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SEP 2016

Date: SEP 26 2016
Refer To: ADEM-16-5271
LAUR: 16-27194
Locates Action No.: U1601855

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

Subject: Response to the Approval with Modifications for the Interim Facility Groundwater Monitoring Plan for Monitoring Year 2017, October 2016 through September 2017 and Various Replacement Pages

Dear Mr. Kieling:

Enclosed please find two hard copies with electronic files of the response to the New Mexico Environment Department's (NMED's) Approval with Modifications for the Interim Facility Groundwater Monitoring Plan for Monitoring Year 2017, October 2016 through September 2017 and Various Replacement Pages.

If you have any questions, please contact Steve Paris at (505) 606-0915 (smparis@lanl.gov) or Hai Shen at (505) 665-5046 (hai.shen@em.doe.gov).

Sincerely,

Bruce Robinson, Program Director
Environmental Remediation Program
Los Alamos National Laboratory

Sincerely,

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

BR/DR/SP:sm

Enclosures: Response to the Approval with Modifications for the Interim Facility Groundwater Monitoring Plan for Monitoring Year 2017, October 2016 through September 2017 and Various Replacement Pages (EP2016-0121)

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Approval with Modifications Interim Facility-Wide Groundwater Monitoring Plan for the 2017 Monitoring Year, October 2016–September 2017 EPA ID No. NM0890010515, HWB-LANL-16-027, Dated August 29, 2016

INTRODUCTION

To facilitate review of this response, the New Mexico Environment Department's (NMED's) comments are included verbatim. Los Alamos National Laboratory's (LANL's or the Laboratory's) responses follow each NMED comment.

MODIFICATIONS

NMED Comment

1. Table 1.3-1, Periodic Monitoring Report Submittal Schedule for MY 2017, page 43

The Periodic Monitoring Report (PMR) scheduling information found in Table 1.3-1 of the Plan is presented in an unclear manner. Specifically, it is uncertain which monitoring and/or sampling event(s) will be incorporated or linked to the associated Periodic Monitoring Report (PMR) submittal dates. The Permittees must submit to NMED a replacement page for Table 1.3-1 that clearly identifies the sampling-event campaigns to be documented in the associated PMR. The replacement page for Table 1.3-1 must be submitted to NMED by ***October 1, 2016****.*

LANL Response

1. Table 1.3-1 has been revised to provide the needed clarification. Text in section 1.3 was also modified to reflect the revisions to Table 1.3-1. Replacement pages 3, 4, 43, and 44 are attached.

NMED Comment

2. Table 2.4-1, Interim Monitoring Plan for TA-21 Group, page 53

Table 2.4-1 indicates the Permittees plan to sample regional aquifer well R-6 for volatile organic compounds (VOCs) on a biennial frequency. R-6 is located downgradient of several subsurface release sites (e.g., MDA T) where VOCs are known to be present and considered a primary contaminant of concern with respect to vapor-phase transport of perched-intermediate groundwater and/or the regional aquifer. Therefore, the Permittees must collect groundwater samples at R-6 for VOC analysis on an annual basis during the 2017 monitoring year. The Permittees must submit to NMED a replacement page for this change to Table 2.4-1 by ***October 1, 2016.***

LANL Response

2. Table 2.4-1 was revised to specify annual sampling for volatile organic compound analysis at regional groundwater monitoring well R-6. Replacement page 53 is attached.

NMED Comment

3. Table 6.4-1, Interim Monitoring Plan for TA-16 260 Group, page 58

The Permittees propose to collect and analyze groundwater samples at CdV-R-37-2 screen 2 (S2) semiannually for metals, VOCs, high explosive compounds, and general inorganics; annually for low-level tritium; and biennially for radionuclides and semi-volatile organic compounds. Past water-quality and field-parameter data collected from S2 indicate that the well does not produce representative samples at purge quantities exceeding three casing volumes. The damage to S2 in terms of the unstable reactive geochemistry along the screened interval appears to be irreversible; therefore, the Permittees must reduce the purge amount at S2 to three casing volumes followed by the collection of a limited analytical suite including low-level tritium and high explosive compounds using method SW-846:8321A_MOD, as well as reduce the sampling frequency to annually. The Permittees must submit to NMED a replacement page for this change to Table 6.4-1 by ***October 1, 2016****.*

LANL Response

3. Table 6.4-1 was revised to specify only annual sampling for low-level tritium and high explosive compounds at regional groundwater monitoring well screen CdV-R-37-2 screen 2. Replacement pages 57 and 58 are attached.

