

MEMO

Date **July 3, 2019**
 To **Nevada Environmental Response Trust**
 From **John Pekala, Scott Warner, and Chris Ritchie**
 Copy to **Nevada Division of Environmental Protection**
United States Environmental Protection Agency
 Subject **Galleria Drive ZVI-Enhanced Bioremediation Treatability Study Monthly Progress Report**

TASK PROGRESS UPDATE: MAY 2019

At the direction of the Nevada Environmental Response Trust (NERT or Trust), Ramboll US Corporation (Ramboll) has prepared this memorandum which summarizes Ramboll’s progress during May 2019 toward successfully implementing the Galleria Drive Zero-Valent Iron (ZVI)-Enhanced Bioremediation Treatability Study.

TASK M18 – GALLERIA DRIVE ZVI-ENHANCED BIOREMEDIATION TREATABILITY STUDY.

- Task Leaders – Scott Warner / Chris Ritchie
- Current Status
 - Phase 1 of the treatability study is on-going. The pre-design field investigation is complete; bench-scale testing is in progress and described further in the following sections. Bench-scale testing has been extended to evaluate nutrient effects on the columns and is anticipated to conclude in June 2019. Phase 2 (design and implementation of a field test) is anticipated to be proposed in Q3 2019 as part of a forthcoming Work Plan Addendum.
 - Column testing is on-going; experimental columns are described in the table below.

Summary of Column Tests				
Column ID	Test Conditions	Length	Start Date	Status
A1	ZVI only (abiotic)	2 feet	Oct. 2018	Completed
B1	ZVI + nutrients	2 feet	Oct. 2018	Operating
A2	ZVI + nutrients	5 feet	Nov. 2018	Operating
B2	ZVI + carbon + nutrients	5 feet	Nov. 2018	Operating with increased flowrate
Pc	Peroxychem commercial ZVI + carbon + nutrients	5 feet	Nov. 2018	Operating
Notes: 1. The “nutrients” are diammonium phosphate (DAP) and vitamin B-12. DAP has a formula of (NH4)2HPO4 and is a common nutrient for biomass. 2. The “carbon” is supplied as Emulsified Oil Substrate (EOS) in column B2 and as an integrated solid carbon substrate in column Pc.				

- As previously reported, the University of Nevada, Las Vegas (UNLV) research team's ion chromatograph (IC) instrument has experienced difficulties with analyzing the column effluent samples for perchlorate due to interferences from the sample matrix. Therefore, any remaining samples requiring analysis of perchlorate are being analyzed by Eurofins TestAmerica, and the results will be presented in subsequent progress reports. The effluent concentrations of nitrate, chlorate, and perchlorate that are currently available for Column A2, Column B2, and Column Pc are presented on Figures 1 through 3, respectively.
- Nutrient amendment of Column A2 was discontinued in May to observe effects of the nutrients on effluent concentrations. Initial results indicate an increase in effluent nitrate concentrations, but relatively low, stable effluent chlorate concentrations. Perchlorate effluent data for Column A2 will be reported in subsequent progress reports.
- In order to determine the minimum hydraulic residence time that will allow for the degradation of all contaminants, the flow rate of Column B2 was increased for the third time in May. In response to the increase in flowrate, Column B2 experienced increases in effluent concentrations of nitrate and chlorate before stabilizing at low-level effluent concentrations. Perchlorate effluent data for Column B2 will be reported in subsequent progress reports.
- Column Pc continues to operate at a reduced flow-rate with analytical results indicating nearly complete removal of nitrate and chlorate. Perchlorate effluent data for Column Pc will be reported in subsequent progress reports.
- Schedule and Progress Updates
 - Column testing is expected to be completed in June 2019.
 - A work plan addendum is anticipated to be submitted in Q3 2019 provided that the data continue to support moving forward with a field test.
- Health and Safety
 - There were no safety incidents during May 2019.

