

Work Plan for Redrilling Well R-47

<p>Primary Purpose</p>	<p>The work plan for this well was originally submitted to the New Mexico Environment Department (NMED) under the name CdV-R-15-1. The well was renamed R-47 in accordance with the Los Alamos National Laboratory (LANL or the Laboratory) naming conventions. The well was planned to be installed at Technical Area 15 (TA-15), approximately 1 mi east of well R-25 (Broxton et al. 2002, 072640), between wells R-18 and CdV-R-15-3. However, after discussions with NMED staff, the well was moved to the rim of Cañon de Valle within TA-14 (see R-47i location, Figure 1). LANL advanced the first R-47 borehole to 1348 ft using open-hole and casing-advance methods. During construction of the well, bentonite was found to be entering the screen. The well casing was removed and attempts to clean the borehole of bentonite were unsuccessful. The borehole is being completed as an intermediate depth perched aquifer well, named R-47i, with a screen at 840–860 ft. This work plan describes the proposed location, methods, and objectives of a new regional aquifer well R-47.</p> <p>Figure 1 shows the locations of R-25, R-47i, proposed well R-47, and other wells and boreholes associated with Consolidated Unit 16-021(c)-99 (aka the 260 Outfall) groundwater investigations. The purpose of well R-47 is to enhance the TA-16 monitoring well network by providing a regional aquifer well to the northeast of the 260 Outfall. The TA-16 monitoring well network analysis is presented in "Evaluation of the Suitability of Wells Near Technical Area 16 for Monitoring Contaminant Releases from Consolidated Unit 16-021(c)-99, Revision 1" (LANL 2007, 100113). The planned screened interval for R-47 is the same as proposed to NMED on September 6, 2009, and approved on September 7, 2009 (Figure 2). However, assessment of the monitoring network with information from new wells R-47i and R-48, along with water-level data from the regional aquifer at R-47i, may lead to relocation or elimination of well R-47.</p> <p>The proposed approach is to advance the borehole to a depth of 1370 ft, which provides sufficient space to complete a well screened 1313–1335 ft. Note that the new location for R-47 is on a bench 56 ft above the existing R-47i construction site; therefore, greater depths than those proposed in the R-47 well design are required to reach comparable elevations within the subsurface.</p> <p>Figure 2 shows the stratigraphy for the R-47 area and the approved well design.</p>
<p>Conceptual Model</p>	<p>Discharge from the 260 Outfall flows into Cañon de Valle and infiltration into the vadose zone is believed to be concentrated along the canyon axis. Contaminants from the outfall are concentrated in perched water beneath the canyon.</p> <p>Data from R-47i and surrounding wells, regional and perched, will be examined to determine whether the regional well at R-47 as proposed will improve detection or monitoring at this site.</p>
<p>Drilling Approach</p>	<p>Drilling will be conducted using methods selected to optimize the potential of completing the well without using any drilling additives in the zone of saturation. Specifically, efforts will be made to meet the target depth of approximately 1370 ft below ground surface (bgs) and to provide a stable borehole environment for constructing the well. The primary method for advancing the borehole will be a combination of open hole, air rotary, and casing advance with air-rotary. The following is a summary of the proposed methods by depth interval.</p> <ul style="list-style-type: none"> • Set a 16 in. surface casing. • Drill a 15 in. open hole with foam to 100 ft above the water table. Flush the hole with water and air, then continue to drill the open hole with air and water only to total depth (TD).

