May 16, 2024

Ms. Connie Pelican
Pelican Oil Company
PO Box 549
Billings, Montana 59103

Delivered via email: cpelican15@gmail.com

SUBJECT: 2024 Additional Corrective Action Work Plan
Pelican Oil Bulk Plant
7 North 18th Street, Billings, Montana
MDEQ Facility ID No. 56-05861; Release 3799
Work Plan 34595
Tetra Tech Project No. 117-8567001D

Dear Ms. Pelican:
Tetra Tech is pleased to present this 2024 Additional Corrective Action Work Plan for the Pelican Oil Bulk Plant located at 7 North 18th Street in Billings, Montana (Figure 1). This work plan has been prepared in response to the letter received from Mr. Reed Miner with the Montana Department of Environmental Quality (MDEQ) dated February 6, 2024 (MDEQ, 2023). Below is a brief discussion of the site history and the proposed scope of work.

BACKGROUND INFORMATION

The Pelican Oil Bulk Plant facility is located at 7 North 18th Street, Billings, Montana (Figure 1). The site has been a bulk fuel facility for approximately 50 years and was previously operated by Standard Oil Company. Developments on the site include an aboveground storage tank (AST) area located within a secondary containment concrete wall and an overhead truck filling rack (Figure 2).

Three 500-gallon underground storage tanks (USTs) containing diesel, kerosene, and petroleum solvents were located southwest of the AST secondary containment (Figure 2). These USTs were removed from the site on July 22, 1992. Petroleum hydrocarbon odors were noted during the excavation of the USTs, and the MDEQ was notified of a release (Release #1270). The diesel and kerosene USTs were pitted, and some small holes were observed. The solvent tank was also pitted (Maxim Technologies, 2002). Remedial activities included excavating impacted soil 12 feet below the ground surface (bgs). However, petroleum hydrocarbon odors were still present at the base of the excavation.

Total petroleum hydrocarbon (TPH) concentrations of soil samples collected beneath the USTs ranged from 6.0 to 6,100 milligrams per kilogram (mg/Kg). Total petroleum hydrocarbons (TPH) concentrations in samples collected below the diesel and kerosene USTs exceeded MDEQ risk-

based screening levels (RBSL; MDEQ, 2018). However, TPH concentrations below the solvent tank were below MDEQ RBSLs.

In 1999, underground piping associated with the aboveground storage tank basin was removed (Maxim Technologies, 2002). During this removal, a leak was discovered at a piping connection. Soil samples collected below this point contained a total extractable hydrocarbon (TEH) concentration of 7,200 mg/Kg. This release was reported to the MDEQ (Release #3799).

Based on local topography (Figure 1) and previous studies in the area, the groundwater flow direction is to the east, and the groundwater depth is approximately 10 to 12 feet below the ground surface (Tetra Tech, 2014).

In September 2002, eight soil borings were installed on the bulk plant property. Petroleum hydrocarbons were detected in five soil borings. Gasoline range hydrocarbons were found in soil borings upgradient of the bulk plant facility tanks and piping, indicating upgradient impacts have also migrated onto the site from the adjacent property, a former service station. Gasoline range components appear mixed with diesel components in the remaining borings.

Five monitor wells (wells PO-1 through PO-5; Figure 2) were installed on the property in August 2003. Initially, groundwater petroleum hydrocarbon concentrations were detected above the MDEQ RBSLs in all five monitor wells. Free product at 0.1 feet or less thickness was occasionally detected at the downgradient monitor wells PO-3 and PO-4 (Maxim Technologies, 2003). Free product has not been detected in any monitor wells since 2004 (Tetra Tech, 2021).

In November 2019, four monitor wells (PO-6, PO-7, PO-8, and PO-9) were installed to delineate the areal extent of petroleum hydrocarbon impacts (Tetra Tech, 2020). Impacts on soil and groundwater were found at these monitor wells.

In 2021, a groundwater monitoring event was conducted in April on monitoring wells PO-6, PO-7, PO-8, and PO-9. Monitoring well PO-6 is associated with release 1270, and monitoring wells PO-7, PO-8, and PO-9 are associated with release 3799. Monitoring well PO-6 was also sampled in August of 2021. Based upon the results collected from monitoring well PO-6, release 1270 was closed in a no further corrective action letter received on May 3, 2022 (MDEQ 2022b). However, groundwater analytical results from PO-7, PO-8, and PO-9 indicate that RBSL exceedances persist at the site (Tetra Tech, 2022).

In June 2021, Tetra Tech conducted a soil vapor extraction (SVE) pilot test. The test demonstrated that soil vapor could be extracted from the subsurface. The vacuum influence observed was approximately 100 feet (Tetra Tech, 2021).

In 2023 a remedial investigation was conducted at the site to determine the extent of the groundwater plume, and soil conditions within the AST basin. Additionally, this investigation was implemented to determine if remedial injection would be viable path forward for eventual site closure. The investigation indicated that the site and downgradient properties could benefit from

remedial injections. However, the existing AST basin and utilities could potentially limit the treatment areas, limiting the potential for release closure (Tetra Tech, 2023).

MDEQ WORK PLAN REQUEST

MDEQ requested a work plan with the following task items (MDEQ, 2024). A summary of the MDEQ work plan requests are as follows:

- *Design and implement a pilot test to assess the feasibility of and provide necessary information for full-scale design of in-situ treatment of petroleum contamination in soil and groundwater.*
    - *○ Identify the product that will be used, the area that will be treated (laterally and vertically), the volume of the treatment product that will be applied, production application rate, etc.*
    - *○ Identify the criteria that will be measured during and after treatment to assess the radius of influence, the completeness of product application, the effectiveness of the product and it's application method, etc.*

- *Collect soil and groundwater data needed to assess the effectiveness of the treatment.*
    - *○ Identify the method, timing (e.g., pre-, post-treatment), and location of sample collection.*
    - *○ Identify the disposal method of soil cuttings (if applicable) and purge water.*

- *Analyze samples for petroleum constituents as required by the Montana Risk-Based Corrective Action Guidance for Petroleum Releases and other criteria as needed to assess the feasibility and effectiveness of treatment.*

- *Validate laboratory analytical data using DEQ's Data Validation Summary Form (DVSF) found online under the Guidance dropdown at the Petroleum Tank Cleanup Section (PTCS) webpage1.*

- *Discuss ongoing WP tasks and results with DEQ's project manager; submit written agreed upon WP modifications as required to complete the WP objectives.*

- *Prepare an updated Release Closure Plan (RCP), discuss the results with DEQ's project manager. DEQ expects the RCP to cover the Release investigation, cleanup pilot test, and monitoring information. Use the RCP format found online under the Guidance dropdown at the PTCS webpage1.*

- *Prepare and submit Cleanup Report detailing the results of the pilot test. The Report is expected to include all the content, tables, figures, and appendices outlined in the Report format.*

- *Use standardized DEQ WP and Report formats found online under the Forms dropdown at the PTCS webpage.*

  Submit WP and Reports electronically following the PTCS submittal requirements found under the Guidance dropdown at the PTCS webpage.

SCOPE OF WORK

This project's scope includes installing three horizontal injection lines, conducting a pilot remedial fluid injection event, and conducting two groundwater monitoring. Tetra Tech will discuss project goals with the DEQ project manager. Following the second groundwater monitoring event, a remedial investigation report (RIR) will be prepared, including RCP development, receptor survey, and data validation. All work will be performed according to Tetra Tech's standard operating procedures. Tetra Tech proposes to conduct the following tasks based on MDEQ's recommended scope of work. The following tasks describe the methods to be used for this investigation:

Task 1 – Work Plan

This task involves preparing this work plan, which requires contacting vendors, the client, and MDEQ and preparing cost estimates and scope of work items.