   In addition, Table E-1.0-1, Watch List for Deep Monitoring Wells, has been revised to specify that samples from CdV-R-37-2 screen 2 will be collected after 3 to 6 casing volumes of purging in accordance with Standard Operating Procedure (SOP) ER-SOP-20032, Groundwater Sampling. Replacement pages E-9 and E-10 are attached.

NMED Comment

4. Table E-1.0-1, Watch List for Deep Monitoring Wells, page E-10

The Permittees have included regional wells R-58 and R-67 as part of a "watch list" presented in Appendix E, Table E-1.0-1 of the Plan. The Permittee's "watch list" identifies certain wells that are suspect in terms of producing representative samples and describes specific approaches, or "Actions" as stated in the Plan, for tracking performance of each well on the "watch list". R-58 and R-67 are included in the list because water-quality data collected at these wells suggest that they do not produce representative samples. The "Actions", as presented in Table E-1.0-1, taken for R-58 and R-67 are limited to "Purge and sample per the Interim Plan," which does not provide sufficient detail on the proposed sampling method considering the current condition of these wells. The Permittees must propose a modified sampling protocol, such as extended purging, for R-58 and R-67 that will assess the performance of each well and potentially enhance the representativeness of sampling results collected at each well. The Permittees must present and propose an acceptable modification(s) in sampling protocol for R-58 and R-67. The modification(s) must be submitted via replacement page for Table E-1.0-1, that describes each action taken to address sample representativeness, to NMED by ***October 1, 2016****.*

LANL Response

4. Table E-1.0-1 has been revised to address sampling protocol for R-58 and R-67. The protocol includes possible extended purging, as necessary, to achieve stable field parameters and representative samples.

Table 1.6-3, Analytes, Field Preparation, and Analytical Methods Used by GGRL Samples Collected under the Interim Plan, has also been modified to include the analytical groups, analytical methods, etc., necessary for laboratory screening analysis. Replacement pages 47, E-9, E-10, E-11, and E-12 are attached.

Additional Revisions

In addition to the changes to the Interim Facility-Wide Groundwater Monitoring Plan for the 2017 Monitoring Year (2017 Interim Plan) required by NMED, the following changes were also made to the document:

- Table 1.7-1, Sampling Schedule for MY2017: October 1, 2016–September 30, 2017, has been revised to reflect only those samples scheduled to be collected in monitoring year 2017. Replacement page 48 is attached.
- Table 3.4-1, Interim Monitoring Plan for Chromium Investigation Group, has been revised to correctly state that SIMR-2 is located in the Mortandad watershed, not in the Sandia watershed. Replacement page 54 is attached.
- The document identification number for the groundwater sampling SOP has been updated to reflect the Laboratory's current document numbering system. Specifically, the groundwater sampling SOP referred to in sections E-2.0 and E-4.0 has been updated as follows: EP-DIV-SOP-20032 has been changed to ER-SOP-20032. Replacement pages E-1 and E-2 are attached.

A list of the replacement pages for the 2017 Interim Plan is provided below.

Document Section/Table Modified	Replacement Page Numbers
Section 1.3	3, 4
Table 1.3-1	43, 44
Table 1.6-3	47
Table 1.7-1	48
Table 2.4-1	53
Table 3.4-1	54
Table 6.4-1	57, 58
Section E-2.0	E-1
Section E-4.0	E-2
Table E-1.0-1	E-3, E-4, E-9, E-10, E-11, E-12

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) in accordance with Section IV.A.6 of the 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 MY2017. 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 IV.A.3.g, Notifications, of the 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 Pueblo of San Ildefonso boundary.

Table 1.3-1
Periodic Monitoring Report Submittal Schedule for MY2017

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

Orange highlighting indicates that the PMR must be sent to the Pueblo de San Ildefonso for review at least 60 days before release to the public.

