality, are assigned a best value flag of “N” (no). ~~In cases where a reanalysis gives a significantly different result from an earlier value, the original result may be rejected and assigned a best value flag of N, and the reanalysis result may be marked with a best value flag of Y.~~ The best value flag is included in Appendix C.

The analytical results for radionuclides and radioactivity are voluntarily compared with the DOE Biota Concentration Guides for surface water (DOE 2002, 085637) and Derived Concentration Technical Standards for groundwater (DOE 2011, 600493) but are not reported in Table 5.2-1 or Appendix D.

Appendix D presents each analytical result that is greater than half of its applicable screening value. Results with a best value flag of N are included in Appendix D but not discussed in the text.

Table 5.2-1 provides groundwater analytical results by hydrogeologic zone for specific analytical suites that are above screening values. Multiple detections are included in the table except for ~~field duplicate~~FD exceedances. For example, if aluminum were detected above its screening value in both a primary sample and a ~~field duplicate~~FD, only the primary sample result would be recorded. If aluminum were detected above its screening value in any primary samples, all results would be shown. As noted in

Table 5.2-1, there are no locations where an analyte was above its screening value for the data reported in this PMR.

Graphs in Appendix E display analyte concentration histories for monitoring group locations where the analyte was above its screening value at least once in the following expanded data set, which includes the PME reported in this PMR in addition to data for the four most recent previous MDA AB monitoring group PMEs. Appendix E may include instances where the analyte data reported in this PMR are evaluated using a higher screening value than the screening value that was used to evaluate previously reported analyte data. For example, the current screening value for perchlorate, 13.8 µg/L per 2016 Consent Order data screening requirements, is greater than the former perchlorate screening value of 4 µg/L, which was used to evaluate previously reported analyte data. The horizontal solid red line on each graph depicts the current analyte screening value, except in cases where there were no exceedances of the current screening value by the data reported in this PMR but there was at least one exceedance of the former (lower) screening value by the previously reported analytical data. In such cases, the horizontal solid red line depicts the former (lower) screening value. Results with a best value flag of N are not included in Appendix E. There were no locations where an analyte was above its screening value at least once during the PMEs reported in this PMR and the four other most recent PMEs, so no graphs are included in Appendix E.

5.2.1 Surface Water (Base Flow)

There are no surface-water monitoring locations in the MDA AB monitoring group.

5.2.2 Groundwater

No detected groundwater results reported in this PMR were above applicable screening values.

5.3 Sampling Program Modifications

No modifications to the currently planned periodic monitoring of the MDA AB monitoring group are proposed at this time.

6.0 SUMMARY AND INTERPRETATIONS

6.1 Monitoring Results

Appendix A presents the field parameter measurements associated with the sampling and analysis data that are reported in this PMR.

6.2 Analytical Results

6.2.1 Surface Water (Base Flow)

There are no surface-water monitoring locations in the MDA AB monitoring group.

6.2.2 Groundwater

No detected groundwater analytical results reported in this PMR were above screening values.

6.3 Data Gaps

Table 2.1-1 summarizes the fieldwork deviations from the planned monitoring for this annual PMR.

6.4 Remediation System Monitoring

Remediation system monitoring is not applicable to the MDA AB monitoring group because no groundwater remediation systems are required for the MDA AB area.

7.0 REFERENCES

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

DOE (U.S. Department of Energy), July 2002. "A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota," DOE Standard No. DOE-STD-1153-2002, U.S. Department of Energy, Washington, D.C. (DOE 2002, 085637)

