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6 May 1996

Mr. Court Fesmire, LAAO AIP
Point of Contact
Department of Energy
Los Alamos Area Office
MS A316
Los Alamos, NM 87544

SUBJECT: Review of Los Alamos National Laboratory's (LANL) Environmental Restoration (ER) Project Resource Conservation Recovery Act Facility Investigation (RFI) Work Plan for Los Alamos and Pueblo Canyons, Field Unit (FU) 4, Operable Unit 1049

Dear Mr. Fesmire:

This conveys New Mexico Environment Department (NMED), Department of Energy Oversight Bureau's (DOE OB) review of the referenced Work Plan. Our focus was on Chapter 7, Sections 7.3 through 7.3.3.1.4. The following comments are provided for the purpose of communicating the results of the DOE OB review. These comments are not provided or intended for the purpose of representing the regulatory position of the New Mexico Environment Department. Under the Site-Specific Protocol currently being negotiated, DOE will be afforded a 20-working-day review and comment period after which, this review will be available for release to applicable agencies.

GENERAL COMMENTS

1). It should be noted that anthropogenic and/or elevated constituents have been detected in the deep aquifer. Historical data collected by LANL's Environmental, Safety and Health, Water Quality & Hydrology Group (ESH-18) and DOE OB show evidence of possible contaminant migration to the deep aquifer:

- In 1991, TW-2 showed elevated tritium (^3H) at 1800 pCi/L (LANL, 1991 ES Report). In 1993, ESH-18 detected chloride at 39 mg/L and sulfate at 25 mg/L at TW-4 (LANL, 1993 ES

Report). In 1994, DOE OB sampled TW-4, and strontium-90 (^{90}Sr) was detected at 6.59 (±1.00) pCi/L. In 1993, TW-1 showed elevated uranium, tritium, total lead and nitrate/nitrite.

DOE OB recommends an investigation of the deep aquifer in the Acid/Pueblo Canyon area and the installation of deep-aquifer monitoring well upgradient of test well TW-1.

2). Based on historical data and general observations, DOE OB suggests that the source of ground water within canyon alluvium from the DP/Los Alamos Canyon confluence to approximately LAO-5 may be from DP Spring and intermittent surface-water flow in DP Canyon. Ground water issuing from DP Spring appears to infiltrate rapidly and may enter Los Alamos Canyon through a saturated zone or underflow within the alluvium of DP Canyon. This possible ground-water zone or conduit may be entirely or intermittently connected to saturated alluvium in Los Alamos Canyon at LAO-2. Hence, ground water within the Los Alamos Canyon alluvium may be subdivided into two distinct ground-water occurrences; one located at some unknown distance upgradient of the DP and Los Alamos Canyon confluence, and one located between the mouth of DP Canyon and the vicinity of LAO-4.5. If this interpretation is correct, then LANL's conceptual model for Los Alamos Canyon shallow ground-water system will need to be re-evaluated. DOE OB also recommends monitoring of DP Spring and DP Canyon surface water, and investigating (e.g., bromide tracer test) the possible connection between DP Spring and ground water within the alluvium at LAO-2.

DOE OB collected surface-water samples at the mouth of DP Canyon on June 21, 1995 and July 16, 1995, and ^{90}Sr results were 46.1 (±5.2) pCi/L, and 15.0 (±3.0) pCi/L, respectively. Hence, ^{90}Sr contamination in ground water may vary from year to year due to surface-water infiltration. Characterization may be difficult since the source of ^{90}Sr and other possible contaminants has not been contained or removed.

DOE OB has two recommendations concerning the intermediate aquifer at LANL:

- The installation of an additional intermediate well near LAO-4.5 to monitor possible migration or seepage of contaminants beneath ground water within canyon alluvium between LAO-2 and LAO-4.5.

- Continuous water-level recording at LAOI-1.5, LAOI(B)-1.1 and LAOI(A)-1.1 during purging events. In addition, water levels at POI-4 should be obtained for correlation with any drawdown observed at TW-1A. Such data may yield additional hydrologic information (e.g., fracture intersection).