Task 2 – Project Management

Task 2 involves general project management, including updating the site-specific health and safety plan (HASP), communicating with clients, subcontractors, and property owners for access, regulators, scheduling, traffic control and encroachment permitting if necessary, permitting for remedial injections, and overseeing all tasks. Tetra Tech will obtain private access agreements for the adjoining properties.

Task 3 – Pilot-Scale Remediation

Tetra Tech will conduct a pilot-scale remediation of the property's soil and groundwater impacts. Horizontal injections were deemed necessary because the site's underground and overhead utilities limit the access of traditional vertical injection points (Figure 2). Below are the methods involved in installing and injecting the remedial injection fluid.

Before installation of the injection points, a public and private utility locate will be conducted. The private locator will utilize ground-penetrating radar to determine utility location and depth. The injection wells will be installed as shown in (Figure 3). The three horizontal lines, two at approximately 140 feet in length and one at approximately 90 feet will be bored directly under the AST and impacted areas. Each line will be spaced approximately 20 feet apart, running parallel under the site. The horizontal borings will be advanced with a track-mounted horizontal direction drilling rig. The borings will be initiated on the southern portion of the property to avoid utilities within the alley. The borehole will remain open by utilizing a bio-degradable biopolymer. The target depth for installation is approximately 8-10 feet below the ground surface, which coincides with the vadose/smear zone for the property. A two-inch Schedule 80 PVC perforated

pipe will be installed and used for remedial injections. Once installed, the horizontal lines will be flushed with potable water to remove the drilling fluid. Once the lines are installed, each line will be flushed with potable water to break down the biopolymer to aid injections. An estimated 200-300 gallons will flush each horizontal line. The horizontal drilling bids are presented in Attachment A.

Any investigation-derived waste identified by field screening will be containerized on-site within 55-gallon drums. A soil sample will be collected from the containerized soil and submitted for laboratory analysis of VPH, EPH, and Resource and Conservation and Recovery Act (RCRA) total metals per landfill disposal requirements.

In-Situ Oxidative Technologies (Isotec) and Tetra Tech will perform the injections. Details on this in-situ chemical oxidation injection are included in Isotec's proposal in (Attachment B). As conveyed in the attachment, activated sodium persulfate (ASP) will be injected into three horizontal injection wells. A 15% sodium persulfate solution blended with carbohydrates,25% sodium hydroxide, and potable water will be used as the remedial injection fluid. Initially, each line will be flushed with 150-300 gallons of potable water. Following the initial flush, the reagent will be pumped into the lines, flooding each line, ideally simultaneously. Approximately 1,800 gallons of reagent will be added to the 140-foot lines, and 1,200 gallons to the 90-foot line (Figure 3). After the reagent is added to the system, a final flush will be pumped into each line. The final flush will mirror the initial flushing, where 150-300 gallons will be added to the system. The field injection volumes will be based on the subsurface intake, radial effects observed during injections, and observations on adjacent monitoring wells. During injections, wells within the treatment area will be monitored for sodium persulfate, dissolved oxygen (DO), and oxidation-reduction potential (ORP). These parameters will aid in determining the zone of influence of the reagent.

Task 4 - Groundwater Monitoring

Two groundwater monitoring events will be conducted under this work plan: an initial groundwater monitoring event will be conducted to assess groundwater conditions 14 days after the remediation injection. The second groundwater monitoring event will be conducted approximately 90 days after remedial injections, pending weather and site conditions. These groundwater monitoring events will consist of the following:

- Depth to groundwater will be measured for each monitoring well (new and existing) using an electronic oil/water interface meter. The meter will be decontaminated between each well measurement using Liquinox® soap solution and clean potable water rinse.

- Monitoring wells PO-3, PO-4, PO-5, PO-7, PO-8, PO-9, PO-10, and PO-11 will then be purged with the low-flow slow-purge pumping method using a submersible bladder pump and dedicated polyethylene tubing. During purging, field instruments will analyze the water for pH, temperature, DO, specific conductivity, ORP, and turbidity. Purge water will be containerized by the Disposal of Untreated Water from the Monitoring Wells Flow Chart and disposed of appropriately following receipt of laboratory results (MDEQ, 2015). The pump will be

decontaminated between wells using a Liquinox solution followed by a triple rinse technique. Additionally, a new bladder will be installed between each well.

- Groundwater samples will be collected from the above wells using a submersible bladder pump and dedicated polyethylene tubing. Groundwater samples will be analyzed for VPH and EPH. Following DEQ guidance, if the EPH concentration in water exceeds 1,000 micrograms per liter (µg/L), an EPH fractionation analysis is required (MDEQ, 2020). For estimated costs for this proposal, it will be assumed that seven of the water samples will also be analyzed for EPH fractions.

Task 5 – Data Validation

Each analytical data package will include a summary report that cross-references the sample identification with the laboratory identification and identifies variations from standard operating procedures; laboratory analytical results; quality control data, which may include but is not limited to surrogate recoveries, initial and continuing calibration blanks and spikes, method blanks, laboratory control blanks, and spikes, and matrix spike and matrix spike duplicates; FID chromatograms; chain of custody form(s); and a sample receipt checklist. Additionally, data validation will be included with the investigation report and will follow DEQ's data validation guideline as per*https//deq.mt.gov/Portals/112/Land/StateSuperfund/Documents/-DataValidationReport.pdf*. It is anticipated that two separate data validations will need to be completed for this project.

Task 6 – Release Closure Plan

Tetra Tech will update the MDEQ release closure plan. The facility data collected to date, including the results of the remedial injections, will be used to update this plan.

Task 7- Reporting

Following the completion of the remedial injection fluid event and the subsequent groundwater monitoring events, a corrective action report will be prepared and submitted to the DEQ. The report will include a summary of the remedial injection event, estimated zone of influence of the treatment, feasibility of a full-scale design, a summary of the groundwater analytical results, a discussion on the effectiveness of the chemical injection, and future recommendations for the site.

PROJECT SCHEDULE AND BUDGET

Tetra Tech will initiate this work upon receiving authorization from the Pelican Oil Company and approval from the DEQ. The work described above will be conducted on a unit cost basis per the attached Groundwater Monitoring and Sampling Unit Cost Worksheets, and Cost Estimate Breakdown included in Attachment C.

AUTHORIZATION

The work described in this plan will be conducted per the terms and conditions in the Consulting Services Agreement between Pelican Oil Company and Tetra Tech, dated February 5, 2019. Should you find this work plan acceptable, please sign Work Authorization #6, included in Attachment D, and return a signed copy to our Billings, Montana office. If you have questions or comments regarding this work plan, don't hesitate to call us at (406) 248-9161. For your convenience, we have forwarded a copy of this work plan to DEQ for their review. We will not begin this work until we have authorization from the Pelican Oil Company and MDEQ. We appreciate the opportunity to provide you with environmental consulting services. If you have any questions or comments regarding this proposal, please do not hesitate to call us at our Billings, Montana office at (406) 248-9161.

Tetra Tech, I*nc.*

Austin Maphis
Project Geologist

Jake Conver
Senior Engineer

cc: Reed Miner, MDEQ – via email rminer@mt.gov
Attachments: Figures
Attachment A: Horizontal Well Installation Bids
Attachment B: Isotec Injection Services Proposal
Attachment C: Estimated Costs
Attachment D: Work Authorization #6

REFERENCES

Maxim Technologies, Inc., 2002. September 2002 Phase I Remedial Investigation Report. Submitted to Ms. Connie Pelican, Pelican Oil Company. December.

Maxim Technologies, Inc., 2003. Report of the August 2003 Monitor Well Installation and Quarterly Groundwater Monitoring Event. Submitted to Ms. Connie Pelican, Pelican Oil Company. December.

