

ISCR/EAB PILOT TEST RESULTS
AND ENGINEERING DESIGN
HERS Industrial Park, Mukilteo, Washington
Prepared for: Russell Road Industrial Park, LLC

Project No. 140252 • August 26, 2024 FINAL



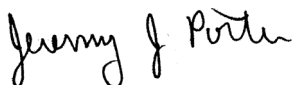
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Contents

Acronyms	iii
1 Introduction	1
2 Pre-Pilot Test Monitoring Results	2
2.1 Quarterly Groundwater Monitoring.....	2
2.1.1 Geology and Hydrogeology	2
2.1.2 Groundwater Monitoring Results.....	2
2.2 Soil Gas Sampling	3
2.2.1 Soil Gas Sampling Results	3
3 Pilot Test Summary	4
3.1 Pre-Injection Activities	4
3.2 Injection Implementation.....	5
3.3 Operational Monitoring	6
3.4 Performance Monitoring	7
3.4.1 Geochemical Results.....	7
3.4.2 cVOC Results.....	8
3.5 Pilot Test Conclusions	9
4 Full Scale Remedial Injection Work Plan.....	11
4.1 Pre-Injection Activities	11
4.1.1 Roles and Responsibilities.....	11
4.1.2 Utility Clearance	11
4.1.3 Baseline Groundwater Monitoring.....	12
4.2 Remedial Injection Design	12
4.2.1 Reagent Selection	12
4.2.2 Injection Layout and Volume.....	12
4.2.3 Treatment Mixture Design.....	13
4.2.4 Drilling and Injection Methods.....	13
4.3 Monitoring.....	14
4.3.1 Operation Monitoring	14
4.3.2 Performance Monitoring.....	15
4.4 Remediation- and Investigation-Derived Waste Management	15
5 References	16
6 Limitations	17

List of Tables

- 1 Groundwater Elevations
- 2 Groundwater Analytical Data
- 3 Soil Gas Analytical Data
- 4 Injection Point Summary
- 5 Breakthrough Monitoring Summary
- 6 Performance Monitoring Results
- 7 Full Scale Injection Design
- 8 Full Scale Performance Monitoring Schedule

List of Figures

- 1 Vicinity Map
- 2 Site Plan and Hydrogeologic Conditions
- 3 Pilot Test Summary
- 4 Full Scale Injection Layout

List of Appendices

- A Laboratory Reports
- B Injection Logs
- C Groundwater Level Logs
- D Breakthrough Monitoring Logs
- E Report Limitations and Guidelines for Use

Acronyms

3DME	3D Microemulsion
Aspect	Aspect Consulting, LLC
cDCE	cis-1,2 dichloroethene
cVOC	chlorinated volatile organic compound
EAB	enhanced anaerobic bioremediation
Ecology	Washington Department of Ecology
EPA	Environmental Protection Agency
gal	Gallon
gpm	gallons per minute
ISCR	In Situ Chemical Reduction
mg/L	milligrams per liter
MTCA	Model Toxics Control Act
PCE	tetrachloroethylene
RRIP	Russell Road Industrial Park LLC
ROI	radius of influence
SMZVI	Sulfidated Micro-Zero-Valent Iron
TCE	trichloroethylene
VC	vinyl chloride

1 Introduction

Aspect Consulting (Aspect) has prepared this In Situ Chemical Reduction (ISCR)/Enhanced Anaerobic Bioremediation (ESB) Pilot Test (Pilot Test) Results and Engineering Design Report (EDR) for the Russell Road Industrial Park LLC (RRIP) property located at 4403 Russell Road in Mukilteo, Washington (the Property; Figure 1). RRIP is conducting a cleanup of the Property under the Washington State Department of Ecology (Ecology) Voluntary Cleanup Program (VCP). The site, where contamination released at the Property has come to be located, includes the Property and portions of adjacent properties (collectively referred to as the Site; VCP Site number NW1554). The purpose of the Pilot Test was to evaluate the ISCR technology identified as the primary element of the preferred cleanup alternative in the “Revised Focused Feasibility Study” (Aspect, 2021) and to reduce chlorinated volatile organic compound (cVOC) concentrations in Site groundwater. The objectives and planned methods of the Pilot Test were described in detailed in the Pilot Test Work Plan (Work Plan; Aspect, 2023).

Section 2 of this EDR summarizes the results of the additional environmental monitoring recommended by Ecology in February 2022 (Ecology, 2022) to assess the plume boundaries and potential vapor pathways at the Site. Section 3 summarizes results of the Pilot Test, including implementation methods, data collected, results, and how results were used to design full-scale in situ groundwater treatment at the Site. Section 4 provides full-scale injection design recommendations.

2 Pre-Pilot Test Monitoring Results

In February 2022, Ecology recommended quarterly groundwater monitoring at MW-16D, MW-22, and MW-23 to assess the plume boundaries, and resampling of SS-1 and SG-1 to assess the potential vapor pathway at the Site. This section details the additional monitoring conducted by Aspect in 2022 to 2023.

2.1 Quarterly Groundwater Monitoring

Groundwater monitoring was completed at the Site between May 2022 to March 2023 to assess groundwater conditions in monitoring wells MW-16D, MW-22, and MW-23. Prior to groundwater sampling, depth-to-groundwater measurements were collected from the 3 monitoring wells using a water level meter. Groundwater sampling was conducted at each well using a peristaltic pump, dedicated tubing, and standard low-flow groundwater sampling techniques.

Following stabilization of field parameters (temperature, specific conductance, dissolved oxygen, pH, oxidation-reduction potential, and turbidity), groundwater samples were collected directly into laboratory-supplied sample containers from the pump tubing discharge, placed on ice in a cooler, and maintained under chain-of-custody protocols until they were delivered to Friedman and Bruya, Inc. in Seattle, Washington (Friedman and Bruya). Groundwater samples were analyzed for tetrachloroethene (PCE) and trichloroethene (TCE) by Environmental Protection Agency (EPA) Method 8260C.

2.1.1 Geology and Hydrogeology

The project Site is located in the Puget Lowland region, characterized by heterogenous, glacially deposited sediments within a large topographic basin. The Site geology consists of Late Pleistocene glacially consolidated Vashon Till overlaying advanced outwash deposits (Yount et al., 1993). During investigations at the site, the following soils were observed: fill from the ground surface to approximately 5 feet below ground surface (bgs), generally consisting of silty sand; glacial till to a maximum depth of 177 feet bgs, consisting of a dense, heterogenous well-graded mixture of silt, sand, and gravel; and advance outwash deposits at 177 feet bgs extending to a thickness of 120 to 160 feet, characterized by poorly graded and well-stratified gravel and sand and silt and clay. The till unit consists of weathered glacial till to an approximate depth of 15 feet, with denser unweathered glacial till beneath. Groundwater occurs as a perched zone above and within the glacial till. Groundwater above the unweathered glacial till occurs at depths ranging from 2 to 7 feet and is likely influenced by the stormwater infiltration system. The general direction of groundwater flow is to the north-northwest. Groundwater contours as measured in March 2023 appear on Figure 2.

2.1.2 Groundwater Monitoring Results

The quarterly groundwater sampling results at the two lateral boundary monitoring wells, MW-22, and MW-23, indicated that PCE and TCE were not detected above the laboratory reporting limits. TCE was detected at MW-16 above the Models Toxics Control Act (MTCA) Method A cleanup level for groundwater, but at concentrations below previous sampling events.

2.2 Soil Gas Sampling

Soil gas sampling was performed on May 19, 2022, in general accordance with the Guidance for Evaluating Soil Vapor Intrusion in *Washington State: Investigation and Remedial Action* (Ecology, 2022).

Two soil gas samples (SG-1 & SS-1) were collected at locations shown on Figure 2. Temporary vapor pins were installed at each location: At SS-1 by drilling a 5/8-inch hole through the concrete slab to collect a subslab soil gas sample; and at SG-1 by drilling through the asphalt pavement and three feet further into the soil (maximum practicable depth of the sampling equipment). At both locations, the hole was then cleaned using a brush and vacuum, and a silicon seal was applied between the vapor pin and the clean hole. Following sample collection, the vapor pin was removed, and the hole patched with rapid-set concrete.

