

TECHNICAL MEMORANDUM

To: Nevada Environmental Response Trust

Cc: Nevada Division of Environmental Protection
United States Environmental Protection Agency

From: Arul Ayyaswami and Dan Pastor

Date: July 25, 2017

Subject: In-Situ Chromium Treatability Study Progress Update

At the direction of the Nevada Environmental Response Trust (NERT or Trust), Tetra Tech, Inc. (Tetra Tech) has prepared this memorandum that summarizes Tetra Tech's progress made through June 2017 toward successfully implementing the In-Situ Chromium Treatability Study as outlined in the In-Situ Chromium Treatability Study Work Plan (Work Plan).

Task Progress Update: June 2017

Task M12 – In-Situ Chromium Treatability Study

- Task Leader – Arul Ayyaswami
- Current Status
 - Bench-scale testing by University of Nevada Las Vegas (UNLV) to support the treatability study has been completed. Preliminary results confirm hexavalent chromium reduction utilizing various chemical and carbon substrates. Additionally, nitrate and chlorate reduction had also been observed, but perchlorate degradation had not yet started. This was not surprising as perchlorate degradation would be expected to occur after nitrate and chlorate reduction. Following completion of the required scope of work, UNLV decided to continue the testing using university funds to evaluate the perchlorate degradation for academic purposes. Preliminary results shared by UNLV indicate that perchlorate degradation is now occurring.
 - Two additional dual-nested monitoring wells (CTMW-05S/D and CTMW-06S/D) were installed in the biological reduction test area from June 5 to June 9, 2017 to provide additional downgradient coverage.
 - The second round of carbon substrate injections for biological reduction was completed from June 6 to June 9, 2017. A total of 18,450 gallons of solution containing carbon substrate and

- nutrient amendments was injected. Chase water (stabilized Lake Mead water) was also injected to enhance subsurface distribution.
- Two performance monitoring events were completed in May for the biological testing portion of the treatability test. The third performance groundwater monitoring event was performed from May 31 through June 2, 2017, five weeks following the initial injection event. The fourth performance groundwater monitoring event was performed from June 19 through June 22, seven weeks following the initial injection event and two weeks following the second injection event. Evaluation of the laboratory results is ongoing; however, preliminary analysis shows that hexavalent chromium has been reduced by 70 to 99% in the first four downgradient shallow monitoring wells (CTMW-01S through CTMW-04S), screened in the Quaternary alluvium.
 - No field activities were conducted in June 2017 with regard to the chemical testing portion of the treatability test.
- Schedule and Progress Updates
 - A third round of injections is planned for late July 2017 or early August 2017. The injections will consist of adding carbon substrates and nutrient amendments into the injection wells.
 - The fifth performance monitoring event for the biological reduction test area will be conducted from July 18 through July 21, 2017.
- Health and Safety
 - There have been no health and safety incidents related to Task M12 during June.