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NEW MEXICO ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau

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EP2014-5048

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

February 19, 2014

Peter Maggiore
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Los Alamos, NM 87544

Jeffrey D. Mousseau, Associate Director
Environmental Programs
Los Alamos National Security, L.L.C.
P.O. Box 1663, MS M991
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RE: APPROVAL WITH MODIFICATIONS
PHASE II INVESTIGATION REPORT FOR SANDIA CANYON
LOS ALAMOS NATIONAL LABORATORY
EPA ID#NM0890010515
HWB-LANL-12-053

Dear Messrs. Maggiore and Mousseau:

The New Mexico Environment Department (NMED) is in receipt of the United States Department of Energy (DOE) and the Los Alamos National Security, L.L.C.'s (collectively, the Permittees) document entitled *Phase II Investigation Report for Sandia Canyon* (Report) dated September 2012 and referenced by EP2012-0195. The Report was received on September 28, 2012. NMED has reviewed the Report and hereby issues this approval with the following modifications.

General Comments:

1. The nature and extent of groundwater contamination in the regional aquifer beneath Sandia and Mortandad canyons have not been determined as required in NMED's March 1, 2005, Compliance Order on Consent (recent revision October 29, 2012). The Compliance Order on Consent specifically states on page 10:

> **"III. GENERAL PROVISIONS III.A PURPOSES AND SCOPE OF CONSENT ORDER,**
> The purposes of this Consent Order are: 1) to fully determine the nature and extent of releases of Contaminants at or from the Facility; 2) to identify and evaluate, where needed, alternatives for corrective measures, including interim measures, to clean up Contaminants in the environment, and to prevent or mitigate the migration of Contaminants at or from the Facility; and 3) to implement such corrective measures."

Contaminant data collected from upgradient well R-62, originally installed as a background monitoring well, include hexavalent chromium or Cr(VI) concentrations ranging from 150 to 200 µg/L. The chemistry of groundwater at R-62 is different from that found at and near the center of the chromium plume as represented by wells R-42 and R-28, located approximately 2400 feet (ft) east of R-62. Common major-ion ratios such as sodium/chloride (Na/Cl) and calcium/alkalinity (Ca/Alk) for R-62 average about 1.3 and 0.3, respectively, while ratios for R-28 and R-42 are about 0.5 for Na/Cl and 0.7 for Ca/Alk. The low tritium activities at R-62 (2 to 7 pCi/L) versus much higher levels at R-28 and R-42 (150 to 200 pCi/L) also suggest a different contaminant source. The groundwater at R-62 is also chemically dissimilar to contaminated perched-intermediate groundwater at SCI-1, SCI-2, and TA-53i, suggesting a different contaminant migration pathway to the regional aquifer. These data suggest that contamination from an additional source or sources is entering the regional aquifer west of R-62. Contamination in the regional aquifer and vadose zone west of R-62 must be delineated. The Permittees must install one single-screen monitoring well at the regional aquifer water table to fully constrain the nature and extent of chromium contamination in the regional aquifer west and upgradient of R-62. The well must be installed at or near coordinates 35°52'01.8" N and 106°16'51.35" W. The Permittees must submit a drilling work plan for the installation of the well by **June 10, 2014**. If sufficient saturation is encountered in the vadose zone during the drilling of this well, then the Permittees must drill and install a perched-intermediate aquifer well or wells if more than one saturated zone is present. The Permittees must submit a work plan for the installation of the associated perched-intermediate well(s) within 60-days after the required regional aquifer well is completed.

The downgradient-eastern extent of chromium contamination in the regional aquifer has not been fully determined. Characterization data and information collected at wells R-44, R-45, and R-50 located along the eastern or downgradient portion of the plume suggest that flow paths turn south towards well R-50 as discussed in Appendix J (page J-9) of the Report. The approximately 100 µg/L Cr(VI) concentration at R-50 Screen 1 and

groundwater flow-velocity estimates for the regional aquifer at R-50 strongly suggest that the plume has migrated offsite. Migration of chromium past the Permittee's facility boundary must be addressed by installing one single-screen regional aquifer well south of R-50. Specifically, the objectives of the well are: 1) delineate the offsite nature and extent of the plume; 2) potentially be used for long-term contaminant detection and monitoring, and monitoring of any future remediation efforts; and 3) provide data and information as to whether production well Pajarito Mesa #4 (PM-4) is susceptible to contamination from the chromium plume. An aquifer test conducted in 2005 at PM-4 and surrounding wells indicates that the horizontal propagation of drawdown (from pumping PM-4) in the regional aquifer surrounding PM-4 extends at least 8,700 ft, which overlaps the chromium plume (***see LANL, 2005: LA-14252-MS, page 58***). The southern lobe of the chromium plume that extends beyond regional well R-50 may be related to the propagation of drawdown from PM-4. In addition, Spinner-log measurements collected at PM-4 indicate that the bulk of flow to the well is from the upper portion (Puye Formation) of the regional aquifer. The required regional aquifer well, as noted above, must be positioned at or near coordinates 35°51'13.01" N and 106°15'14.25" W. The Permittees must submit a drilling work plan for the installation of the well by **June 10, 2014**.

2. Chromium concentrations in perched-intermediate groundwater exceed the New Mexico Water Quality Control Commission and United States Environmental Protection Agency standards for chromium of 50 µg/L and 100 µg/L, respectively. The nature and extent of contamination in the perched-intermediate aquifers beneath Sandia and Mortandad canyons have not been determined and contaminant transport from these perched-intermediate zones to the regional drinking-water aquifer is poorly understood; therefore, additional investigation may be required by NMED in the future. Such investigation would likely include conducting deep-geophysical surveys (e.g., resistivity or seismic refraction) and/or drilling of additional characterization/monitoring wells.

3. As highlighted in Appendix E of the Report, results from the geophysical characterization activities conducted at the wetland area in the upper reach of Sandia Canyon indicate multiple low-resistivity structures beneath the wetland. The largest and most pronounced structure is located beneath the eastern section of the wetland. The structure may represent an infiltration zone for groundwater recharge to perched-intermediate groundwater and the regional aquifer. With respect to present-day discharges and chromium releases between 1956 and 1972 to the wetland and downstream, this structure may play a significant role in contaminant transport to groundwater. Recent excavation activities that are part of the installation of a grade-control structure located along the eastern edge of the wetland suggests that the bulk of alluvial groundwater beneath the wetland is either consumed through evapotranspiration and/or infiltrates to the subsurface beneath the wetland. This assertion is based on the excavation and trenching into bedrock across the canyon bottom where no lateral groundwater flow was observed. In fact, evidence of saturation was not observed in the canyon-bottom alluvium and bedrock located approximately 130 ft downstream of the wetland. Therefore, the alluvial

groundwater must be infiltrating upstream of the trenches and beneath the wetland. The presence of these low-resistivity structures warrants additional investigation to determine if downward contaminant migration from the wetland has occurred or is occurring. The Permittees must install one boring, with core, to a depth of 400 feet. Core analyses for contaminant concentration (leach test) and moisture content must be performed at intervals ranging from 10 to 20 feet with biased sampling and analyses at fractures, surge beds, etc. The boring must be located at or near coordinates 35°52'24.49" N and 106°18'37.57" W. The Permittees must submit a work plan for the boring by **June 20, 2014**.

Should you have any questions, please contact Michael Dale of my staff at (505) 661-2673.

Sincerely,

John E. Kieling
Chief
Hazardous Waste Bureau

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File: Reading and LANL 2014, Sandia Canyon Phase II Report