ATTACHMENTS

Figure 1: Influent and Effluent Concentrations of (a) Nitrate, (b) Chlorate, and (c) Perchlorate in Column Containing ZVI Only (Column A2) through May 2019 (Preliminary)

Figure 2: Influent and Effluent Concentrations of (a) Nitrate, (b) Chlorate, and (c) Perchlorate in Column Containing ZVI and Organic Carbon (Column B2) through May 2019 (Preliminary)

Figure 3: Influent and Effluent Concentrations of (a) Nitrate, (b) Chlorate, and (c) Perchlorate in Column Containing PeroxyChem EHC (Column Pc) through May 2019 (Preliminary)

**Galleria Drive ZVI-Enhanced Bioremediation Treatability Study
Progress Update**

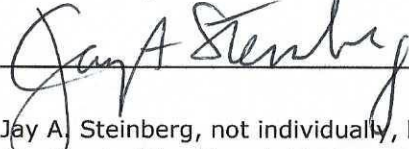
**Nevada Environmental Response Trust
Site (Former Tronox LLC Site)
Henderson, Nevada**

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 system(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, Inc., 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

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: 7/3/19

Galleria Drive ZVI-Enhanced Bioremediation Treatability Study Progress Update

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

Responsible Certified Environmental Manager (CEM) for this project

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 provided 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.