<p>Drilling Approach (continued)</p>	<ul style="list-style-type: none"> • If hole caving is encountered at 1328 ft (1272 ft in first borehole), continue to blow with air for several hours to see if the caving stops or slows down enough to continue to drill to TD. • If the formation will not stand open at 1328 ft, set a minimum 10-in. casing and drill to depth, assumed to be 1370 ft bgs. <p>Since screening samples from the perched groundwater at the R-47i screen depth did not detect contamination, no attempts to seal off perched water at the same elevation will be made.</p>
<p>Potential Drilling Fluids, Composition, and Use</p>	<p>The following fluids and additives that may be used are consistent with those previously used in the drilling program at the Laboratory and have been characterized geochemically.</p> <ul style="list-style-type: none"> • Potable water from the municipal water supply is used to aid in the delivery of other drilling additives. • QUIK-FOAM, a blend of alcohol ethoxy sulfates, is used as a foaming agent. • AQF-2, an anionic surfactant, is used as a foaming agent.
<p>Geochemical Objective</p>	<p>The geochemical objective is to provide a groundwater sampling point free of drilling-fluid effects within the regional aquifer.</p>
<p>Potential Groundwater Occurrence and Detection</p>	<p>The top of the regional groundwater system is expected to occur at a depth of approximately 1298 ft (see Figure 2) based on the depth to water at the R-47i borehole. Based on drilling at the R-47i borehole, it is possible that a perched zone capable of producing water will be detected in the 800–900-ft depth range.</p> <p>Methods for groundwater detection may include driller’s observations, water-level measurements, and borehole video.</p>
<p>Core Sampling</p>	<p>Core sampling is not proposed for R-47. Cuttings will be collected at 5-ft intervals within the regional aquifer.</p>
<p>Groundwater Screening Sampling</p>	<p>Groundwater screening samples will be collected during drilling at any groundwater zones producing sufficient water for sampling.</p> <p>Screening samples of groundwater will be analyzed for cations/metals (dissolved and total) and anions (dissolved) by the Earth and Environmental Sciences Division’s Geochemistry and Geomaterials Research Laboratory and for high explosives (HE), tritium, and volatile organic compounds by off-site laboratories.</p>
<p>Groundwater Characterization Sampling</p>	<p>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. These samples will be analyzed for the full suite of TA-16-related constituents, including tritium; metals/cations; general inorganic chemicals; volatile organic compounds; semivolatile organic compounds; HE compounds, including RDX (research department explosives [hexahydro-1,3,5-trinitro-1,3,5-triazine]) and related degradation products; and stable isotopes.</p> <p>Subsequent groundwater samples will be collected under the annual “Interim Facility-Wide Groundwater Monitoring Plan.</p>
<p>Geophysical Testing</p>	<p>The Laboratory’s borehole video camera, natural gamma, and induction tools will be used if open-hole conditions allow logging in the R-47 borehole before each casing string is introduced.</p>
<p>Well Completion Design</p>	<p>The proposed well design is shown in Figure 2, which is consistent with the NMED-approved well design for R-47 in the first borehole (R-47i).</p>

<p>Well Development</p>	<p>The well may be developed by both mechanical and chemical means. Mechanical means include swabbing, bailing, and pumping. Chemical means include the use of sodium acid pyrophosphate or AQUA-CLEAR PFD to remove natural and added clays and/or chlorination to kill bacteria introduced during well completion. Chemical means will not be used without prior approval by NMED.</p> <p>After initial swabbing and bailing, the well will be pumped to complete the development.</p> <p>Water-quality parameters to be monitored are as follows: pH, specific conductance, temperature, turbidity, and total organic carbon (TOC), and acetone or ethylene glycol, as applicable.</p> <p>Target water-quality parameters are as follows: turbidity <5 nephelometric turbidity units, TOC <2 ppm, other parameters stable.</p>
<p>Hydraulic Testing</p>	<p>A pumping test will be performed if hydrologic conditions permit. Response to pumping will be monitored at nearby wells.</p>
<p>Investigation-Derived Waste Management</p>	<p>Investigation-derived waste (IDW) will be managed in accordance with Standard Operating Procedure (SOP) EP-SOP-5238, Characterization and Management of Environmental Program Waste (http://www.lanl.gov/environment/all/qa/adeq.shtml). 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 include drill cuttings, drilling water, development water, purge water, decontamination water, and contact waste.</p> <p>Drill cuttings 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 contents of the pits will be characterized with direct sampling following completion of drilling activities, 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 to 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.</p> <p>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.</p>
<p>Tentative Drilling Schedule</p>	<p>The Laboratory proposes that a review of data from the existing groundwater monitoring network and the new well R-47i may provide insights that would warrant relocation or elimination of the need for R-47 in the context of meeting the 260 Outfall corrective measures evaluation objectives. Water level and quality data from new wells R-47i and R-48 will be collected over a 6-mo period ending in May 2010. These data will be incorporated into the current monitoring network and the need for and location of R-47 will be proposed by June 15, 2010. Pending this review, the Laboratory proposes that R-47 be drilled with a target completion date of December 31, 2010. The proposed schedule allows for both the necessary data review and for threatened and endangered species restrictions.</p>

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 number. This information is also included in text citations. ER ID numbers are assigned by the Environmental Programs Directorate's Records Processing Facility (RPF) and are used to locate the document at the RPF and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the 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.

