

MEMO

Date **August 16, 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: JUNE 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 June 2019 toward successfully implementing the Galleria Drive Zero-Valent Iron (ZVI)-Enhanced Bioremediation Treatability Study. Treatability study laboratory testing is performed at the University of Nevada, Las Vegas (UNLV) via subcontract with Ramboll on behalf of NERT.

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

- Task Leaders – Scott Warner / Chris Ritchie
- Current Status
 - Phase 1 of the treatability study was completed in June. The bench-scale testing component of Phase 1 was completed in June and is described further in the following sections. Phase 2 (design and implementation of a field test) is on hold pending submission of a treatability study modification as described in more detail below under the heading “Schedule and Progress Updates.”
 - Column testing was completed in June; 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 Mar. 2019
B1	ZVI + nutrients	2 feet	Oct. 2018	Completed May 2019
A2	ZVI + nutrients	5 feet	Nov. 2018	Completed June 2019
B2	ZVI + carbon + nutrients	5 feet	Nov. 2018	Completed June 2019
Pc	Peroxychem commercial ZVI + carbon + nutrients	5 feet	Nov. 2018	Completed June 2019
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 UNLV ion chromatograph (IC) instrument experienced difficulties with analyzing the column effluent samples for perchlorate due to interferences from the sample matrix. All remaining samples requiring analysis of perchlorate were analyzed by Eurofins TestAmerica in June. The effluent concentrations of nitrate, chlorate, and perchlorate 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 monitor and evaluate effects of the nutrients on effluent concentrations. June results indicate an increase in effluent nitrate concentrations and less prominent increases in effluent chlorate and perchlorate concentrations (Figure 1).
- Investigation into the the lower range of hydraulic residence time necessary to promote degradation of all chemical contaminants of interest involved increasing the flow rate of Column B2 for the third time in May 2019. Following the increase in flowrate, June samples from Column B2 showed increases in effluent concentrations of nitrate and chlorate before stabilizing at low-level effluent concentrations; no perchlorate was detected in the effluent sample (Figure 2).
- Column Pc continued to operate at a reduced flow-rate with June analytical results indicating nearly complete removal of nitrate, chlorate, and perchlorate (Figure 3).
- Schedule and Progress Updates
 - Recent information provided by the Trust indicates uncertainty with BRC-owned parcels along Galleria Drive due to developer interest. During the reporting period, various candidate locations for the relocation of Phase 2 of the treatability study were evaluated. A forthcoming modification (Treatability/Pilot Study Modification No. 9) will be prepared to present the Trust's path forward for Phase 2 of the study.
 - Pending approval and completion of the abovementioned modification, a work plan addendum is anticipated to be submitted in first quarter 2020 to present Phase 2 details of the treatability study.
- Health and Safety
 - There were no safety incidents during June 2019.

ATTACHMENTS

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

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

Galleria Drive ZVI-Enhanced Bioremediation Treatability Study Progress Update

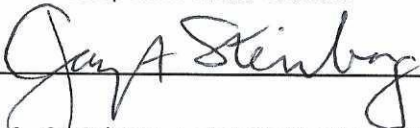
Nevada Environmental Response Trust Site (Former Tronox LLC Site) Henderson, Nevada

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: 8/16/19

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.