The subslab soil gas samples were collected using a laboratory-supplied, evacuated, 1-liter (L) SUMMA canister with 150 milliliter per minute (mL/min) flow controller, according to the following procedure:

- A shut-in test was performed by inducing a vacuum to the sampling train (including Teflon tubing up to the vapor pin, fittings, and connections to the SUMMA canister), and applying a minimum vacuum of 20 inches of mercury for a period of 5 minutes. No change in vacuum was observed during the shut-in test.
- The vapor pin was then enclosed in a leak-testing shroud and helium tracer gas was applied until a minimum of 30 percent helium was measured inside the shroud. Approximately 700 mL of subslab vapor was purged through each vapor pin, after which the purged subslab vapor was measured for helium with a handheld helium meter in order to verify integrity of the silicon seal between the vapor pin and concrete slab.
- After confirming that no significant leakage was present in the sampling train or around the vapor pin seal, the SUMMA canister was opened and allowed to fill at 150 mL/min over approximately 5 minutes until the canister vacuum reached -5 inches of mercury.

Samples were transferred under appropriate chain-of-custody documentation to Friedman and Bruya, and analyzed using EPA Method TO-15 for volatile organic compounds (VOCs).

2.2.1 Soil Gas Sampling Results

The analytical results of the subslab soil gas sampling were compared to the MTCA Method B screening levels and are summarized in Table 3. No VOCs were detected at either SG-1 or SS-1 at concentrations exceeding their respective MTCA Method B screening levels (Table 3). Laboratory reports are included in Appendix A.

3 Pilot Test Summary

This section describes the methods and results of the in situ injection Pilot Test. Figure 4 shows the Pilot Test layout, including injection and monitoring locations. The Pilot Test was designed based on the following objectives:

1. Evaluate ability to deliver and distribute reagent in the Shallow groundwater zone.
2. Reduce cVOC concentrations in the source area.
3. Estimate design parameters for implementing ISCR.
4. Evaluate performance downgradient of the injection points.
5. Evaluate ability to manage secondary effects.

These objectives serve as the basis for performance evaluation during the Pilot Test.

The Pilot Test was conducted in accordance with the Work Plan except as noted in this EDR. All Pilot Test objectives were accomplished.

3.1 Pre-Injection Activities

Aspect conducted a utility survey prior to initiation of subsurface work. The utility survey included a public and private utility locate and a review of available public and/or private as-built drawings. Based on the findings of the utility locates, the proposed injection points were not in conflict with the existing utilities.

During the utility locate, a hand-held global positioning satellite (GPS) receiver was used to record the coordinates of each Pilot Test monitoring well. Injection locations were adjusted based on the field-verified well locations, with the objective of maintaining the planned distance between injection locations and breakthrough monitoring wells. The updated well and injection locations are reflected on figures 2-4 in this report, and completed injection point locations are shown on Figure 3.

Select monitoring wells in and downgradient of the planned injection area were sampled prior to injection to establish baseline conditions for performance evaluations (see Table 6). Monitoring wells MW-1, MW-11, MW-12, MW-16, MW-20, and MW-21 were sampled during baseline monitoring. Groundwater sampling was conducted at each well using a peristaltic pump, dedicated tubing, and standard low-flow groundwater sampling techniques.

Following stabilization of field parameters (temperature, specific conductance, dissolved oxygen, pH, oxidation-reduction potential, and turbidity), groundwater samples were collected directly into laboratory-supplied sample containers from the pump tubing discharge, placed on ice in a cooler, and maintained under chain-of-custody protocols until they were delivered to Friedman and Bruya. Samples were analyzed in accordance with Pilot Test Work Plan (Aspect, 2023).

3.2 Injection Implementation

Direct-push injection activities were performed from June 26 through June 28, 2023. The Work Plan proposed 4 injection points (IP-1 through IP-4) spaced 11 feet on-center, with a target radius of influence (ROI) of 7 feet. The Work Plan specified a total of 1,000 pounds (67 gallons (gal)) of Regenesys' Sulfidated Micro Zero Valent Iron (SMZVI), 800 pounds (96 gal) of Regenesys' three-dimensional microemulsion (3DME), and 3,100 gal clean water to be mixed and injected between 7 and 17 feet bgs across the injection points.

A total of 66.2 gal of SMZVI, 95.1 gal of 3DME, and 2,660.5 gal of water was injected across six injection points. Total reagent and water injection volumes for each point are summarized in Table 4, and detailed volumes per injection interval can be found in the injection logs provided in Appendix B.

Surfacing and Step-outs. Total volume injected at each point varied due to the occurrence of injection fluid seeping out of the ground surface (i.e., surfacing) during injections. When surfacing could not be controlled by a reduction in flow rate, injection at that location was stopped, and a new location was advanced nearby (i.e., a 'step-out'), and the remaining intervals were injected at the step-out location. Step-outs were also conducted when direct-push rods met refusal above the target depth. Original and step-out locations that received injection fluid are indicated by "-a" and "-b".

Adaptive Implementation. As the injection progressed, total injection volumes per point were reduced to mitigate surfacing. This was accomplished by reducing the ratio of water used in the mixture while maintaining the total reagent per location. IP-1, IP-3, and IP-4 were implemented using the original design, and IP-2 was implemented using the revised design. Total volumes of reagent and water are shown in Table 4.

Flow Rates and Pressures. The target range of injection flow rates was 3 to 8 gallons per minute (gpm). This was achieved through application of injection pressures ranging from 10 to 200 pounds per square inch (psi). Pressures were generally consistent except at total depth or depth of refusal in the weathered consolidated glacial till, where pressures were substantially higher. Pumping pressures and flow rates were generally reduced when surfacing was observed.

Drilling Refusal. Depth of direct-push rod refusal occurred at IP-4a (13 ft bgs), and at IP-4b (14.5 ft bgs). 1-foot step-outs were generally effective at achieving target depth, verifying the understanding that the depth to surface of the weathered till varies vertically and laterally on the foot-scale.

Equipment. Direct-push injection tooling and rods were advanced using a Geoprobe® 7800-series drill rig. The injection slurry was initially mixed into two 250-gallon vat-style mixers with two sets of propellers per vat. The slurry was pumped to the injection points using a hydra-cell pump with a pressure gauge located at the top of the injection casing.

Injection Tooling and Approach. Multiple combinations of injection tooling and approaches were evaluated to determine applicability at the Site. Injections were

performed either by pushing the tooling to the bottom of the target injection depth interval and injecting intervals sequentially from bottom to top (“bottom-up”), or pushing to the top of the target interval and injecting intervals from top to bottom (“top-down”). The following approaches were tested:

- Bottom-up approach with a 2-foot retractable-screen tool
- Top-down approach with a 2-foot retractable-screen tool
- Bottom-up approach with a 6-inch pressure activated tool with integrated check valve

The Pilot Test verified that injection and emplacement of the injection slurry was feasible when employing appropriate equipment and methods. The following equipment and methods were found to be most effective:

- Geoprobe 7800 drill rig
- Two 250-gallon vat-style mixers
- Hydra-cell diaphragm pump
- Retractable-screen injection tooling
- Bottom-up injection approach
- Avoid injecting into adjacent points sequentially to allow subsurface pressurization to dissipate

3.3 Operational Monitoring

Operational monitoring was conducted during injections to evaluate reagent distribution and hydraulic response in real-time. Hydraulic response was evaluated by measuring water levels in injection-area wells at the beginning and end of each day, in accordance with the Work Plan. Reagent distribution was evaluated by conducting breakthrough monitoring, which consisted of purging groundwater from the groundwater monitoring well closest to an active injection point and collecting groundwater quality field parameter measurements, visual observations of the purge water, and by measuring water level changes in the well. Breakthrough monitoring data is summarized in Table 5, water level logs are provided in Appendix C, and data table outputs from the field parameter data loggers are provided in Appendix D.

Breakthrough was observed at all four monitored wells, as indicated by visual observation of the cloudy, black injection fluid, and rapid changes in groundwater quality field parameters.

Mobile porosity is a parameter that defines the relationship between an injection volume and the distance the injection fluid travels (i.e., the ROI). Connected void space within soil media, fractures formed in the soil during injection, and pre-existing preferential pathways are forms of mobile porosity that influence how injection fluid flows. An estimate of mobile porosity considers all of these influences and can vary locally

depending on subsurface conditions. Breakthrough monitoring, while useful to evaluate overall trends, does not provide an exact or precise means of measuring mobile porosity.

Mobile porosities from the Pilot Test were estimated based on breakthrough monitoring results to inform the full-scale injection design. The cumulative volume that had been injected at each point at the time of breakthrough was used to estimate a mobile porosity of injection using the following equation:

$$r_{inj} = \sqrt{\frac{V_{inj}}{\pi \times h \times \theta_m}}$$

where

h is the injection zone thickness (normally the length of the injection well screen)

θ_m is the mobile porosity

V_{inj} is the injected volume

Estimated mobile porosities ranged from 1.1% to 9.7%, averaging 4.1%. This confirmed that the 7% mobile porosity used in the Pilot Test design was sufficiently conservative.

