EMID-702132

DEPARTMENT OF ENERGY
Environmental Management Los Alamos Field Office (EM-LA)
Los Alamos, New Mexico 87544

EMLA-2022-BF103-02-001

June 10, 2022

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NMED Hazardous Waste Bureau

Mr. Rick Shean
Bureau Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6313

Subject: Submittal of the Drilling Work Plan for Chromium Groundwater Project Regional Aquifer Monitoring Well R-77, Revision 1, and Comment Response

Dear Mr. Shean:

Enclosed please find two hard copies with electronic files of the "Drilling Work Plan for Chromium Groundwater Project Regional Aquifer Monitoring Well R-77, Revision 1." Enclosure 1 includes an electronic copy of a redline strikeout version of the report that incorporates all changes made in response to the New Mexico Environment Department's review comments dated April 2022 (Enclosure 2).

If you have any questions, please contact Joseph Sena at (505) 551-2964 (joseph.sena@em-la.doe.gov) or Cheryl Rodriguez at (505) 414-0450 (cheryl.rodriguez@em.doe.gov).

Sincerely,

ARTURO DURAN
Digitally signed by ARTURO DURAN
Date: 2022.06.06 13:15:43 -06'00'

Arturo Q. Duran
Compliance and Permitting Manager
U.S. Department of Energy
Environmental Management
Los Alamos Field Office

Enclosure(s):

1. Two hard copies with electronic files (including a redline strikeout version) – Drilling Work Plan for Chromium Groundwater Project Regional Aquifer Monitoring Well R-77, Revision 1 (EM2022-0341)
2. U.S. Department of Energy Responses to New Mexico Environment Department Draft Comments, Drilling Work Plan for Chromium Groundwater Project Regional Aquifer Monitoring Well R-77, Dated April 2022 (EM2022-0275)

cc (letter and enclosure[s] emailed):
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Enclosure 1

Drilling Work Plan for Chromium Groundwater Project Regional Aquifer Monitoring Well R-77, Revision 1

Drilling Work Plan for Chromium Groundwater Project Regional Aquifer Monitoring Well R-77, Revision 1

Primary Objectives and Purpose	This work plan presents the objectives, drilling approach, and conceptual design for groundwater monitoring well R-77. The primary objective for R-77 is to characterize vertical extent of chromium contamination in the regional aquifer near CrEX-4 which is a two-screen extraction well completed in November 2017. Initial data collected in December 2017 during discrete-screen interval pumping conducted shortly after completion of CrEX-4 showed chromium concentrations of approximately 350 ppb in the upper screen (screen 1) and approximately 540 ppb in the lower screen (screen 2).The two screens are separated by a blank section of casing only 10 ft in length. The primary objective of R-77 is to delineate vertical extent of chromium in the CrEX-4 area and provide for long-term performance monitoring for chromium as part of future remediation efforts. This objective drives the deep screen in R-77 to be deeper than screen 2 in CrEX-4. An additional aspect of this deep characterization objective is to set the deep screen within the Chamita formation (Tcar) to address uncertainties of whether the Tcar is a preferential pathway for chromium migration and whether groundwater flow within the Tcar is uniquely influenced by pumping of Los Alamos County water-supply wells. R-77 will complement a series of wells, including R-78 (the R-28 replacement well) and R-73, which will characterize the Tcar from west to east along the groundwater flow path. Additional objectives are (1) to characterize and monitor the lateral variability in chromium concentrations observed in CrEX-4 screen 2 and (2) to characterize the vertical gradient at depth in the central portion of the plume. The deep characterization of the plume centroid provided by R-77 may assist in identifying the source of deep contamination observed in the eastern portion of the plume. Two considerations drive the proposed location for R-77 (Figure 1). First, the primary objective of R-77 supports a location near CrEX-4. Second, the location needs to be outside the influence of any potential residual effects of sodium dithionite deployed at R-42 as part of the study to evaluate the feasibility of using amendments for in situ treatment of chromium in the regional aquifer. Potential locations are also constrained by the floodplain and nearby existing infrastructure. Figure 2 presents a cross-section that extends from R-42 to CrEX-4, showing the stratigraphic sequence and screen positions of nearby wells and those proposed for R-77. Figure 3 shows the conceptual design for R-77, with the understanding that a separate and more detailed design package that reflects actual information obtained during and following drilling, will be submitted to the New Mexico Environment Department (NMED) for review and approval.
Drilling Approach	The proposed drilling approach for R-77 will use fluid-assisted air-rotary with casing-advance methods. Telescoping casing sizes between 24 in. and 10 in. and dual-rotary methods will be used to advance the borehole to a depth approximately 170 ft into the regional aquifer. This approach will produce a borehole that can accommodate an approximately 3-in. annular filter pack around the 5-in.-diameter well screen. Because the deeper portion of the borehole is expected to encounter potentially unstable Tcar sediments, the drilling subcontractor may use various techniques to maintain borehole stability and eventual placement of a well screen. Specific techniques that may be used to manage conditions in the Tcar are not provided in this work plan. DOE and the selected drilling subcontractor will have the responsibility to use drilling and well-completion methods that are best suited for the conditions encountered. Well completion will follow New Mexico Office of the State Engineer regulations concerning well construction including, but not limited to (1) the hanging of the casing throughout well construction and (2) industry standard centralizers allowing for a minimum 2-in. annular space in a vertical well. Drilling subcontractors are required to have a New Mexico Well Driller's License.