MDEP, 2008a. Massachusetts Department of Environmental Protection (MADEP), 2008. Method for Determination of Volatile Petroleum Hydrocarbons (VPH). Revision 1.1. May.

MDEP, 2008b. Massachusetts Department of Environmental Protection (MADEP), 2008. Method for Determination of Extractable Petroleum Hydrocarbons (EPH). Revision 1.1.

Montana Department of Environmental Quality (MDEQ), 2018. Montana Tier 1 Risk-Based Corrective Action Guidance for Petroleum Releases. May.

MDEQ, 2022a. Additional Corrective Action Work Plan Required for the Petroleum Release at Pelican Oil Bulk Plant, 7 North 18th Street, Billings, Yellowstone County, Montana; Facility ID 56-05861 (TID 30065), Release 3799, Work Plan 34595. August.

MDEQ, 2022b. No Further Corrective Action Required for the Petroleum Release at GM Petroleum Distributors/Pelican Oil Bulk Plant, 7 North 18th Street, Billings, Yellowstone County, Montana; Facility ID 56-05861 (TID 30065), Release 1270. May 3.

MDEQ, 2024. Additional Corrective Action Work Plan Required for the Petroleum Release at Former Pelican Oil Bulk Plant, 7 North 18th Street, Billings, Yellowstone County, Montana; Facility ID 56-05861 (TID 30065), Release 3799, Work Plan ID 34820. February.

Tetra Tech, 2014. Report of the September 2014 Groundwater Monitoring Event, Pelican Bulk Oil Plant, 7 North 18th Street, Billings, Montana. Submitted to Ms. Connie Pelican, Pelican Oil Company. October 23.

Tetra Tech, 2019. Report of the September 2014 Groundwater Monitoring Event, Pelican Bulk Oil Plant, 7 North 18th Street, Billings, Montana. Submitted to Ms. Connie Pelican, Pelican Oil Company. October 23.

Tetra Tech, 2020a. Additional Remedial Action Work Plan for Groundwater Monitoring 2021, Pelican Oil Bulk Plant, 7 North 18th Street, Billings, Montana. MDEQ Facility ID #56-05861; Release #1270; WPID #34200. December 10.

Tetra Tech, 2020b. Remedial Action Work Plan for Groundwater Monitoring and SVE Pilot Testing, Pelican Oil Bulk Plant 7 North 18th Street, Billings, Montana. MDEQ Facility ID #56-05861; Release #3799; WPID #34208. December 10.

Tetra Tech, 2020c. 2019 Groundwater Investigation and Monitoring Report and Contaminated Media Investigation in Utility Trench, Pelican Oil Bulk Plant 7 North 18th Street, Billings, Montana. MDEQ Facility ID #56-05861; Release #1270 and #3799; WPID #33818 and 33817. March 19.

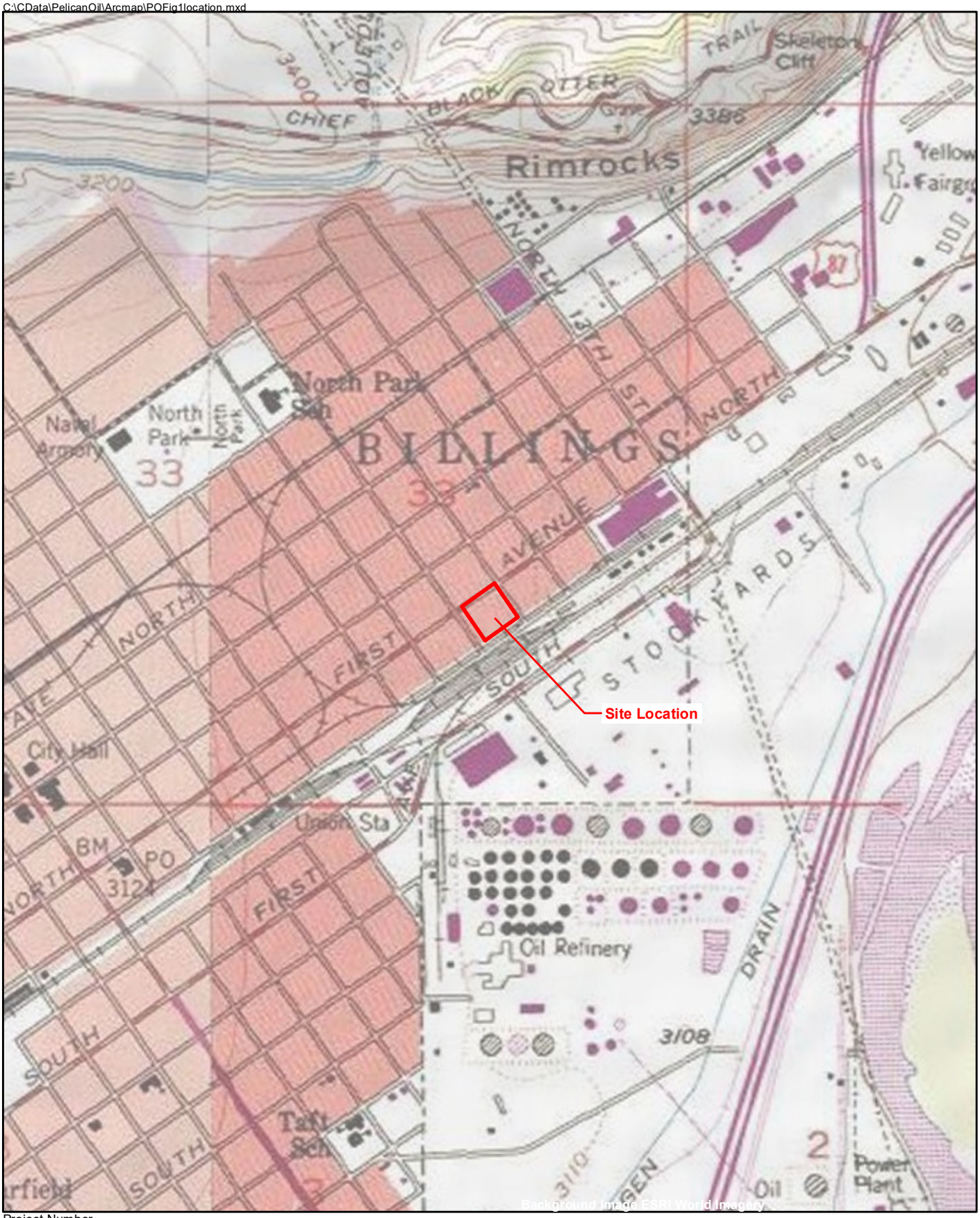
Tetra Tech, 2021. 2021 Groundwater Monitoring and Soil Vapor Extraction Pilot Testing Report, Pelican Oil Bulk Plant, 7 North 18th Street, Billings, Montana, MDEQ Facility ID No. 56-05861; Releases 1270 & 3799 Work Plans 34200 and 34208. June 29.

Tetra Tech, 2023. Remedial Investigation Report, Pelican Oil Bulk Plan, 7 North 18th Street, Billings, Montana, MDEQ Facility ID No. 56-05861; Release 3799; (TID 30065), Work Plan 34595, Tetra Tech Project No. 117-8567001C. August.

