



State of New Mexico
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CERTIFIED MAIL – RETURN RECEIPT REQUESTED

September 24, 2018

Doug Hintze, Manager
 Environmental Management
 Los Alamos Field Office
 P.O. Box 1663 MS-M984
 Los Alamos, NM 87545

**RE: APPROVAL
 COMPLETION REPORT FOR GROUNDWATER EXTRACTION WELL
 CrEX-4
 LOS ALAMOS NATIONAL LABORATORY
 EPA ID #NM0890010515
 HWB-LANL-18-025**

Dear Mr. Hintze:

The New Mexico Environment Department (“NMED”) has received from the United States Department of Energy (“DOE”) and Los Alamos National Security L.L.C. the document entitled *Completion Report for Groundwater Extraction Well CrEX-4* (“Report”), dated April 2018 and referenced by LA-UR-18-23083/EP2018-0037. The Report was received on April 25, 2018.

NMED submitted comments on the Report to DOE by email on June 6, 2018. In accordance with Section XXIII of the 2016 Compliance Order on Consent, a meeting was held on June 20, 2018 to informally resolve all pertinent issues concerning the Report. NMED received DOE’s response on September 14, 2018 (see attached), which addressed the issues discussed during the June 20, 2018 meeting.

Certain technical data and analyses addressed in NMED’s General Comment must be discussed in future documents and/or technical team meetings. Specific Comment #2 refers to additional analyses for aquifer test data that DOE does not typically perform. NMED recommends that

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DOE perform these analyses to help refine the Conceptual Site Model for the chromium plume. Additionally, NMED recommends that DOE employ the modifications to field procedures addressed in the Specific Comments #3 so that better data can be collected in future aquifer tests. NMED has reviewed DOE's response and hereby issues an approval for the Report.

If you have any questions or comments regarding this correspondence, please contact Dane Andersen at 505-476-6056.

Sincerely,



John E. Kieling
Chief
Hazardous Waste Bureau

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File: Reading and LANL 2018, Approval for CrEX-4 Well Completion Report

NMED COMMENTS ON THE COMPLETION REPORT FOR GROUNDWATER EXTRACTION WELL CrEX-4, APRIL 2018

The New Mexico Environment Department (NMED) has received the *Completion Report for Groundwater Extraction Well CrEX-4* (Report), dated April 2018. NMED has reviewed the Report and provides the following comments.

General Comments

NMED Comment: Missing from the Report is an analysis of head response in surrounding monitoring wells to the CrEX-4 aquifer tests. Analyzing the aquifer's response to testing is useful to determine the radius of influence, storativity or storage coefficient, hydraulic diffusivity, anisotropy, and communication between geologic formations which comprise the regional aquifer. Head response data should be analyzed and presented with potentiometric surface maps showing the potentiometric surface before and after aquifer testing. In the future, the Permittees should analyze head response in surrounding monitoring wells and include potentiometric surface maps in well completion reports.

Response: The value of the type of data described in NMED's comment is acknowledged. This type of analysis wasn't conducted for the Well Completion Report, but will likely be evaluated as part of ongoing work conducted under the Chromium Plume Center Characterization activities and discussed with NMED in Technical Team meetings.

Specific Comments

1. Section 7.2 – Well Construction, page 6

NMED Comment: According to Appendix F, Section II of the 2016 Compliance Order on Consent (Consent Order), a comparison should be made between the actual volumes of annular materials used during well construction and the calculated or theoretical volumes of annular materials needed. The Consent Order also recommends that any discrepancies between the actual and calculated volumes should be explained in the Report. The Permittees should include this comparison in the Report and discuss the possible reasons for any discrepancies between the actual and calculated annular material volumes (voids, bridging, etc.).

Response: Acknowledged. In the case of CrEX-4, the upper filter pack sand is the only interval that indicated a discrepancy. This interval exceeded the calculated volume by 162% and is attributed to wash-outs in the borehole within the interval and surging the screen interval to compact the filter sand as part of well construction activities.

2. Section D-1.0-1 Conceptual Hydrogeology, page D-1

NMED Comment: The conceptual hydrogeology discussion neglects to estimate the saturated thickness of the aquifer. While the Report states that the top of the Puye Formation is 925 feet below ground surface, this depth does not correlate to the top of the saturated interval (which is the water table). The Report also indicates that a confining or leaky confining unit is present beneath the CrEX-4 well screen, but does not discuss the possibility that this unit may be considered the effective bottom of the saturated interval in which CrEX-4 is screened. NMED recognizes that the confining or leaky confining unit may not be considered the bottom of the saturated interval because of leakage through the unit. However, this unit has been interpreted as a barrier to vertical groundwater flow (i.e. the bottom of the saturated interval in the Puye Formation) in other aquifer test analyses conducted on the Pajarito Plateau, often with good results.

Comparison of the estimated saturated thickness to aquifer test data can help verify or refute estimates of the saturated thickness, as well as obtain estimates for hydraulic conductivity and anisotropy. It may be the case that the CrEX-4 aquifer test data don't support the interpretation that the confining or leaky confining unit is the bottom of the saturated interval. Nevertheless, the Permittees should attempt to estimate the saturated thickness and apply it to aquifer test analyses (if possible) in future well completion reports.

Response: The analyses and associated assumptions presented in the CrEX-4 well-completion report are consistent with those performed at the other chromium infrastructure wells.

3. Section D-1.0-2 – Aquifer Testing, page D-2

NMED Comment: It is noted that neither a packer nor a check valve were installed on the pump column during aquifer testing. Packers and check valves preserve early-time drawdown and recovery data, respectively. These early-time data are useful for determining the hydraulic conductivity immediately adjacent to the well screen and constraining values of hydraulic conductivity obtained from other analyses. In the future, the Permittees should use packers and check valves during aquifer testing so that early-time drawdown and recovery data can be collected and analyzed.

Response: Acknowledged. Check valves were not installed in order to keep CrEX-4's aquifer test consistent with previous infrastructure wells' tests where the pump column was not removed between well development and aquifer testing activities. A packer was only used for zonal isolation between screens for the separate tests; not for eliminating casing storage effects.

4. Section D-3.0-1, Lower Screen, page D-4

NMED Comment: The drawdown curve for the lower screen 24-hour constant-rate aquifer test contains significant variability or “noise,” i.e. it is not a smooth curve. Possible causes of this should be discussed in the Report.

Response: The most likely cause of this is from having mechanically limited the pump discharge with a ball valve at the surface.

5. Section D-3.0-2, Composite Tests, page D-5

NMED Comment: The drawdown curve did not flatten during the dual screen 24-hour constant-rate aquifer test. In fact, the drawdown curve shows a decreasing drawdown trend as the aquifer test progressed. Possible causes of this anomalous behavior should be discussed in the Report.

Response: This is likely indicative of over pumping during the 24-hour constant-rate aquifer test and/or operation of nearby municipal wells.

6. Section D-3.0-3, Upper Screen, page D-6

NMED Comment: The drawdown curve for the upper screen 24-hour constant-rate aquifer test contains significant variability or “noise,” i.e. it is not a smooth curve. Possible causes of this should be discussed in the Report.

Response: The most likely cause of this is from having mechanically limited the pump discharge with a ball valve at the surface.