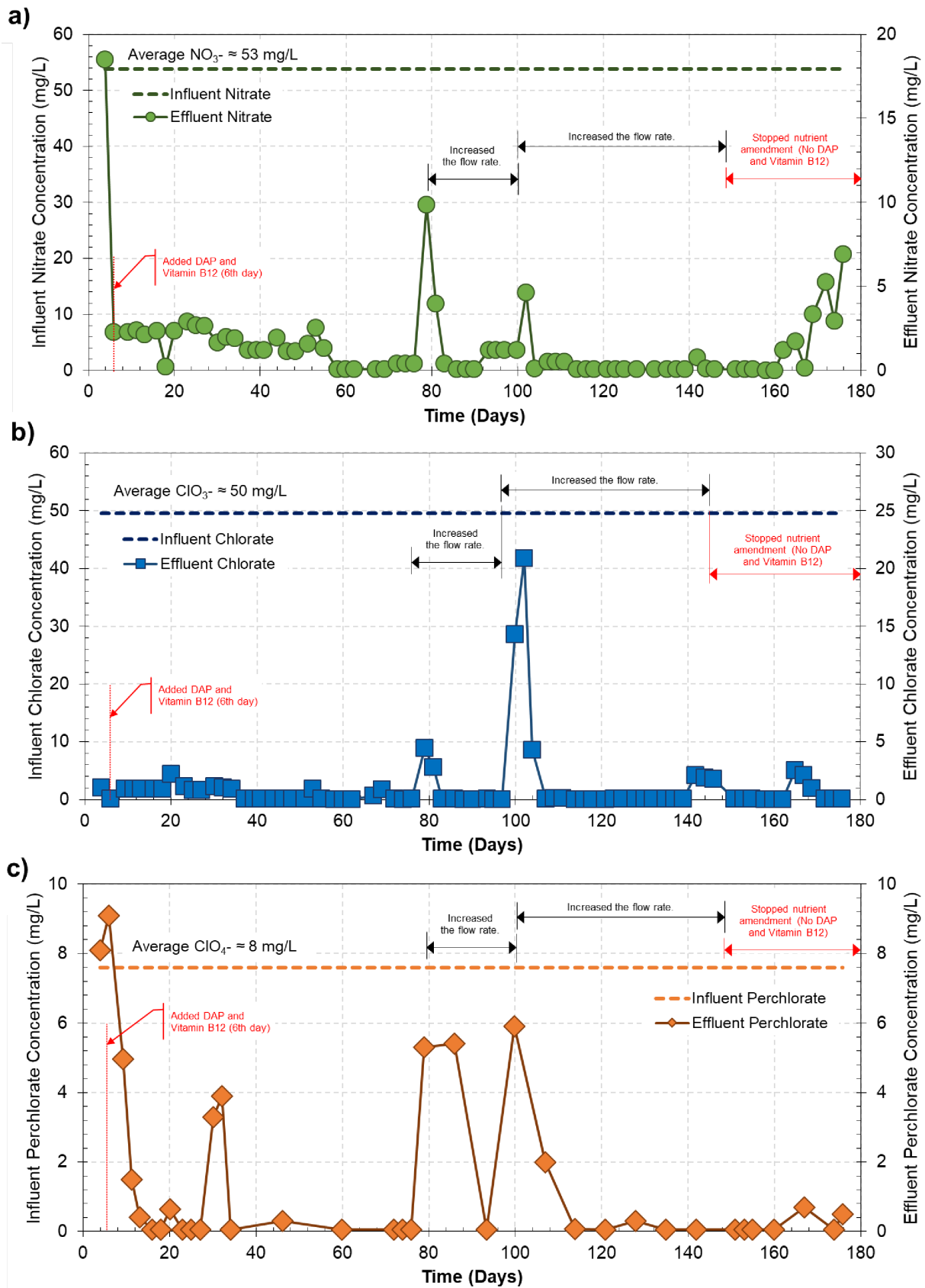


John M. Pekala, PG
Principal

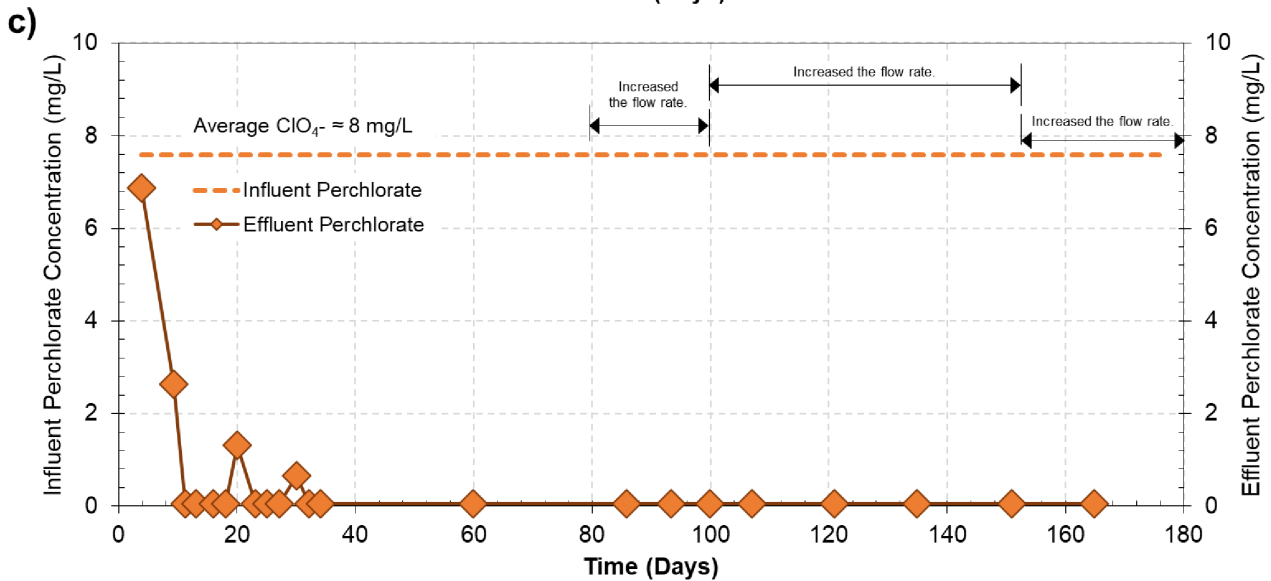