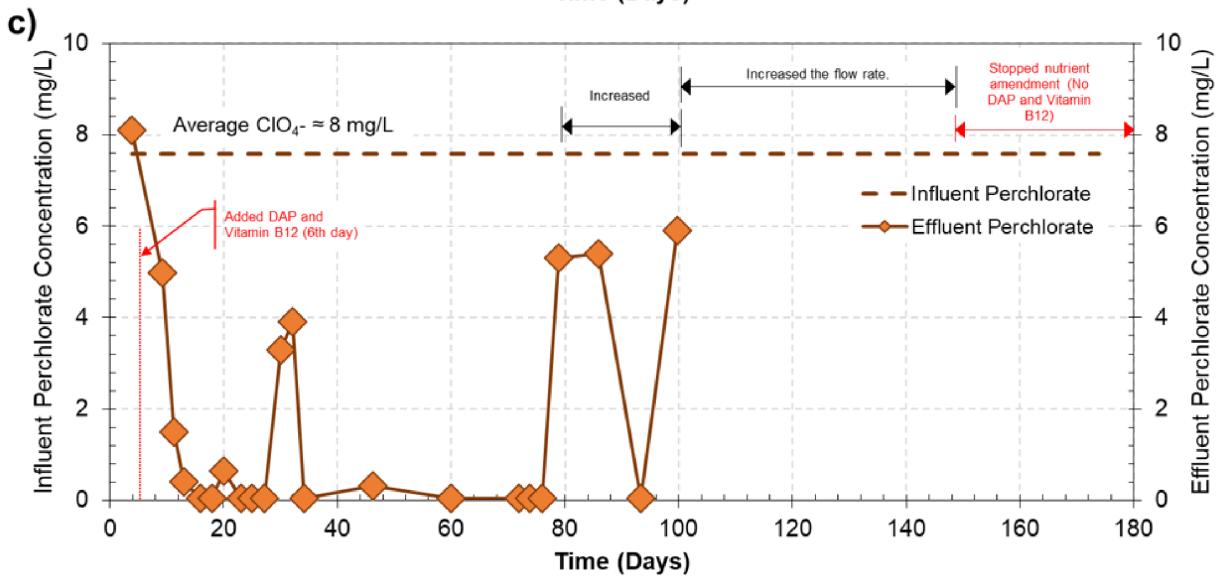
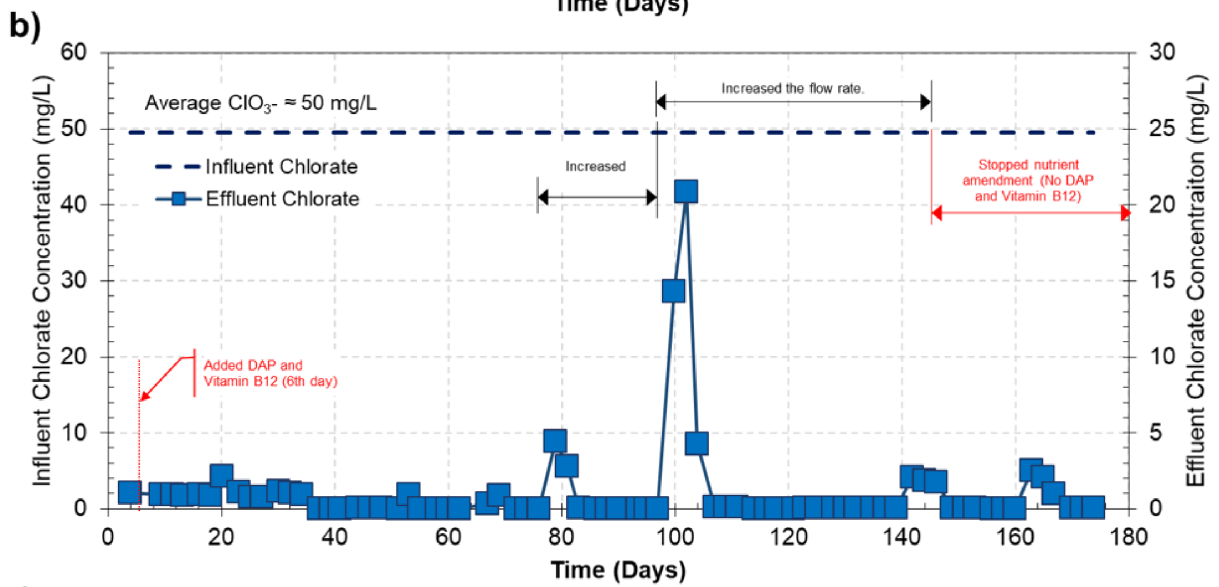
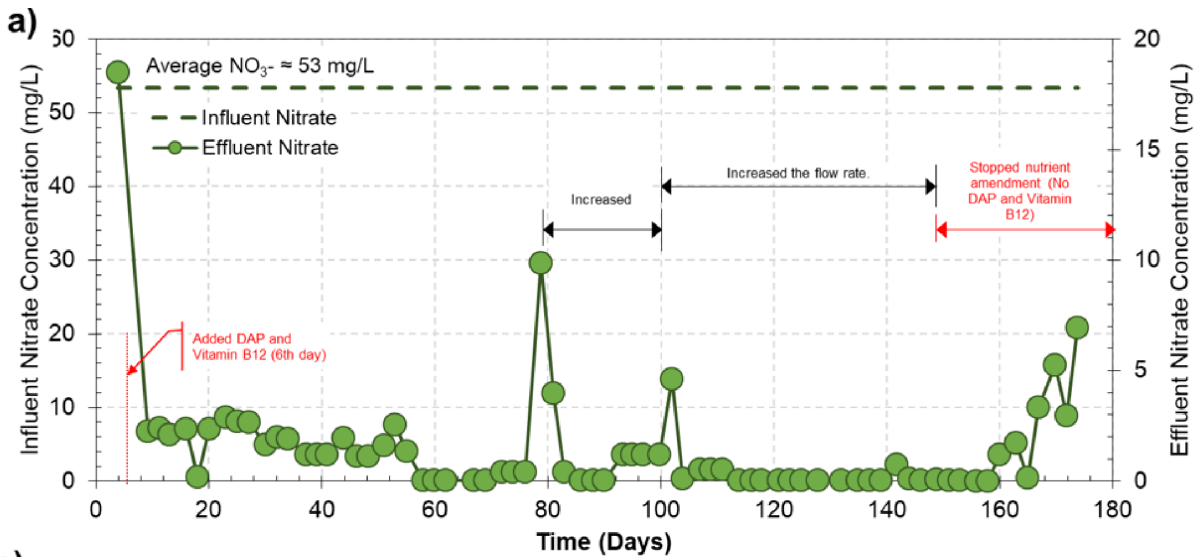


