

TECHNICAL MEMORANDUM

To: Nevada Environmental Response Trust

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

From: Carl Lenker and Dan Pastor

Date: August 16, 2019

Subject: Unit 4 Source Area In-Situ Bioremediation Treatability Study Monthly Progress Report

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 during June 2019 toward successfully implementing the Unit 4 Source Area In-Situ Bioremediation Treatability Study.

Task Progress Update: June 2019

Task M21 – Unit 4 Source Area In-Situ Bioremediation (ISB) Treatability Study

- Task Leader – Arul Ayyaswami
- Current Status
 - The University of Nevada – Las Vegas (UNLV) continued microcosm and column testing in accordance with the Unit 4 Source Area In-Situ Bioremediation Treatability Study Bench-Scale Work Plan and Treatability Study Modification No. 1. The following is a brief summary of the microcosm study results for the May 17, 2019 sampling event:
 - UNLV performed microcosm tests with a combination of molasses, molasses with acetate, mixed microbial cultures, and soil and groundwater collected from boring and well locations near the Unit 4 Building. After 267 days, hexavalent chromium, nitrate, and chlorate have completely degraded in 11 out of 12 microcosms which contain total dissolved solids (TDS) concentrations as high as 21,000 mg/L. In microcosms utilizing molasses as the carbon substrate and an initial TDS concentration of approximately 21,000 mg/L, perchlorate concentrations reduced from approximately 1,800 mg/L to 1,350 mg/L. In microcosms utilizing molasses as the carbon substrate and an initial TDS concentration of approximately 18,000 mg/L, perchlorate concentrations reduced from approximately 1,500 mg/L to less than 0.02 mg/L. In microcosms utilizing molasses as the carbon substrate and an initial TDS concentration of approximately 15,000 mg/L, perchlorate concentrations reduced from approximately 1,400 mg/L to 1,000 mg/L. In general, the degradation of the chemicals of potential concern (COPCs) is slower in the microcosms containing molasses and acetate than molasses alone.
- Schedule and Progress Updates

- The following activities are scheduled to be conducted in July 2019:
 - Continued UNLV microcosm and column testing in accordance with the Unit 4 Source Area In-Situ Bioremediation Treatability Study Bench-Scale Work Plan and Treatability Study Modification No. 1. The next microcosm sampling event is planned to occur on July 26, 2019. This may be the final sampling event; however, UNLV believes there may be sufficient microcosm material left to allow collection of one additional sample. Additional information on the microcosm and column testing will be summarized in future progress reports when that data is available.
 - A Unit 4 Source Area In-Situ Bioremediation Treatability Study Work Plan Addendum for Phase 2 will be prepared at the completion of laboratory testing, provided the data support moving forward with a field test. The submittal timeline of the Addendum will be dependant on the duration of the microcosm and column studies.
- Health and Safety
 - There were no health and safety incidents related to Task M21 during June 2019.

CERTIFICATION

Unit 4 Source Area Bioremediation Treatability Study Monthly Progress Report

**Nevada Environmental Response Trust Site
(Former Tronox LLC Site)
Henderson, Nevada**

Nevada Environmental Response Trust (NERT) Representative Certification

I certify that this document and all attachments submitted to the Division were prepared at the request of, or under the direction or supervision of NERT. Based on my own involvement and/or my inquiry of the person or persons who manage the systems(s) or those directly responsible for gathering the information or preparing the document, or the immediate supervisor of such person(s), the information submitted and provided herein is, to the best of my knowledge and belief, true, accurate, and complete in all material respects.

Office of the Nevada Environmental Response Trust

Le Petomane XXVII, not individually, but solely in its representative capacity as the Nevada Environmental Response Trust Trustee

Signature:



Not Individually, but Solely
as President of the Trustee

_____, not individually,
but solely in his representative capacity as President of the Nevada Environmental Response Trust Trustee

Name: Jay A. Steinberg, not individually, but solely in his representative capacity as President of the Nevada Environmental Response Trust Trustee

Title: Solely as President and not individually

Company: Le Petomane XXVII, Inc., not individually, but solely in its representative capacity as the Nevada Environmental Response Trust Trustee

Date:

8/16/19

CERTIFICATION

I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been prepared in a manner consistent with the current standards of the profession, and to the best of my knowledge, comply with all applicable federal, state, and local statutes, regulations, and ordinances. I hereby certify that all laboratory analytical data was generated by a laboratory certified by the NDEP for each constituent and media presented herein.

Description of Services Provided: Prepared Unit 4 Source Area Bioremediation Treatability Study Monthly Progress Report.



8/16/19

Kyle Hansen, CEM
Field Operations Manager/Geologist
Tetra Tech, Inc.

Date

Nevada CEM Certificate Number: 2167
Nevada CEM Expiration Date: September 18, 2020