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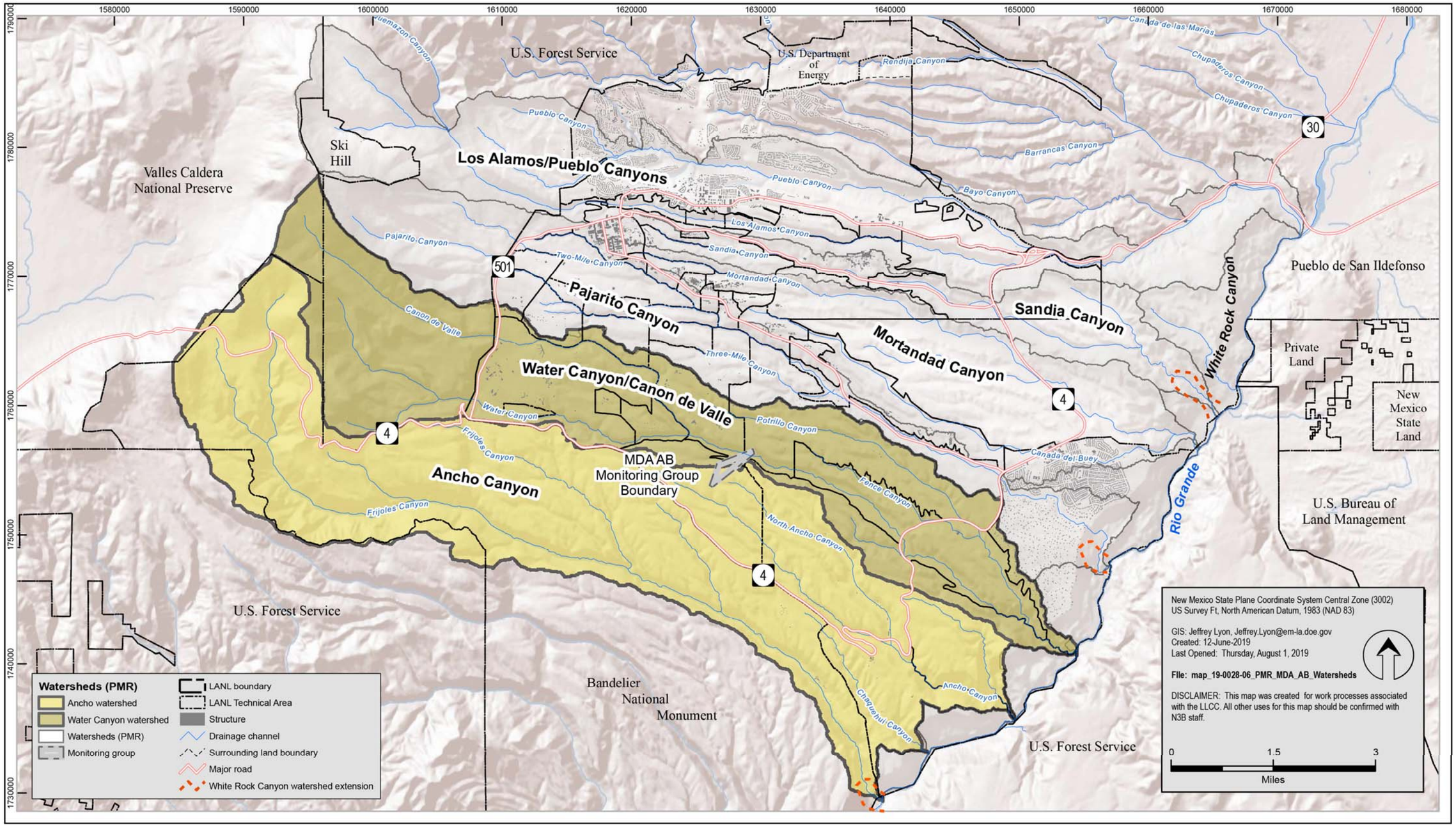