Drilling Fluids, Composition, and Use	Fluids and additives will be used to facilitate drilling and may include those previously authorized for use by NMED, including the following: • Potable water, municipal water supply, to aid in delivery of other drilling additives and to cool the drill bit, • QUIK-FOAM, a blend of alcohol ethoxy sulfates, used as a foaming agent to lift cuttings, and • AQF-2, an anionic surfactant, used as a foaming agent to lift cuttings. The goal is to stop use of drilling fluids and additives 100 ft above the regional aquifer. But use of additives may be necessary to advance drilling and maintain borehole integrity. Complete records will be maintained detailing the type, amount, and volume of fluid and additives used, and the depth at which fluids or additives were added to the borehole.
Potential Groundwater Occurrence and Detection	Although perched-intermediate groundwater was not observed during drilling of nearby wells R-42 and CrEX-4, perched-intermediate groundwater may be present in the vicinity of the proposed location for R-77. Methods used to identify perched-intermediate groundwater during drilling will include driller's observations, water-level measurements, and borehole video, if appropriate. The top of the regional aquifer is projected to occur at approximately 924 ft below ground surface.
Geophysical Testing	Geophysical logging will be conducted through the saturated interval in the regional aquifer when the borehole has been drilled to total depth. Neutron and gamma logs will be run to refine estimates of the top of regional saturation, to identify geologic contacts, and to characterize the hydraulic properties of strata beneath the water table. The neutron log measures the amount of hydrogen in the formation in either a water- or air-filled borehole, which typically provides a good measure of moisture content in the unsaturated zone and of the porosity in the saturated zone. The gamma survey employs a scintillation detector to measure the gross gamma radiation activity of the formation. Naturally occurring gamma radiation comes from the decay of potassium-40 plus the uranium and thorium decay series. Typically, these elements occur in varying concentrations within different strata, and the gamma log can be used to estimate porosity and relative content of fine-grained material. The geophysical data will be used in conjunction with drill cuttings and driller's observations to identify intervals within the aquifer that are suitable for screen placement.
Cuttings Characterization	Cuttings will be collected from the length of the borehole. Cuttings collection and characterization methods will attempt to optimize representative retention of the fine-grained fraction, particularly within the regional aquifer. Split samples of all cuttings collected during drilling will be provided to NMED.
Well Development	The well filter pack may be developed by both mechanical and chemical means. Mechanical means may include airlift swabbing, bailing, and pumping. Chemical means include the use of additives to remove clays, and/or chlorination to kill bacteria that may be introduced during well completion. Filter pack development during placement will be considered complete when less than 1/10 ml/L of sand is passing through the well screen. A submersible pump will be used in the well development process following construction of the well. Sand production during well development will be measured with a Rossum Sand Tester. The key parameters to be monitored for well development include turbidity measured in the field and total organic carbon (TOC), which will be measured at an analytical laboratory. If water-quality parameters cannot be brought to within the target values specified below during well development, the use of chemical well development may be discussed with NMED. No chemicals will be added without NMED's approval.

