December 1, 2021

Arturo Duran, Designated Agency Manager
Environmental Management, U.S. Department of Energy
Los Alamos Field Office
1200 Trinity Drive, Suite #400
New Mexico 87544

RE: REVIEW RESULTS FROM EXTENDED PURGING OF MONITORING WELLS R-42 AND R-28
LOS ALAMOS NATIONAL LABORATORY
EPA ID#NM0890010515
HWB-LANL-21-063

Dear Arturo Duran,

The New Mexico Environment Department (NMED) received the United States Department of Energy's (DOE) *Results from Extended Purging of Monitoring Wells R-42 and R-28* (Report) on October 26, 2021. The Report is dated October 26, 2021 and referenced as EM2021-0715. DOE issued the Report in lieu of the mutually agreed upon well rehabilitation workplan (Workplan) conveyed in DOE's June 29, 2021 letter referenced as EMLA-2021-BF131-02-001.

NMED concurs with DOE's recommendation in the Report for replacement of well R-28. DOE acknowledged in the Report that regional well R-28 cannot be rehabilitated within a reasonable timeframe and has agreed to provide a work plan for its replacement.

DOE has requested to collect additional data from well R-42 before submitting a drilling work plan for replacement of regional well R-42. During the October 18, 2021 meeting, NMED agreed that DOE should collect additional data for six months from R-42 to demonstrate to NMED that the well has been successfully rehabilitated. To be considered successfully rehabilitated, DOE must meet all the hydraulic and geochemical criteria outlined in the April 28, 2021 *Well Rehabilitation Work Plan Requirement* letter. DOE must submit a report to NMED by June 2, 2022 either documenting successful rehabilitation of R-42 or proposing a schedule for drilling a replacement well for R-42.

Additionally, DOE must provide NMED with a video evaluation, hydraulic testing, and dilution tracer testing of well R-42 as required by the December 2019 *Supplemental Work Plan for Pilot-Scale Amendments Testing for Chromium in Groundwater beneath Mortandad Canyon, Revision 1* (SWP), that was approved by NMED in January 2020. Because NMED documented that DOE has improperly conducted specific capacity tests, that line of evidence is no longer valid. Instead, NMED requires DOE to reconduct the aquifer performance test previously conducted on June 17, 2013 at well R-42 for a minimum of 24 hours at a constant extraction rate of nine (9)

gallons per minute to appropriately compare with the results of the June 2013 test results[1]. The comparison between the two tests will involve both hydraulic responses and water quality responses. In addition to the specific hydrogeochemical criteria, based on groundwater chemistry prior to the addition of any chemicals injected at well R-28, set forth in the Attachment, NMED requires the additional hydraulic parameters:

- Submittal of video-logging pre redevelopment conditions,
- Assessing flow velocity changes via dilution tracer tests, pre- and post-dilution tracer test results must be within 10 percent of pre-amendment results,
- Pumping the entire screen length until field parameters stabilize to pre-amendment values and turbidity is below 5 NTU,
- Video-logging post redevelopment conditions,
- Spinner logging to verify that flow has been restored along the entire screen length, and
- Post redevelopment well discharge rate is within 10 percent of pre-amendment well discharge rate.

Based on the current effective output of chromium plume control interim measures extraction well CrEX-3 being limited to 30 to 35 gallons per minute to minimize filter clogging[2] compared to its original yield of 51 gallons per minute[3], NMED does not concur that CrEX-3 has been successfully rehabilitated. Whether the effective extraction rate at CrEX-3 must be reduced to minimize filter clogging that is due to biogeochemical fouling of the regional aquifer between well R-28 and CrEX-3 or due to other issues, this well requires additional attention. If continued rehabilitation of CrEX-3 is not feasible, NMED requires a replacement well for CrEX-3 at a new location that is not affected by the impacts of the chemical amendment pilot study at well R-28, or for other reasons not related to the well R-28 pilot study. It is imperative that a highly effective extraction operation for chromium is not hampered by any biogeochemical fouling that significantly impairs maximum performance of the chromium plume control interim measures.

If DOE cannot demonstrate successful rehabilitation with all the parameters listed above and in the Attachment to this letter, NMED will require a replacement monitoring well for R-42.

[1] Los Alamos National Laboratory, March 2014, Summary Report for the 2013 Chromium Groundwater Aquifer Tests at R-42, R-28, and SCI-2: EP2014-0066; LA-UR-14-21642.