TETRA TECH

FIGURES

C:\CData\PelicanOil\Arcmap\POFig1location.mxd



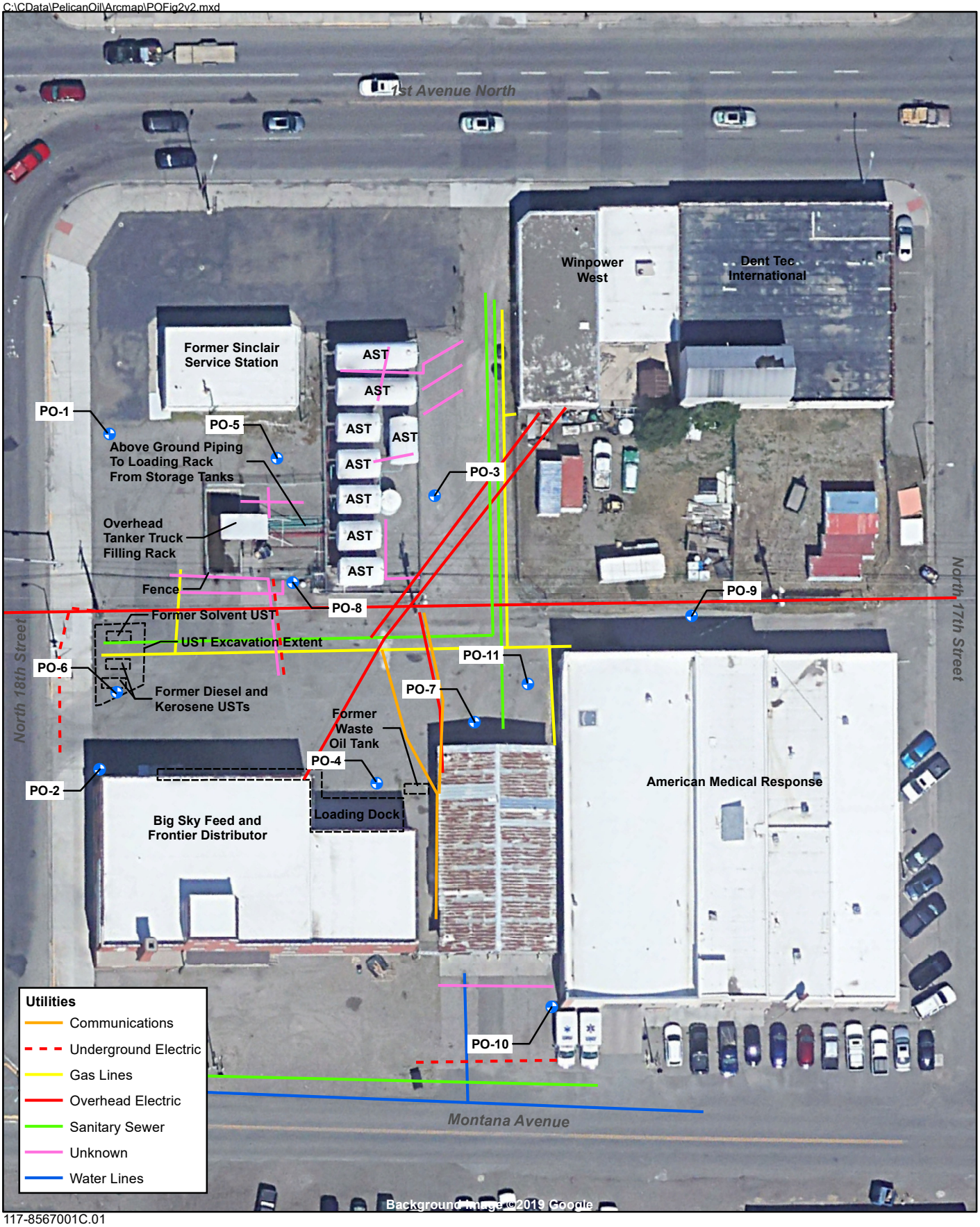
Project Number
3/10/2020

N

Feet
0 1,000

Figure 1
Site Location Map
Pelican Oil Bulk Plant
7 North 18th Street
Billings, Montana

C:\CData\PelicanOil\Arcmap\POFig2v2.mxd



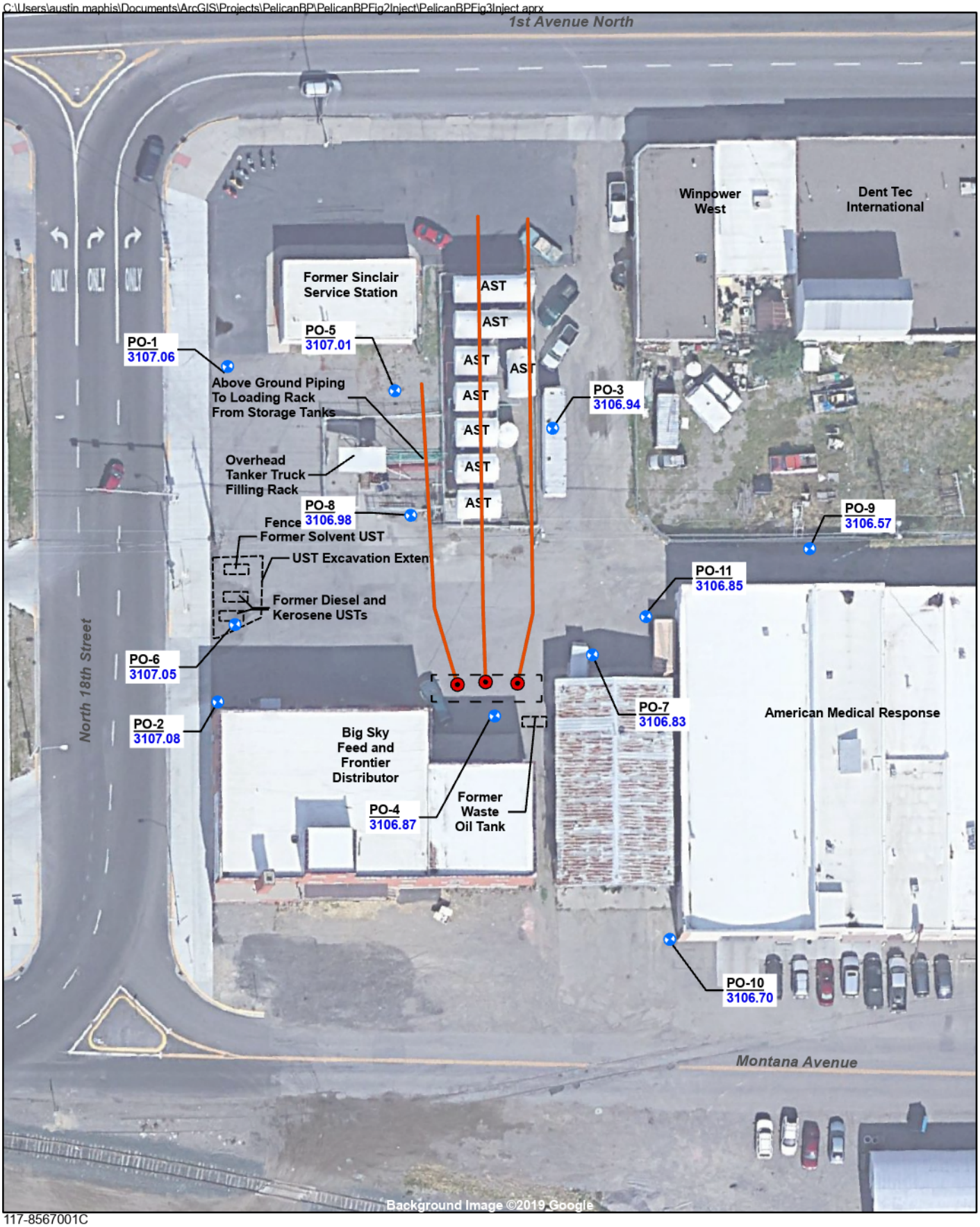
117-8567001C.01
8/10/2023

Feet
0 30

PO-1 Monitor Well Location
UST Underground Storage Tank
AST Above Ground Storage Tank

Figure 2
Site Detail Map
Pelican Oil Bulk Plant
7 North 18th Street
Billings, Montana