3.4 Performance Monitoring

Performance monitoring consisted of groundwater sampling prior to injections to establish a baseline, and subsequently over a 12-month period following injections, and was conducted in accordance with the Work Plan. Monitoring wells MW-1, MW-11, MW-12, and MW-16 were sampled after 3 months, 6 months, and 12 months, and were analyzed for cVOCs and geochemical parameters. MW-20 and MW-21, which were further downgradient, were sampled less frequently and analyzed only for cVOCs.

Performance monitoring analytical results are provided in Table 6 and laboratory analytical reports are provided in Appendix A. Complete historical cVOC analytical results are provided in Table 2. Performance Monitoring and Operational Monitoring locations are shown on Figure 3, which compares baseline results with 12-month results.

3.4.1 Geochemical Results

Geochemical analytical results were examined for the following trends, which consistently indicate maintenance or enhancement of reducing conditions and degradation of cVOCs:

- Low dissolved oxygen, nitrate, and sulfate concentration results during the baseline event indicate that groundwater was geochemically reducing prior to the Pilot Test.
- Increased total organic carbon (TOC) and dissolved iron concentrations in MW-01, MW-12, and MW-16 indicate injected reagent was effectively distributed in the subsurface. Sustained TOC and dissolved iron in MW-12 and MW-16

indicate treatment reagent longevity exceeds 12 months, and treatment is likely to continue until TOC and iron return to baseline concentrations.

- Low or non-detect oxygen, nitrate, and sulfate concentrations, and elevated iron after injections indicate that the treatment reagent enhanced geochemically reducing conditions necessary for cVOC treatment.
- Methane concentrations in and downgradient of the injection area increased temporarily. MTCA does not provide a groundwater cleanup level for methane, so groundwater analytical results were screened against a 10 milligrams per liter (mg/L) screening level suggested by the Indiana Department of Environmental Management (2019) established to evaluate the risk of methane vapor intrusion into nearby buildings. Methane concentrations did not exceed the 10 mg/L.

3.4.2 cVOC Results

cVOC results indicated rapid degradation of cVOCs where reagent distribution was verified. cVOC concentration trends indicate the extent and rate of PCE degradation. Tetrachloroethene (PCE) degrades sequentially to trichloroethene (TCE), cis-1,2 dichloroethene (cDCE), vinyl chloride (VC), ethene and ethane (the sum of which is referred to as ETH). ETH are non-toxic end products that indicate complete degradation of cVOC contaminants. The results of the performance monitoring is as follows:

- **MW-1:** Treatment at MW-1 was demonstrated via decreasing PCE and TCE concentrations and increasing cDCE and VC concentrations. During the baseline monitoring PCE was detected at 6.3 µg/L which decreased and was not detected above laboratory reporting limits by the 6-month monitoring event. TCE was detected at a concentration of 160 µg/L during the baseline monitoring event and decreased and was not detected above laboratory reporting limits by the 6-month monitoring event. Concentrations of cDCE and VC increased after the injections to maximum concentrations of 260 µg/L and 120 µg/L, respectively, indicating ongoing degradation during the performance monitoring. During the 12-month monitoring event, cDCE was not detected above the laboratory reporting limits and VC concentrations had decreased to 0.82 µg/L, indicating complete degradation of cVOCs to non-toxic end products.
- **MW-12:** Treatment at MW-12, 9 feet downgradient of injection point IP-2 and 12 feet downgradient of injection point IP-3, was demonstrated via decreasing PCE and increasing cDCE, VC, and ETH concentrations. During the baseline monitoring PCE was detected at 18 µg/L which decreased after the injections and was not detected above the laboratory reporting limits during the 3-month monitoring event. TCE was detected at a concentration of 26 µg/L during the baseline event and decreased to 0.65 µg/L, which is below the cleanup level. Concentrations of cDCE, VC, and ETH increased after the injections. Concentrations of cDCE increased to 72 µg/L during the 3-month monitoring event before decreasing to 14 µg/L, which is below the cleanup level of 16 µg/L. VC increased to a maximum concentration of 8.1 µg/L during the 6-month monitoring event before decreasing to a concentration of 2.6 µg/L during the 12-month monitoring event.

- **MW-16:** Treatment at MW-16, 5 feet downgradient of injection point IP-1 and 11 feet downgradient of injection point IP-2, was demonstrated via decreasing PCE and increasing cDCE, VC, and ETH concentrations. PCE was detected at 24 µg/L during the baseline monitoring event, and decreased after the injections and was not detected above the laboratory reporting limits by the 3-month monitoring event. TCE was detected at a concentration of 28 µg/L during the baseline monitoring event and decreased after the injections and was not detected above cleanup levels by the 6-month monitoring event. Increases in cDCE and VC indicate ongoing degradation, and increasing ETH concentrations indicate complete cVOC degradation to non-toxic end-products.

Results of the performance monitoring at MW-11, 45 feet downgradient of the injections, MW-21, 80 feet downgradient of the injections, and MW-20, 90 feet downgradient of the injections, showed that relative concentrations of cVOCs remained within the historical ranges, indicating limited water quality response from injections at those distances.

3.5 Pilot Test Conclusions

The Pilot Test results presented in Section 3 led to the following conclusions:

- **The SMZVI reagent can be effectively delivered and distributed in the Shallow groundwater zone.** All of the planned 66.2 gallons of SMZVI and 95.1 gallons of 3DME were injected during the Pilot Test. Operational monitoring results presented in Section 3.3 indicated that while technically challenging to drill and inject, reagent can be distributed effectively in the subsurface using direct-push injection methods.
- **Pilot injections significantly reduced cVOC concentrations in the source area.** Performance monitoring results demonstrate a reduction in PCE and TCE at monitoring wells MW-1, MW-12, and MW-16, and complete dechlorination to ETH of a substantial portion of the original total cVOC mass in groundwater. This significant reduction in source-area cVOC concentrations verify that the selected reagents SMZVI and 3DME effectively treat Site groundwater when well-distributed in the subsurface.
- **Design parameters and specifications for effectively implementing ISCR have been determined.** Injection pressures up to 200 psi were required to inject the SMZVI/3DME mixture at flow rates between 3 to 8 gpm. Based on the consistency of pressure and flow data and the variability in calculated mobile porosities, the mechanism of reagent emplacement is likely to be a combination of permeation and preferential pathways or fracturing along the top of the weathered till. The equipment and methods required for effective implementation include bottom-up injection using retractable-screen injection tools equipped with check valves.

Breakthrough monitoring resulted in an average estimated mobile porosity of 4.1%, demonstrating that the design mobile porosity of 7% used in the Pilot Test was sufficiently conservative. A mobile porosity of 5% is recommended for full-scale injection design because it balances being conservatively high while also

reducing overall injection volumes and therefore implementation effort and likelihood of surfacing.

- **Treatment performance was determined to be limited downgradient of injection points.** During the duration of the Pilot Test, groundwater flow velocity was not high enough to transport treatment reagent or treated groundwater downgradient of the injection area to MW-11, MW-20, and MW-21 in sufficient quantity or time to provide effective treatment; therefore, treatment at these locations will be facilitated by injection locations closer to these wells.
- **Secondary effects are not anticipated to require additional mitigation measures.** The concentrations of ethene and ethane at MW-12 and MW-16 indicate that PCE degradation byproducts (TCE, cis-1,2-dichloroethene [cDCE], and vinyl chloride [VC]) are being degraded completely to non-toxic end products and are not accumulating. Methane concentrations did not exceed the 10 mg/L screening level and began to decrease as reagent as consumed. Secondary effects should be monitored if additional treatment is planned, but no additional mitigation measures are required at this time or during full-scale implementation.

These Pilot Test results were used to inform the full-scale remedial design presented in Section 4.

4 Full Scale Remedial Injection Work Plan

This section presents a Full Scale Remedial Injection Engineering Design (Engineering Design proposing methods and approach for full-scale remedial injections designed to treat the remaining PCE and TCE groundwater contamination. The full-scale injection layout is shown on Figure 4, and the injection mixture design is provided in Table 7.

4.1 Pre-Injection Activities

This section describes the planning and field activities to be performed prior to in situ injections.

4.1.1 Roles and Responsibilities

Environmental Consultant and Engineer (Aspect) – Aspect is the environmental consulting firm operating on behalf of RRIP and is the engineer of record for the in situ injection-based groundwater treatment. On behalf of the Owner, Aspect will obtain injection permits, oversee injection activities, and direct subcontractors.

