Interim Measures Work Plan for the Plugging and Abandonment of Intermediate Groundwater Well MCOBT-4.4

Primary Purpose	This work plan summarizes the methods Los Alamos National Laboratory (LANL or the Laboratory) proposes to use to plug and abandon groundwater monitoring well MCOBT-4.4. This work plan is being written in response to a letter dated May 28, 2009, from the New Mexico Environment Department (NMED), "Notice of Determination to Rescind Approval of Proposed Well Abandonment Method and Interim Measure for the Plugging and Abandonment of MCOBT-4.4, Los Alamos National Laboratory, EPA ID# NM0890010515." NMED's requirement for a revised work plan states that "*In order to reduce or prevent the migration of contaminants to the regional drinking-water aquifer, the Permittees must promptly and properly abandon well MCOBT-4.4. The Permittees shall plug and abandon MCOBT-4.4 using the overdrilling method, which provides the greatest assurance that the breach of the perching horizon is completely sealed off from the overlying saturated unit to prevent the movement of contaminated groundwater below the perched zone."* Well abandonment of MCOBT-4.4 will be consistent with the requirements in the letter and guidelines of Sections IV.B.1.b.v and X.D (Well Abandonment) of the Compliance Order on Consent. The construction of well MCOBT-4.4 and the proposed methods to abandon the well are detailed below.
Construction of MCOBT-4.4	Groundwater monitoring well MCOBT-4.4 was installed in 2001 using air-rotary, dual-rotation, reverse-circulation drilling methods. Construction details are as follows: • 0–130 ft: 13 3/8-in.-outside diameter (O.D.) steel casing, cemented in place 0–68 ft • 0–545 ft: 5-in.-O.D. stainless-steel casing, with a bentonite chip seal 68–474 ft • 485–524 ft: 5 ½-in.-O.D. stainless-steel pipe-based screen, with filter pack 474–527 ft
Abandonment Methods	All aboveground and belowground appurtenances will be removed, including pumps, transducers, data loggers, control panels, concrete pad, etc. The well will be inspected with a downhole video camera, and a natural gamma log will be collected to document the existing conditions. The screened interval and a nominal length of the 5-in. stainless-steel well casing will be pressure-grouted in place, utilizing 30% solids bentonite grout before overdrilling. Pressure will be achieved by adding water into the well to achieve a calculated hydrostatic head to force the grout into the borehole and formation. The well casing will be grouted to a minimum depth of 455 ft below ground surface (bgs) (7 ft above the Otowi Member/Guaje Pumice Bed contact). Performing an in situ grout abandonment in the lower portion of the well ahead of overdrilling activities is advisable. Because of several factors (e.g., original borehole deviation), overdrilling could result in damage to the existing well. The well could be twisted or broken and restrict access to the lower portion. After the screened interval is abandoned, MCOBT-4.4 will be overdrilled, and an attempt will be made to remove the entire 545-ft string of 5-in. well casing from the borehole. The well will be overdrilled below the cemented casing (at 68 ft bgs) to total depth or to a depth that will allow the remaining well casing to be removed. Overdrilling will be accomplished with 8 5/8-in.-O.D. flush-welded drill casing and a 12 ¼- × 7-in. cutting shoe with the use of bentonite-based drilling fluids. After the well casing is removed if not at total depth, the borehole will be advanced to total depth and abandoned with a cement and bentonite grout mixture from bottom to top using a tremie pipe.

Abandonment Methods (cont.)	If the well casing breaks or the well cannot be pulled from the borehole, additional efforts will be made to fish the well out of the borehole or advance the overdrill method to total depth with drilling and/or milling to reach a satisfactory depth for successful abandonment. The 13 3/8-in. conductor casing will remain in place. The conductor casing was sealed in place at the time of well construction and does not pose a leakage issue. The conductor casing will also provide a guide for overdrilling the stainless-steel well.
Surface Completion	Once the well casing is removed and the grout is cured, the top 2 ft of the borehole will be filled with concrete to ensure a secure surface seal, and a survey monument will be placed in the concrete.
Waste Disposal	No sampling will take place during plugging and abandonment of this well. All fluids and cuttings will be contained on-site in a lined cuttings pit. The intent is to reuse and recycle well materials (e.g., pump and steel) to the extent possible. If some materials cannot be recycled (e.g., fluids and cuttings), they will be disposed of in accordance with the waste characterization strategy form that applies to this activity. All investigation-derived waste (IDW) generated during well plugging and abandonment activities will be managed in accordance with applicable standard operating procedures (SOPs). These SOPs incorporate the requirements of all applicable U.S. Environmental Protection Agency and NMED regulations, U.S. Department of Energy orders, and Laboratory requirements. The SOP applicable to the characterization and management of IDW is EP-ERSS-SOP-5022, Characterization and Management of Environmental Restoration Project Waste, available at http://www.lanl.gov/environment/all/qa/adep.shtml. Investigation activities will be conducted in a manner that minimizes the generation of waste. Waste minimization will be accomplished by implementing the most recent version of the "Los Alamos National Laboratory Hazardous Waste Minimization Report" (LANL 2008, 104174). Waste streams will be recycled/reused, as appropriate. If analytical data or acceptable knowledge documentation indicates the presence of listed constituents that are not associated with a listed source, a due diligence review of available documentation may be performed to support the position that the constituents are not from a listed source (i.e., a listed process or spill or disposal of an unused/unspent chemical). If the due diligence does not identify a listed source, the waste will not carry the listed waste number. If a listed constituent is identified and is from a listed source, but the levels are below groundwater standards or soil screening levels and land disposal restrictions, a contained-in request may be made to NMED to remove the listed waste number from the waste stream. If appropriate, and based on the analytical data, drill cuttings will be evaluated for land application in accordance with ENV-RCRA-QP-11.1, Land Application of Drill Cuttings. Drilling fluids and purge water will be evaluated for land application in accordance with ENV-RCRA-SOP-10.1, Land Application of Groundwater. Any wastes that cannot be land-applied will be managed and disposed of based upon the regulatory classification of the waste.
Summary Report	A brief report will be prepared detailing the methods used, presenting borehole logs (video and natural gamma), identifying the quantities of materials used, and providing the final abandonment details. Refer to the MCOBT-4.4 Drill Schedule. Figures in the summary report will depict the location of the abandoned well and backfill completion will also be included in the report.
Drill Activities	• Plug and abandon MCOBT-4.4 August 15, 2009 • Submit report to NMED September 15, 2009

REFERENCE

The following list includes all documents cited in this report. Parenthetical information following each reference provides the author(s), publication date, and ER ID. This information is also included in text citations. ER IDs 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.

LANL (Los Alamos National Laboratory), November 2008. "Los Alamos National Laboratory Hazardous Waste Minimization Report," Los Alamos National Laboratory document LA-UR-08-7274, Los Alamos, New Mexico. (LANL 2008, 104174)