



January 22, 2024

Arturo Duran, Designated Agency Manager  
U.S. Department of Energy  
Environmental Management  
Los Alamos Field Office  
1200 Trinity Drive, Suite 400  
Los Alamos, NM 87544

**RE: REVIEW**  
**DRILLING WORK PLAN FOR GROUNDWATER REGIONAL AQUIFER MONITORING WELL R-79,**  
**REVISION 1**  
**LOS ALAMOS NATIONAL LABORATORY**  
**EPA ID#NM0890010515**  
**LANL-23-026**

Dear Mr. Duran,

The New Mexico Environment Department (NMED) received the United States Department of Energy's (DOE) *Drilling Work Plan for Groundwater Regional Aquifer Monitoring Well R-79, Revision 1* (Workplan) on October 27, 2023 to fulfill fiscal year 2024 proposed Milestone 4 of Appendix B of the 2016 Compliance Order on Consent. The Workplan was dated and received October 27, 2023 and referenced by EM2023-0624.

NMED has reviewed the Workplan and issues the following comments:

**1. Primary Objectives and Purposes, pg. 1.**

Revisions to the text must clarify that any deviations from the approved drilling work plan, the sample analysis plan, or requirements of New Mexico Office of the State Engineer (NMOSE) issued permit must be communicated to NMED prior to deviating from the approved plans or permits. NMED will approve modifications via letter or e-mail. If NMED does not approve of the modifications, DOE must pause the work until final decisions are issued by regulatory agencies.

The description provided must include the anticipated prioritization for the completion of the deeper screen at R-79, which is to be completed in the Chamita Formation (TCar). The Workplan discusses the decision to change the design from dual-screen to single-screen but does not clarify that the single-screen well, as proposed in the Workplan, will not fulfill the data gap requirements at R-79.

**2. Drilling Approach, pg. 2.**

The description provided must clarify that the zonal sampling procedures, specified in the Water-Quality Sampling section, shall not interfere with the New Mexico Office of the State Engineer (NMOSE) issued permit. The telescoping drive casing must meet NMOSE issued permit instructions and the zonal well

borehole must be drilled to a lesser diameter than the final well design. The Workplan must clarify that if a drive casing with a greater diameter than the final completion design is used, drilling operations must stop progress no less than 5 feet above the expected aquifer depth to prevent penetrating the aquifer. Furthermore, add text to clarify that deviations in the zonal sampling procedures of an approved drilling work plan require approval from NMED prior to implementation.

**3. Drilling Fluids, Composition, and Use, pg. 2.**

Revise the text to state that the use of any other fluids or additives that are not included on the list in this section of the Workplan requires prior approval from NMED.

**4. Water-Quality Sampling, pg. 4.**

The proposed zonal sampling well design must be revised to meet the requirements in NMED Comment 2. The current zonal sampling procedure calls for a borehole with a greater diameter than the final borehole diameter. The drilling approach for zonal sampling should be revised to state that an 8-in diameter borehole be used, which would allow for the final well design to be constructed at the proposed 10-inch diameter. Further revisions are required to update the purge volume for the required zonal sampling well design.

**5. Water-Quality Sampling, pg.4.**

Revise the text to state that the zonal well screen and all casing metals in contact with the aquifer must be 5-inch or lesser diameter stainless steel with at least a 2-inch annulus, as described in the Workplan. Clarify that any deviations to this plan must be approved by NMED prior to implementation. Revise the Workplan to describe the spacers used to keep the well screen centralized in the zonal sampling borehole. Additionally, clarify that the stainless-steel casing and well screen shall be decontaminated between each zonal sample interval.

**6. Water-Quality Sampling, pg. 4.**

The casing slot size and sand specifications for annulus & filter materials must be re-evaluated to account for observations during the zonal sampling data collection at regional aquifer monitoring well R-76. Include a discussion in the Workplan to ensure that there are sufficiently sized slots in the stainless-steel temporary well screen to allow sufficient infiltration.

NMED calculations presented in Attachment 1, indicate that the 20/40 transition sand used for during zonal sampling at R-76 had a greater conductivity than the surrounding formation which means that samples have the potential to be homogenized by mixing in the borehole. Revisions must include clarification that a transition sand with a lesser conductivity than the formation, for example 40/170 sand, be used as the final transition sand, and it shall also be used as the plug between zonal sampling intervals if bentonite cannot be used.

NMED notes that the custom machined screen slots should ensure that sand grains do not become lodged within the slots (Attachment 1) causing excessive drawdown and NMED suggests that the screen slots have a trapezoidal profile. Revisions to the text should clarify that the well screen, chamber, and lift pipe be free from corrosion and physical defects prior to use (Attachment 1).

7. **NMED/NMOSE Communication, pg. 5.**

Revise the section to specify that NMED would like the driller's log included in the daily reports.

Should you have any questions regarding this correspondence, please contact Michael Petersen (505) 690-5107.

Sincerely,

**Rick Shean** Digitally signed by  
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Date: 2024.01.22  
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New Mexico Environment Department

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Attachment 1:

File: 2024 LANL, Review, Drilling Work Plan for Groundwater Regional Aquifer Monitoring Well R-79,  
Revision 1  
LANL-23-026

Attachment 1

<i>Sand Spec</i>	<i>Grain Size (d10 mm)</i>	<i>K @ <math>\phi=0.2</math>; (ft/s)</i>	<i>K @ <math>\phi=0.2</math>; (ft/day)</i>	<i>Comments</i>
6-12	1.4	0.0028	241	More conductive than formation
10-20	0.85	0.0010	89.0	More conductive than formation
20-40	0.38	0.00020	17.3	Higher than formation average
40-140	0.12	0.000019	1.63	In the lower end of formation Ks
-170	0.090	0.000012	0.999	Intersects lowest end of formation Ks
-200	0.075	0.0000080	0.694	Below the lower range of formation Ks; this is the actual d10 of the 40-140 sand reviewed.

Table 1: Effective conductivity for engineered sand calculated using Kozeny-Carman at Omniculator.com with a nominal porosity of 0.2 and converted to site units (ft/day).



Figure 1: Corrosion on the interior of the temporary well's pump chamber. This is not a suitably inert environment for samples where metal and nitrate concentrations are of interest.



Figure 2: Custom machined 'screen slots' that provide much less surface area for water entry than a typical screen. Remaining area likely reduced to ~50% of that by sand particles becoming lodged against the slot sidewalls. This likely contributed significantly to the excessive drawdowns observed in the casing during pumping.

Table 2: Condition of carbon-steel pipes improvised for use in R-76.