Drilling and Injection Subcontractor (the Driller) – Aspect will contract a Washington State-licensed driller to implement the reagent injections. The Driller is responsible for providing the necessary injection equipment and implementing the reagent injections according to this Work Plan. The Driller will also be responsible for supplying water and submitting injection point notices of intent to Ecology. Two fire hydrants were identified for potential use during the Pilot Test, and their locations are shown on Figure 2. The Driller shall verify water availability and obtain necessary permission to use hydrants prior to mobilization.

Other Subcontractors – Other subcontractors are necessary to complete Pilot Test activities, including analytical laboratories (Friedman & Bruya), remediation- and investigation-derived waste disposal (DH Environmental), and private utility locator (APS). The reagent vendor (Regenesis) is responsible for supplying the reagent chemistry. The subcontractors will conduct their portion of the PTS activities in accordance with the scope of their subcontract.

4.1.2 Utility Clearance

Prior to initiation of any subsurface work, a utility survey will be performed. At a minimum, this utility survey will include a public utility locate (i.e., “one-call”), a private utility locate, and a review of available public and/or private as-built drawings. Prior to the locates, the proposed injection locations will be identified at the Site. If utility locates indicate potential utilities adjacent to injection locations, a vacuum truck will be mobilized to “clear” proposed boring locations to a shallow depth prior to drilling.

Known utilities in the injection area are shown on Figure 4, but should be considered approximate and for general awareness only. Actual utility markings at the time of this work will be used to determine final drilling locations.

4.1.3 Baseline Groundwater Monitoring

Groundwater monitoring data will be collected to establish baseline conditions for performance evaluation. This monitoring event will include groundwater elevation gauging, sample collection, and laboratory analysis. The following wells will be gauged: MW-16, MW-12, MW-11, MW-21, MW-20, MW-1, MW-7, MW-9, MW-13, MW-15, MW-10, and MW-2. The following wells will be sampled during the baseline monitoring event: MW-16, MW-12, MW-11, MW-21, MW-20, and MW-1. Performance monitoring analytes and monitoring wells are described in detail in Section 4.3.2.

4.2 Remedial Injection Design

The full-scale remedial injection was designed with the objective of reducing the PCE and TCE groundwater concentrations to less than MTCA Method A cleanup levels. The groundwater monitoring results presented in Section 1.1.2 and Pilot Test results presented in Section 2 serve as the primary bases of this Work Plan.

4.2.1 Reagent Selection

As summarized in Section 3.5, the following conclusions were made about the Pilot Test treatment reagents, SMZVI and 3DME:

- The reagents were demonstrated to effectively treat Site cVOCs when distributed sufficiently in the subsurface.
- The reagents could consistently be distributed to an ROI of at least 5 feet, and up to 9 feet.
- Reagent longevity exceeded 12 months.

As a result, SMZI and 3DME were considered effective reagents and were selected for full-scale application.

4.2.2 Injection Layout and Volume

The full-scale injection layout is shown on Figure 5 and includes injection monitoring locations. Treatment mixture will be injected at 13 locations spaced 14 feet center-to-center, in a series of transects. Spacing was increased from 11 feet for the Pilot Test to 14 feet for Full Scale design to reduce the ROI overlap and occurrence of surfacing now that mobile porosity is better understood. The transects were spaced relatively close together because significant downgradient transport of treatment reagent after injection is not anticipated.

The target vertical interval of injection was reduced from 10 feet during the Pilot Test to 8 feet in the Full Scale design based on the frequent surfacing observed during the Pilot Test, and the regular occurrence of meeting refusal above the target depth of 17 feet, which resulted in a shorter saturated thickness. A target injection interval of 8 feet will optimize treatment where concentrations are likely to be highest (bottom of target interval) while also reducing the total injection volume and surfacing.

The injection volumes and treatment mixture design are summarized in Table 7. As demonstrated feasible during the Pilot Test, a target ROI of 7 feet was selected. To

achieve that ROI, the mobile porosity of 5% estimated in Section 3.3 was used to calculate a total volume per point of 460 gal.

4.2.3 Treatment Mixture Design

The full-scale treatment mixture design (Table 7) follows the Pilot Test design closely because where treatment solution was distributed, treatment was effective and reagent lasted over 12 months. The design SZMVI dosing of 0.05% of the treated soil mass was maintained from the Pilot Test design. The 3DME dosing as a percentage of injection volume was increased from 3% to 4% to accommodate the overall reduced injection volume while maintaining the same ratio of SMZVI to 3DME used in the Pilot Test.

4.2.4 Drilling and Injection Methods

This section describes the drilling and injection equipment and methods to be used during the Pilot Test. All injections will be performed via direct-push injection points using a Geoprobe® 7800-series drill rig or equivalent to advance injection rods to target treatment depths. Smaller, lighter-weight rigs may not be able to advance drill rods to the target depth in the weathered till.

The following injection methods and equipment are recommended for full-scale injections based on the Pilot Test conclusions summarized in Section 3.5:

- **Injection Tooling.** Intervals will be injected starting from the bottom using a retractable screen tooling.
- **Injection Sequencing.** Points will be injected one-at-a-time. Points closest to monitoring wells will be injected first to facilitate operational monitoring. Where possible, points will be injected in an alternating pattern so adjacent points are not injected sequentially, to minimize mounding and to minimize “pushing” groundwater from one end of the injection area to the other.
- **Pumps.** A pump capable of generating 300 psi while pumping at 8 gpm is recommended. Injection in weathered, glacially consolidated till routinely requires greater than 200 psi. A diaphragm pump or progressive cavity (e.g., Moyno) pump would be suitable for the consistent flow they generate.
- **Flow and Pressure.** Injections will begin at low pressures (<50 psi) targeting a flow rate between 3 and 8 gpm. Injection pressures will be increased until at least 3 gpm is achieved and decreased if 8 gpm is exceeded. If pressure exceeds 200 psi, pause work and consult with the Aspect project manager. Pressure and flow will be monitored as pressure is adjusted. If flow declines or pressure increases beyond those specified, remaining injection volume for that point may be injected into an adjacent injection interval or offset (i.e., “step-out”) injection locations.
- **High Pressure Injection.** Overall, injection via low pressures is preferred because it generally results in more even distribution of reagent; however, if a flow rate of 1 gpm is not achievable using non-fracturing pressures, hydraulic fracturing of the target interval will be evaluated as a method to achieve reagent delivery and distribution (Suthersan et al., 2017). Fracturing is indicated by a decrease in pressure and a corresponding increase in flow rate.

- **Surfacing.** Injection at a given interval will be slowed if reagent is observed at ground surface. If surfacing cannot be controlled, the injection point may be advanced to the next depth interval to resume injection. If surfacing is observed at multiple intervals, injection may be stopped at that location, and remaining volume for that point may be injected at an offset location if fracturing has not occurred.
- **Injection Point Abandonment.** After injection, direct-push injection points will be abandoned using hydrated bentonite chips or grout in accordance with WAC 173-160-451.

4.3 Monitoring

Monitoring is required to ensure cleanup is performed according to design parameters (operational monitoring) as well as to evaluate treatment performance (performance monitoring). This section describes the methods for operational and performance monitoring of full-scale injections.

4.3.1 Operation Monitoring

Monitoring conducted during injection, referred to as operational monitoring, will be used to determine geochemical and physical response to injections.

- **Injection rate, volume, and pressure.** The injection rate and pressure at each injection point will be monitored continuously by the Driller, and a value for each will be recorded for each interval of injection. Injection pressures will be managed to achieve reasonable injection flow rates (3-8 gpm) and to avoid formation fracturing, if possible. Formation fracturing would be indicated by a loss in pressure and associated increase in injection flow rate. The total of each reagent injected, total volume injected, and total flush water volume per point and per depth interval will also be recorded. A blank injection monitoring log is provided in Appendix B. Additional information regarding expected pressures and flow rates is provided in Section 4.2.4.
- **Water level monitoring.** Water levels will be measured at MW-11, MW-12, MW-13, MW-10, MW-20, and MW-21 at the beginning and end of each day. Before and after completion of each injection point, water levels will be measured at each groundwater monitoring well within 20 feet of the completed point. A blank field log is provided in Appendix B.
- **Breakthrough monitoring.** Breakthrough monitoring is performed during injections to determine the volume of mixture that must be injected for solution to arrive at nearby wells. This volume is used to establish the volume-ROI relationship via calculation of mobile porosity, and may be used to adjust subsequent injection volumes. Breakthrough monitoring will occur during injection into the closest point adjacent to a monitoring well and may be continued at subsequent points if breakthrough is not observed.

