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Hazardous Waste Bureau

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Date: FEB 02 2015
Refer To: ADESH-15-012
LAUR: 15-20305
Locates Action No.: N/A

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

Subject: Submittal of the Drilling Work Plan for Regional Aquifer Well R-61r

Dear Mr. Kieling:

Enclosed please find two hard copies with electronic files of the Drilling Work Plan for Regional Aquifer Well R-61r.

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@nnsa.doe.gov).

Sincerely,

Michael T. Brandt, DrPH, CIH, Associate Director
Environment, Safety, and Health
Los Alamos National Laboratory

Sincerely,

Peter Maggiore, Assistant Manager
Environmental Projects Office
Los Alamos Field Office

36892

Drilling Work Plan for Regional Aquifer Well R-61r

Primary Purpose	Los Alamos National Laboratory (LANL or the Laboratory) is installing regional aquifer well R-61r to meet the New Mexico Environment Department's (NMED's) requirement for installation of a single-screen well to replace existing well R-61. In "Evaluation of Regional Well R-61," dated June 2014 (LANL 2014, 257586), the Laboratory stated that although some water-quality data are still affected by residual conditions around the well, concentrations of key monitored constituents (specifically chromium, nitrate, and perchlorate) are sufficiently representative of groundwater conditions such that R-61 can be used to support remediation and monitoring in its current location within the plume(s) beneath Mortandad Canyon. Following the December 2, 2014, letter from NMED, the Laboratory is replacing R-61 because "…well R-61 is not reliable for groundwater monitoring and contaminant-detection purposes," and "Groundwater samples collected at R-61 for contaminant monitoring and detection do not meet requirements included in the March 2005 Consent Order…" (NMED 2014, 600065). The proposed location for replacement well R-61r is estimated to be approximately 50 ft upgradient of R-61 and on the same drill pad as R-61 (Figure 1). Based on observations made during drilling of R-61, the R-61r borehole is expected to penetrate the top of regional saturation at a depth of approximately 1101 ft within sedimentary deposits of the Puye Formation. The target borehole total depth (TD) is approximately 1180 ft bgs (Figure 2). The well will be completed with one well screen placed near the regional water table within the Puye Formation. Figure 2 shows the observed geology at R-61r and a conceptual well design for well R-61r. A final well design will be based on data acquired during drilling, including information from lithological logs of cuttings, water-level measurements, video logs, geophysical logs, and driller's observations. A well design document will be submitted to NMED for approval prior to construction.
Drilling Approach	A combination of open-hole and casing-advance methods with air-rotary fluid assist will be used. Each interval of open hole or casing advance will be optimized to meet well objectives. Casing will be used to advance the borehole when open-hole drilling is not possible and to secure the borehole through unstable zones or any perched groundwater horizons. A down-the-hole hammer, with or without casing advance, may be used to penetrate the Cerros del Rio basalts. Drilling foam may be used to condition the borehole, lift cuttings, and reduce the volume of compressed air needed, but will be terminated at least 100 ft above the regional aquifer.
Potential Drilling Fluids, Composition, and Use	Fluids and additives may be used to facilitate drilling and well development. Fluids and additives previously approved for use by NMED include • potable water, municipal water supply, used to aid in delivery of other drilling additives and cool the drill bit; • QUIK-FOAM, a blend of alcohol ethoxy sulfates, used as a foaming agent; and • AQF-2, an anionic surfactant, used as a foaming agent. Complete records will be maintained detailing the type, amount, and volume of drilling fluid used; depth at which drilling fluid was added to the borehole; amount of fluid in storage in the borehole; and recovery volume of drilling fluid. No drilling fluids will be used within 100 ft of the regional aquifer, except potable municipal water, unless otherwise approved by NMED.