C:\Users\austin.maphis\Documents\ArcGIS\Projects\PelicanBP\PelicanBPFig2Inject\PelicanBPFig3Inject.aprx



117-8567001C
5/16/2024

Feet
0 30

PO-1 3105.70 Monitor Well (elevation in feet amsl)

Proposed Horizontal Injection Line

Horizontal Well

UST Underground Storage Tank

AST Above Ground Storage Tank

Figure 3
Proposed Horizontal Injection Map
Pelican Oil Bulk Plant
7 North 18th Street
Billings, Montana

TETRA TECH

ATTACHMENT A

Horizontal Well Installation Bids

KARV LLC
PO Box 81482
Billings, MT 59108 US
406-596-5200
accounting@karvllc.com
www.karvllc.net

Estimate

ADDRESS
Tetra Tech
7100 Commercial Ave
Suite 4
Billings, MT 59101

ESTIMATE # 1152
DATE 03/19/2024

ACTIVITY	QTY	RATE	AMOUNT
Boring:Bore Bore/Install 1-1" Slotted PVC Pipe 3 separate bores	365	42.50	15,512.50
Hard Surface Cut &Repair Concrete/Asphalt Cut and repair asphalt at exit and entry pits	1	3,500.00	3,500.00
Materials:Road Mix Road Mix Backfill for pits.	1	180.00	180.00
Inspection Covers Cast Iron inspection covers 12"	6	150.00	900.00

7 North 18th Street Billings
Pelican Oil

TOTAL **$20,092.50**

Accepted By

Accepted Date

From: Gaskill, Steve <Steve.Gaskill@rmcontractors.com>
Sent: Tuesday, March 19, 2024 12:55 PM
To: Maphis, Austin
Subject: RE: contact info

Austin,
My apologies, but I don't think RMC is a good fit for this particular project. W/the type of product and so many questionable factors w/proposed route, I just feel that there is too much risk for us. I have a local drill contractor I've been working alongside for years that I am confident that could successfully help you complete your project.
Please feel free to contact Eric Simonsen w/ Karv Construction(406-596-5200)
Thanks!

From: Maphis, Austin <Austin.Maphis@tetratech.com>
Sent: Tuesday, March 19, 2024 8:08 AM
To: Gaskill, Steve <Steve.Gaskill@rmcontractors.com>
Subject: RE: contact info

Good Morning Steve-
We spoke about using you to conduct some horizontal drilling for the installation of injection lines at a site in Billings. We would also like to get a cost/bid from you. The project details are as follows:

The Project is at a bulk plant facility at 7 North 18th Street, Billings, Montana. Attached are two figures for the project location and utilities.
We would like to install three horizontal lines with slotted PVC (well screen—1" diameter) for remedial injections.
The depth of each line would be expected to be 8-10' below the ground surface in a sandy gravel layer.
-1 line will be 85ft, and 2 lines will be ~ 130-140ft. Please see the attached Google Earth for the approximate locations. The entry/exit locations may need to be adjusted according to your expertise.
-Drilling fluids - We will need to use a bio polymer, as the lines will inject remedial fluid once it is completed.
-We will supply the PVC materials
-We would also like continual access to each of the lines and will likely need some permanent cover for them.
-The expected time frame would likely be this summer or fall.

I should be available for a call most of this week. Please let me know if you have any questions.
Thanks,

Austin J Maphis | Project Manager/Hydrogeologist
Direct **406.248.9161** | Cell **406.208.9195** | Fax **406.248.9282** | austin.maphis@tetratech.com

Tetra Tech | Complex World, Clear Solutions™
7100 Commercial Avenue, Suite 4, Billings, MT 59101 | tetratech.com

From: Gaskill, Steve <Steve.Gaskill@rmcontractors.com>
Sent: Tuesday, March 19, 2024 6:07 AM
To: Maphis, Austin <Austin.Maphis@tetratech.com>
Cc: Gaskill, Steve <Steve.Gaskill@rmcontractors.com>
Subject: contact info

Steve Gaskill
Project Manager
Office: 406-227-3604
Mobile: 406-459-9629
steve.gaskill@rmcontractors.com

From: shaneo fullrod.com
To: Maphis, Austin
Subject: Re: Horizontal Drill Bid - Environmental Project
Date: Monday, April 8, 2024 3:35:29 PM

Austin I apologize for not getting back to you sooner I not be able to bid on this project due to my workload for this year. I appreciate the opportunity to bid on this project Please include me in future bids I would appreciate it. Thank you !!

Shane O'Brien
Full Rod Construction

From: Maphis, Austin <Austin.Maphis@tetratech.com>
Sent: Monday, April 8, 2024 2:01:44 PM
To: shaneo fullrod.com <shaneo@fullrod.com>
Subject: RE: Horizontal Drill Bid - Environmental Project

Shane, Because this is a state-funded job, I am required to get three bids. If you are not interested in this project, it would be very helpful if you emailed me back stating you do not wish to bid for it. If you are interested, please see below and let me know if you have any questions.
Thank you,

Austin J Maphis | Project Manager/Hydrogeologist
Direct **406.248.9161** | Cell **406.208.9195** | Fax **406.248.9282** | austin.maphis@tetratech.com

Tetra Tech | Complex World, Clear Solutions™
7100 Commercial Avenue, Suite 4, Billings, MT 59101 | tetratech.com

---

From: Maphis, Austin
Sent: Monday, April 1, 2024 2:34 PM
To: shaneo@fullrod.com
Subject: RE: Horizontal Drill Bid - Environmental Project

Shane, Have you had a chance to review the bid request below?
Please let me know if you have any questions.
Thanks,

Austin J Maphis | Project Manager/Hydrogeologist
Direct **406.248.9161** | Cell **406.208.9195** | Fax **406.248.9282** | austin.maphis@tetratech.com

Tetra Tech | Complex World, Clear Solutions™
7100 Commercial Avenue, Suite 4, Billings, MT 59101 | tetratech.com

---

From: Maphis, Austin
Sent: Wednesday, March 13, 2024 1:27 PM
To: shaneo@fullrod.com
Subject: Horizontal Drill Bid - Environmental Project

Shane-
We spoke about a horizontal drilling project for the installation of pvc well screen for fluid injection at a site in Billings. We would like to get a cost/bid from you. The project details are as follows:

The Project is at a bulk plant facility at 7 North 18th Street, Billings, Montana. Attached are two figures for the project location and utilities.
We would like to install three horizontal lines with slotted PVC (well screen—1" diameter) for remedial injections.

The depth of each line would be expected to be 8-10' below the ground surface in a sandy gravel layer.

-1 line will be 85ft, and 2 lines will be ~ 130-140ft. Please see the attached Google Earth for the approximate locations. The entry/exit locations may need to be adjusted according to your expertise.

-Drilling fluids - We will need to use a bio polymer, as the lines will inject remedial fluid once it is completed.

-We will supply the PVC materials

-We would also like continual access to each of the lines and will likely need some permanent cover for them.

-The expected time frame would likely be this summer or fall.

I should be available for a call most of this week. Please let me know if you have any questions.