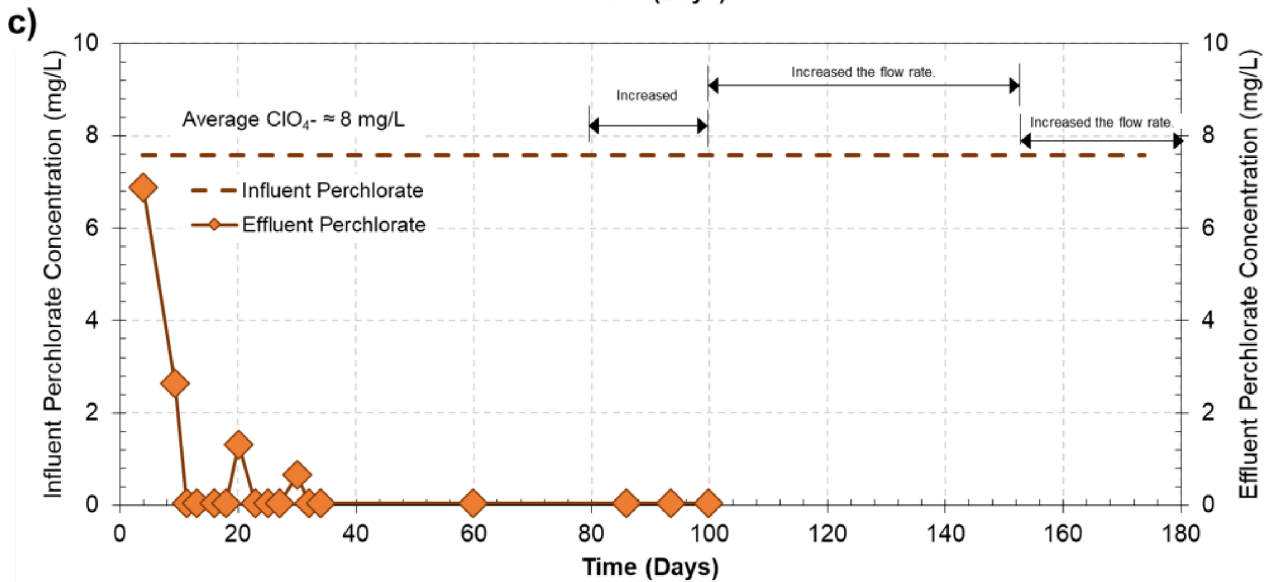
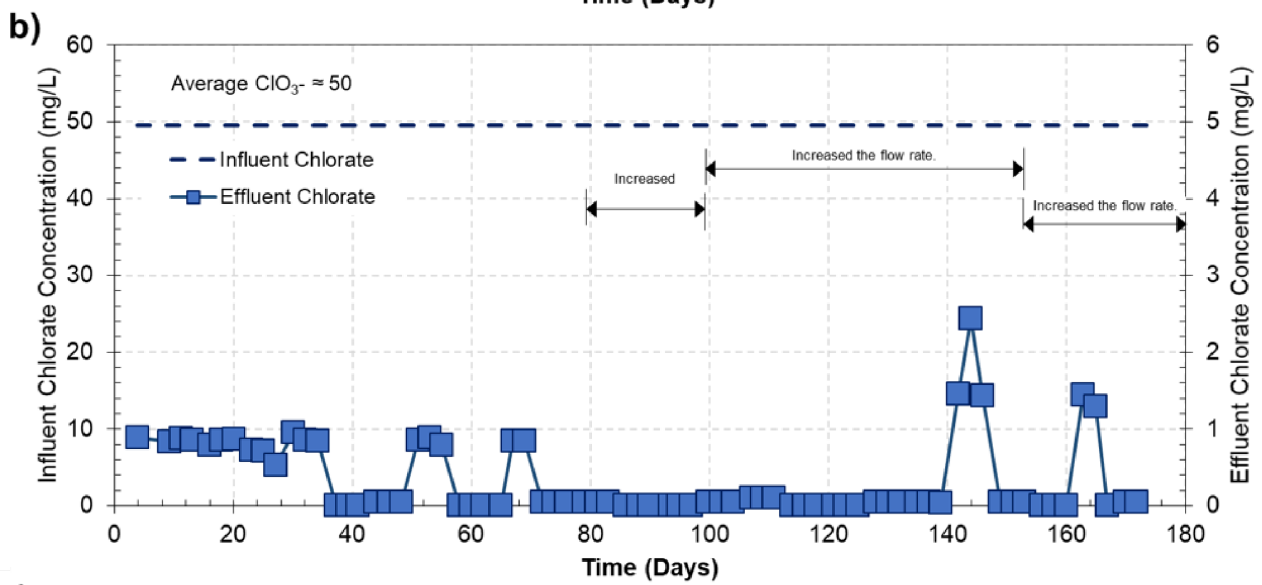