Breakthrough monitoring will consist of purging groundwater through an Aqua TROLL 500 at a low (~300 milliliters per minute) flow rate using a peristaltic pump. The Aqua TROLL will be programmed to record field parameters at 1-minute intervals. The purge water will also be visually observed to verify Aqua

TROLL readings. Depth to water will be measured manually using a water level indicator, and the readings will be entered into the Aqua TROLL data table. Aspect will use the data to calculate mobile porosity and verify subsequent injection volumes with the Aspect project manager prior to injection at the subsequent injection locations.

MW-11, MW-20, and MW-21 will be monitored during injection at points within 10 feet of the wells or until breakthrough is observed.

4.3.2 Performance Monitoring

Performance monitoring consisting of groundwater sampling and analysis will be conducted to evaluate reagent distribution, geochemical conditions, cVOC treatment, and secondary effects of treatment. Monitoring wells will be sampled prior to injections, and at regular intervals thereafter. Locations and frequencies are based on their vertical and horizontal proximity to the injection points. The analytes to be evaluated and the sampling locations and frequencies are summarized in Table 8. The duration of monitoring and number and frequency of monitoring events may change based on monitoring results. The following wells will be sampled during the baseline monitoring event, prior to injections: MW-1, MW-16, MW-12, MW-11, MW-21, MW-20, and MW-23.

Groundwater samples will be collected using standard low-flow purging and sampling techniques. The static water level will be measured in each well prior to purging and sampling and field parameters of temperature, pH, electrical conductance (specific conductance), dissolved oxygen, and redox potential will be monitored and recorded during purging.

4.4 Remediation- and Investigation-Derived Waste Management

Drilling, monitoring, and injection work to implement the remedy may generate the following types and quantities of waste, which may contain cVOCs and/or remediation reagents:

- Groundwater purged during operational and performance monitoring (one 55-gallon drum)
- Drilling equipment decontamination water (four 55-gallon drums)
- Excess remediation reagent (not anticipated)
- Injection solution and/or groundwater from surfacing/daylighting during injections (not anticipated)
- Drilling cuttings from injection points (not anticipated)

Waste will be collected and stored on the property in United States Department of Transportation-approved steel drums. The drums will be designated as F-listed hazardous waste pending laboratory analysis and clearly labeled with a description of contents. Water will be segregated and consolidated into the fewest number of drums to the extent possible, to be disposed of off-site in accordance with federal, state, and local regulations.

5 References

- Aspect Consulting, LLC (Aspect), 2021, Revised Focused Feasibility Study, HERS Industrial Park, Mukilteo, Washington, November 2021.
- Aspect Consulting, LLC (Aspect), 2023, Pilot Test Work Plan, HERS Industrial Park, Mukilteo, Washington, February 1, 2023.
- Indiana Department of Environmental Management, 2019, Technical Guidance Document: Addressing Methane at Anaerobic Bioremediation Sites, accessed January 11, 2022, https://www.in.gov/idem/cleanups/files/remediation_tech_guidance_methane_mitigation.pdf.
- Suthersan, S. S., Horst, J., Schnobrich, M., Welty, N., and McDonough, J., 2017, Remediation engineering: design concepts, CRC press.
- Washington State Department of Ecology (Ecology), 2022, Opinion Pursuant to WAC 173-340-515(5) on Remedial Action, HERS Industrial Park, 4403-4480 Russell Road, Mukilteo, Washington, February 9, 2022.
- Washington State Department of Ecology (Ecology), 2022, Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action, Publication No. 09-09-047, dated March 2022.
- Yount, et al., 1993, Geologic Map of Surficial Deposits in the Seattle 30' x 60' Quadrangle, Washington. U.S. Department of the Interior, U.S. Geological Survey.

6 Limitations

Work for this project was performed for Russell Road Industrial Park, LLC (Client), and this report was prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. This report does not represent a legal opinion. No other warranty, expressed or implied, is made.

All reports prepared by Aspect Consulting for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect Consulting. Aspect Consulting's original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

Please refer to Appendix E titled “Report Limitations and Guidelines for Use” for additional information governing the use of this report.

TABLES

Table 1. Groundwater Elevations

Project No. 140252, HERS Industrial, Mukilteo, Washington

Well ID	TOC Elevation ⁽¹⁾ (feet)	Screen Interval ⁽²⁾ (feet bgs)	Date	Depth to Water (feet BTOC)	Groundwater Elevation (feet)
MW-1	549.80	--	3/28/2023	3.63	546.17
MW-2	551.88	--	3/28/2023	4.94	546.94
MW-2D	551.86	--	3/28/2023	162.25	389.61
MW-3	552.06	--	3/28/2023	5.19	546.87
MW-4	552.02	--	3/28/2023	6.86	545.16
MW-5	550.94	--	3/28/2023	5.76	545.18
MW-6	549.62	--	3/28/2023	2.14	547.48
MW-7	549.92	--	3/28/2023	2.56	547.36
MW-8	550.02	--	3/28/2023	2.36	547.66
MW-9	550.02	--	3/28/2023	2.79	547.23
MW-10	550.81	--	3/28/2023	3.39	547.42
MW-11	551.77	--	3/28/2023	4.53	547.24
MW-12	550.87	--	3/28/2023	3.57	547.30
MW-13	550.13	--	3/28/2023	2.78	547.35
MW-15	549.96	--	3/28/2023	3.09	546.87
MW-16	551.62	--	3/28/2023	4.46	547.16
MW-16D	551.67	--	3/28/2023	56.39	495.28
MW-17	549.55	--	3/28/2023	2.26	547.29
MW-18	552.09	--	3/28/2023	4.17	547.92
MW-19	549.25	--	3/28/2023	2.94	546.31
MW-20	549.18	--	3/28/2023	2.42	546.76
MW-21	550.20	--	3/28/2023	3.78	546.42
MW-22	549.17	--	3/28/2023	2.34	546.83
MW-23	547.56	--	3/28/2023	5.81	541.75

Notes:

(1) Feet above mean sea level based on the NAVD88 vertical datum.

(2) Screen interval documented at time of well installation

Definitions:

BGS = below ground surface

BTOC = below top of casing

TOC = top of casing

Table 2. Groundwater Analytical Data

Project No. 140252, HERS Industrial Park, Mukilteo, Washington

Analyte Group		VOCs			
Analyte		Tetrachloroethene (PCE)	Trichloroethene (TCE)	cis-1,2-Dichloroethene (cDCE)	Vinyl Chloride
Unit		ug/L	ug/L	ug/L	ug/L
Screening Levels for Groundwater [†]		5	5	16	0.2
Location	Date				
MW-01	09/01/2005	< 0.2 U	1.3	--	--
	05/01/2006	< 2 U	< 2 U	--	--
	01/01/2007	< 0.2 U	3	--	--
	04/01/2008	< 0.2 U	6.4	--	--
	03/01/2009	< 0.2 U	27	--	--
	09/01/2009	< 2 U	1.1	--	--
	01/01/2012	15	1100	--	--
	01/22/2015	2.3	96	5.2	4.1
	08/10/2015	5.3	200	6.9	4
	04/27/2021	< 1 U	8.9	< 1 U	< 0.2 U
	05/30/2023	6.3	160	4.7	0.97
	09/25/2023	1	67	260	36
	12/28/2023	< 1 U	< 0.5 U	100	120
	05/16/2024	< 1 U	< 0.5 U	< 1 U	0.82
MW-02	01/23/2015	< 1 U	< 1 U	< 1 U	< 0.2 U
	08/11/2015	< 1 U	4.7	< 1 U	< 0.2 U
	10/08/2019	< 1 U	1.7	< 1 U	< 0.2 U
MW-02D	08/10/2015	< 1 U	< 1 U	< 1 U	< 0.2 U
	10/09/2019	< 1 U	< 1 U	< 1 U	< 0.2 U
MW-03	01/22/2015	< 1 U	< 1 U	1.5	< 0.2 U
	08/11/2015	< 1 U	< 1 U	1.5	< 0.2 U
	10/08/2019	< 1 U	< 1 U	< 1 U	< 0.2 U
MW-04	01/22/2015	< 1 U	< 1 U	< 1 U	< 0.2 U
	08/11/2015	< 1 U	< 1 U	< 1 U	< 0.2 U
	10/08/2019	< 1 U	< 1 U	< 1 U	< 0.2 U
MW-05	01/22/2015	< 1 U	< 1 U	< 1 U	< 0.2 U
	08/11/2015	< 1 U	< 1 U	< 1 U	< 0.2 U
	10/07/2019	< 1 U	< 1 U	< 1 U	< 0.2 U
MW-06	01/23/2015	< 1 U	< 1 U	< 1 U	< 0.2 U
	08/11/2015	< 1 U	< 1 U	< 1 U	< 0.2 U
	10/07/2019	< 1 U	< 1 U	< 1 U	< 0.2 U
MW-07	10/01/2005	460	7000	--	--
	05/01/2006	10	21	--	--
	01/01/2007	< 0.2 U	0.22	--	--
	04/01/2008	< 0.2 U	< 0.2 U	--	--
	03/01/2009	< 0.2 U	< 0.2 U	--	--
	09/01/2009	0.33	1	--	--
	01/01/2012	< 0.2 U	< 0.2 U	--	--
	01/28/2015	< 1 U	< 1 U	< 1 U	< 0.2 U
	08/11/2015	< 1 U	< 1 U	< 1 U	< 0.2 U
MW-08	04/27/2021	< 1 U	< 1 U	< 1 U	< 0.2 U
	01/22/2015	< 1 U	< 1 U	< 1 U	< 0.2 U
	08/11/2015	< 1 U	< 1 U	< 1 U	< 0.2 U
MW-09	10/08/2019	< 1 U	< 1 U	< 1 U	< 0.2 U
	01/23/2015	< 1 U	< 1 U	< 1 U	< 0.2 U
	08/11/2015	< 1 U	< 1 U	< 1 U	< 0.2 U
MW-10	04/28/2021	< 1 U	< 1 U	< 1 U	< 0.2 U
	05/01/2006	23	< 2 U	--	--
	01/01/2007	11	0.54	--	--
	04/01/2008	22	0.6	--	--
	03/01/2009	18	0.53	--	--
	09/01/2009	4	< 0.2 U	--	--
	01/01/2012	3.9	< 0.2 U	--	--
	01/22/2015	7.5	< 1 U	< 1 U	< 0.2 U
MW-11	08/10/2015	3.2	< 1 U	< 1 U	< 0.2 U
	04/27/2021	3.5	< 1 U	< 1 U	< 0.2 U
	05/01/2006	58	270	--	--
	01/01/2007	150	700	--	--
	04/01/2008	14	130	--	--
	03/01/2009	8.4	88	--	--
	09/01/2009	220	580	--	--
	01/01/2012	27	130	--	--
	01/28/2015	12	54	7.4	< 0.2 U
MW-11	08/10/2015	69	190	66	1.3
	04/27/2021	3.9	18	1	< 0.2 U
	05/30/2023	4.3	21	1.1	< 0.02 U
	12/28/2023	5.8	23	2.5	0.022
	05/16/2024	5	18	1	< 0.02 U

Table 2. Groundwater Analytical Data

Project No. 140252, HERS Industrial Park, Mukilteo, Washington

Analyte Group		VOCs			
Analyte		Tetrachloroethene (PCE)	Trichloroethene (TCE)	cis-1,2-Dichloroethene (cDCE)	Vinyl Chloride
Unit		ug/L	ug/L	ug/L	ug/L
Screening Levels for Groundwater [†]		5	5	16	0.2
Location	Date				
MW-12	06/01/2006	180	1700	--	--
	01/01/2007	140	480	--	--
	04/01/2008	99	320	--	--
	03/01/2009	85	230	--	--
	09/01/2009	95	230	--	--
	01/01/2012	54	99	--	--
	01/23/2015	14	20	11	0.3
	08/11/2015	28	59	40	2.8
	04/27/2021	14	21	9.6	0.6
	05/30/2023	18	26	15	0.7
	09/25/2023	< 1	1.3	72	2.6
	12/28/2023	< 1 U	< 0.5 U	43	8.1
	05/16/2024	< 1 U	0.65	14	2.6
MW-13	06/01/2006	9	270	--	--
	01/01/2007	11	44	--	--
	04/01/2008	4.2	25	--	--
	04/27/2021	< 1 U	< 1 U	< 1 U	< 0.2 U
MW-15	06/01/2006	< 2 U	26	--	--
	01/01/2007	28	1000	--	--
	04/01/2008	0.26	4.8	--	--
	01/22/2015	< 1 U	1.6	< 1 U	0.69
	08/10/2015	< 1 U	5.8	1.5	0.96
	04/27/2021	< 1 U	1.3	< 1 U	0.41
MW-16	01/23/2015	110	410	270	5.8
	08/11/2015	110	120	290	6.5
	10/09/2019	59	64	140	2.8
	05/30/2023	24	28	66	1.4
	09/25/2023	< 1	0.56	29	0.65
	12/28/2023	< 1 U	< 0.5 U	49	1.2
	05/16/2024	< 1 U	< 0.5 U	58	1.5
MW-16D	04/27/2015	< 1 U	24	1	< 0.2 U
	08/11/2015	< 1 U	10	1.1	< 0.2 U
	10/09/2019	< 1 U	2.4	< 1 U	< 0.2 U
	04/28/2021	1.6	30	3.2	< 0.2 U
	05/20/2022	< 1 U	13	--	--
	08/16/2022	< 1 U	11	--	--
	01/05/2023	< 1 U	11	< 1 U	< 0.02 U
	03/28/2023	< 1 U	12	--	--
MW-17	01/23/2015	< 1 U	< 1 U	< 1 U	< 0.2 U
	08/10/2015	< 1 U	< 1 U	< 1 U	< 0.2 U
	10/07/2019	< 1 U	< 1 U	< 1 U	< 0.2 U
MW-18	01/23/2015	1.2	< 1 U	< 1 U	< 0.2 U
	08/11/2015	< 1 U	< 1 U	< 1 U	< 0.2 U
	10/07/2019	1	< 1 U	< 1 U	< 0.2 U
MW-19	01/23/2015	< 1 U	< 1 U	< 1 U	< 0.2 U
	08/11/2015	< 1 U	1.2	< 1 U	< 0.2 U
	10/08/2019	< 1 U	< 1 U	< 1 U	< 0.2 U
	04/27/2021	< 1 U	< 1 U	< 1 U	< 0.2 U
MW-20	04/27/2015	17	< 1 U	< 1 U	< 0.2 U
	08/10/2015	25	< 1 U	< 1 U	< 0.2 U
	10/07/2019	32	< 1 U	< 1 U	< 0.2 U
	05/30/2023	35	< 0.5 U	< 1 U	< 0.02 U
	05/16/2024	35	< 0.5 U	< 1 U	< 0.02 U
MW-21	08/10/2015	85	280	55	1.3
	10/08/2019	110	300	68	1.6
	05/30/2023	74	170	43	0.97
	05/16/2024	91	200	52	1.6
MW-22	08/10/2015	< 1 U	< 1 U	< 1 U	< 0.2 U
	10/07/2019	< 1 U	< 1 U	< 1 U	< 0.2 U
	05/19/2022	< 1 U	< 0.5 U	--	--
	08/16/2022	< 1 U	< 0.5 U	--	--
	01/05/2023	< 1 U	< 0.5 U	--	--
	03/28/2023	< 1 U	< 0.5 U	--	--
MW-23	05/06/2021	< 1 U	< 1 U	< 1 U	< 0.2 U
	05/19/2022	< 1 U	< 0.5 U	--	--
	08/16/2022	< 1 U	< 0.5 U	--	--
	01/05/2023	< 1 U	< 0.5 U	--	--
	03/28/2023	< 1 U	< 0.5 U	--	--

Table 3. Soil Gas Analytical Data

Project No. 140252, HERS Industrial Park, Mukilteo, Washington

Location Date Sample			SG-01 05/19/2022 SG-01-051922	SS-01 05/19/2022 SS-01-051922
Analyte	Unit	MCTA Method B Screening Levels for Soil Gas		
VOCs				
1,1,1-Trichloroethane	ug/m3	76000	< 2.2 U	< 2.5 U
1,1,2-Trichloroethane	ug/m3	3	< 0.22 U	< 0.25 U
1,1-Dichloroethane	ug/m3	52	< 1.7 U	< 1.9 U
1,1-Dichloroethene	ug/m3	3000	< 1.6 U	< 1.8 U
1,2-Dichloroethane (EDC)	ug/m3	3.2	< 0.17 U	< 0.19 U
Chloroethane	ug/m3	150000	< 11 U	< 12 U
cis-1,2-Dichloroethene (cDCE)	ug/m3		< 1.6 U	< 1.8 U
Tetrachloroethene (PCE)	ug/m3	320	< 28 U	< 31 U
trans-1,2-Dichloroethene	ug/m3	610	< 1.6 U	< 1.8 U
Trichloroethene (TCE)	ug/m3	11	0.62	< 0.49 U
Vinyl Chloride	ug/m3	9.5	< 1 U	< 1.2 U