Potential Groundwater Occurrence and Detection	*Potential Perched Water:* Perched-intermediate groundwater was not encountered while drilling the R-61 borehole, therefore no perched groundwater is anticipated at R-61r. Regional Groundwater: Regional groundwater is expected to occur at a depth of approximately 1103 ft within the Puye Formation. Methods for determining groundwater levels prior to construction may include driller's observations, water-level measurements, borehole video, and borehole geophysics.
Regional Groundwater Characterization Sampling	Groundwater samples will be collected from the completed well between 10 and 60 d after well development, in accordance with the Compliance Order on Consent (Consent Order). These samples will be analyzed for a full suite of constituents, including radionuclides, metals/cations, general inorganic chemicals, high explosives, and volatile organic compounds. Subsequent groundwater samples will be collected in accordance with the Interim Facility-Wide Groundwater Monitoring Plan.
Geophysical Testing	The Laboratory's borehole video camera and natural gamma and induction tools will be used in the open borehole if conditions allow. The Laboratory's geophysical logs will be used to select the length and depth of the well screen.
Well Completion Design	Figure 2 shows the conceptual well design for well R-61r.
Well Development	The well may be developed by both mechanical and chemical means. Mechanical means include swabbing, bailing, and pumping. Chemical means include the use of additives to remove clay minerals introduced as annular fill and/or chlorination to kill bacteria introduced during well completion. • After initial swabbing and bailing, a submersible pump will be used to complete the development process. • Water-quality parameters will be measured in a flow-through cell. The parameters to be monitored are pH, specific conductance, dissolved oxygen, temperature, turbidity, oxidation-reduction potential, and total organic carbon (TOC). • If the Laboratory is unable to bring the water-quality parameters within measurement limits specified below, the use of chemical well development may be discussed with NMED. No chemicals will be added without approval from NMED. • Chemicals that may be used include the addition of sodium acid pyrophosphate and AQUACLEAR PFD to remove clay minerals and/or chlorination to kill bacteria introduced during well completion. Well development will be considered complete when target water-quality parameters are met. The target water-quality parameters are turbidity <5 nephelometric turbidity units, TOC <2 ppm, and other parameters stable.
Hydraulic Testing	Hydraulic testing will be conducted following completion and development. The most likely test will be a 24-h constant-rate pump test.

Investigation-Derived Waste Management	Investigation-derived waste (IDW) will be managed in accordance with Standard Operating Procedure (SOP) EP-DIR-SOP-10021, Characterization and Management of Environmental Program Waste (procedures are listed at http://www.lanl.gov/community-environment/environmental-stewardship/plans-procedures.php and are available at eprr.lanl.gov). This SOP incorporates the requirements of applicable U.S. Environmental Protection Agency and NMED regulations, U.S. Department of Energy orders, and Laboratory requirements. The primary waste streams will include drill cuttings, drilling water, drilling fluids and additives, development water, purge water generated during hydraulic testing, decontamination water, and contact waste. Drill cuttings with residual additives will be managed in accordance with the NMED-approved Notice of Intent (NOI) Decision Tree for Land Application of IDW Solids from Construction of Wells and Boreholes (November 2007). Drilling, purge, and development waters will be managed in accordance with the NMED-approved NOI Decision Tree for Drilling, Development, Rehabilitation, and Sampling Purge Water (November 2006). Initially, drill cuttings and drilling water will be stored in lined pits. The cuttings may or may not contain residue of drilling/well completion additives (e.g., drilling foam and bentonite clay). The contents of the pits will be characterized with direct sampling following completion of drilling activities and/or via use of a composite of subsamples collected during drilling, 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. Cuttings, drilling water, development water, and purge water that cannot be land-applied and are designated as hazardous waste will be sent to an authorized treatment, storage, or disposal facility within 90 d of containerization. Development water, purge water, and decontamination water will be containerized separately at their 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 of the media with which it came in contact.
Schedule	Well R-61r will be completed by June 30, 2016.

REFERENCES

The following list includes all documents cited in this plan. 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.