Table 1.6-1
Potentially Applicable Standards Used to Select
Base-Flow and Groundwater Screening Levels

Type	Source	Description	Potential Applicability[a]	
			Surface Water	Groundwater (Includes Springs)
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	Consent Order	Screening Level for Perchlorate in Groundwater	—	X
EPA				
Standard	40 Code of Federal Regulations 141	EPA maximum contaminant levels	—	X
Risk—Human	EPA Generic Screening Levels[d]	EPA Generic Screening Levels for Tap Water	—	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] — = Indicate the screening level is not applicable to the water type.

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

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

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

Table 1.6-3
Analytes, Field Preparation, and Analytical Methods Used by GGRL 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
15N Isotopes in Ammonium	WSP-N14/N15-NH4	Filtered	Generic:Nitrogen Isotope Ratio	Nitrogen-15/nitrogen-14 ratio from ammonium
$^{15}N/^{18}O$ 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
Tracers (TA-16 260 Study)	WSP-EES6-Tracer+Bromide	Unfiltered	EPA:300.0	Sodium bromide
		Unfiltered	SW-846:8330, generic poly aromatic 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
Tracers (Chromium Investigation Study)	WSP-EES-Tracers(CrStudy)+D2H	Unfiltered	EPA:300.0	Sodium bromide
		Unfiltered	SW-846:8330, generic poly aromatic 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
		Unfiltered	Generic:Deuterium Ratio	Deuterated Water (D_2O)
		Unfiltered	EPA:200.8	Sodium Perrhenate ($NaReO_4$)
		Unfiltered	EPA:310.1	Sodium Bicarbonate ($NaHCO_3$)
		Unfiltered	EPA:310.1	Sodium Carbonate ($NaCO_3$)
Anions	WSP-EES6-Anions	Filtered	EPA:300.0	Bromide, chloride, fluoride, nitrate, nitrate as nitrogen, nitrite, nitrite as nitrogen, oxalate, phosphorus, orthophosphate (expressed as PO_4), 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 EPA:310.1	Acidity /Alkalinity Alkalinity-CO3, Alkalinity-CO3+HCO3

Table 1.7-1
Sampling Schedule for MY2017: October 1, 2016–September 30, 2017

Primary Watershed / Monitoring Group	Sampling Table	First Quarter Oct–Dec 2016	Second Quarter Jan–Mar 2017	Third Quarter Apr–Jun 2017	Fourth Quarter Jul–Sep 2017
Pajarito Watershed					
TA-54	Table 5.4-1	A, S, Q	Q	S, Q	Q
General Surveillance	Table 8.3-1	S	—[a]	B[2017], A, S	—
Mortandad and Sandia Canyons					
Chromium Investigation	Table 3.4-1	A, S, Q	Q[b]	S, Q	Q
MDA C	Table 4.4-1	A, S	—	S	—
General Surveillance	Table 8.3-1	S, A[c], Q	Q	S, Q	T[2017], A, Q
Los Alamos and Pueblo Canyons					
TA-21	Table 2.4-1		S		A, S
General Surveillance	Table 8.3-1	S	—	T[2017], A, S	—
Water/CdV Watershed[d]					
TA-16 260	Table 6.4-1	Q	A, S, Q	Q	S, Q
General Surveillance	Table 8.3-1	—	S	—	A, S
Ancho Watershed					
MDA AB	Table 7.4-1	—	A, S	—	S
General Surveillance	Table 8.3-1	—	—	—	—
White Rock Canyon					
General Surveillance	Table 8.3-1	T[2017], B[2017], 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 as noted in Table E-1.0-1 (Watch List for Deep Monitoring Wells).

[c] R10 S1, R-10 S2, R-34.