Well Development (cont.)	Chemical development methods that may be used include AQUA-CLEAR PFD or a similar product to remove clays, and/or chlorination with sodium hypochlorite. Well development will be considered complete when target water-quality parameters and sand production quantities are met, and a volume of water equivalent to that which was introduced into the aquifer during drilling and construction is removed. The target water-quality parameters are turbidity <5 nephelometric turbidity units and TOC <2 ppm. The target sand production quantity is less than 1 mg/L.
Step-Drawdown Testing	Step-drawdown testing will be performed to investigate and record each well screen interval's performance under controlled discharge conditions. Initial specific capacity will be determined for each screen interval, and the data will be used to help select a suitable permanent pump for the dedicated sampling system. Specific pumping rates for each step test will be determined in the field.
Water-Quality Sampling	If perched-intermediate groundwater is encountered, attempts will be made to collect screening-level samples using air-lifting or bailing methods. Water-quality samples will be collected at 20-ft intervals during advancement through the regional aquifer. Borehole water will be air lifted to the surface while each new section of 20-ft drill casing section is welded at the surface. Each sample will be collected from the air-lifed water just before continuing advancement of the casing string. These screening-level samples will be analyzed with fast turnaround at Los Alamos National Laboratory's Geochemistry and Geomaterials Research Laboratory (GGRL) for anions and metals. This practice may not be conducted within the Tcar if circulation borehole water during the welding phase causes borehole instability. After achieving total depth at approximately 170 ft into the regional aquifer, a series of "temporary wells" will be constructed in the 10-in. borehole. A well string with a 5-ft stainless-steel screened interval will be lowered into the drill casing to total depth, and the annular space around the well screen will be filled with 10/20 filter-grade silica sand (adjacent to screen slots) extending 1 ft to 2 ft above and below the screened interval and with 20/40 transition sand emplaced 5 ft above and below the primary filter pack interval. The 10-in. drill casing will then be retracted to expose the screen interval to the native formation. A 4-in. submersible pump will be deployed in the temporary well on stainless-steel drop pipe to purge and sample. The well construction and purging/sampling procedure will be repeated in 20-ft intervals up through the interval targeted for the upper screen, The purge volumes for each sampling interval will follow this approach: 20 casing volumes for 10-in. casing at a (nominal) length of 10 ft plus introduced water volume for the 20-ft drilling interval being sampled + 10%. [For example: 1 casing volume: (4.1 gal./ft)(10 ft) = 41 gal.; (41 gal.)(20) = 820 gal.; 820 gal. + introduced volume = X; (X)(1.1) = purge volume.] Samples from each of these intervals will be analyzed at the GGRL for anions and metals. Samples will also be made available to the NMED upon request. These geochemistry data, along with the geophysics data and information from drill cuttings and driller's observations, will be used for the well-design package submitted to NMED for review and approval. The first groundwater samples from the completed well will be collected at the end of the step-drawdown testing conducted in each of the two screens. These samples will be analyzed for metals, general inorganic chemicals (including nitrate, perchlorate, sulfate, etc.), semivolatile organic compounds, volatile organic compounds, and radionuclides (including low-level tritium). Subsequent samples will be collected from the dedicated sampling system described below.

Sampling System Installation	A two-screen Baski sampling system will be installed in the well. The system will use a typical 3- or 4-in. pump and motor to maintain sampling purge rates at or near 5 gal. per minute.
Investigation-Derived Waste Management	Investigation-derived waste will be managed in accordance with Standard Operating Procedure (SOP) N3B-EP-DIR-SOP 10021, "Characterization and Management of Environmental Programs Waste." This SOP incorporates the requirements of applicable U.S. Environmental Protection Agency and NMED regulations, U.S. Department of Energy orders, and Newport News Nuclear BWXT-Los Alamos, LLC (N3B) requirements. The primary waste streams will include drill cuttings, drilling water, drilling fluids and additives, development water, purge water generated during step-drawdown testing, decontamination water, and contact waste. Drill cuttings will be managed in accordance with the NMED-approved "Decision Tree for the Land Application of Drill Cuttings" (April 2016). Drilling, purge, and development waters will be managed in accordance with the NMED-approved "Decision Tree for Land Application of Drilling, Development, Rehabilitation, and Sampling Purge Water" (November 2016). Initially, drill cuttings and drilling fluids will be stored in a lined pit. Representative samples of the drill cuttings and drilling fluids will be collected and analyzed, and waste determinations will be made from validated data. If validated analytical data show these wastes cannot be land-applied, they will be removed from the pit, containerized, and placed in accumulation areas appropriate for the type of waste. Development and aquifer testing water that meets the requirements to be treated and land-applied will be managed under Discharge Permit 1793. Decontamination water will be containerized separately at the point of generation, placed in an accumulation area appropriate to the type of waste, and directly sampled. Contact waste will be containerized at the point of generation, placed in an appropriate accumulation area, and characterized using acceptable knowledge or the media with which it came in contact.
Schedule	Documentation of completion of R-77 is a proposed fiscal year 2023 Appendix B target.