Figure 2.0-1 MDA AB vicinity map

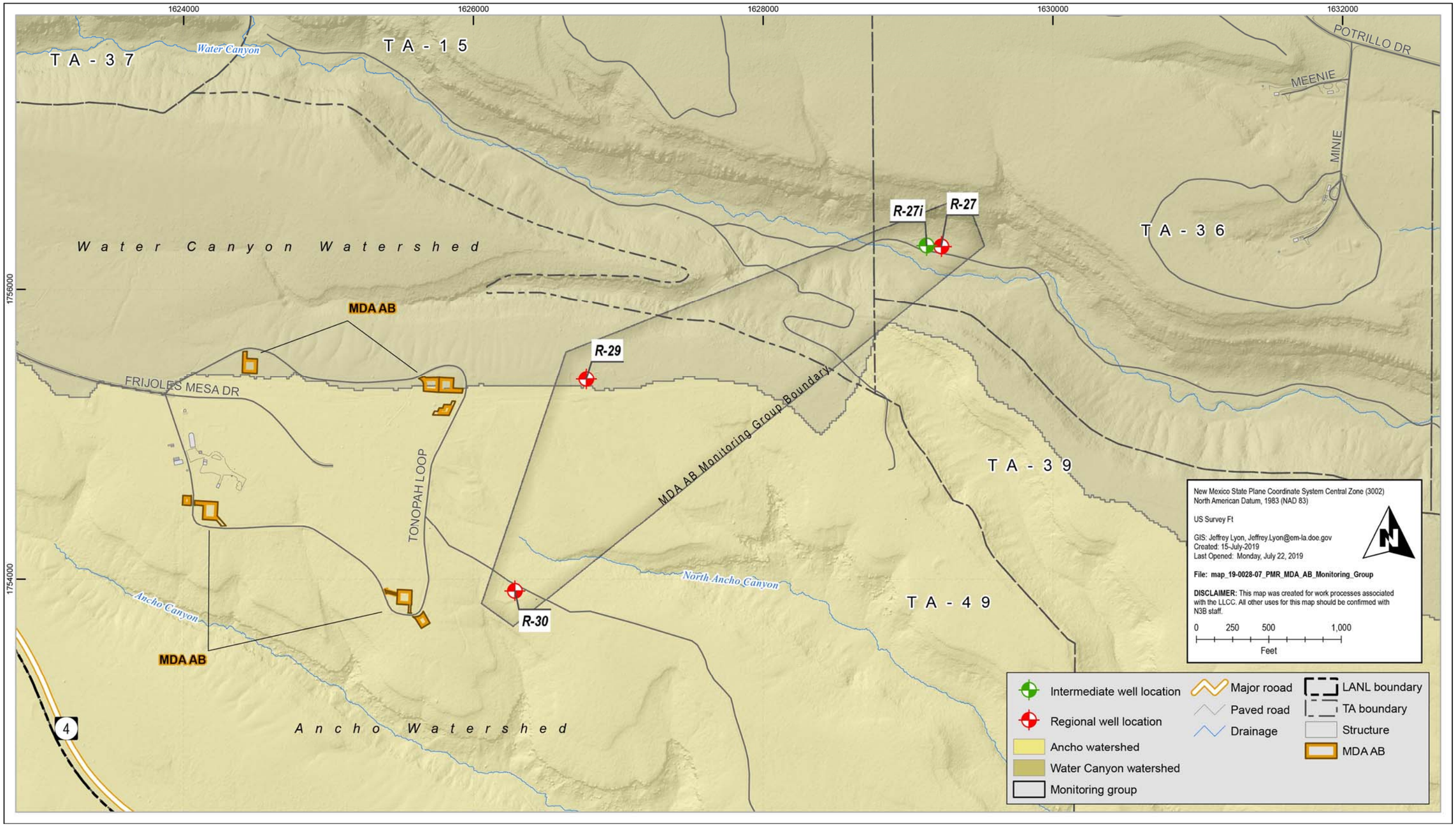

Figure 2.0-2 MDA AB monitoring group locations (see Table 2.0-1)

