

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: December 20, 2018

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 October 2018 toward successfully implementing the Unit 4 Source Area In-Situ Bioremediation Treatability Study.

Task Progress Update: October 2018

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 testing with a combination of molasses, molasses with acetate, mixed microbial cultures, and soil and groundwater collected from boring and well locations in the vicinity of the Unit 4 Building. Hexavalent chromium concentrations reduced from 38 milligrams per liter (mg/L) to 0.6 mg/L within 15 days and to less than 0.1 mg/L within 35 days in microcosms containing molasses and TDS concentrations as high as 21,000 mg/L. Hexavalent chromium concentrations also reduced in microcosms containing molasses and acetate, but at a slower rate than molasses alone. Nitrate, chlorate, and perchlorate are being analyzed and the results will be summarized in future progress reports.
 - UNLV began conducting column testing in accordance with the Unit 4 Source Area In-Situ Bioremediation Treatability Study Bench-Scale Work Plan. Two columns were packed with soil collected from the intermediate zone (75 to 85 feet bgs) and two columns were packed with soil collected from the deep zone (95 to 105 feet bgs). Initially, molasses will be used as the carbon substrate for the columns. Other carbon substrates may be used later. Future progress reports will include summaries of the results as those results become available.
 - Preparations began for the implementation of the extended groundwater extraction test as part of the NDEP-approved Treatability / Pilot Study Modification No. 4 for the Unit 4 Source Area In-Situ Bioremediation Treatability Study Work Plan.

- Schedule and Progress Updates
 - The following activities are scheduled to be conducted in November 2018:
 - 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.
 - Installation of the groundwater extraction test equipment as part of the NDEP-approved Treatability / Pilot Study Modification No. 4. The extended groundwater extraction test is anticipated to begin in early December 2018.
 - Preparation of the Unit 4 Source Area In-Situ Bioremediation Treatability Study Work Plan Addendum that is currently anticipated to be submitted by the Second Quarter of 2019.
- Health and Safety
 - There were no health and safety incidents related to Task M21 during October 2018.

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

not individually, but solely as President

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

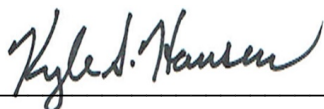
Company: Le Petomane XXVII, Inc., not individually, but solely in its representative capacity as the Nevada Environmental Response Trust Trustee

Date: 12/28/18

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, Nevada Environmental Response Trust Site, Henderson, Nevada.



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

December 20, 2018

Date

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