Austin J Maphis | Project Manager/Environmental Geologist
Direct **406.248.9161** | Cell **406.208.9195** | Fax **406.248.9282** | austin.maphis@tetratech.com

Tetra Tech | Complex World, Clear Solutions™
7100 Commercial Avenue, Suite 4, Billings, MT 59101 | tetratech.com

TETRA TECH

ATTACHMENT B

Isotec Injection Services Proposal

ISCO PILOT TEST PROGRAM PROPOSAL

PELICAN BULK OIL PLANT
7 NORTH 18TH STREET
BILLINGS, MONTANA

APRIL 5, 2024

PREPARED FOR

TETRA TECH
7100 COMMERCIAL AVENUE, SUITE 4
BILLING, MONTANA 59101

ISOTEC PROPOSAL NO. 803340

In-Situ Oxidative Technologies, Inc.
11 Princess Road, Suite A
Lawrenceville, New Jersey 08648
Phone: (609) 275-8500, Fax: (609) 275-9608
www.ISOTEC-INC.com

SBA Certified Small Business

*****

This In-Situ Oxidative Technologies, Inc. (ISOTEC) document includes proprietary data that shall not be duplicated, used or disclosed outside Tetra Tech for any purpose other than to evaluate this document. This restriction does not limit right to use information contained in this document if it is obtained from another source without restriction.

TABLE OF CONTENTS

FIGURES

TABLES

ATTACHMENTS

1.0 INTRODUCTION

In-Situ Oxidative Technologies, Inc., (ISOTEC) is pleased to offer this *ISCO Pilot Test Program Proposal* to Tetra Tech for remediation services at the Pelican Bulk Oil Plant, located in Billings, Montana. Based on information provided by Tetra Tech, ISOTEC proposes to implement as in-situ chemical oxidation (ISCO) pilot test using activated sodium persulfate (ASP) delivered into the subsurface via horizontal injection wells.

1.1 Site Setting and Design Assumptions

The subject Site has been impacted by petroleum hydrocarbons as a result of historic on-site operations. The Site is located on the corner of North 18th Avenue and 1st Avenue North and is currently an active bulk oil facility. Petroleum constituents of concern (COCs) noted at the site include benzene, naphthalene, total purgeable hydrocarbons (TPH), and total extractable hydrocarbons (TEH).

Results from the May 2023 soil sampling event report petroleum hydrocarbon-impacted soils at depths ranging from 2 to 13 feet (ft) below grade surface (bgs). Results from soils collected at soil boring location SB-1 (7.5'-9.5') reported benzene at 0.13 milligrams per kilogram (mg/kg), TPH at 289 mg/kg, TEH at 2,730 mg/kg, C_9-C_{18} aliphatics at 1,390 mg/kg, and C_{11}-C_{22} aromatics at 855 mg/kg.

Groundwater results from the June 2023 sampling event reported dissolved petroleum hydrocarbon exceedances in on-site monitoring wells PO-3 and PO-8. Dissolved concentration exceedances in monitoring well PW-3 included benzene at 4,400 micrograms per liter (ug/L), C_9-C_{10} aromatics at 3,300 ug/L, C_5-C_8 aliphatics at 9,900 ug/L, C_9-C_{12} aliphatics at 2,000 ug/L, TPH at 23,000 ug/L, TEH at 44,000 ug/L, C_9-C_{18} aliphatics at 10,000, C_{19}-C_{36} aliphatics at 2,300, and C_{11}-C_{22} aromatics at 9,500 ug/L.

General subsurface lithology at the site consists of medium to coarse gravel with sand (fill) from grade surface to 1-foot bgs underlain by lean clay to a depth of approximately 4.5 ft bgs. The lean clay unit is underlain by gravel, sand and clayey sand to approximately 20 ft bgs. Depth to water at the Site is approximately 10 ft bgs.

Tetra Tech is proposing an in-situ chemical oxidation (ISCO) injection pilot test using three (3) newly installed horizontal wells to deliver reagents across the smear/vadose zone soils at the Site. The newly installed horizontal will have the added benefit of being able to be utilized as soil vapor extraction wells following the injection(s) to enhance aerobic biodegradation of any residual petroleum hydrocarbons.

The following items are the design assumptions provided Tetra Tech:

- Horizontal Injection Well #1 will consist of approximately 140 linear feet of 2-inch PVC slotted screen placed at approximately 8 ft bgs.
- Horizontal Injection Well #2 will consist of approximately 140 linear feet of 2-inch PVC slotted screen placed at approximately 8 ft bgs.
- Horizontal Injection Well #3 will consist of approximately 90 linear feet of 2-inch PVC slotted screen placed at approximately 8 ft bgs.
- Target treatment interval is the smear/vadose zone present from approximately 8 to 10 ft bgs.

A Conceptual Horizontal Wells Injection Location Map is included as **Figure 1**.

2.0 ISCO TECHNOLOGY OVERVIEW

ISOTEC is proposing utilizing Activated Sodium Persulfate (ASP) for the impacted smear zone and vadose zone soils.

2.1 Activated Sodium Persulfate (ASP)

The activated sodium persulfate process utilizes sodium persulfate ($Na_2S_2O_8$) oxidant activated using various methods to produce sulfate free radicals and other reactive species. The activators include a proprietary carbohydrate, chelated iron catalyst[1], alkali (e.g., sodium hydroxide [NaOH]), heat, hydrogen peroxide or combinations of each. The reaction mechanism associated with the activated sodium persulfate process is shown below.

$S_2O_8^{2-} + Activator \leftrightarrow 2SO_4^{\bullet-}$

$S_2O_8^{2-}$ = Sodium persulfate

$SO_4^{\bullet-}$ = Sulfate free radical

Activator = Chelated Iron catalyst, Hydrogen Peroxide, Carbohydrates, or Sodium Hydroxide

ISOTEC is proposing **sodium persulfate activation via food grade carbohydrates (CHASP)** for the ISCO Pilot Test based on ISOTEC's experience at treating petroleum hydrocarbon-impacted vadose zone soils (see **Attachment A**). The components of the CHASP technology are presented in **Table 1** below.

Table 1: CHASP Technology Proposed for the Smear/Vadose Zone

Technology	Reagent Components
CHASP	Sodium Persulfate
	Food Grade Carbohydrates
	Sodium Hydroxide

Activation will be achieved via food grade carbohydrates in the presence of slight alkalinity (i.e. sodium hydroxide). Sodium persulfate is a more persistent oxidant (weeks to months) compared with hydrogen peroxide (hours to days). In addition, sodium persulfate is a less reactive oxidant. Applying activated sodium persulfate first will allow the installed wells to be injection tested and to achieve initial degradation of contaminants. In addition, due to the persistence of sodium persulfate and its density greater than water, some persulfate solution will move downward through vadose zone soil to the groundwater, which will deliver persistent oxidant at the water table to treat petroleum hydrocarbons in shallow groundwater and/or those that may sink towards the water table during liquid injection. Additionally, an oxidation reaction product of sodium persulfate is sulfate which can support activity of anaerobic bacteria that biodegrades petroleum hydrocarbons.

3.0 ISCO PILOT TEST PROGRAM

3.1 Implementation Approach

This section provides details for implementing a CHASP pilot test injection event. A 15% sodium persulfate solution blended with carbohydrates and 25% sodium hydroxide will be delivered using 3 newly installed horizontal injection wells. Sodium persulfate and ISOTEC's proprietary carbohydrates will be delivered to the site as a powder in 55.1-pound bags, and sodium hydroxide (NaOH) will be delivered to the site in liquid form as 25% NaOH in 55-gallon poly drums.

The pilot test implementation for the site consists of the following steps:

(a) Mobilization will include procurement and coordination of delivery of the selected ISCO reagents (CHASP). ISOTEC will coordinate with Tetra Tech to have truck deliveries of the reagents to the site.

(b) ISOTEC will unload the remediation amendments and place them within a secure staging location identified by Tetra Tech. ISOTEC will provide secondary containment (with 110% storage capability) to be utilized to store all liquid reagents.

(c) A diesel- or gas-powered air compressor will be mobilized to the site to operate the dual diaphragm injection pumps. The compressor will be located at a designated location by the property manager.

(d) The chemical mixing area and the active injection area will be surrounded by safety cones, delineators, and/or caution tape to establish barriers and delineation of active remediation area.