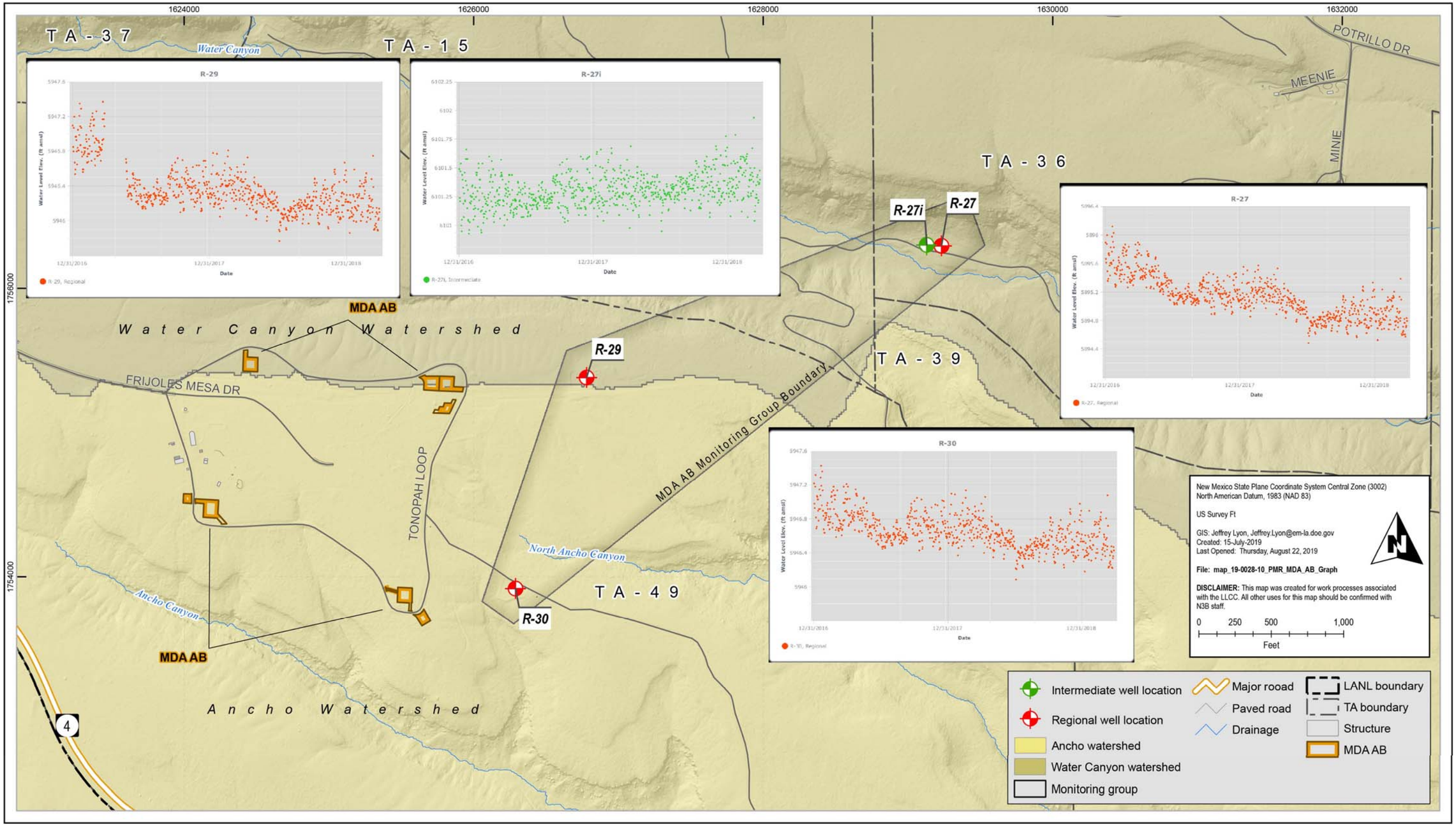

Figure 4.4-1 Groundwater elevations

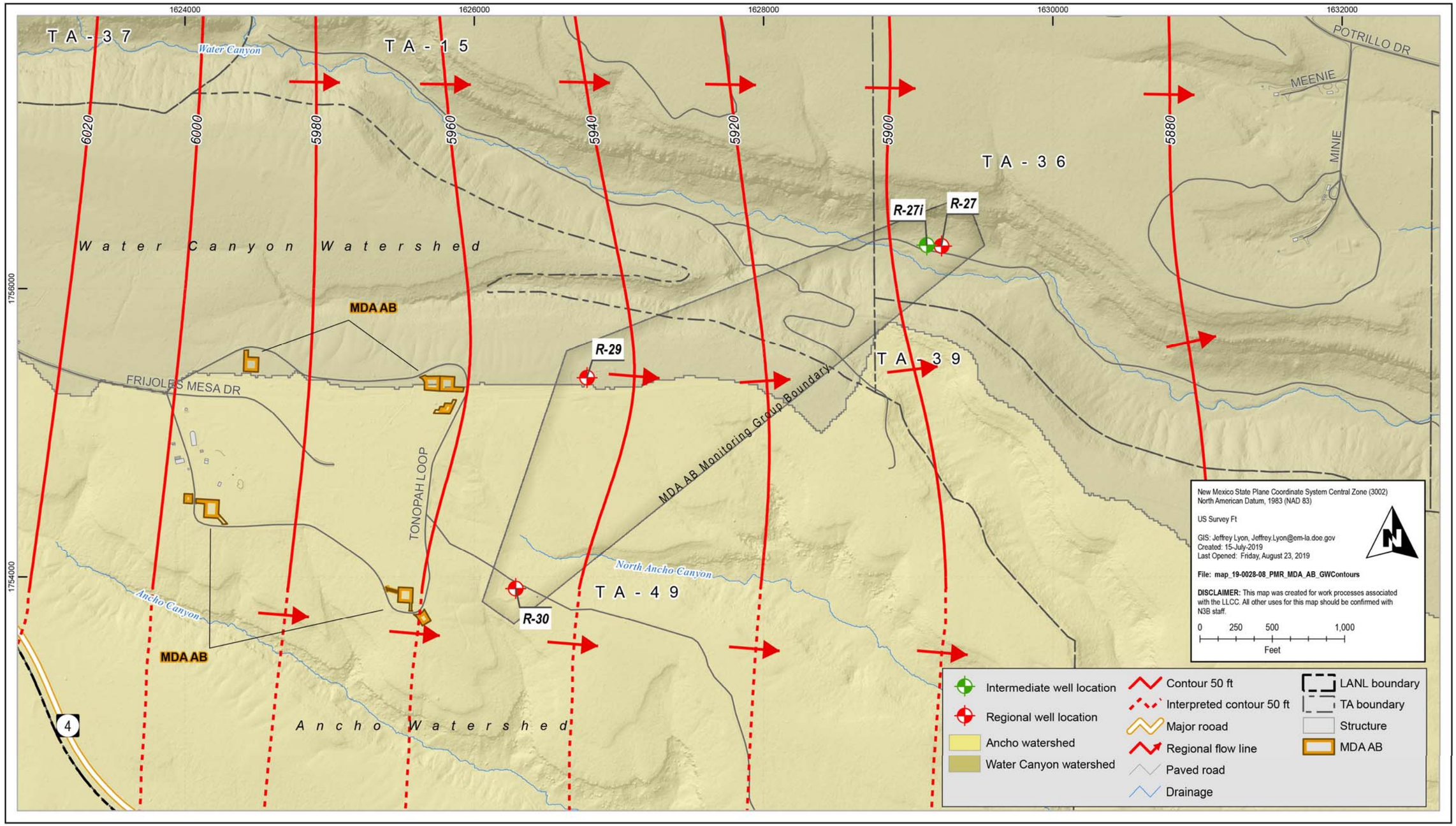

Figure 4.4-2 MDA AB regional groundwater surface and flow direction

Table 2.0-1
MDA AB Monitoring Group PME Locations and General Information

Location Name	Watershed	Sampling Event		Sample Collection Date	Screened Interval (ft)	Screen Top Depth (ft)	Screen Bottom Depth (ft)	Calculated Single Casing Volume (gal.)	Purge Volume (gal.)	Purge or Flow Rate (gpm*)
		MY	Quarter							
Intermediate										
R-27i	Water	2019	2	02/08/2019	10	619	629	13.65	42.18	0.57
Regional										
R-27	Water	2019	2	02/08/2019	23	852	875	49.29	156	3.9
R-29	Ancho			02/05/2019	10	1170	1180	38.19	230.7	7.69
R-30	Ancho			02/06/2019	20.9	1140	1160.9	45.71	150	5

* gpm = Gallons per minute.

Table 2.1-1
MDA AB Monitoring Group PME Observations and Deviations

Monitoring Location	Watershed	Sampling Event		Observation/Deviation	Cause	Comment
		MY	Quarter			
n/a*	n/a	n/a	n/a	There were no observations or deviations to report for this PMR.	n/a	n/a