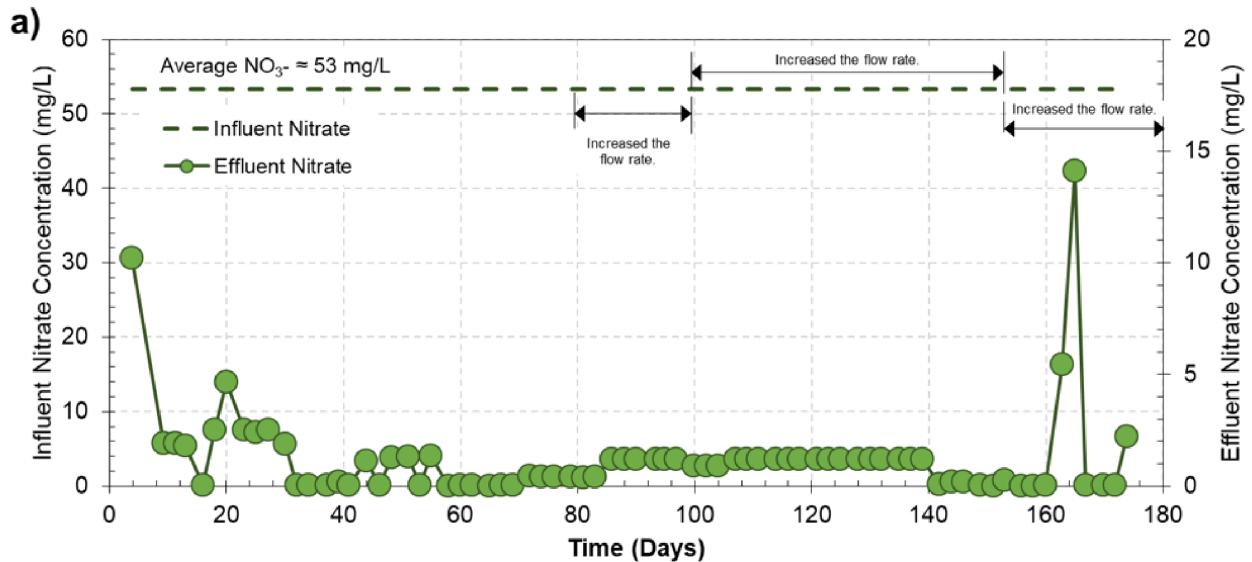
John M. Pekala, PG
Principal

