



NEVADA DIVISION OF
**ENVIRONMENTAL
PROTECTION**

STATE OF NEVADA
Department of Conservation & Natural Resources

Steve Sisolak, *Governor*
James R. Lawrence, *Acting Director*
Greg Lovato, *Administrator*

September 30, 2022

Jay A. Steinberg
Nevada Environmental Response Trust
35 East Wacker Drive, Suite 690
Chicago, IL 60601

Re: **Tronox LLC (TRX) Facility**
Nevada Environmental Response Trust (Trust) Property
NDEP Facility ID #H-000539
Nevada Division of Environmental Protection (NDEP) Response to: *Seep Well Field*
Area Bioremediation Treatability Study 2021 Annual Progress Report

Dated: August 17, 2022

Dear Mr. Steinberg,

The NDEP has received and reviewed the Trust's above-identified Deliverable and finds that the document is acceptable with the comments noted for the Administrative Record in the Attachment A.

Please contact the undersigned with any questions at wdong@ndep.nv.gov or 702-668-3929.

Sincerely,

Weiquan Dong, P.E.
Bureau of Industrial Site Cleanup
NDEP-Las Vegas City Office

WD:cp

EC:

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James Dotchin, NDEP BISC Las Vegas
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Mickey Chaudhuri, Metropolitan Water District of Southern California
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Nicole Moutoux, U.S. Environmental Protection Agency, Region 9
Orestes Morfin, CA
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Steve Armann, U.S. Environmental Protection Agency, Region 9
Tanya O'Neill, Foley & Lardner L
Todd Tietjen, SNWA
William Frier, U.S. Environmental Protection Agency, Region 9

Attachment A

1. General Comments

General Comment 1

NDEP asks a project summary report beyond the annual progress reports after the project completion. Please provide the criteria used to determine when an additional injection is required in the project summary report. The criteria should be both quantitative and qualitative. Please analyze the relationship among injection frequency, injection EOS concentration, chase water, biofouling, and injection well maintenance for all events that were completed. NDEP suggest a table of metrics how the in-situ bioremediation of the groundwater perchlorate in the study area can be optimized in the full-scale project. Please provide the response to the following comments in the summary report.

General Comment 2

This is a well-planned and executed long-term study that has investigated many aspects of the treatment process very thoroughly. The data from this study show clearly the relationship between higher total organic carbon (TOC) and better removal of perchlorate and chlorate. Recognizing no further injections will be performed as part of this pilot study, injection of a larger quantity of emulsified vegetable oil (EVO) is recommended for any future full scale application of this technology to increase TOC and enhance treatment.

General Comment 2

As previously commented on November 17, 2021, the amount of carbon substrate (EOS) added is low however it is injected at a high concentration which contributes to the clogging of the wells and then dispersed by a large quantity of distribution water resulting in a low concentration of organic carbon in the treatment area. The 2021 comments recommended more EOS in less distribution water but injected at a lower concentration to prevent clogging of wells. Additional 2021 comments make recommendations for well maintenance. It is recommended that these 2021 comments are considered if and when the full scale application of this technology is designed.

2. Essential Corrections

Essential Correction 1: Section 2.1 Designed Injection Quantities Page 4

There is a discussion of nutrient addition, however Appendix E shows that nitrogen and phosphorus have not been analyzed in the pilot study wells in some time. It is suggested that nitrogen and phosphorus are monitored in order to verify the nutrient levels in the aquifer.

Essential Correction 2: Section 2.4 Evaluation of Injection Frequency Page 6

Table 1 in this section shows that the number of months between injections have increased. Please provide the metrics used to determine when an additional injection is required.

Essential Correction 3: Figures 5A,5B, 6A, 6B, and 7A, 7B

In these figures the "baseline conditions" figure is from June 2021. Understanding that this is a report on the 2021 data, it may, nevertheless, be helpful to include a figure showing the true baseline conditions (prior to any injections) to demonstrate the extent to which the pilot study has affected overall chemical concentrations.

Essential Correction 4: Table 2: Injection Well Maintenance Methods Page 10

Table 2 suggests that hydrojetting with chemical addition as currently performed may not offer any improved performance over hydrojetting alone. This should be considered when planning well maintenance for any full scale application.

Essential Correction 5: Section 4.2: Hydrogeological Evaluation Page 13

This section discusses a significant change in groundwater levels occurring in December 2021. The trend graphs in Appendix F do show changes in trends in the December 2021 data. It is suggested that a note of some type is included in these graphs to indicate that the December 2021 data may not be indicative of true trends due to the water level change.

Essential Correction 6: Section 4.3.4: Total Organic Carbon Page 24

This section states that increases in TOC were "marginal" at best and the reason for this was that the carbon is thought to be consumed closer to the injection wells and does not reach the monitoring wells. However, some monitoring wells are within 30 feet of the closest injection well and if carbon is not observed within 30 feet of the injection well, it may be an indication that insufficient carbon is being added.

Essential Correction 7: Section 4.4: Microbial Evaluation Page 29

The microbial data show clearly the effectiveness of higher organic carbon on microbial numbers and the composition of bacteria. This supports the recommendation that organic carbon be injected at a higher concentration.