

TECHNICAL MEMORANDUM

To: Nevada Environmental Response Trust

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

From: Dan Pastor and Dana Grady

Date: December 20, 2018

Subject: **Galleria Drive 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 which summarizes Tetra Tech's progress during October 2018 toward successfully implementing the Galleria Drive Bioremediation Treatability Study.

Task Progress Update: October 2018

Task M17 – Galleria Drive Bioremediation Treatability Study

- Task Leader – Dana Grady/Dan Pastor
- Current Status
 - Phase 1 pre-design field activities were performed from April to June 2018 to gather relevant data and information required to optimize the final treatability study design. Based on the results of the recent Phase 1 pre-design activities, it was determined that a Phase 1 Work Plan Modification was necessary as Phase 1 investigation results yielded information that perchlorate is deeper than expected, i.e., in the deeper Upper Muddy Creek formation (UMCf) (90 -110 feet below ground surface [bgs]). As a result, a Treatability/Pilot Study Modification No. 3 was submitted to NDEP on August 29, 2018 to recommend bench-scale and step-rate injection testing on the 90 – 110 feet bgs interval. This Modification No. 3 was approved by NDEP on August 30, 2018. Following implementation of this modification, the Phase 1 findings and resulting Phase 2 treatability study design will be presented to NDEP, EPA and the NERT Stakeholders, followed by a third-party cost evaluation and submittal of the Galleria Drive Treatability Study Work Plan Addendum.
 - Activities associated with the Treatability/Pilot Study Modification No. 3 began in September 2018. The following activities have been completed to-date:
 - Step-rate injection tests were completed in September 2018 and a summary of results was presented in the September 2018 monthly progress update.

- Current bench-scale testing being performed at UNLV is focusing on the biodegradation of perchlorate and chlorate in the deeper horizon from 90 – 110 feet bgs. Initial microcosm testing in this deep zone has not yet shown any degradation of chlorate and perchlorate. The elevated total dissolved solids concentrations (approximately 50,000 milligrams per liter) observed within the deep horizon of the treatability study area could be hindering bioremediation due to lack of indigenous bacteria. As a result, the second round of batch microcosms testing was recently initiated to screen for potential factors hindering biodegradation and evaluate bioaugmentation. Results will be summarized as they become available in forthcoming monthly reports.
- Schedule and Progress Updates
 - Activities associated with the Treatability/Pilot Study Modification No. 3 are expected to continue through December 2018.
 - Bench-scale testing is on-going.
 - The Galleria Drive Bioremediation Treatability Study Work Plan Addendum will summarize the Phase 1 findings and present the final Phase 2 design. The Work Plan Addendum will be submitted in the first quarter of 2019.
- Health and Safety
 - There were no safety incidents related to Task M17 during October 2018.

CERTIFICATION

Galleria Drive 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: J. A. Steinberg, *not indiv. but solely as Pres*, 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: 12/20/18

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 Galleria Drive Bioremediation Treatability Study Monthly Progress Report.



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