7/3/2019

Date

Certified Environmental Manager
Ramboll US Corporation
CEM Certificate Number: 2347
CEM Expiration Date: September 20, 2020

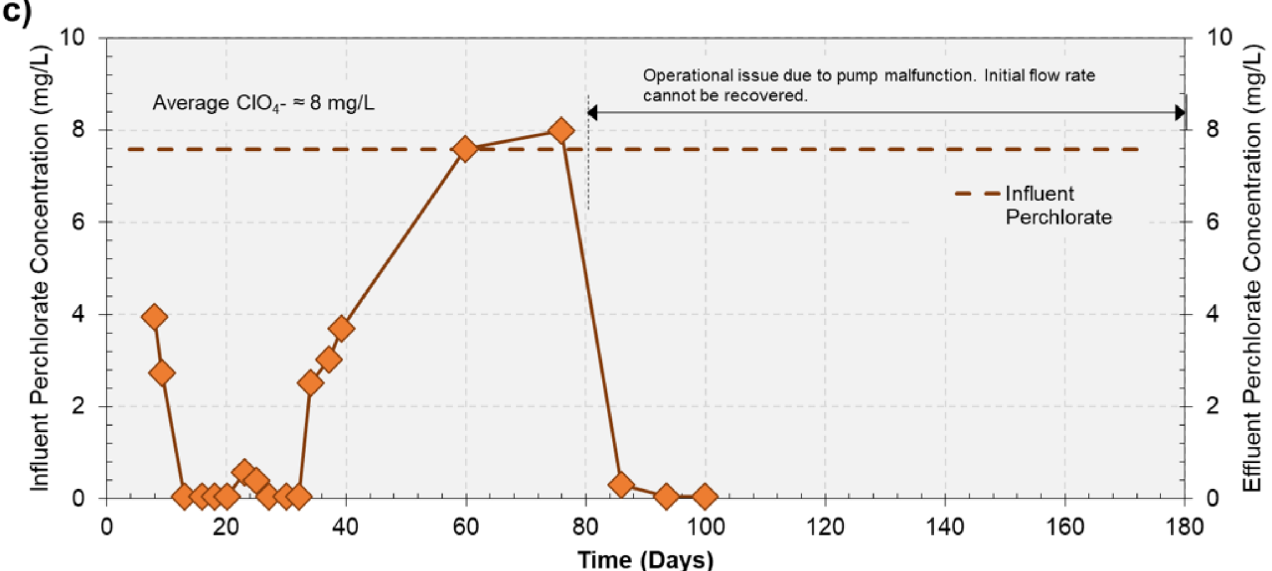
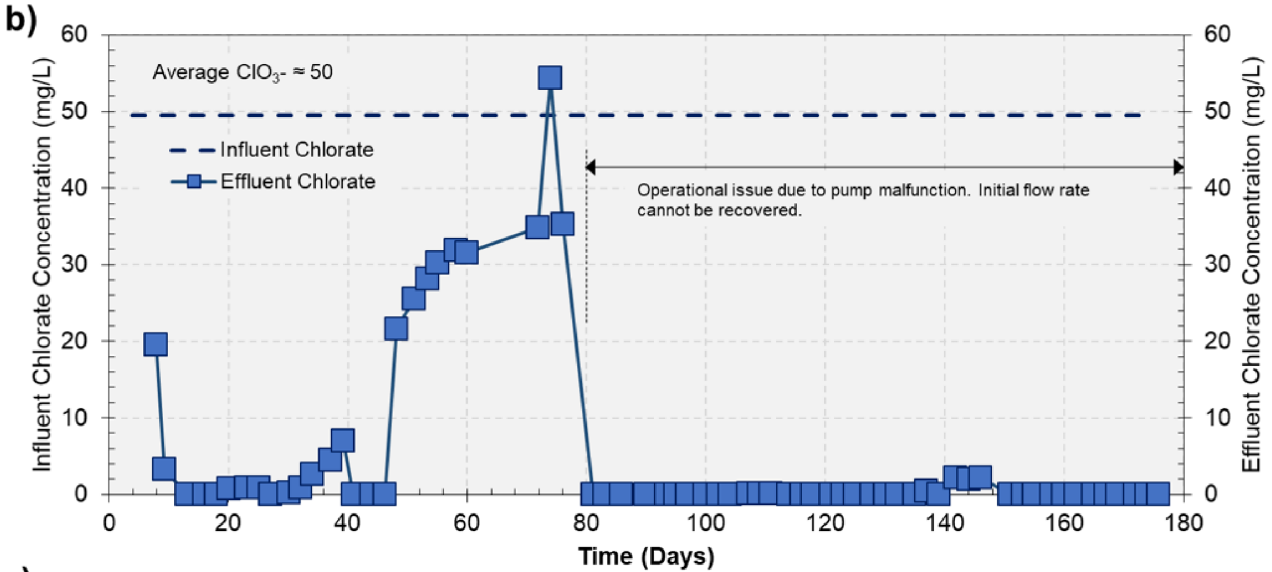
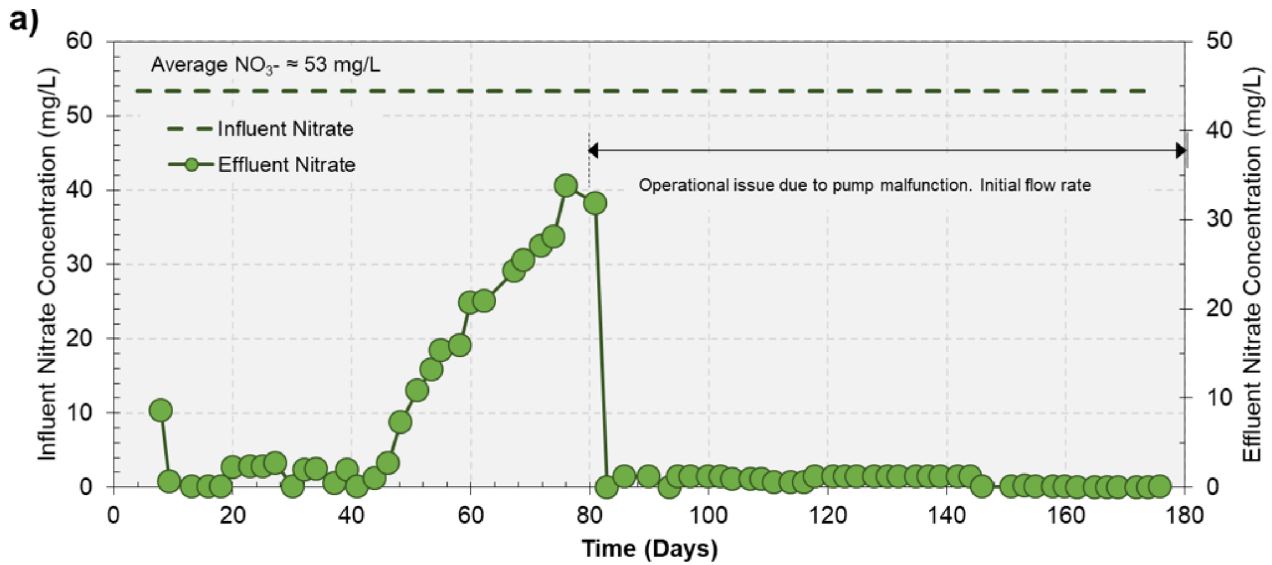




Influent and Effluent Concentrations of (a) Nitrate, (b) Chlorate, and (c) Perchlorate in Column Containing ZVI and Organic Carbon (Column B2) through May 2019 (Preliminary)
Nevada Environmental Response Trust, Henderson, Nevada

Figure

2



Influent and Effluent Concentrations of (a) Nitrate, (b) Chlorate, and (c) Perchlorate in Column Containing PeroxyChem EHC (Column Pc) through May 2019 (Preliminary)
Nevada Environmental Response Trust, Henderson, Nevada

Figure

3