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

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

Location	Watershed	Monitoring Group	Surface Water Body or Source Aquifer	Metals	VOCs	SVOCs	Low-MDL VOCs and SVOCs	PCBs	HEXMOD	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics
LADP-3	Los Alamos	TA-21	Intermediate	S	B (2018)[a]	B (2018)	—[b]	—	—	—	A	—	A	S
LAOI(a)-1.1	Los Alamos	TA-21	Intermediate	A	B (2018)	B (2018)	—	—	—	—	A	—	A	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-5 S2	Los Alamos	TA-21	Intermediate	B (2018)	B (2018)	B (2018)	—	—	—	—	B (2018)	—	B (2018)	B (2018)
R-6i	Los Alamos	TA-21	Intermediate	A	A	A	—	—	—	—	A	A	—	A
R-9i S1	Los Alamos	TA-21	Intermediate	A	B (2018)	B (2018)	—	—	—	—	B (2018)	—	—	A
TA-53i	Los Alamos	TA-21	Intermediate	A	A	A	—	—	—	—	A	A	—	A
R-5 S3	Los Alamos	TA-21	Regional	B (2018)	B (2018)	B (2018)	—	—	—	—	B (2018)	—	B (2018)	B (2018)
R-6	Los Alamos	TA-21	Regional	S	A	B (2018)	—	—	—	—	S	S	—	S
R-64	Los Alamos	TA-21	Regional	S	A	A	—	—	—	—	S	—	S	S
R-66	Los Alamos	TA-21	Regional	S	A	A	—	—	—	—	S	—	S	S
R-8 S1	Los Alamos	TA-21	Regional	B (2018)	B (2018)	B (2018)	—	—	—	—	B (2018)	—	B (2018)	B (2018)
R-8 S2	Los Alamos	TA-21	Regional	B (2018)	B (2018)	B (2018)	—	—	—	—	B (2018)	—	B (2018)	B (2018)
R-9	Los Alamos	TA-21	Regional	A	B (2018)	B (2018)	—	—	—	—	A	A	—	A

Notes: Sampling suites and 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] 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 Group

Location	Watershed	Monitoring Group	Surface Water Body or Source Aquifer	Metals	VOCs	SVOCs	Low-MDL VOCs and SVOCs	PCBs	HEXMOD	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics	Chromium Isotopes	$^{15}N/^{18}O$ Isotopes in Nitrate	Tracers (Chromium Investigation Study)
MCOI-5	Mortandad	Chromium Investigation	Intermediate	Q	S	S	—[a]	—	—	—	A	A	—	Q	A	A	—
MCOI-6	Mortandad	Chromium Investigation	Intermediate	Q	S	S	—	A	—	—	A	A	—	Q	Q	A	—
SCI-1	Sandia	Chromium Investigation	Intermediate	S	B (2018)[b]	B (2018)	—	B (2018)	—	—	A		A	S	A	A	—
SCI-2	Sandia	Chromium Investigation	Intermediate	Q	B (2018)	B (2018)	—	B (2018)	—	—	A	A	—	Q	S	A	—
R-1	Mortandad	Chromium Investigation	Regional	S	A	A	—	A	—	—	B (2018)	—	A	S	A	A	—