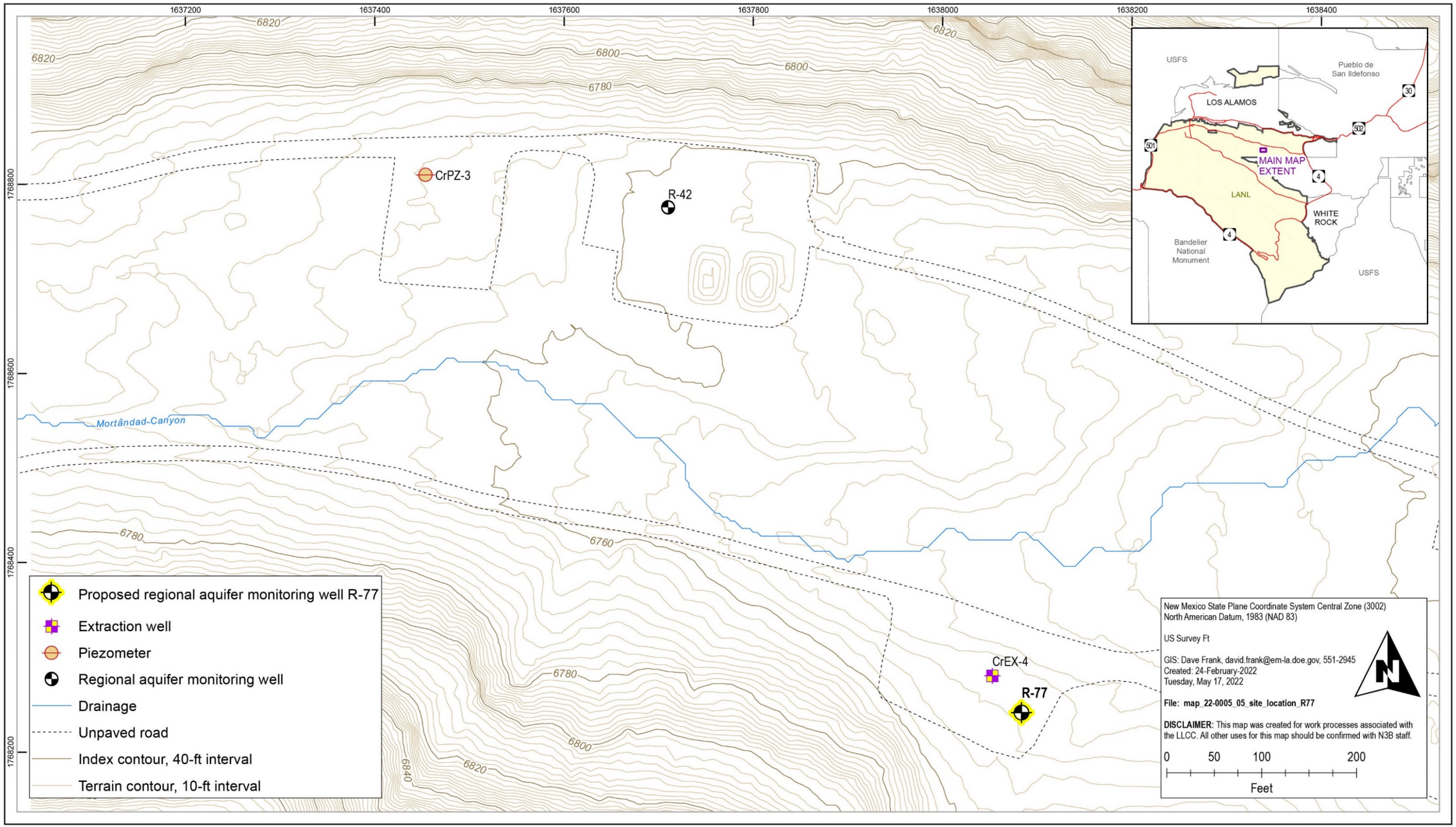

Figure 1 Proposed location for R-77

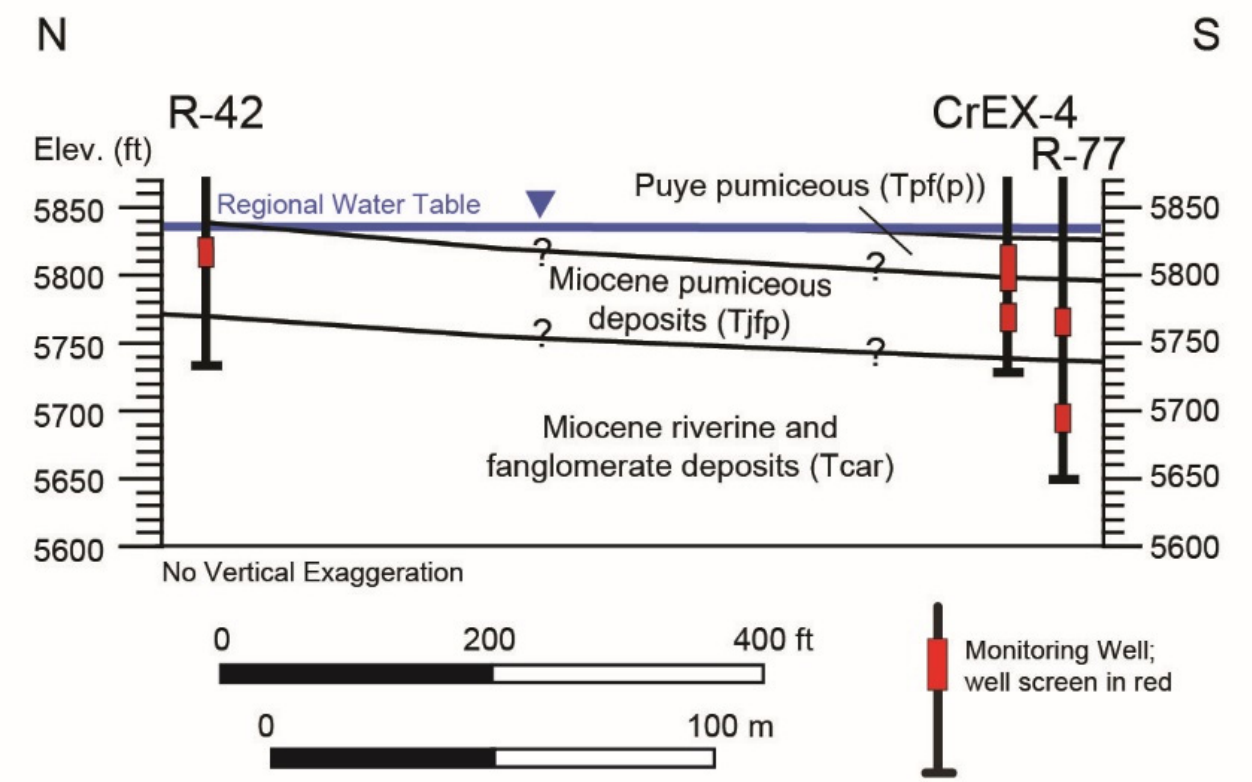

Figure 2 **Cross-section showing the stratigraphy and screen positions for nearby wells and the proposed location and well-screen positions for R-77**

