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Date: JUL 28 2015
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John Kieling, Bureau Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303

Subject: Additional Information Regarding Los Alamos National Laboratory's Regional Well R-56 Screen 2 Packer Failure Proposed Remedy

Dear Mr. Kieling:

In its June 11, 2015, letter, the U.S. Department of Energy (DOE) and Los Alamos National Security (LANS) requested that the New Mexico Environment Department (NMED) allow regional well R-56 screen 2 to recover naturally from cross-flow by allowing sufficient time for lateral groundwater flow to flush out the well casing and surrounding area. The letter also requested that DOE/LANS resume sampling R-56 screen 1 with the Technical Area 54 monitoring group during the first quarter of monitoring year (MY) 2016.

In its July 15, 2015, response to the proposed remedy, NMED requested the estimated flow rate, estimated volumes, and method calculations used to determine that a 6- to 8-month period would be sufficient for complete flushing of the R-26 screen 2 interval.

The estimated cross-flow during the packer deflation event at R-56 was calculated based on a cross-flow rate of 2.32 gallons per minute (gpm). This flow rate was determined with the assumption of a head difference of 4.4 ft between the two screens and specific capacity of 0.98 gpm/ft for screen 1 and 1.14 gpm/ft for screen 2, per the 2011 Completion Report for Regional Aquifer Well R-56. The total time during which cross-flow occurred was 25,160 minutes. The total estimated cross-flow volume was 58,400 gallons, based on these assumptions.

The 58,400 gallons are assumed to have flowed down from screen 1 to screen 2, effectively displacing a cylinder of water at screen 2 with a radius of 13 m, assuming an effective porosity of 0.2 for the Puye Formation in which R-56 screen 2 is completed. Based on values cited in literature, an effective porosity of 0.2 is reasonable (cf. McWhorter and Sunada 1977, Ground-Water Hydrology and Hydraulics). The estimated hydraulic gradient at R-56 is 0.006 m/m, the estimated hydraulic conductivity of the formation at R-56 screen 1 is ~4 ft/d, and the estimated hydraulic conductivity at R-56 screen 2 is ~13 ft/d.

With the assumed hydraulic conductivity of ~4 ft/d for R-56 screen 1 (a relatively low permeability for the Puye Formation in this area), the estimated groundwater flow velocity is approximately 0.03 m/d (13 m/yr). With the assumed hydraulic conductivity of ~13 ft/d and a porosity of 0.2 for R-56 screen 2, the estimated groundwater flow velocity is approximately 0.12 m/d (45 m/yr).

Therefore, based solely on advection and a piston-flow model, the DOE/LANS estimates approximately 100 to 300 days will be required for the 13-m cylinder of water to be pushed out from the lower screen of R-56 to a downgradient distance that would be beyond capture under sampling conditions.

DOE/LANS propose to resume sampling of R-56 screen 2 during the first quarter of MY2016, which will be approximately 6 months after the packer was reinflated. Given that there is no contamination in either screen at R-56 and given that samples from both screens 1 and 2 are very similar geochemically, DOE/LANS believe that the lower screen is not compromised from its ability to detect new arrivals of contamination from the overlying vadose zone or from an upgradient source. Therefore, DOE/LANS recommend no further action at R-56, and routine monitoring at R-56 screen 2 may be resumed.

If you have questions, please contact Steve Paris at (505) 606-0915 (smparis@lanl.gov) or Hai Shen at (505) 665-5046 (hai.shen@em.doe.gov).

Sincerely,

Alison M. Dorries, Division Leader
Environmental Protection Division
Los Alamos National Laboratory

Sincerely,

Christine Gelles, Acting Manager
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Los Alamos Field Office

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