R-11	Sandia	Chromium Investigation	Regional	Q	B (2018)	B (2018)	—	—	—	—	B (2018)	—	A	Q	S	A	—
R-13	Mortandad	Chromium Investigation	Regional	Q	B (2018)	B (2018)	—	—	—	—	B (2018)	—	A	Q	A	A	—
R-15	Mortandad	Chromium Investigation	Regional	Q	B (2018)	B (2018)	—	—	—	—	B (2018)	—	A	Q	A	A	—
R-28	Mortandad	Chromium Investigation	Regional	Q	B (2018)	B (2018)	—	—	—	—	B (2018)	A	—	Q	A	A	Q
R-33 S1	Mortandad	Chromium Investigation	Regional	Q	B (2018)	B (2018)	—	—	—	—	B (2018)	—	A	Q	A	A	—
R-33 S2	Mortandad	Chromium Investigation	Regional	Q	B (2018)	B (2018)	—	—	—	—	B (2018)	—	—	Q	A	A	—
R-35a	Sandia	Chromium Investigation	Regional	Q	B (2018)	B (2018)	—	—	—	—	B (2018)	—	A	Q	A	A	—
R-35b	Sandia	Chromium Investigation	Regional	Q	B (2018)	B (2018)	—	—	—	—	B (2018)	—	A	Q	A	A	—
R-36	Sandia	Chromium Investigation	Regional	Q	A	A	—	—	—	—	B (2018)	—	A	Q	A	A	—
R-42	Mortandad	Chromium Investigation	Regional	Q	B (2018)	B (2018)	—	—	—	—	B (2018)	A	—	Q	A	A	Q
R-43 S1	Sandia	Chromium Investigation	Regional	Q	B (2018)	B (2018)	—	—	—	—	B (2018)	—	A	Q	Q	A	—
R-43 S2	Sandia	Chromium Investigation	Regional	Q	B (2018)	B (2018)	—	—	—	—	B (2018)	—	A	Q	A	A	—
R-44 S1	Mortandad	Chromium Investigation	Regional	Q	B (2018)	B (2018)	—	—	—	—	B (2018)	—	A	Q	S	S	—
R-44 S2	Mortandad	Chromium Investigation	Regional	Q	B (2018)	B (2018)	—	—	—	—	B (2018)	—	A	Q	A	A	—
R-45 S1	Mortandad	Chromium Investigation	Regional	Q	B (2018)	B (2018)	—	—	—	—	B (2018)	—	A	Q	Q	S	—
R-45 S2	Mortandad	Chromium Investigation	Regional	Q	B (2018)	B (2018)	—	—	—	—	B (2018)	—	A	Q	Q	S	—
R-50 S1	Mortandad	Chromium Investigation	Regional	Q	B (2018)	B (2018)	—	—	—	—	B (2018)	—	S	Q	Q	A	—
R-50 S2	Mortandad	Chromium Investigation	Regional	Q	B (2018)	B (2018)	—	—	—	—	B (2018)	—	S	Q	A	A	—
R-62	Mortandad	Chromium Investigation	Regional	Q	B (2018)	B (2018)	—	—	—	—	B (2018)	—	A	Q	S	A	—
R-67[c]	Sandia	Chromium Investigation	Regional	Q1	Q1	Q1	—	Q1	Q1	Q1	Q1	—	Q1	Q1	Q1	Q1	—
R-67[d]	Sandia	Chromium Investigation	Regional	Q	B (2018)	B (2018)	—	—	—	—	B (2018)	—	S	Q	Q	A	—
SIMR-2[e]	Mortandad	Chromium Investigation	Regional	Q	B (2018)	B (2018)	—	—	—	—	B (2018)	—	S	Q	S	A	—