(e) The CHASP reagents will be diluted as described in **Table 2** below, with final dosages to be determined in consultation with Tetra Tech.

(f) The injection wells will initially receive 200 to 300 gallons of water as a wetting effect. After performing initial water injections, the ISCO solution will be injected into each injection well until the proposed volume is reached. A final water flush of 200 to 300 gallons will then be conducted.

(g) ISOTEC anticipates using dual diaphragm pumps for injections. ISOTEC will mobilize enough equipment and pumps to the site capable of achieving the estimated injection volume and equipment to inject into 2 to 3 injection wells simultaneously.

(h) Based on the site geology description provided by Tetra Tech and previous ISOTEC injection experience at a nearby site in Billings, anticipated injection flow rates of 3 to 5 gallons per minute are assumed.

Table 2: CHASP Solution Injected into the Smear/Vadose Zone Design

Horizontal Well	Injection Screen Length (feet)	Injection Screen Depth (ft bgs)	Initial Flush Water Volume [1] (gallons)	Total Reagent Volume[1] (gallons)	Final Flush Water Volume[1] (gallons)	Sodium Persulfate (lbs)	CHASP Concentration
1	~140	~8	200 - 300	1,800	200 - 300	~2,479	15%
2	~140	~8	200 - 300	1,800	200 - 300	~2,479	15%
3	~90	~8	150 - 250	1,200	150 - 250	~1,653	15%

Notes:

1. The total volume (CHASP solution and water flushes) for each of the 3 injection wells equates to approximately 25% of the pore volume.
2. The actual volume injected will depend upon the permeability of the target zones, injection flow rate, and injection pressures noted during injections.
3. The above treatment duration assumes injection of the CHASP solution at 15% concentration. Concentrations may be increased to reduce injection volume if the site is unable to accept the targeted injection volume per day.

(i) Equipment will be stored within a locked box truck.

(j) Tetra Tech will be responsible for coordinating with the site owner/ property manager for access to the target area (for equipment and chemical storage) for the duration of the treatment program.

(k) Field decisions regarding injection volumes will be based on the subsurface intake, radial effects noted during injection, and the distance of the injection well from the nearest monitoring well. ISOTEC will relay to Tetra Tech any concerns or suggestions regarding changes to the project scope. Final decisions related to project scope changes will be the responsibility of Tetra Tech.

3.2 Monitoring

During field implementation, ISOTEC will periodically monitor nearby wells within the treatment area to assess radial distribution from the injections by monitoring for sodium persulfate, dissolved oxygen, oxidation reduction potential (DO), specific conductivity, and pH.

For the purpose of this proposal, baseline, interim and post-treatment performance monitoring is assumed to be performed by Tetra Tech.

3.3 Reporting

During the treatment program, ISOTEC shall record and provide daily injection summary sheets to Tetra Tech. Information included within the daily reports will include a summary of the daily activities, equipment utilized, hours of onsite personnel, injection logs and photographs taken of field activities. A master injection volume list will be generated following conclusion of the treatment program.

3.4 Health and Safety

ISOTEC processes are some of the safest treatment processes due to the use of stabilized reagents injected in a controlled manner to reduce the possibility of any hazard occurring. The processes have been designed with health and safety as a prime consideration. Most negative effects noted with in-situ oxidation (including well fouling, vapor generation, explosive conditions, etc.) occur with aggressive oxidation reactions utilizing high concentration reagents under high-pressure conditions. These conditions can create a significant temperature rise and an enormous amount of carbon dioxide and/or oxygen off-gas, which can mobilize COCs within the subsurface through volatilization. ISOTEC processes do not utilize this approach. Reagents utilized are stabilized, used at low concentrations, and injected in a controlled manner to reduce the possibility of surface breakout or subsequent migration. Furthermore, based on sites with shallow groundwater, extreme caution must be exercised while injecting reagents as the mounding effect created can raise the groundwater elevation to close proximity of the surface. Again, the stabilized reagents utilized along with control of the injection process limit these concerns. ISOTEC personnel understand the potential dangers associated with the chemical reaction they are creating, and have completed extensive safety training. As with any activity, by applying safety measures, plus understanding how a process works, limits the potential for any

misfortune. **ISOTEC has not had a significant health and safety incident in over 27 years of field application.**

A site-specific health and safety plan will be prepared and submitted under separate cover prior to field mobilization. This plan discusses safety monitoring procedures, material handling, storage procedures, etc. Daily health and safety tailgate meetings will be held at the ISOTEC trailer prior to start of field activities. All members of the injection team have completed health and safety training consistent with the Occupational Safety and Health Act (Title 29 of the Code of Federal Regulations 1910.120) with current certificates. The site supervisor has completed an additional eight hours of OSHA supervisor training. All employees receive an annual physical, drug screening and 8-hour safety refresher course. In addition, all employees have also completed loss prevention system (LPS) training with current annual refresher, cardiopulmonary resuscitation training (CPR), and Transportation Worker Identification Credential (TWIC) training with complete fingerprinting and background checks.

4.0 PROJECT SCHEDULE

The injection event is estimated to be completed in 3 injection days excluding mobilization and demobilization, which may add one day before injection and one day after injection. Alternate injection volumes and implementation strategies may alter the estimated project schedule. Costs assume working during normal business hours Monday-Sunday.

5.0 LIST OF ASSUMPTIONS & EXCEPTIONS

Besides the technical design assumptions stated in **Section 3.0**, the following items are excluded from the estimated costs listed in **Section 6.0** below and are assumed to be the responsibility of Tetra Tech.

- Site access, injection permits, road closures and traffic control.
- Installation and development of the three (3) horizontal wells.
- Water supply
- Private utility locator (if required)
- Temporary fencing for reagent storage (if needed).
- Baseline and post-treatment performance monitoring and analysis.
- Any investigative derived waste (IDW), collected daylighted liquid and/or hazardous materials over the course of the injections or following the injection program will be collected, stored and handled by Tetra Tech.

6.0 ESTIMATED PROJECT COSTS

Costs associated with the ISCO pilot test injection event are provided below.

ESTIMATED PILOT TEST INJECTION EVENT COSTS	
Mobilization/Demobilization	**$7,547.00**
Injection Services • Inject into three (3) horizontal injection wells for up to three (3) injection days. • Field Implementation – includes site supervisor and field technician(s). • Air compressor, forklift, injection pumps and hoses, secondary containment, daily reporting, and per diem. • Project management/ Reporting.	**$15,849.00**
CHASP Reagents • Procurement and delivery of sodium persulfate, 25% sodium hydroxide and carbohydrates. Cost includes disposal and removal of reagent containers, pallets and drums.	**$13,300.00**
TOTAL	**$36,696.00**

6.1 Standard Terms and Conditions

1. The above quote is not a guaranteed price to clean up the contamination noted at the referenced site. The number of ISOTEC treatments will be dependent on the amount of contamination and site geology. The higher the concentration of contamination and the tighter the geology, the greater the number of necessary treatments.
2. A typical ISOTEC treatment program is performed over multiple injection events to allow for (a) any desorbed contamination or converted product from the first injection event to be readily attacked during the second injection event, and (b) make changes to the reagent stoichiometry and/or injection approach based on lessons learned from previous events.
3. Treatment program reagent volumes and concentrations presented within this proposal are based on information provided within the RFP. Alternative reagent volumes and concentrations will require a change order.
4. Scheduling is based on a first come first serve basis, with an authorized proposal (or subcontract) being the primary basis for scheduling, followed by payment history. ISOTEC will not schedule fieldwork without an authorized proposal (or subcontract), or outstanding receivables over 30 days.
5. Work to be performed in modified Level D personal protective equipment (PPE). Higher-level PPE requires a change order for additional costs associated with such.
6. Regulatory approval will be the responsibility of Client.
7. Site monitoring and pre and post treatment sampling will be the responsibility of Client.
8. Cancellation of a scheduled treatment program within 3 weeks of authorized program start will be subject to a $7,500 cancellation fee.
9. ISOTEC will require an on-site source (within 200 feet) of water supply (10 gpm minimum) to perform treatment program activities. Access and costs associated with this request will be provided/ incurred by the Client and/or Property Owner.