* n/a = Not applicable.

Table 3.0-1
Sources for Standards and Screening Levels for Groundwater

Standard Type	Standard Source	Description	Groundwater
New Mexico			
Standard	20 NMAC 6.2.3103	Groundwater Human Health Standards, other standards for domestic water supply and standards for irrigation use (NMWQCC)	X[a]
Screening Level	NMED	Tap water screening levels[b]	X
EPA			
Standard	40 Code of Federal Regulations 141	EPA maximum contaminant levels (MCL)	X
Risk-Human	EPA Generic Screening Levels	EPA generic screening levels for tap water[c]	X

Table 3.0-1 (continued)

Standard Type	Standard Source	Description	Groundwater
DOE			
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] X = Applied to data screen for this report.
[b] Screening levels derived from NMED guidance (NMED 2017, 602274; NMED 2019, 700550).
[c] EPA generic screening levels (http://www.epa.gov/risk/risk-based-screening-table-generic-tables)

Table 4.2-1
Target Analytes with MDLs Equal to or Above Screening Values

Analyte Name	MDL	Analytical Method	Screening Value	Unit	Screening-Value Type	Lab ID
SVOCs						
Atrazine	3–3.23	SW-846:8270D	3	µg/L	EPA TAP SCRN LVL[a]	GELC[b]
Azobenzene	3–3.23	SW-846:8270D	1.2	µg/L	EPA TAP SCRN LVL	GELC
Benzidine	3.9–4.19	SW-846:8270D	0.00109	µg/L	NMED A1 TAP SCRN LVL[c]	GELC
Benzo(a)anthracene	0.3–0.323	SW-846:8270D	0.12	µg/L	NMED A1 TAP SCRN LVL	GELC
Benzo(a)pyrene	0.3–0.323	SW-846:8270D	0.2	µg/L	EPA MCL	GELC
Bis(2-chloroethyl)ether	3–3.23	SW-846:8270D	0.137	µg/L	NMED A1 TAP SCRN LVL	GELC
Dibenz(a,h)anthracene	0.3–0.323	SW-846:8270D	0.0343	µg/L	NMED A1 TAP SCRN LVL	GELC
Dibenz(a,h)anthracene	0.3–0.323	SW-846:8270D	0.0343	µg/L	NMED A1 TAP SCRN LVL	GELC
Dichlorobenzidine[3,3'-]	3–3.23	SW-846:8270D	1.25	µg/L	NMED A1 TAP SCRN LVL	GELC
Dinitro-2-methylphenol[4,6-]	3–3.23	SW-846:8270D	1.52	µg/L	NMED A1 TAP SCRN LVL	GELC
Dinitrotoluene[2,4-]	3–3.23	SW-846:8270D	2.37	µg/L	NMED A1 TAP SCRN LVL	GELC
Dinitrotoluene[2,6-]	3–3.23	SW-846:8270D	0.485	µg/L	NMED A1 TAP SCRN LVL	GELC