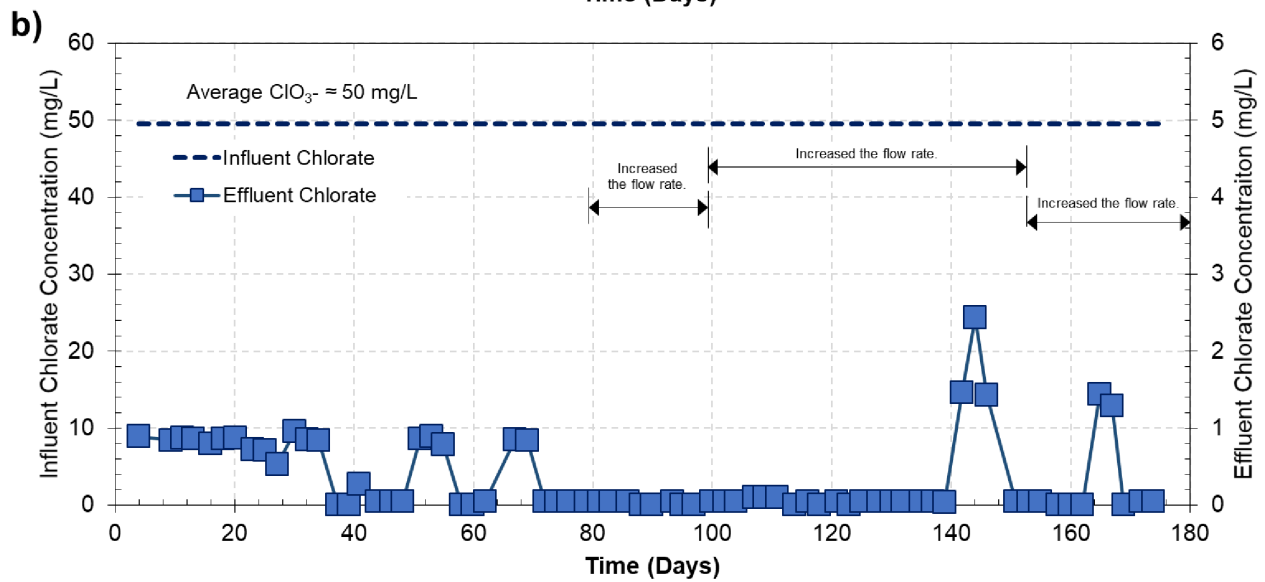
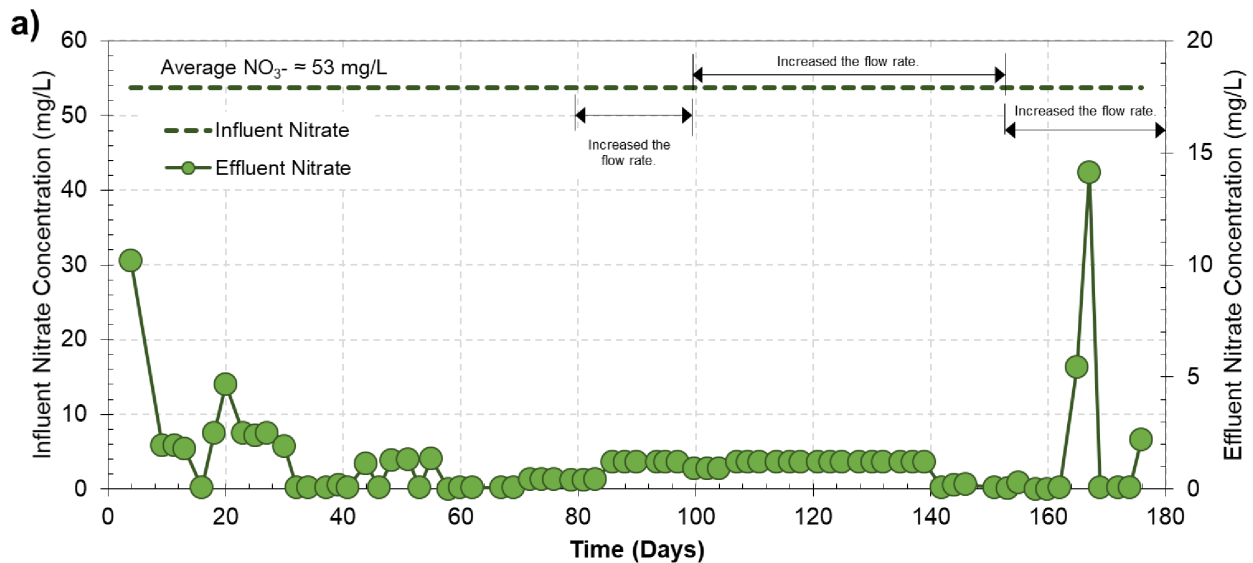
8/16/2019