Broxton, D., R. Warren, P. Longmire, R. Gilkeson, S. Johnson, D. Rogers, W. Stone, B. Newman, M. Everett, D. Vaniman, S. McLin, J. Skalski, and D. Larssen, March 2002. "Characterization Well R-25 Completion Report," Los Alamos National Laboratory report LA-13909-MS, Los Alamos, New Mexico. (Broxton et al. 2002, 072640)

LANL (Los Alamos National Laboratory), November 2007. "Evaluation of the Suitability of Wells Near Technical Area 16 for Monitoring Contaminant Releases from Consolidated Unit 16-021(c)-99, Revision 1," Los Alamos National Laboratory document LA-UR-07-6433, Los Alamos, New Mexico. (LANL 2007, 100113)

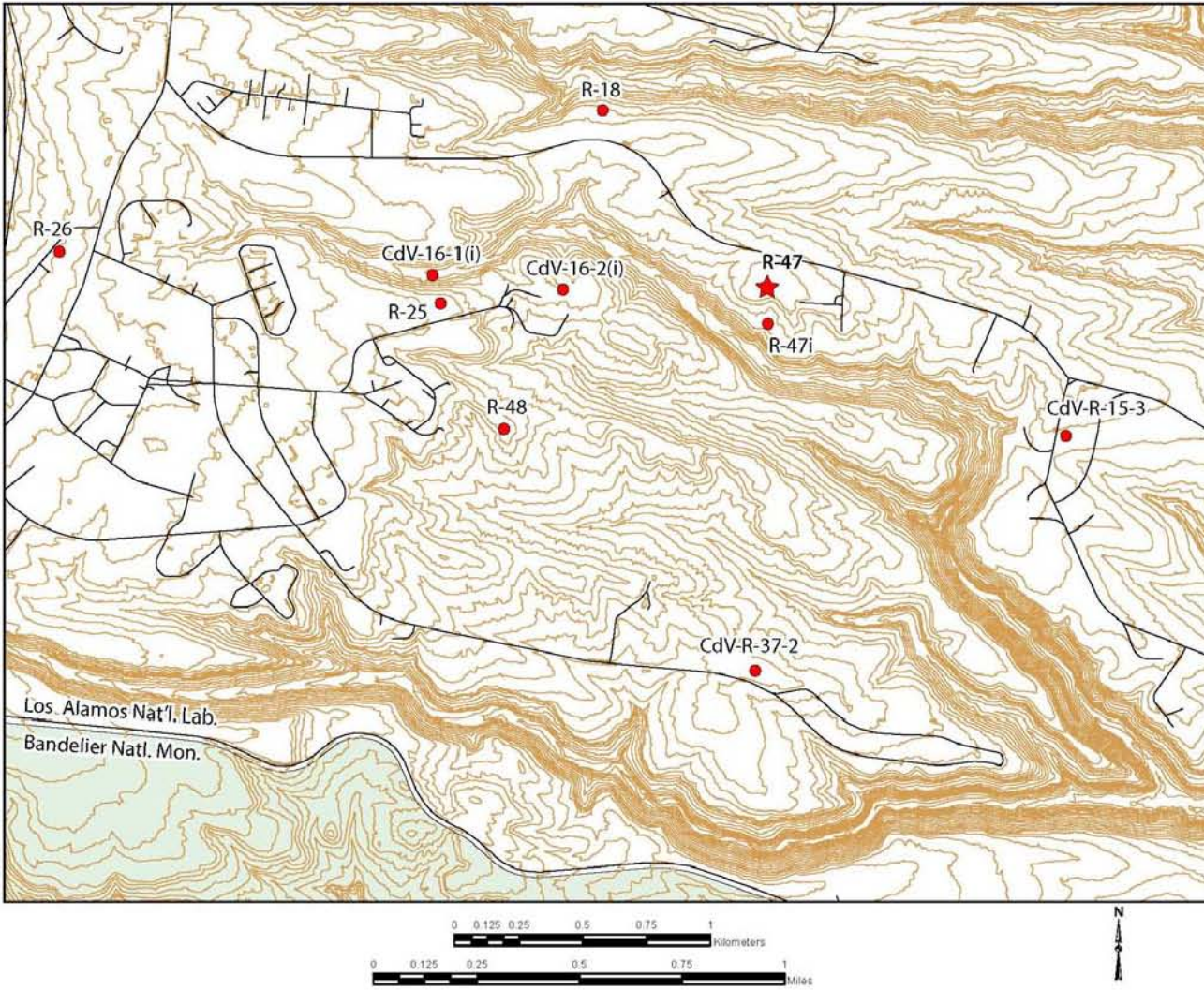
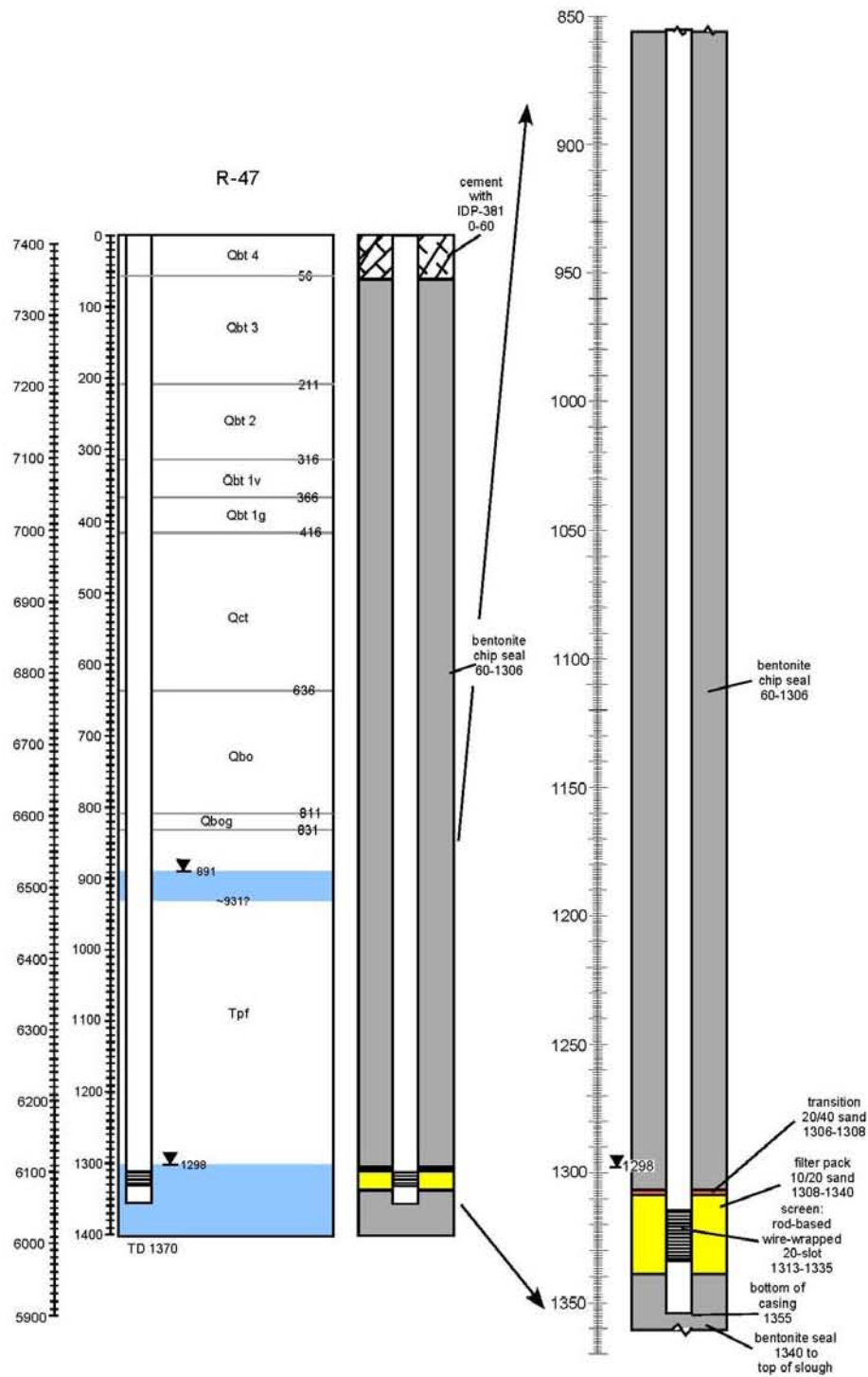


Figure 1 Proposed location of R-47 relative to R-47i, R-25, and other TA-16 monitoring well



Notes: Qbt = unit 4, 3t, 3, 2, 1v, or 1g of the Tshirege Member of the Bandelier Tuff; Qbtt = Tsankawi Pumice of the Tshirege Member; Qct = Cerro Toledo Interval; Qbo = Otowi Member of the Bandelier Tuff; Qbog = Guaje Pumice of the Otowi Member of the Bandelier Tuff; Tpf = Puye Formation.

Figure 2 Proposed well design for R-47 in relation to local stratigraphy