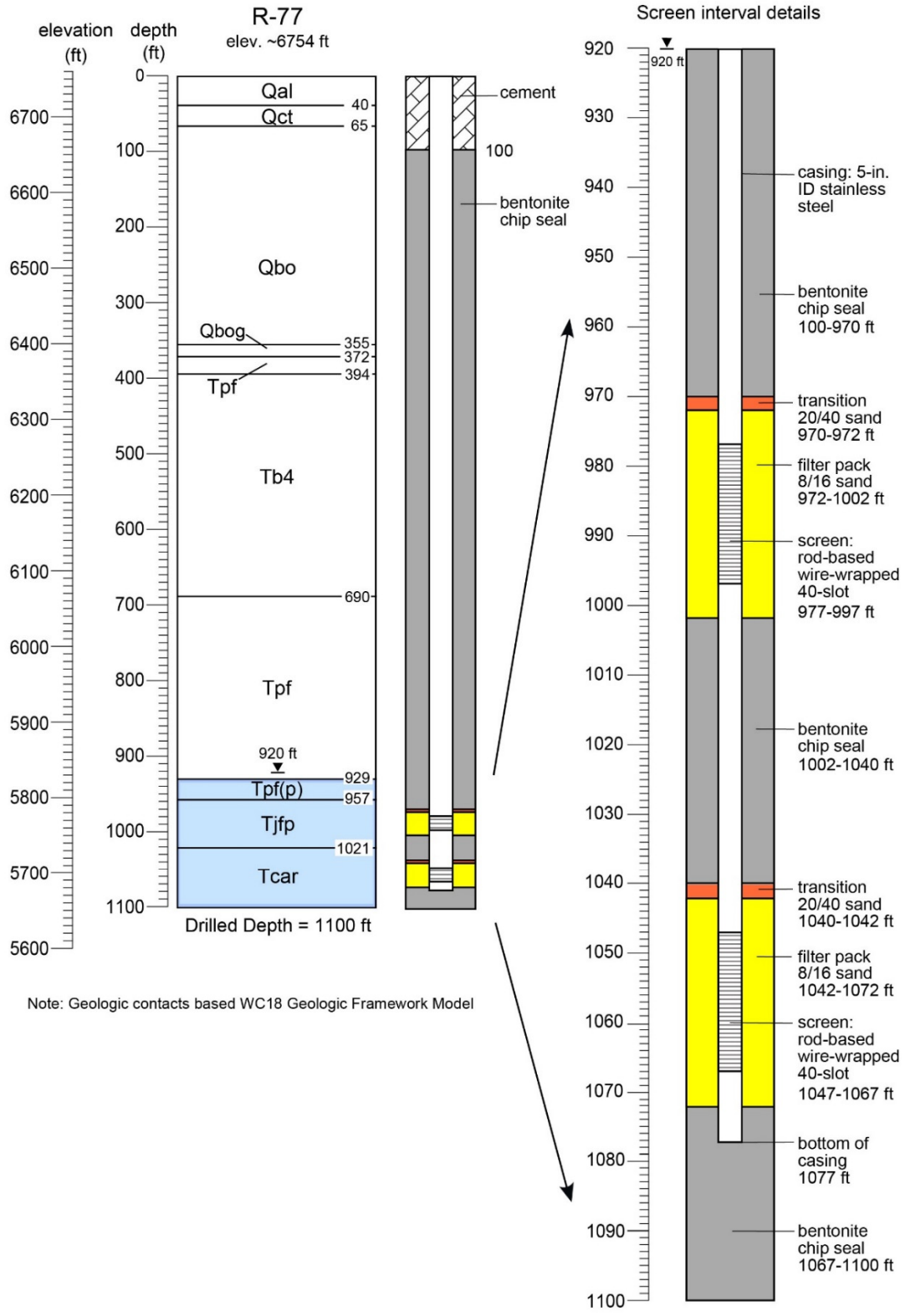

Figure 3 Conceptual well design for R-77

Enclosure 2

U.S. Department of Energy Responses to New Mexico Environment Department Draft Comments on "Drilling Work Plan for Chromium Groundwater Project Regional Aquifer Monitoring Well R-77" Dated April 2022