Date

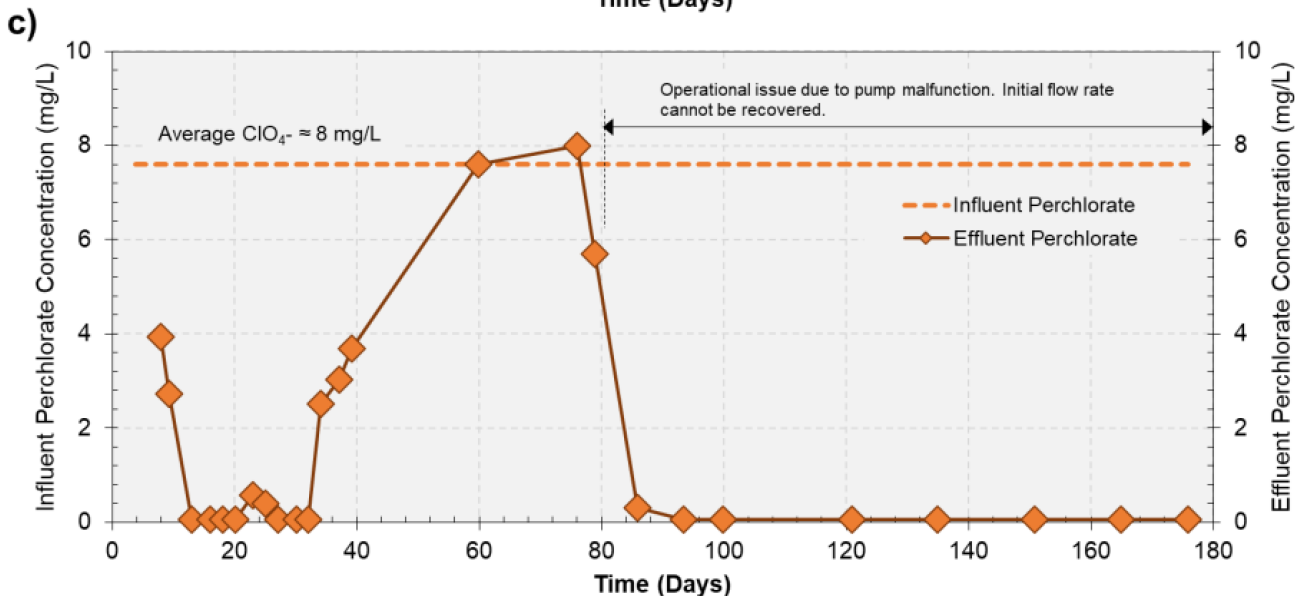
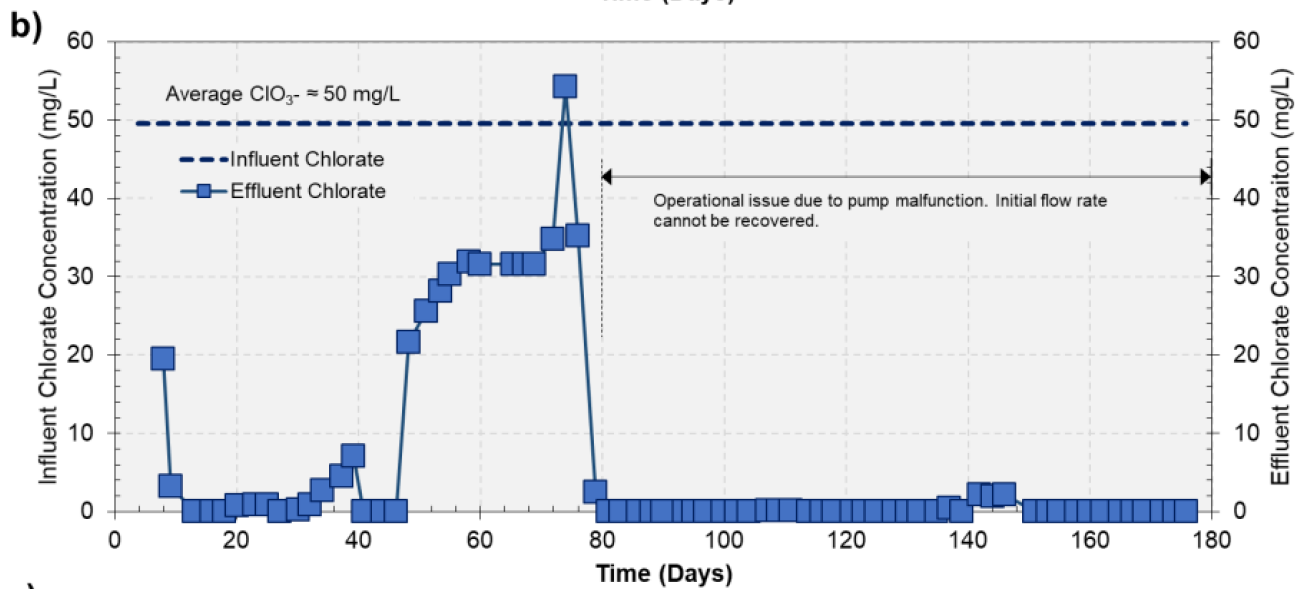
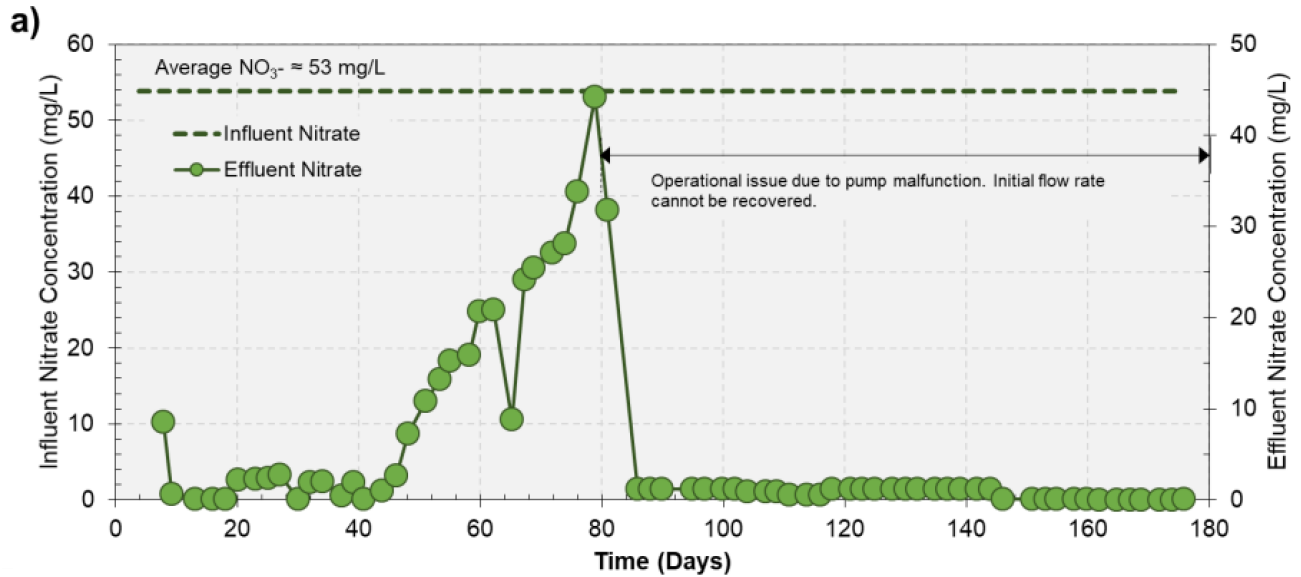
Certified Environmental Manager
Ramboll US Corporation
CEM Certificate Number: 2347
CEM Expiration Date: September 20, 2020



Influent and Effluent Concentrations of (a) Nitrate, (b) Chlorate, and (c) Perchlorate in Column Containing ZVI Only (Column A2) through June 2019 (Preliminary)
 Nevada Environmental Response Trust, Henderson, Nevada



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



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

Figure

3