Notes: Sampling suites and 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); Q1 = Monitoring Year 2017 Q1 only.

[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] R-67 sampling plan for MY2017 Q1 only. This Q1 sampling plan for R-67 produces the fourth "full analytical suite" sampling round (out of four required) for this new regional well.

[d] R-67 sampling frequencies for MY2017 Q2, Q3, and Q4. Used the specified sampling frequencies in conjunction with Table 1.7-1 to develop the R-67 sampling plan for Q2, Q3 and Q4.

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

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

Location	Watershed	Monitoring Group	Surface Water Body or Source Aquifer	Metals	VOCs	SVOCs	Low-MDL VOCs and SVOCs	PCBs	HEXMOD	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics	Tracers (TA-16 260 Study)
Canon de Valle below MDA P	Water	TA-16 260	Base flow	Q	S	B (2018)[a]	—[b]	V (2020)[c]	Q	V (2020)	B (2018)	—	—	Q	—
Between E252 and Water at Beta	Water	TA-16 260	Base flow	Q	S	B (2018)	—	V (2020)	Q	V (2020)	B (2018)	—	—	Q	—
Water at Beta	Water	TA-16 260	Base flow	Q	S	B (2018)	—	V (2020)	Q	V (2020)	B (2018)	—	—	Q	—
Pajarito below S&N Ancho E Basin Confluence	Pajarito	TA-16 260	Base flow	Q	S	B (2018)	—	V (2020)	Q	V (2020)	B (2018)	—	—	Q	—
Bulldog Spring	Pajarito	TA-16 260	Spring	Q	S	B (2018)	—	V (2020)	Q	V (2020)	B (2018)	—	—	Q	—
SWSC Spring	Water	TA-16 260	Spring	Q	S	B (2018)	—	V (2020)	Q	V (2020)	B (2018)	—	—	Q	—
Burning Ground Spring	Water	TA-16 260	Spring	Q	S	B (2018)	—	V (2020)	Q	V (2020)	B (2018)	—	—	Q	—
Martin Spring	Water	TA-16 260	Spring	Q	S	B (2018)	—	V (2020)	Q	V (2020)	B (2018)	—	—	Q	—
FLC-16-25280	Water	TA-16 260	Alluvial	Q	S	B (2018)	—	V (2020)	Q	V (2020)	B (2018)	—	—	Q	—
CdV-16-02656	Water	TA-16 260	Alluvial	Q	S	B (2018)	—	V (2020)	Q	V (2020)	B (2018)	—	—	Q	—
CdV-16-02659	Water	TA-16 260	Alluvial	Q	S	B (2018)	—	V (2020)	Q	V (2020)	B (2018)	—	—	Q	—
CdV-16-611923	Water	TA-16 260	Alluvial	Q	S	B (2018)	—	V (2020)	Q	V (2020)	B (2018)	—	—	Q	—
MSC-16-06293	Water	TA-16 260	Alluvial	Q	S	B (2018)	—	V (2020)	Q	V (2020)	B (2018)	—	—	Q	—
MSC-16-06294	Water	TA-16 260	Alluvial	Q	S	B (2018)	—	V (2020)	Q	V (2020)	B (2018)	—	—	Q	—
PRB Alluvial Seep	Water	TA-16 260	Alluvial	Q	S	B (2018)	—	V (2020)	Q	V (2020)	B (2018)	—	—	Q	—
CdV-16-611937	Water	TA-16 260	Alluvial	Q	S	B (2018)	—	V (2020)	Q	V (2020)	B (2018)	—	—	Q	—
16-26644	Water	TA-16 260	Intermediate	Q	S	B (2018)	—	—	Q	—	B (2018)	—	A	Q	—
CdV-9-1(i) S1	Water	TA-16 260	Intermediate	Q	Q	Q	—	A	Q	A	A	—	S	Q	Q
CdV-16-1(i)	Water	TA-16 260	Intermediate	Q	S	B (2018)	—	—	Q	—	B (2018)	—	A	Q	Q
CdV-16-2(i)r	Water	TA-16 260	Intermediate	Q	S	B (2018)	—	—	Q	—	B (2018)	—	A	Q	Q
CdV-16-4ip S1	Water	TA-16 260	Intermediate	Q	S	B (2018)	—	V (2020)	Q	V (2020)	B (2018)	—	A	Q	Q
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	S	—	—	—	Q	—	—	—	A	Q	Q
R-25 S2	Water	TA-16 260	Intermediate	Q	S	—	—	—	Q	—	—	—	A	Q	Q
R-25 S4	Water	TA-16 260	Intermediate	Q	S	—	—	—	Q	—	—	—	A	Q	Q
R-25b	Water	TA-16 260	Intermediate	Q	S	B (2018)	—	—	Q	—	B (2018)	—	A	Q	Q
R-26 PZ-2	Water	TA-16 260	Intermediate	Q	Q	B (2018)	—	—	S	—	B (2018)	—	A	Q	—

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

Location	Watershed	Monitoring Group	Surface Water Body or Source Aquifer	Metals	VOCs	SVOCs	Low-MDL VOCs and SVOCs	PCBs	HEXMOD	Dioxins/Furans	Radionuclides	Tritium	Low-Level Tritium	General Inorganics	Tracers (TA-16 260 Study)
R-26 S1	Water	TA-16 260	Intermediate	S	S	B (2018)	—	—	S	—	B (2018)	—	A	S	—
R-47i	Water	TA-16 260	Intermediate	Q	S	B (2018)	—	—	Q	—	B (2018)	—	A	Q	Q
R-47	Water	TA-16 260	Regional	Q	Q	Q	—	A	Q	A	A	—	S	Q	Q
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	—	—
R-18	Pajarito	TA-16 260	Regional	Q	Q	B (2018)	—	—	Q	—	B (2018)	—	A	Q	Q
R-25 S5	Water	TA-16 260	Regional	Q	S	—	—	—	Q	—	—	—	A	Q	Q
R-25 S6	Water	TA-16 260	Regional	Q	S	—	—	—	Q	—	—	—	A	Q	—
R-25 S7	Water	TA-16 260	Regional	Q	S	—	—	—	Q	—	—	—	A	Q	—
R-48	Water	TA-16 260	Regional	Q	S	B (2018)	—	—	Q	—	B (2018)	—	A	Q	Q
R-58[d]	Water	TA-16 260	Regional	Q1	Q1	Q1	—	Q1	Q1	Q1	Q1	—	Q1	Q1	Q1
R-58[e]	Water	TA-16 260	Regional	Q	Q	Q	—	A	Q	A	A	—	S	Q	Q
R-63	Water	TA-16 260	Regional	Q	S	B (2018)	—	—	Q	—	B (2018)	—	A	Q	Q

Notes: Sampling suites and 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) Q1 = Monitor Year 2017 Q1 only.