3). DOE OB has concerns over the re-mobilization of contaminants within the canyon alluvium vadose zone at Technical Areas (TAs) - 2 and TA-41. Water levels within the alluvium could rise to a point at which ground water may come into contact with contaminates (e.g., ^{90}Sr) in the vadose zone, and therefore, introduce or re-mobilize into ground water via dissolution. Characterization of ground water near the referenced TAs may be difficult since the contaminant source may still exist. DOE OB recommends monitoring ground water during both low- and high-head conditions, evaluating any variations, and possibly remediating contaminated areas which may come into contact with ground water.

4). Several lines of evidence suggest that some recharge to Basalt Spring may be from near-by surface-water infiltration, and that Basalt Spring may not entirely represent intermediate ground water:

- At approximately 7:30 a.m. on April 17, 1996, DOE OB staff observed surface-water (effluent water from Los Alamos County Sewage Treatment Facility) flow in Pueblo and Los Alamos Canyon below the Pueblo confluence at <1 gpm, and at 8:25 a.m., observed little or no flow in the active channel above Basalt Spring, suggesting that the outfall at the treatment facility had been temporarily turned off. Basalt Spring was flowing; however, DOE OB noted that flow had decreased due to the presence of high water-marks (still wet) on structures (boulders, sticks, etc.) within the surface-water flow path downstream from the spring discharge point. The sewage treatment facility was contacted that day, and confirmed that the outfall had been turned off at approximately 9:00 p.m. on April 16, 1996 and turned back on at approximately 9:00 a.m. on April 17, 1996.

- Temperature of Basalt Spring water was 7.2 ° C on April 17, 1996, and does not correlate with that of intermediate ground-water temperatures at TW-1A, which has a temperature of approximately 16.3 ° C (measured by DOE OB on June 6, 1995). This abnormally low temperature of Basalt Spring water suggests nearby recharge.

- On May 25, 1995, LANL's ESH-18 and DOE OB sampled Basalt Spring at a location considered to the be the spring source; however, on November 15, 1995, DOE OB observed that flow had completely ceased at this particular location. Basalt Spring may have discharged greater volumes of water in May due to an increase in surface-water flow due to the mixing of snow-melt runoff in Los Alamos Canyon with sewage treatment-plant outfall water.

Therefore, DOE OB cautions against the use of Basalt Spring as an intermediate ground-water monitoring location. LANL may want to utilize Los Alamos Spring, which is located approximately 0.2 mi east of Basalt Spring. This spring issues from the north-facing side of Los Alamos Canyon at an elevation approximately 40 ft directly above the active channel. Hydrochemical data obtained by DOE OB during 1994 and 1995 and general observations suggest that this spring may represent some type of intermediate ground water. Data concerning Basalt and Los Alamos Springs were submitted to DOE and LANL in a letter dated July 28, 1995.

5). DOE OB recommends that LANL continue drilling to the deep aquifer at the proposed intermediate wells if intermediate ground water is not encountered. This would be cost effective, yield much needed hydrogeologic and hydrochemical information (e.g., flow gradients, water quality, etc.), and other data which might address contaminant migration.

6). DOE OB has concerns over the movement of contaminants (e.g., storm-water run-off) from sites near the edge of canyon walls and the possibility that contaminants are entering active channels within Los Alamos and Pueblo Canyons and their tributaries. During storm-water run-off events, contaminants may become re-mobilized in solution (if soluble) into surface water and ground water. Insoluble constituents may be transported in suspended sediment during run-off events, and ultimately deposited downstream (San Ildefonso Pueblo, Rio Grande, Cochiti Lake, etc.). DOE OB collected storm-water samples at Los Alamos Canyon and State Road 4 on September 7, 1995, and data show that the radionuclides ^{90}Sr, ^{238}Pu, $^{239/240}Pu$, ^{241}Am and ^{137}Cs are being transported in suspended sediment. The radionuclide ^{90}Sr was detected in solution. Data concerning this sampling event were submitted to DOE and LANL in a letter dated January 12, 1996. DOE OB recommends that measures be implemented in a timely manner to contain suspected and known contamination sources (e.g., SWMUs).

Please feel free to contact Michael Dale at 672-0449 if any question arise.

Sincerely,

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New Mexico Environment Department

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