U.S. Department of Energy Responses to New Mexico Environment Department Draft Comments on "Drilling Work Plan for Chromium Groundwater Project Regional Aquifer Monitoring Well R-77" Dated April 2022

INTRODUCTION

To facilitate review of this response, the New Mexico Environment Department's (NMED's) comments are included verbatim. The U.S. Department of Energy (DOE) Environmental Management Los Alamos Field Office responses follow each NMED comment.

SPECIFIC COMMENTS

NMED Comment

1. Primary Objectives and Purpose, Page 1.

a. ***DOE Statement:*** *"An additional aspect of this deep characterization objective is to set the deep screen within the Chamita formation (Tcar) to address uncertainties of whether the Tcar is a preferential pathway for chromium migration and whether groundwater flow within the Tcar is uniquely influenced by pumping of Los Alamos County water-supply wells, particularly well PM-4."*

NMED Comment: *While the proposed R-77 drill location is slightly closer to PM-4 than PM-3 and it is known that some chromium monitoring wells (R-28 and R-13) are within the 8,713-foot radius of influence generated from extended PM-4 pumping[1], PM-4 is not downgradient of the migration direction of the chromium plume and is not solely screened in the Tcar as is PM-3 but also is screened in the Puye formation as are most chromium monitoring wells. NMED has demonstrated that PM-3 obtains water from the Tcar above the Miocene basalt based on the pumping analysis between PM-3 and R-35a, the screened interval and the known pump setting in PM-3, thus not agreeing with DOE's conclusion that PM-3 withdrawals water from below the Miocene basalt[2]. Regarding placement of the deep screen within the Tcar, in principle PM-3 should be emphasized as much as PM-4 in this statement. Although, NMED concurs that PM-4 is also a potential receptor to contaminants migrating from DOE's chromium plume and recognizes that all supply wells are sensitive receptors to DOE's groundwater contaminant plumes, NMED believes it is best for DOE to delete ", particularly well PM-4" from the Drilling Work Plan for Chromium Groundwater Project Regional Aquifer Monitoring Well R-77 (Workplan). Please revise the Workplan accordingly.*

b. ***DOE Statement:*** *"The deep characterization of the plume centroid provided by R-77 may assist in further understanding the nature and source of deep contamination observed downgradient in R-70 screen 2 and R-45 screen 2."*

NMED Comment: *It is not clear exactly how drilling at the proposed location, which is about 2,500 feet upgradient of R-45, will provide further understanding of the trend documented at R-45 screen 2. NMED has demonstrated that the increasing chromium trend at depth at R-45 is probably due to DOE's interim measures injection operations conducted at CrIN-1, CrIN-2, and CrIN-3, which are only 320 feet, 495 feet and 1,400 feet upgradient of R-45, respectively. In addition, several other IM actions including groundwater extraction at CrEX-3 and CrEX-4 and the molasses injection at R-28 take place between DOE's proposed R-77 drill location and R-45 and would likely interfere with migration from the plume centroid to the plume perimeter downgradient.*

Regarding the chromium concentration trends at R-70, DOE should consider alternate sources for that contamination because the deeper heads between the proposed R-77 location and R-70 indicate groundwater flow and plume migration is not in the direction from R-77 to R-70. Inclusion of this statement in the Workplan makes it appear to NMED that DOE is asserting that the proposed location is ideal and is avoiding the injection operations as the likely cause of the documented unfavorable responses in the regional aquifer. DOE must be open to considering other locations for R-77. (NMED will require DOE to directly address this unfavorable injection response issue in a pending workplan to be submitted to satisfy fiscal year 2022 Milestone #2.) Revise the Workplan by removing this statement from the revision.

c. ***DOE Statement:*** *"Second, the location needs to be off-gradient from aquifer sediments and groundwater potentially influenced by the residual effects of sodium dithionite deployed at R-42 as part of the study to evaluate the feasibility of using amendments for in situ treatment of chromium in the regional aquifer."*

