## Drilling Work Plan for Alluvial Aquifer Wells WCO-1a and WCO-3a

| | WCO-1a | WCO-3a |
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| **Primary Purpose** | Replace existing well WCO-1 that may not be constructed in a configuration capable of intercepting alluvial groundwater as directed in the New Mexico Environment Department's (NMED's) February 19, 2007, letter, "Notice of Disapproval South Canyons Investigation Work Plan" (NMED 2007, 095025). | Replace existing well WCO-1 that may not be constructed in a configuration capable of intercepting alluvial groundwater as directed in NMED's February 19, 2007, letter, "Notice of Disapproval South Canyons Investigation Work Plan" (NMED 2007, 095025). |
| **Conceptual Model** | Well WCO-1 was constructed during a period of artificially low recharge (during diversion of water from the upper watershed at Water Canyon galley). Flow has since returned to more normal levels, and replacement of the well may allow for better collection of alluvial groundwater. | Well WCO-1 was constructed during a period of artificially low recharge (during diversion of water from the upper watershed at Water Canyon galley). Flow has since returned to more normal levels, and replacement of the well may allow for better collection of alluvial groundwater. |
| **Drilling Method** | Casing will be advanced with a sonic rig to total depth (TD). | Casing will be advanced with a sonic rig to TD. |
| **Potential Drilling Fluids, Composition, and Use** | An attempt will be made to drill with air without the use of any additional fluids. Potable water may be used if the casing is not moving freely. | An attempt will be made to drill with air without the use of any additional fluids. Potable water may be used if the casing is not moving freely. |
| **Well Completion design** | The well will be constructed of polyvinyl chloride (PVC) (4 in.) with a 10-ft screen placed at the base of alluvium. | The well will be constructed of PVC (4 in.) with a 5-ft screen placed at the base of alluvium. |
| **Location** | Within 100 ft of existing well WCO-1 | Within 100 ft of existing well WCO-3 |
| **Projected Depth** | 29 ft, which is 5 ft below the alluvium-bedrock interface as required in the Compliance Order on Consent (Consent Order) (IV.A.3.e.i) | 29 ft, which is 5 ft below the alluvium-bedrock interface as required in the Consent Order (IV.A.3.e.i) |
| **Geologic Objectives** | Determine the thickness and composition of alluvium at this location in Water Canyon | Determine the thickness and composition of alluvium at this location in Water Canyon |
| **Hydrologic Objectives** | Determine if saturated alluvium is present at this location within Water Canyon; monitor groundwater levels in alluvium | Determine if saturated alluvium is present at this location within Water Canyon; monitor groundwater levels in alluvium |
| **Geochemical Objectives** | Groundwater samples collected from the completed well will provide information on the chemistry of alluvial water, if present | Groundwater samples collected from the completed well will provide information on the chemistry of alluvial water, if present |
| **Potential Groundwater Occurrence and Detection** | Groundwater is anticipated to be located at the base of alluvium. Presence of groundwater will be documented by field personnel based on moisture content in drilling returns and downhole water-level measurements. | Groundwater is anticipated to be located at the base of alluvium. Presence of groundwater will be documented by field personnel based on moisture content in drilling returns and downhole water-level measurements. |

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| **Groundwater Screening Samples** | No screening samples will be collected. | No screening samples will be collected. |
| **Groundwater Characterization Sampling** | These samples will be analyzed for the constituents included in the NMED<br><br>Hazardous Waste Bureau Interim Facility-Wide Groundwater Monitoring Plan (or the full suite of constituents if the specific well is not listed under the most current NMED Hazardous Waste Bureau Interim Facility-Wide Groundwater Monitoring Plan). | These samples will be analyzed for the constituents included in the NMED<br><br>Hazardous Waste Bureau Interim Facility-Wide Groundwater Monitoring Plan (or the full suite of constituents if the specific well is not listed under the most current NMED Hazardous Waste Bureau Interim Facility-Wide Groundwater Monitoring Plan). |
| **Core** | Because this is a replacement well with the purpose of providing a groundwater sampling point, core samples will not be collected | Because this is a replacement well with the purpose of providing a groundwater sampling point, core samples will not be collected |
| **Well Development** | The well will be surged and bailed to remove fines created during drilling. If sufficient groundwater flow is available, the well will also be pumped to continue development. | The well will be surged and bailed to remove fines created during drilling. If sufficient groundwater flow is available, the well will also be pumped to continue development. |
| **Hydraulic Testing** | Slug tests may be performed if hydrogeologic conditions permit. | Slug tests may be performed if hydrogeologic conditions permit. |
| **Geophysical testing** | None | None |
| **Investigation-Derived Waste Management** | Investigation-derived waste (IDW) will be managed in accordance with Standard Operating Procedure (SOP) EP-SOP-5238, Characterization and Management of Environmental Restoration Project Waste (http://www.lanl.gov/environment/all/qa/adep.shtml). This SOP incorporates the requirements of applicable U.S. Environmental Protection Agency (EPA) and NMED regulations, U.S. Department of Energy (DOE) orders, and Los Alamos National Laboratory (Laboratory) requirements. The primary waste streams include drill cuttings, drilling water, development water, purge water, decontamination water, and contact waste. | IDW will be managed in accordance with SOP EP-SOP-5238, Characterization and Management of Environmental Restoration Project Waste (http://www.lanl.gov/environment/all/qa/adep.shtml). This SOP incorporates the requirements of applicable EPA and NMED regulations, DOE orders, and Laboratory requirements. The primary waste streams include drill cuttings, drilling water, development water, purge water, decontamination water, and contact waste. |

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| **Investigation-Derived Waste Management (continued)** | 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). Drill cuttings, drilling, purge, development and decontamination waters will be containerized separately, placed in accumulation areas appropriate to the type of waste, and directly sampled. Waste determinations will be made from validated data. Cuttings, drilling, purge and development waters 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. Decontamination water that is designated as hazardous waste will also be sent to an authorized treatment, storage, and disposal facility within 90 d of containerization. Contact waste will be containerized at the point of generation placed into an appropriate accumulation area and characterized using acceptable knowledge (AK) of the media with which it came into contact.<br><br>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. | Drill cuttings will be managed in accordance with the NMED-approved 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). Drill cuttings, drilling, purge, development and decontamination waters will be containerized separately, placed in accumulation areas appropriate to the type of waste, and directly sampled. Waste determinations will be made from validated data. Cuttings, drilling, purge and development waters 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 containerization. Decontamination water that is designated as hazardous waste will also be sent to an authorized treatment, storage, and disposal facility within 90 d of containerization. Contact waste will be containerized at the point of generation placed into an appropriate accumulation area and characterized using AK of the media with which it came into contact.<br><br>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. |
| **Plug and Abandonment of Existing Wells** | Existing well WCO-1 will be overdrilled with the sonic rig. Casing will be removed and the hole grouted with cement containing IDP-381. | Existing well WCO-3 will be overdrilled with the sonic rig. Casing will be removed and the hole grouted with cement containing IDP-381. |

## REFERENCES

*The following list includes all documents cited in this plan. Parenthetical information following each 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)

NMED (New Mexico Environment Department), February 19, 2007. "Notice of Disapproval, South Canyons Investigation Work Plan," New Mexico Environment Department letter to D. Gregory (DOE-LASO) and D. McInroy (LANL) from J.P. Bearzi (NMED-HWB), Santa Fe, New Mexico. (NMED 2007, 095025)