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DEPARTMENT OF ENERGY
Environmental Management Los Alamos Field Office (EM-LA)
Los Alamos, New Mexico 87544

Mr. John E. Kieling
Bureau Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303



SEP 20 2018

Dear Mr. Kieling:

Subject: Request for Extension of Phase 2 Pilot Amendments Testing Work Plan Milestone

The U.S. Department of Energy (DOE) Environmental Management Los Alamos Field Office (EM-LA) is requesting an extension for the Phase 2 Pilot Amendments Testing Work Plan (hereafter, Phase 2 work plan) for the reasons described below. As indicated in the 2016 Compliance Order on Consent (Consent Order) fiscal year (FY) 2018 Appendix B Milestones and Targets table, the Phase 2 work plan (Milestone #10) is required to be submitted by September 28, 2018. DOE is using the process outlined in the Consent Order, Section XXVIII, *Extensions*, to submit a request for an extension for the above-mentioned milestone to a new date of **June 28, 2019**. The revised milestone will be incorporated into Appendix B pursuant to the process set forth in Section VIII.C, *Campaign Approach*. Furthermore, in accordance with Section XXXV.A.3, *Stipulated Penalties*, Milestone #10 mentioned above is no longer a milestone for FY 2018.

The overarching objective of the Phase 2 work plan is to build on the Phase 1 pilot-scale amendments test by scaling up the area of the aquifer where geochemical conditions are favorably altered to induce conversion of hexavalent chromium to trivalent chromium through introduction of an amendment. This extension request is driven by two primary considerations, described in detail below:

- Additional time is required to acquire data from the Phase 1 testing currently underway in order to appropriately design the Phase 2 test. EM-LA therefore requests an extension for good cause, specifically under Example #7 provided in Consent Order Section XXVIII.C, because of new technical information, namely the longer-than-expected duration of the Phase 1 testing.
- The extended submittal date will also enable completion of a tracer study to characterize the hydrology of the proposed Phase 2 test location. This tracer study will be conducted in support of the Phase 2 amendments test pursuant to the New Mexico Environment Department (NMED) approval of a tracer work plan that will be submitted to NMED by October 31, 2018.



EM-LA and the Los Alamos National Security, LLC began implementing the NMED-approved Phase 1 “Pilot-Scale Amendments Testing Work Plan for Chromium in Groundwater beneath Mortandad Canyon” in August 2017 (EP2017-0091). The Phase 1 test involves characterization of the deployment of amendments into two regional aquifer monitoring wells (R-42 and R-28) within the centroid of the chromium plume to study the feasibility of an in situ remediation approach for chromium. Sodium dithionite was deployed into well R-42, and molasses was deployed into well R-28. The Phase 1 study currently involves ongoing sampling at R-42 and R-28 to monitor for chromium breakthrough within each well and to characterize secondary geochemical conditions (e.g., elevated manganese) that form in the aquifer in association with introduction of amendments. To date, hexavalent chromium concentrations have been reduced to levels below the 50- $\mu\text{g/L}$ groundwater standard in each of the two wells because of favorably reducing conditions that have developed around both wells as intended with the amendments. However, the anticipated breakthrough has not yet occurred, so additional time is required to acquire the data from the Phase 1 test in order to appropriately design the Phase 2 test. The current sampling protocol under the Phase 1 test involves collection of samples twice weekly from each well. Plans are in place to determine if continuous pumping and periodic sampling can be conducted to accelerate the duration of the Phase 1 study. Continuous pumping will cause much more contaminated water (pore volumes) to pass through the reactive zone established by the amendments around each well, thus mimicking time via passage of a higher volume of water through the reactive zone than would pass through under ambient groundwater flow conditions.

The Phase 2 test design will likely propose introduction of one of the two amendments currently being tested in Phase 1 into chromium piezometer CrPZ-1, with pumping and monitoring occurring at nearby extraction well CrEX-2. Optimization of the study design, including amendment quantity and concentration, and deployment strategy, will greatly benefit from an initial cross-hole tracer study between CrPZ-1 and CrEX-2. The tracer study is expected to provide key information on how much of the CrEX-2 capture zone includes water that would pass through the reactive zone induced through amendment introduction in CrPZ-1. Such data will help design the Phase 2 study and facilitate interpretation of CrEX-2 wellhead data following deployment of the amendment into CrPZ-1. As mentioned above, the tracer work plan will be submitted to NMED by October 31, 2018, and tracer deployment will occur following approval from the NMED Hazardous Waste Bureau and the NMED Groundwater Quality Bureau’s processing of a Notice of Intent to Discharge submitted by EM-LA and Newport News Nuclear BWXT – Los Alamos, LLC (N3B). The intent would be to deploy the tracers before the end of calendar year 2018 so monitoring could be conducted over the subsequent winter months. The close proximity of CrPZ-1 to CrEX-2 (approximately 75 ft) and the direct hydraulic response that CrPZ-1 shows to CrEX-2 pumping suggests that the total duration of the tracer test may be on the order of only 2 to 3 months for full tracer breakthrough.

The goal is to obtain sufficient Phase 2 design information from the Phase 1 study concurrently with the implementation and completion of the cross-hole tracer study. The timing of these two components is expected to inform design and preparation of the Phase 2 work plan by the proposed date of June 28, 2019. Quarterly reports will continue to be prepared for the Phase 1 test to present progress on the study. The most recent Phase 1 report was submitted in July 2018, with subsequent Phase 1 reports scheduled for submittal to NMED by October 31, 2018, January 31, 2019, and April 30, 2019.

Because the Phase 2 work plan is performed under the Chromium Interim Measure and Characterization Campaign, there is also a potential impact to Milestone #15, Summary Report (Completion or Progress) of the Phase 2 Pilot Amendment Test Results submitted to NMED-HWB with a date of September 30, 2019, included in the proposed Appendix B Milestones submitted for NMED consideration on July 31, 2018, for milestones during Fiscal Year 2019. In addition, this may impact the subsequent target "Chromium Corrective Measures Evaluation (CME) Report completed and submitted to NMED-HWB" with a target due date of September 30, 2020. DOE and its contractor N3B will work collaboratively with their NMED counterparts to evaluate progress on the Chromium Interim Measure and Characterization Campaign and its potential impact on the target date for the CME Report.

If you have any questions, please contact Joseph Legare at (505) 309-1346 (joseph.legare@em-la.doe.gov) or Cheryl Rodriguez at (505) 665-5330 (cheryl.rodriguez@em.doe.gov).

Sincerely,



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