NMED Comment: *DOE's proposed drilling location for monitoring well R-77 as shown in Figure 1 on page 5 (see NMED specific comment nos. 8 and 9) appears about 250 feet southeast of R-42 and about 375 feet northwest of CrEX-4. This location is not off-gradient from the potential effects of the sodium dithionite deployed at R-42 in 2017 because the associated injection would have created a temporary hydraulic high at R-42 that would have forced the sodium dithionite out of the well and into the regional aquifer in all directions, specifically downgradient (southeast) toward CrEX-4. Consequently, the area between R-42 and CrEX-4 may likely be affected by potential reductive conditions from the deployment as operation of CrEX-4 would pull the amendment and oxidation products, iron, manganese, and other injectates (sodium carbonate-sodium bicarbonate) from R-42 southeast and down to CrEX-4. To avoid effects of the sodium dithionite and other natural and injected chemicals deployed at R-42, DOE must relocate R-77 southeast and downgradient of, and as adjacent as possible to, CrEX-4. Additionally, because the primary objective for R-77 is to characterize vertical extent of chromium contamination in the regional aquifer near CrEX-4, which has a total depth 20 feet above the top of the Chamita Formation (Tcar), NMED's suggested location with its greater proximity to CrEX-4 will provide the best data and information to determine the vertical extent of chromium contamination and fulfil the primary objective for R-77. In the revised Workplan, DOE must relocate the proposed location accordingly in all pertinent sections and figures of the revision.*

DOE Response

1. a. "PM-4" was a typo and intended to state PM-3. The phrase "particularly well PM-4" has been removed from the sentence.

1. b. Characterizing the nature of deep contamination in the plume centroid may provide additional understanding of the source of contamination at R-45 screen 2 and, in general, deep contamination in the eastern portion of the plume. The statement does not imply that R-77 would provide further understanding of the trend at R-45 screen 2. However, DOE has clarified the statement to better reflect the intent of the sentence: "The deep characterization of the plume centroid provided by R-77 may assist in identifying the source of deep contamination observed in the eastern portion of the plume."

1. c. While DOE developed its proposed location with the goal of avoiding drilling into the zone previously impacted by dithionite deployed in R-42, DOE agrees to modify the well location per this comment. The drilling work plan has been revised accordingly.

NMED Comment

2. Drilling Approach, Page 1.

DOE Statement: *"The proposed drilling approach for R-77 will use fluid-assisted air-rotary with casing-advance methods. Telescoping casing sizes between 24 in. and 10 in., and dual-rotary methods will be used to advance the borehole to a depth within the upper 170 ft of the regional aquifer. This approach will produce a borehole that can accommodate an approximate 3-in. annular filter pack around the 5-in.-diameter well screen."*

NMED Comment: *Revise the Workplan to include a description on how DOE plans to address the potential for encountering flowing sands that have occurred during past deeper drilling operations at the Los Alamos National Laboratory (LANL). In the Workplan revision, also provide the centralizer specifications that will be used to ensure a sufficient annulus that complies with the State engineer's specifications and whether the driller will "hang" the well to aid in well plumbness to further ensure that a 3-inch annulus develops for emplacement of filter pack, bentonite seal and cement grout. This is crucial to ensure that an adequate seal is installed between the two well screens for subsequent vertical hydraulic gradient and geochemical profiling evaluations.*

DOE Response

2. DOE and the drilling subcontractor will be prepared to deal with the issues for drilling and well completion in the Tcar. Language in the work plan will be changed to describe this perspective but will not include specific approaches that a drilling subcontractor may use for addressing the potential for flowing sands. Additionally, the final well design will conform with applicable New Mexico Office of the State Engineer requirements, as stated in the revision to the Drilling Approach section.

NMED Comment

3. Potential Groundwater Occurrence and Detection, Page 2.

DOE Statement: *"Although perched-intermediate groundwater was not observed during drilling of nearby wells R-42 and CrEX-4, perched-intermediate groundwater is known to be present in the vicinity of the proposed location for R-77."*

NMED Comment: *In the revision, justify this statement because it contradicts itself i.e., explain how perched-intermediate groundwater can be 'known to be present' in the vicinity of proposed monitoring well R-77 when it was not observed during drilling of nearby R-42 and CrEX-4. If perched-intermediate groundwater is encountered with a sufficient quantity and yield (i.e., 250 milliliter per minute or more at three well volumes) while drilling R-77, NMED will require a separate perched-intermediate aquifer monitoring well be installed at the R-77 pad.*

DOE Response

3. The text in the work plan has been changed to "Although perched-intermediate groundwater was not observed during drilling of nearby wells R-42 and CrEX-4, perched-intermediate groundwater may be present in the vicinity of the proposed location for R-77."