[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.

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

[d] R-58 sampling plan for MY2017 Q1 only. This Q1 sampling plan for R-58 produces the fourth "full analytical suite" sampling round (out of four required) for this new regional well.

[e] R-58 sampling frequencies for MY2017 Q2, Q3 and Q4. Use the specified sampling frequencies in conjunction with Table 1.7-1 to develop the R-58 sampling plan for Q2, Q3 and Q4.

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	Low-MDL VOCs and SVOC	PCBs	HEXMOD	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	S	S	S	—	—	S	—	S	—	S	S
R-30	Ancho	MDA AB	Regional	S	S	S	—	—	S	—	S	—	S	S

Notes: Sampling suites and 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).

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

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 describes the approaches used for tracking 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 will be updated as conditions evolve. Changes will 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 which 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 list includes all documents cited in this appendix. Parenthetical information following each reference provides the author(s), publication date, and ER ID or ESH ID. This information is also included in text citations. ER IDs were assigned by the Environmental Programs Directorate's Records Processing Facility (IDs through 599999), and ESH IDs are assigned by the Environment, Safety, and Health (ESH) Directorate (IDs 600000 and above). IDs are used to locate documents in the Laboratory's Electronic Document Management System and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the ESH Directorate. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.

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), March 2012. "Technical Area 16 Well Network Evaluation and Recommendations," Los Alamos National Laboratory document LA-UR-12-1082, Los Alamos, New Mexico. (LANL 2012, 213573)

LANL (Los Alamos National Laboratory), February 2015. "Drilling Work Plan for Regional Aquifer Well R-61r," Los Alamos National Laboratory document LA-UR-15-20305, Los Alamos, New Mexico. (LANL 2015, 600175)

NMED (New Mexico Environment Department), May 10, 2010. "Replacement of the Multi-Screened Monitoring Well R-25," New Mexico Environment Department letter to G.J. Rael (DOE-LASO) and M.J. Graham (LANL) from J.P. Bearzi (NMED-HWB), Santa Fe, New Mexico. (NMED 2010, 109696)

Table E-1.0-1 (continued)

Location	Monitoring Group	Watch List Rationale	Description of Condition	Action
Wells with Westbay No-Purge Sampling Systems (continued)				
Water-Quality				
R-43 S2	Chromium Investigation	Field parameters monitored during previous extended purging events showed some indication that DO levels were continuing to increase although stability criteria were met earlier in the purge.	Variability in DO levels may be associated with mixing of groundwater with varying geochemical signature originating from different strata accessed during purging.	Per field sampling SOP, collect samples after stabilization of field parameters during a 3- to 6-CV purge. This recommended action is based on evaluation of data collected during the extended purge conducted at R-43 S2 on August 8, 2015.
R-61 S1	Chromium Investigation	Phosphate levels associated with chemicals used during rehabilitation of the well screen conducted in fall 2012 are elevated above background. Residual drilling lubricants associated with drilling may be present around the borehole near the well screen.	NMED indicated data from R-61 cannot be used to make regulatory decisions (NMED 2015, 600154) and requested that R-61 be replaced. The Laboratory submitted the drilling work plan for R-61r on February 2, 2015 (LANL 2015, 600175).	Continue monitoring R-61 S1 for water levels only.
R-61 S2	Chromium Investigation	High iron and manganese; reducing conditions in vicinity of well screen. Phosphate levels continue to remain elevated above background. Residual lubricants associated with drilling may be present around the borehole near the well screen.	NMED indicated data from R-61 cannot be used to make regulatory decisions (NMED 2015, 600154) and requested that R-61 be replaced. The Laboratory submitted the drilling work plan for R-61r on February 2, 2015 (LANL 2015, 600175).	Continue monitoring R-61 S2 for water levels only.