LANL (Los Alamos National Laboratory), June 2014. "Evaluation of Regional Well R-61," Los Alamos National Laboratory document LA-UR-14-22583, Los Alamos, New Mexico. (LANL 2014, 257586)

NMED (New Mexico Environment Department), December 2, 2014. "Evaluation of Regional Well R-61," New Mexico Environment Department letter to P. Maggiore (DOE-NA-LA) and M. Brandt (LANL) from J.E. Kieling (NMED-HWB), Santa Fe, New Mexico. (NMED 2014, 600065)

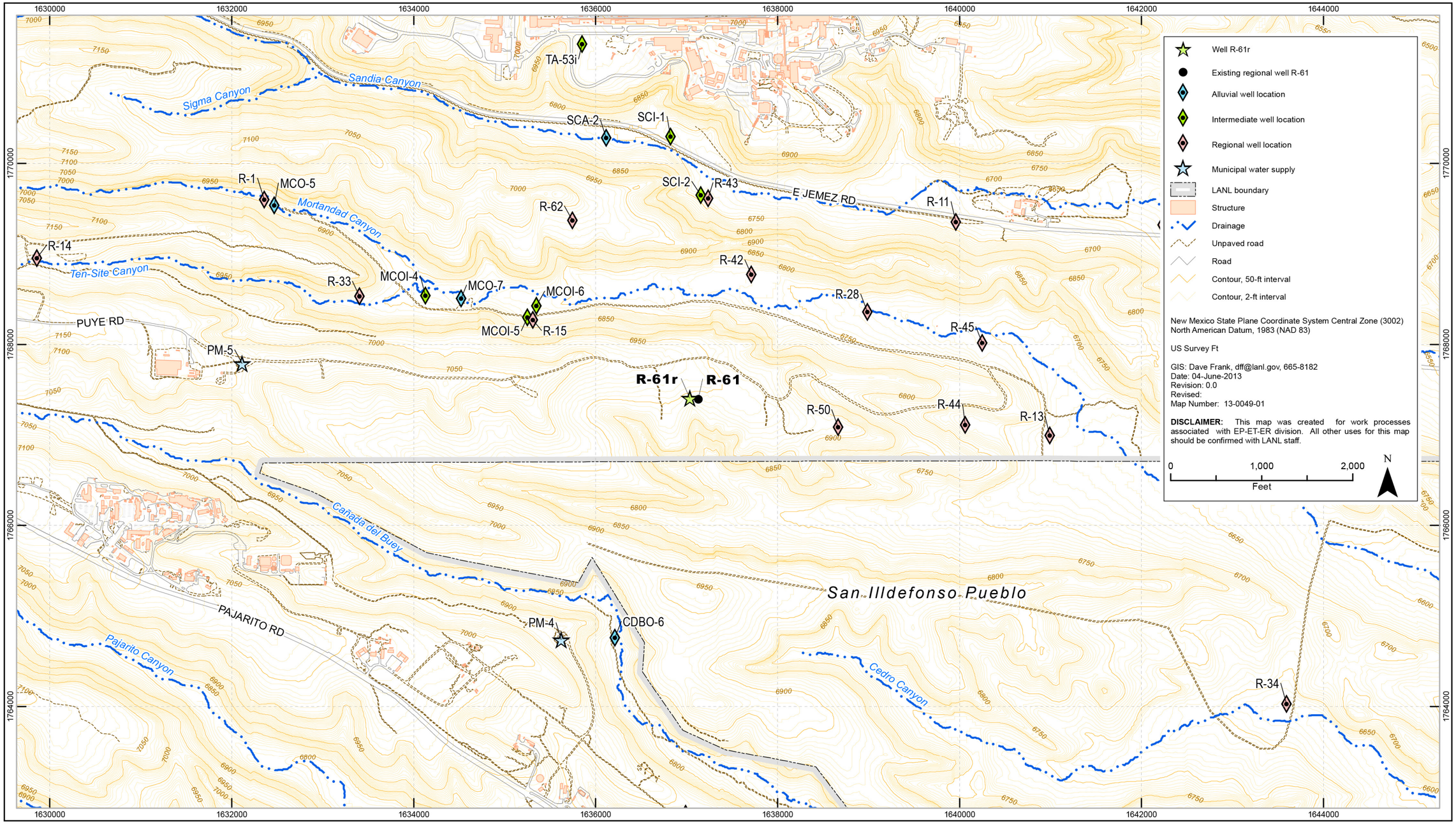

Figure 1 Proposed location for well R-61r

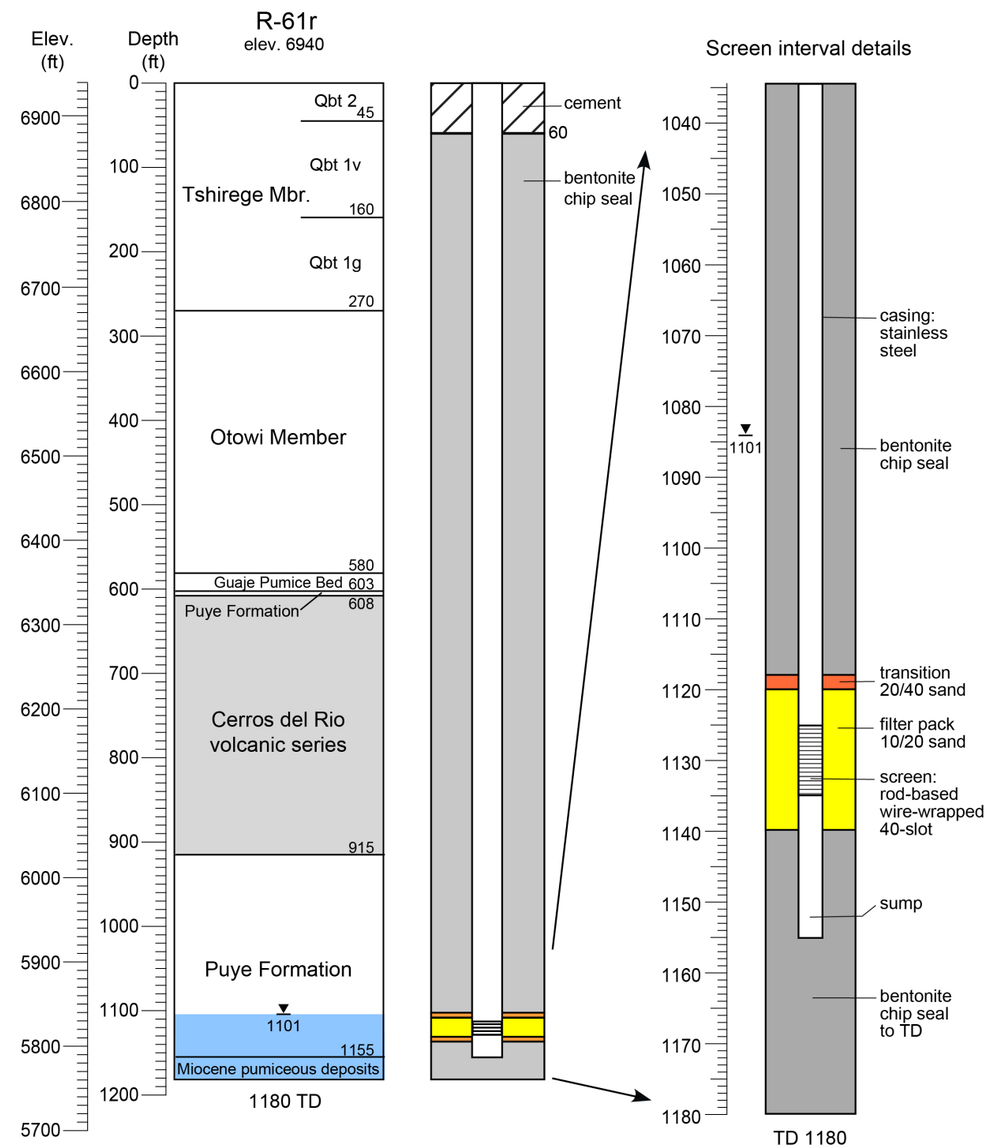

Figure 2 Predicted geology and conceptual well design for well R-61r