NMED Comment

4. Geophysical Testing, Page 2.

DOE Statement: *"Geophysical logging will be conducted through the saturated interval in the regional aquifer when the borehole has been drilled to total depth. Logging data will be used to refine estimates of the top of regional saturation and to characterize the hydraulic properties of strata beneath the water table."*

NMED Comment: *Provide in the revision to the Workplan the specific geophysical logs that DOE will run, and the information DOE expects to obtain from each log to achieve the stated hydrogeological characterization.*

DOE Response

4. Additional detail has been provided on the specific logs (gamma and neutron logs) and their purpose.

NMED Comment

5. Cuttings Characterization, Page 2

DOE Statement: *"Cuttings will be collected from the length of the borehole."*

NMED Comment: *Revise the Workplan to include that DOE will provide NMED with split samples of all cuttings collected during the drilling of R-77.*

DOE Response

5. The work plan has been revised to include a statement to that effect.

NMED Comment

6. Hydraulic Testing, Page 2.

DOE Statement: *"Both screened intervals will be hydraulically tested following development."*

NMED Comment: *Hydraulic testing must be removed from the Workplan revision. Appendix C, Appendix E Section II and Appendix F Section I.B.6.c of the 2016 Order on Consent (CO) provides the appropriate investigations, standards, and reports where hydraulic testing are to be conducted and presented. NMED requires a specific workplan for all aquifer and well hydraulic tests that are in accordance with the CO and provides the rationale for the test including the purpose, goals, objectives, needs, methods, and the intended use for the acquired data including the proposed hydraulic test at R-77. If NMED concurs with the need, DOE shall provide a separate workplan prepared in accordance with NMED HWB's Aquifer Testing Guidance Document (pending) and is conducted as part of an RCRA Facility Investigation (RFI) or Interim Measure (IM) in accordance with the CO and subject to NMED review, comment, and approval. NMED stresses the value in a singular, large-scale, long-term, multi-well aquifer performance test at the chromium plume over the individual limited tests typically performed at LANL. NMED will not accept any data derived from, or report that contains the hydraulic testing methodology, rationale and analyses used at monitoring well R-70.*

DOE Response

6. The hydraulic testing section has been replaced by a section on step-drawdown testing for the purpose of sizing the pump in the dedicated sampling system and determining the specific capacity of the well.

NMED Comment

7. Water-Quality Sampling, Page 2.

DOE Statement: *"If perched-intermediate groundwater is encountered, attempts will be made to collect screening-level samples using air-lifting or bailing methods.*

During drilling of the well, an investigation method (not yet determined) will be used to collect discrete-interval samples to help identify vertical extent of contamination. Such data may provide useful estimates of the vertical extent of chromium and, along with other lines of evidence, will be used for the well-design package submitted to NMED for review and approval.

The first groundwater samples from the completed well will be collected at the end of the hydraulic test in each of the two screens."

NMED Comment: *Include in the revision to the Workplan that screening-level samples will also be collected from the regional aquifer and that split samples will be provided to NMED under NMED chain of custody protocol or that DOE will make the drill site safe and accessible for two NMED personnel at a time to collect their own screening-level groundwater samples during active drilling operations. Revise the Workplan to provide a detailed suitable investigation method. NMED would like to point out the method used during drilling of both R-35a and R-35b be considered to collect these groundwater samples during the drilling operation to install R-77. NMED analyte suites for groundwater samples shall consist of major cations and anions, fluoride, metals, tritium, low-level perchlorate, and nitrate. If groundwater is not encountered in the perched intermediate aquifer, NMED will not request to be on site until regional aquifer groundwater is encountered. All groundwater quality data collected by DOE must be provided to NMED upon receipt from the laboratory.*

See NMED specific comment no. 6 regarding hydraulic testing. Refrain from referring to DOE's post development extended purging and collection of "first samples" as a hydraulic test as it does not conform to standard hydraulic well testing methods that are accepted and understood worldwide.

DOE Response

7. A description of the sampling and characterization process has been added to the document, along with a statement (in the Cuttings Characterization section) affirming NMED's access to split samples. References to "hydraulic tests" have been removed throughout the document.

NMED Comment

8. Figure 1, Proposed location for R-77, Page 5.

NMED Comment: *Revise Figure 1 to show the proposed location for R-77 to be immediately southeast of CrEX-4. See Specific Comment No. 1c.*

DOE Response

8. The figure has been revised.

NMED Comment

9. Figure 2, Cross-section showing the stratigraphy and screen positions for nearby wells and the proposed location and well-screen positions for R-77, Page 7.

NMED Comment: *Revise the Workplan to show R-77 in cross-section east of CrEX-4 (See NMED specific comments nos. 1c and 8). The target screen interval for R-77 S1 should be between about 5,760 and 5,780 feet and R-77 S2 to be about 5,700 and 5,720 feet MSL. Vertical spacing of well screens should be about 50 feet and the top of the screens are not within 20 feet of a major hydrogeological contact.*

DOE Response

9. Figures 2 and 3 have been revised to reflect the change in the proposed well location and the initial conceptual design of the well. The final well design package will present a proposed design based on data collected during and subsequent to drilling.