Table 4.2-1 (continued)

Analyte Name	MDL	Analytical Method	Screening Value	Unit	Screening-Value Type	Lab ID
Hexachlorobenzene	3–3.23	SW-846:8270D	1	µg/L	EPA MCL	GELC
Hexachlorobutadiene	3–3.23	SW-846:8270D	1.39	µg/L	NMED A1 TAP SCRN LVL	GELC
Nitrobenzene	3–3.23	SW-846:8270D	1.4	µg/L	NMED A1 TAP SCRN LVL	GELC
Nitrosodiethylamine[N-]	3–3.23	SW-846:8270D	0.00167	µg/L	NMED A1 TAP SCRN LVL	GELC
Nitrosodimethylamine[N-]	3–3.23	SW-846:8270D	0.00491	µg/L	NMED A1 TAP SCRN LVL	GELC
Nitroso-di-n-butylamine[N-]	3–3.23	SW-846:8270D	0.0273	µg/L	NMED A1 TAP SCRN LVL	GELC
Nitroso-di-n-propylamine[N-]	3–3.23	SW-846:8270D	0.11	µg/L	EPA TAP SCRN LVL	GELC
Nitrosopyrrolidine[N-]	3–3.23	SW-846:8270D	0.37	µg/L	NMED A1 TAP SCRN LVL	GELC
Pentachlorobenzene	3–3.23	SW-846:8270D	3.07	µg/L	NMED A1 TAP SCRN LVL	GELC
Pentachlorophenol	3–3.23	SW-846:8270D	1	µg/L	EPA MCL	GELC
Tetrachlorobenzene[1,2,4,5]	3–3.23	SW-846:8270D	1.66	µg/L	NMED A1 TAP SCRN LVL	GELC
VOCs						
Acrolein	1.5	SW-846:8260B	0.0415	µg/L	NMED A1 TAP SCRN LVL	GELC
Acrylonitrile	1.5	SW-846:8260B	0.523	µg/L	NMED A1 TAP SCRN LVL	GELC
Chloro-1,3-butadiene[2-]	0.3	SW-846:8260B	0.187	µg/L	NMED A1 TAP SCRN LVL	GELC
Dibromo-3-Chloropropane[1,2-]	0.5	SW-846:8260B	0.2	µg/L	EPA MCL	GELC
Dibromoethane[1,2-]	0.3	SW-846:8260B	0.05	µg/L	EPA MCL	GELC
Dibromomethane	0.3	SW-846:8260B	0.0747	µg/L	NMED A1 TAP SCRN LVL	GELC
Trichloropropane[1,2,3-]	0.3	SW-846:8260B	0.00835	µg/L	NMED A1 TAP SCRN LVL	GELC

Note: This table is applicable to samples reported in this PMR.

[a] EPA TAP SCRN LVL = U.S. Environmental Protection Agency screening level for tap water.

[b] GELC = GEL Laboratories, LLC, Division of the GEL Group, Charleston, SC.

[c] NMED A1 TAP SCRN LVL = New Mexico Environment Department screening level for tap water.

Table 4.2-2
Target Analytes with MDLs Below Screening Values

Analyte Name	MDL	Analytical Method	Screening Value	Unit	Screening-Value Type	Lab ID
SVOCs						
Pentachlorobenzene	3–3.23	SW-846:8270D	3.07	µg/L	NMED A1 TAP SCRN LVL[a]	GELC[b]

[a] NMED A1 TAP SCRN LVL = New Mexico Environment Department screening level for tap water.

[b] GELC = GEL Laboratories, LLC, Division of the GEL Group, Charleston, SC.

Table 5.2-1
MDA AB Monitoring Group Groundwater Results Above Screening Values

Location	Date	Analyte	Field Prep Code	Result	Unit	Screening Value	Screening-Value Type
n/a*	n/a	There are no results above screening values for data reported in this PMR.	n/a	n/a	n/a	n/a	n/a

* n/a = Not applicable.