10. ISOTEC will require adequate and secure staging areas for chemical preparation and storage.
11. Traffic control, if required will be the responsibility of Client.
12. Work performed will be completed during regular business hours between 8 AM and 5 PM (8-hour days). Alternative scheduling will require a change order.
13. Disposal of hazardous wastes and/or reagents collected will be handled by the client. The potential for reagent channeling along utility corridors and other preferential pathways exists with any injection program. ISOTEC is not responsible for seepage or surfacing of reagents and/or hazardous materials into any utility corridor, subsurface collection system or other preferential pathway, nor any costs associated with collection and disposal of such.
14. Price quotations are valid for 90 days. An initial invoice for reagent procurement will be issued upon approval and authorization of this proposal. Payment terms for this initial invoice is net 30 days. Remaining balance invoices will be submitted monthly proportional to the amount of work performed. Payment terms are net 30 days (unless other terms and conditions apply), 1.5% interest per month will be added to any outstanding balances that exceed 60 days. Any legal or other costs incurred in collecting delinquent amounts shall be incurred by the Client.
15. Information included within this proposal is to be considered confidential and for Client use only without written authorization by ISOTEC.
16. Without the prior consent of ISOTEC, Client and any affiliated or related companies will not for a period of 2 years from the date of this proposal and/or signed contract, directly or indirectly solicit for employment or engage as a consultant any person who is now employed by ISOTEC.

7.0 ACKNOWLEDGEMENT

Please acknowledge that you have reviewed this proposal and terms. If acceptable, please sign below and return to ISOTEC.

ACKNOWLEDGED AND ACCEPTED:

(Signature)	(Date)
(Name, Title)	(Company & Address)

FIGURES

LEGEND

Horizontal Injection Well Location

0 20 40

1 INCH = 40 FEET

NOTES:

1.) Base map provided by TetraTech.

In-Situ Oxidative Technologies, Inc.

ISOTEC

CONCEPTUAL HORIZONTAL INJECTION WELL
LOCATION MAP
ISCO PILOT TEST PROGRAM
Pelican Bulk Oil Plant
Billings, Montana

DRAWN BY: TE	DATE: 04/01/2024	FIGURE 1
CHECKED BY: PD	PROPOSAL NO: 803340	

ATTACHMENT A

ISCO

Project Summary

In-Situ Chemical Oxidation for Home Heating Oil Release

ISOTEC

Case Study 127

Location: Lowell, MA

Site Setting: Residential

Contaminant: Heating Oil

Treatment Area: ~300 ft^2

Treatment Interval: 1 - 5 ft bgs

Lithology: fine sand and siltl

Remedy Approach:

- ISCO: Carbohydrate Activated Sodium Persulfate
- 14 Injection Wells
- 2 Injection Events (February & June 2023)

Remediation Results:

- All soil samples collected under the basement were below Massachusetts criteria after 2nd ISCO injection.
-

INTRODUCTION

A former fuel oil above ground storage tank (AST) released approximately 40 gallons of fuel into a residential basement. Some of the fuel was sorbed up and removed through sorption mats; however, no soil was removed for disposal. Soil samples collected below the basement floor detected residual petroleum hydrocarbons above Massachusetts Contingency Plan (MCP) criteria. The depth to groundwater is 5 to 6 feet below the basement, and groundwater samples showed only trace to no petroleum hydrocarbon concentrations. A sub-slab depressurization system was installed. In-situ chemical oxidation (ISCO) was selected for treatment of petroleum hydrocarbons in unsaturated soils beneath the basement.

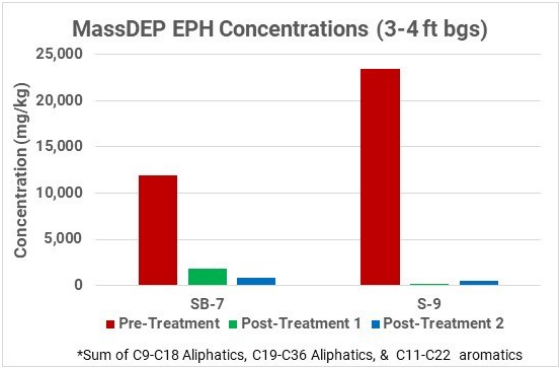
TREATMENT PROGRAM AND IMPLEMEMENTATION

A network of 14 injection wells (1" PVC) were installed in the basement using a hand-held auger driller. Injection wells had screen intervals of 1-4 and 1-5 feet bgs. Sodium persulfate was selected as the oxidant for its longevity and effectiveness for treatment of petroleum hydrocarbons. In addition, it was assumed that some persulfate solution would sink out of vadose zone soil to the groundwater, which will provide persistent oxidant at the water table to treat petroleum hydrocarbons in shallow groundwater and contamination that may sink towards the water table during liquid injection. Oxidant batching and injection pumping were performed in a small box truck parked outside of the residence. Injection hoses were run through a basement window. Two injection events were completed approximately 4 months apart.

RESULTS

Soil samples were collected 3 months after each ISCO injection at corresponding locations to baseline soil samples. After the second ISCO event, all soil samples collected under the basement were below Massachusetts criteria.

No adverse impacts to groundwater quality were observed as a result of ISCO injections in unsaturated soils. The project represents a successful combined remedy of vapor extraction (via the SSDS) and ISCO for treatment of unsaturated, fuel oil impacted soils.



Southern California Center	Southeast Regional Center	Western Regional Center	Northeast Regional Center	Headquarters
San Diego, CA	Atlanta, GA	Denver, CO	Boston, MA	Lawrenceville, NJ
(714) 701-8530	(470) 552-3720	(303) 843-9079	(617) 964-0945	(609) 275 - 8500

TETRA TECH

ATTACHMENT C

Estimated Costs

TETRA TECH

ATTACHMENT D

Work Authorization #6

TETRA TECH

WORK AUTHORIZATION

TO: *Pelican Oil Company*

FROM: Tetra Tech, Inc.

WORK AUTHORIZATION NO.: *6*

PROJECT TITLE: *2024 Additional Corrective Action*

PROJECT LOCATION: *Pelican Bulk Plant at 7 North 18th Street, Billings, Montana*

Pursuant to the terms and conditions of the Consulting Services Agreement dated *February 5, 2019*, this Work Authorization hereby authorizes Tetra Tech to perform the specific services and under the particular conditions set forth herein:

1. **SCOPE OF WORK:** Per the Scope of Work attachment hereto.
2. **COMPENSATION:** *Time and materials in Attachment C of this work plan.*
3. **BILLING SCHEDULE:** *Monthly*
4. **TIME FOR COMMENCEMENT:** *May 2024*
5. **TIME FOR COMPLETION:** *April 2025*
6. **REPORTING REQUIREMENTS:** *Report*
7. **OTHER PROVISIONS:** *None*

Upon execution of this Work Authorization, Client and Tetra Tech agree to bound by and comply with all the terms and conditions contained in the above referenced Consulting Services Agreement, except as modified by the specific terms and conditions, if any, contained herein.

APPROVED AND ACCEPTED BY:

Pelican Oil Company (Client)	Tetra Tech, Inc. (Consultant)
Signed: _____	Signed: _____
Name: _____	Name: Austin Maphis
Title: _____	Title: Project Manager
Date: _____	Date: 5/16/24
Phone: _____	