[2] Newport News Nuclear BWXT-Los Alamos, LLC, September 2021, Semiannual Progress Report on Chromium Plume Control Interim Measure Performance, January through June 2021: EM2021-0520.

[3] Los Alamos National Laboratory, September 2016, Completion Report for Groundwater Extraction Well CrEX-3: EP2016-0077; LA-UR-16-26486.

Should you have any questions regarding this correspondence, please contact Christopher Krambis (505) 231-5423.

Sincerely,

Rick Shean Digitally signed by Rick Shean
Date: 2021.12.01 15:15:07
-07'00'

Rick Shean
Chief
Hazardous Waste Bureau

cc with Attachment:

N. Dhawan, NMED HWB
C. Krambis, NMED HWB
M. Petersen, NMED HWB
C. Catechis, NMED
P. Longmire, NMED GWQB
S. Yanicak, NMED-DOE-0B
L. King, US EPA Region 6
S. Ellinger, US EPA
J. Fields, US EPA
R. Ross, US EPA
R. Martinez, San Ildefonso Pueblo, NM
D. Chavarria, Santa Clara Pueblo, NM
L. Bishop, EM-LA
C. Rodriguez, EM-LA
C. Maupin, N3B
E. Day, N3B
W. Alexander, N3B
P. Maestas, N3B
emla.docs@em.doe.gov
RegDocs@EM-LA.DOE.GOV

File: 2021 LANL, Results from Extended Purging of Monitoring Wells R-42 and R-28
HWB LANL-21-063

Attachment for R-42 Rehabilitation

Field Parameters

dissolved oxygen, >6.70 mg/L
odor, non-detect
oxidation-reduction potential (ORP), uncorrected, >+250 mV
pH >7.5 <8.3
specific conductance, <430 µS/cm
turbidity, <0.80 NTU

Solutes (GGRL. dissolved)

total carbonate alkalinity, 90 - 100 mg$CaCO_3$/L
aluminum, <1 µg/L, non-detect
ammonium-N, <0.01 mg/L, non-detect
antimony, <1.0 µg/L, non-detect
arsenic, <2.0 µg/L
barium, <80 µg/L
beryllium, <1.0 µg/L, non-detect
boron, <50 µg/L
bromide, <0.01 mg/L
cadmium, <0.30 µg/L, non-detect
calcium, <55 mg/L
cesium, <l µg/L, non-detect
chloride, <40 mg/L
chromium, breakthrough 380 - 800 µg/L, if reduced Cr as Cr(III), <3 µg/L
cobalt, <1 µg/L, non-detect
color, non-detect
copper, < 0.8 µg/L, non-detect
dissolved organic carbon, <1.0 mgC/L
fluoride, 0.29 - 0.40 mg/L
hardness, 125 - 170 mg/L
iron (total dissolved), <10 µg/L, non-detect
ferrous iron, <10 µg/L, non-detect
lead, <0.30 µg/L, non-detect
lithium, <40 µg/L
magnesium, <15 mg/L
manganese, <2 µg/L, non-detect
mercury, <0.05 µg/L, non-detect
molybdenum, <1 µg/L, non-detect
nickel, <20 µg/L
nitrate-N, >4.0 mg/L
nitrite-N, <0.01 mg/L, non-detect
oxalate, <0.01 mg/L, non-detect
perchlorate, >1.0 µg/L

phosphorus, orthophosphate (P), <0.01 mg/L, non-detect
potassium, <2.0 mg/L
rhenium, <0.1 µg/L, non-detect
selenium, <2.5 µg/L, non-detect
silica (SiO_2), <70 mg/L
silver, <0.30 µg/L, non-detect
sodium, <17 mg/L
strontium, <160 µg/L
sulfate, <60 mg/L
sulfide, <0.01 mg/L, non-detect
thallium, <0.60 µg/L, non-detect
tin, <1 µg/L, non-detect
titanium, <2 µg/L, non-detect
total dissolved solids, <400 mg/L
total Kjeldahl nitrogen, <0.10 mg/L, non-detect (GEL, offsite laboratory)
total organic carbon, <1.0 mgC/L
uranium, >1.0 µg/L
vanadium, <7 µg/L
zinc, <1 µg/L, non-detect