Bold - Analyte was detected at or above the laboratory reporting limit (RL)

U - Analyte not detected at or above Reporting Limit (RL) shown

MTCA - Model Toxics Control Act (MTCA) Method B Cleanup Level for subslab soil gas.

ug/m3 - micrograms per cubic meter

Aspect Consulting

8/9/2024

\\ASP-Sea-01\Projects\HERS Industrial Park - 140252\Deliverables\Pilot Test Summary\Tables\T3. Soil Gas Analytical Data

Table 3

Page 1 of 1

Table 4. Injection Point Summary

Project No. 140252 , Seattle, Washington

Injection Point ID	Lifts	Injection Interval (ft bgs)	Drilling Refusal Depth (ft bgs)	Surfacing	Tooling	Dates		Injected Volume (gal)				Notes
						Start	End	SMZVI	3DME	Water	Total	
IP-1	Bottom-up	16-6	none	Limited	2 ft retractable screen ¹	6/26/2023 10:44	6/27/2023 09:10	15.7	22.5	713.3	751.5	
IP-2a	Bottom-up	16-7	none	Significant	2 ft retractable screen	6/27/2023 13:02	6/28/2023 11:35	16.7	24	559.3	600	
IP-2b	Bottom-up	15.5-13	15.5	Significant	Pressure activated 6in screen ²	6/28/2023 12:20	6/28/2023 12:58	2.2	3.2	87.6	93.0	13 gal flush
IP-3	Bottom-up	16-7	none	Significant	2 ft retractable screen	6/26/2023 15:06	6/28/2023 11:56	14.7	21.1	513.1	536.5	
IP-4a	Top-down	7-13	13	Slight	2 ft retractable screen	6/27/2023 13:14	6/28/2023 09:38	9.6	13.8	456.6	480	20 gal flush
IP-4b	Bottom-up	14.5-10.5	14.5	Slight	2 ft retractable screen	6/28/2023 10:13	6/28/2023 11:41	7.3	10.5	330.6	348.5	
Total								66.2	95.1	2660.5	2809.5	

Notes

ft - feet

bgs - below ground surface

¹ Retractable screen tooling was pushed to depth then raised 2 ft to expose screen for injections. Injections preformed in 2ft lifts.

² Pressure activated tooling pushed to depth then injection pressure used to open tooling. Lifts preformed every 1 ft.

Table 5. Breakthrough Monitoring Summary

Project No. 140252, HERS Industrial Park, Mukilteo, Washington

Well	Injection Point ¹	Distance (ft)	Breakthrough observed	Injection time until breakthrough (min)	Injection Volume before breakthrough (gal)	Saturated thickness injected by time of breakthrough (ft)	Estimated Effective Porosity
MW-1	IP-4a	5	Yes	165	340	6	9.7%
MW-7	IP-3	15	Yes	160	500	9	1.1%
MW-12	IP-3	11.8	Yes	25	70	2	1.1%
MW-16	IP-1	5	Yes	50	56	2	4.8%
Average							4.1%

Table 6. Performance Monitoring Results
Project No. 140252, HERS Industrial Park, Mukilteo, Washington

Analyte Group			VOCs				Dissolved Gases			Metals	Conventionals				Field Parameters				
Analyte Unit Screening Levels for Groundwater ¹			Tetrachloroethene (PCE) ug/L 5	Trichloroethene (TCE) ug/L 5	cis-1,2-Dichloroethene (cDCE) ug/L 16	Vinyl Chloride ug/L 0.2	Ethane mg/L	Ethene mg/L	Methane mg/L	Iron, dissolved ug/L 11000	Nitrate as Nitrogen mg/L 26	Nitrite as Nitrogen mg/L 1.6	Sulfate mg/L	Total Organic Carbon mg/L	Specific Conductance uS/cm	Dissolved Oxygen mg/L	pH pH units	Oxidation Reduction Potential mV	Turbidity NTU
Location	Event	Date																	
MW-01	Baseline Event	05/30/2023	6.3	160	4.7	0.97	< 0.0151 U	< 0.0146 U	0.586	3250	0.304 J	< 0.240 UJ	6.34	13.8 J	316.63	0.24	6.91	21.7	5.18
	3 Months	09/25/2023	1	67	260	36	< 0.0151 U	< 0.0146 U	3.41	68600	< 0.500 UJ	< 0.600 UJ	< 0.600 U	77.8 J	608.53	0.27	6.62	-94.1	7.76
	6 Months	12/28/2023	< 1 U	< 0.5 U	100	120	< 0.0151 U	0.0271	7.24	262000	< 1.00 R	< 1.20 R	< 6.00 U	221	1532.9	< 0 U	6.58	-93	44.2
	12 Months	05/16/2024	< 1 U	< 0.5 U	< 1 U	0.82	< 0.0100 U	< 0.0100 U	3.36	6600	< 2.00 U	< 2.00 U	< 1.00 U	7.28	197.35	0.23	7.06	-92.7	9.87
MW-11	Baseline Event	05/30/2023	4.3	21	1.1	< 0.02 U	--	--	--	--	--	--	--	--	355.53	0.45	5.76	201.2	5.4
	6 Months	12/28/2023	5.8	23	2.5	0.022	--	--	--	--	--	--	--	--	332.43	0.7	6.12	91.7	2.32
	12 Months	05/16/2024	5	18	1	< 0.02 U	--	--	--	--	--	--	--	--	428.35	0.21	6.05	48.6	4.91
MW-12	Baseline Event	05/30/2023	18	26	15	0.7	< 0.0151 U	< 0.0146 U	0.0370	355	< 0.200 UJ	< 0.240 UJ	3.31	2.46 J	431.64	0.19	6.28	109.3	1.45
	3 Months	09/25/2023	< 1	1.3	72	2.6	0.0293	< 0.0146 U	2.32	67400	< 0.500 UJ	0.900 J	< 1.20 U	111 J	688.75	0.15	6.16	-101.4	3.64
	6 Months	12/28/2023	< 1 U	< 0.5 U	43	8.1	0.0262	0.0233	9.80	174000	< 1.00 R	< 1.20 R	< 6.00 U	83.5	696.2	0.01	6.16	-85.3	20.4
	12 Months	05/16/2024	< 1 U	0.65	14	2.6	0.0165	0.0178	5.52	44000	< 2.00 U	< 2.00 U	< 5.00 U	57.8	787.61	0.2	6.53	-128.1	52.27
MW-16	Baseline Event	05/30/2023	24	28	66	1.4	< 0.0151 U	< 0.0146 U	0.0900	387	< 0.200 UJ	< 0.240 UJ	3.44	11.1 J	518.34	0.63	6.24	182.8	3.24
	3 Months	09/25/2023	< 1	0.56	29	0.65	0.128	0.0644	0.743	315000	< 2.00 UJ	< 2.40 UJ	< 6.00 U	220 J	242.08	0.08	6.74	-338.1	8.55
	6 Months	12/28/2023	< 1 U	< 0.5 U	49	1.2	0.206	0.0907	9.25	779000	< 1.00 R	< 1.20 R	< 6.00 U	667	2030.8	< 0 U	6.55	-103.3	7.85
	12 Months	05/16/2024	< 1 U	< 0.5 U	58	1.5	0.0259	0.0184	5.07	97000	< 2.00 U	< 2.00 U	< 5.00 U	134	1383.8	0.11	6.77	-125	6.78
MW-20	Baseline Event	05/30/2023	35	< 0.5 U	< 1 U	< 0.02 U	--	--	--	--	--	--	--	--	219.56	2.06	6.06	218.6	12.8
	12 Months	05/16/2024	35	< 0.5 U	< 1 U	< 0.02 U	--	--	--	--	--	--	--	--	189.35	2.58	6.59	94.6	33
MW-21	Baseline Event	05/30/2023	74	170	43	0.97	--	--	--	--	--	--	--	--	438.75	2.15	6.12	196.1	0.61
	12 Months	05/16/2024	91	200	52	1.6	--	--	--	--	--	--	--	--	672.71	0.18	6.47	61	3.52

Notes:
Results in **bold** indicate the analyte was detected above the laboratory reporting limit.
Blue Shaded - Detected result or nondetected RL exceeded screening level
U = indicates analyte concentration not detected at or above the laboratory Reporting Limit (RL) shown.
J - Result value estimated
UJ - Analyte concentration not detected and the Reporting Limit (RL) is an estimate.
R - Result Rejected. Not viable for quantitative or qualitative use.
mV = millivolts
mg/L = milligram per liter
ug/L = microgram per liter
¹ Model Toxics Control Act (MTCA) unrestricted Method A Cleanup Levels for Groundwater, or Method B Cleanup levels for Groundwater, where Method A is not established.