Table E-1.0-1 (continued)

Location	Monitoring Group	Watch List Rationale	Description of Condition	Action
Wells with Westbay No-Purge Sampling Systems (continued)				
R-62	Chromium Investigation	Field parameters monitored during extended purging events showed some indication that DO levels were continuing to increase although stability criteria were met earlier in the purge. Additionally, the chromium concentrations vary with purge volume.	Historical data from sampling conducted under different purge volumes show variations in chromium concentrations. One conceptual model for the variations in chromium concentration assumes aquifer heterogeneity as the cause. Data collected during pump/extended purge tests conducted at R-62 in May 2014 and February 2016 suggest extended purging at R-62 may increasingly draw water from strata within the screened/filter pack interval that has higher concentrations of chromium than the zone accessed using the standard 3- to 6-CV purge protocol.	An 8-h extended purge will be performed during the second quarter (January–March) of MY2017 to monitor transients of chromium (and related constituents [e.g., nitrate]) within the chromium plume area.
R-67	Chromium Investigation	R-67 is a new groundwater monitoring well that was completed on September 21, 2015.	Water-quality data show elevated iron and manganese concentrations, suggesting reducing conditions are present.	Collect Interim Plan samples per ER-SOP-20032, Groundwater Sampling, if possible. Additional purging may be conducted, as necessary, to achieve stable field parameters and representative samples. Other sampling protocol may also be implemented to support evaluations of conditions at the well, if necessary.
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.	Reduce sampling frequency to annual and collect Interim Plan samples at 3 to 6 CV per ER-SOP-20032, Groundwater Sampling. Limit sample analysis to low-level tritium and high explosives. Code all samples collected from CdV-R-37-2 S2 as “W.”

Table E-1.0-1 (continued)

Location	Monitoring Group	Watch List Rationale	Description of Condition	Action
Wells with Westbay No-Purge Sampling Systems (continued)				
R-58	TA-16 260	R-58 is a new groundwater monitoring well that was completed on November 5, 2015.	Water-quality data show elevated iron and manganese concentrations, suggesting reducing conditions are present.	Collect Interim Plan samples per ER-SOP-20032, Groundwater Sampling, if possible. Additional purging may be conducted, as necessary, to achieve stable field parameters and representative samples. Other sampling protocol may also be implemented to support evaluations of conditions at the well, if necessary.
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.	Sample for low-level tritium, general inorganics, and metals only.
R-40 S1	TA-54	High iron and manganese	Residual drilling effects are evident; the yield is extremely low.	Sample for VOCs and low-level tritium. Collect sample at 1 CV plus drop-pipe volume because of extremely low recovery rate.
R-54 S1	TA-54	High iron and manganese; reducing conditions in vicinity of well screen.	Field parameters vary from regional aquifer background values until considerable purging has been conducted. Initial low DO concentrations during purging, along with relatively high iron and manganese, suggest reducing conditions near well screen.	Sample for low-level tritium only.
R-55i	TA-54	High iron and manganese	Iron and manganese concentrations are elevated relative to background. Sulfate, nitrate, chloride, and magnesium are also elevated. DO values are low but are improving with extended purging.	Sample for low-level tritium only.
R-12 S1	General Surveillance	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.

Table E-1.0-1 (continued)

Location	Monitoring Group	Watch List Rationale	Description of Condition	Action
Wells with Westbay No-Purge Sampling Systems (continued)				
R-12 S2	General Surveillance	Sample data suggest the possibility of reducing conditions.	Manganese concentrations are elevated; dissolved chromium concentrations are low, and DO is low.	Continue sampling R-12 S2 annually (rather than biennially) with the intent of reducing the potential for stagnation around the well screen between sampling events. Per field sampling SOP, collect samples after stabilization of field parameters during a 3- to 6-CV purge. This recommended action is based on evaluation of data collected during the extended purge conducted at R-12 S2 on July 22, 2015.
R-16 S4	General Surveillance	Screen shows reducing conditions, as indicated by potentially low, but stable, DO, even after extended purging.	Concentrations of phosphate above background persist in samples from R-16 S4.	Per field sampling SOP, collect samples after stabilization of field parameters during a 3- to 6-CV purge. This recommended action is based on evaluation of data collected during the extended purge conducted at R-16 S4 on July 28, 2015.