Table 7. Full-Scale Injection Design

Project No. 140252, HERS Industrial Park, Mukilteo, Washington

Parameter	Value	Units	Notes
Injection Point Layout			
Target treatment area	2,001	ft ²	Based on radius of influence of four locations
Number of injection points	13	points	
Target radius of influence (ROI)	7	ft	
Injection point spacing	14	ft	
Target treatment interval	7-17	feet bgs	Based on Revised FFS Section 1.3.3.1 and Pilot Test.
Target treatment interval thickness	8	ft	
SMZVI Dosing			
Soil density	1.6	tons/yard ³	Based on lithology
Soil mass of treatment volume	1,900,000	lbs	
Target iron dosing	0.05%	lbs/lbs	efficacy
Target iron treatment mass	950	lbs	
Target SMZVI mass	2500	lbs	Based on 40% iron content of SMZVI, rounded to 500-lbs package size
3DME Dosing			
Dosing by injection volume	4.0%		porosity
Injection Point Hydraulics			
Total porosity	35%		
Total pore volume	41,913	gal	
Design Mobile Porosity	5%		Estimated for weathered till, reduced from 7% based on Pilot Test results
Injection volume as % of Mobile Porosity	100%		As percentage of mobile pore volume.
Injection volume per vertical foot	58	gal/ft	
Target Injection volume per point	460	gal	
Total injection volume	5,980	gal	
Reagent Dosing and Batching			
3DME target total mass	2000	lbs	Equal to five drums
3DME target total volume	240	gal	Assumes 3DME density of 8.33 lbs/gal
SMZVI target total mass	2500	lbs	Equal to five drums
SMZVI target total volume	167	gal	Assumes SMZVI density of 15 lbs/gal
3DME per vertical foot	2.3	gal/ft	
SMZVI per vertical foot	1.6	gal/ft	
Mix water per vertical foot	54	gal/ft	
3DME per point	18.5	gal/point	
SMZVI per point	12.8	gal/point	
Mix water per point	429	gal/point	
Total Quantities			
Total 3DME required	8	drums	
Total SMZVI required	8	drums	
Total Mix Water Required	5,600	gal	Rounded up to nearest 100 gal

Notes:

% - percent gal - gallons SMZVI - sulfidated micro zero valent iron
3DME - Three-dimension microemulsion lbs - pounds
ft - feet ROI - radius of influence

Table 8. Full Scale Performance Monitoring Schedule

Project No. 140252, HERS Industrial Park, Mukilteo, Washington

Sampling Schedule					
Well ID	Location	Baseline	Event 1	Event 2	Event 3
Time Elapsed Since Injection ¹ (months)		Pre-Injection	3	6	12
MW-11	Injection area	MNA	MNA	MNA	MNA
MW-20	Injection area	MNA	MNA	MNA	MNA
MW-21	Injection area	MNA	MNA	MNA	MNA
MW-23	Downgradient of Injection area	MNA	-	MNA	MNA
MW-1	48 feet upgradient of injections	CVOCs	-	-	CVOCs
MW-12	25 feet upgradient of injections	CVOCs	-	-	CVOCs
MW-16	30 feet upgradient of injections	CVOCs	-	-	CVOCs
Analyte List					
Analyte		Analytical Method		Purpose	
CVOCs					
Chlorinated Volatile Organic Compounds		EPA 8260C		Contaminant concentrations and degradation	
MNA - Monitored Natural Attenuation					
Chlorinated Volatile Organic Compounds		EPA 8260C		Contaminant concentrations and degradation	
Dissolved gases; ethane, ethene, methane		RSK-175		Degradation end-product (ethene and ethane);	
Total Organic Carbon (TOC)		EPA 415.1 (or SW-846 Method 9060 or SM 5310C)		Electron donor	
Sulfate		EPA 300.0		Redox indicator as electron acceptor	
Iron (Dissolved) ¹		EPA 6020 or 6010B		Redox indicator as electron acceptor	
Field Parameters					
Total Dissolved Solids		Multi-parameter meter		Field parameter, reagent tracer	
Specific conductance		Multi-parameter meter		Field parameter, reagent tracer	
Dissolved oxygen		Multi-parameter meter		Redox indicator as electron acceptor	
pH		Multi-parameter meter		Geochemical indicator	
ORP		Multi-parameter meter		Geochemical indicator	
Turbidity		Turbidimeter		Field parameter, reagent tracer	

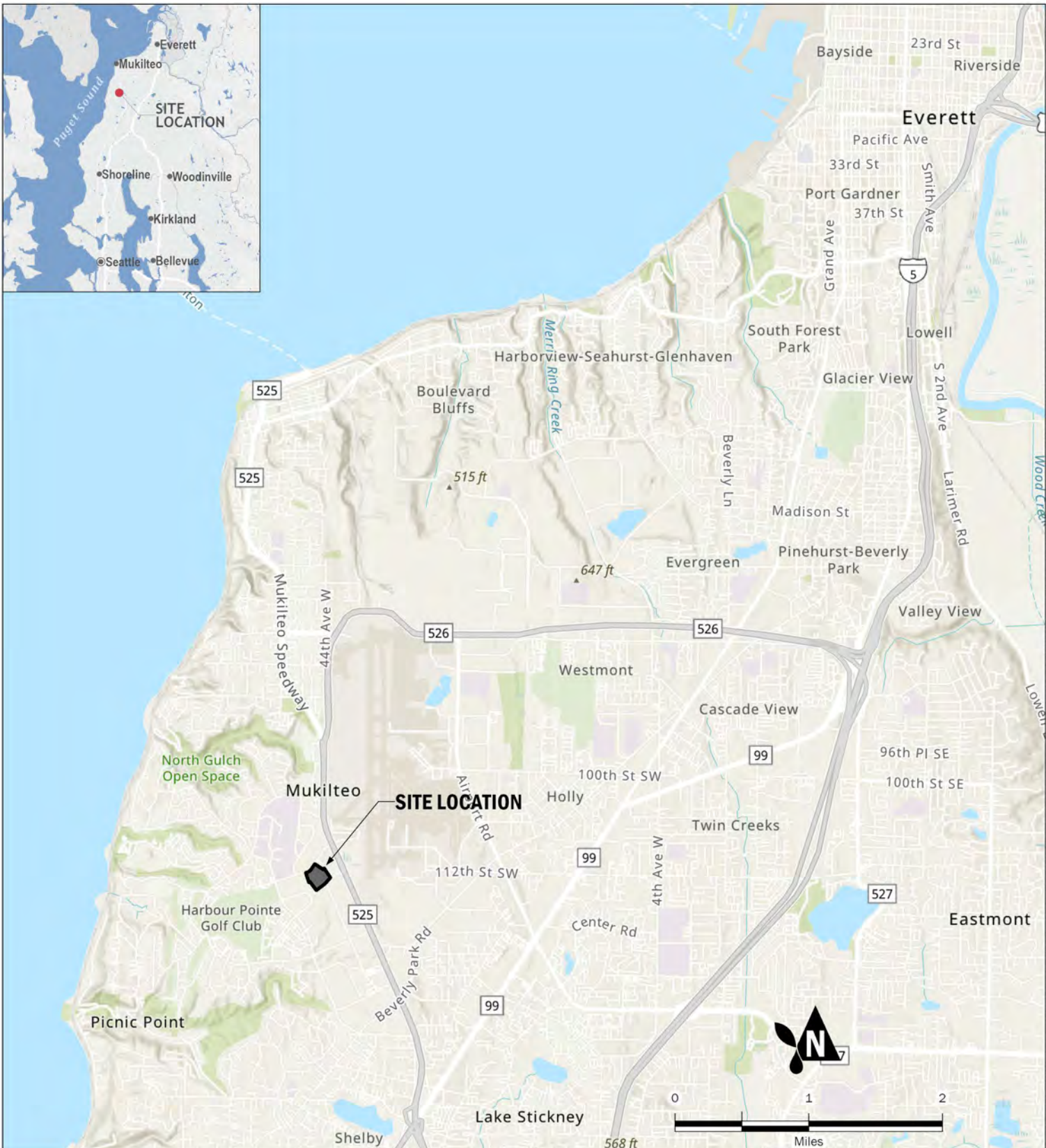
Notes:

1. Dissolved metals samples will be field-filtered using a 0.45 micron filter

bgs = below ground surface

- = well will not be sampled during this event

FIGURES

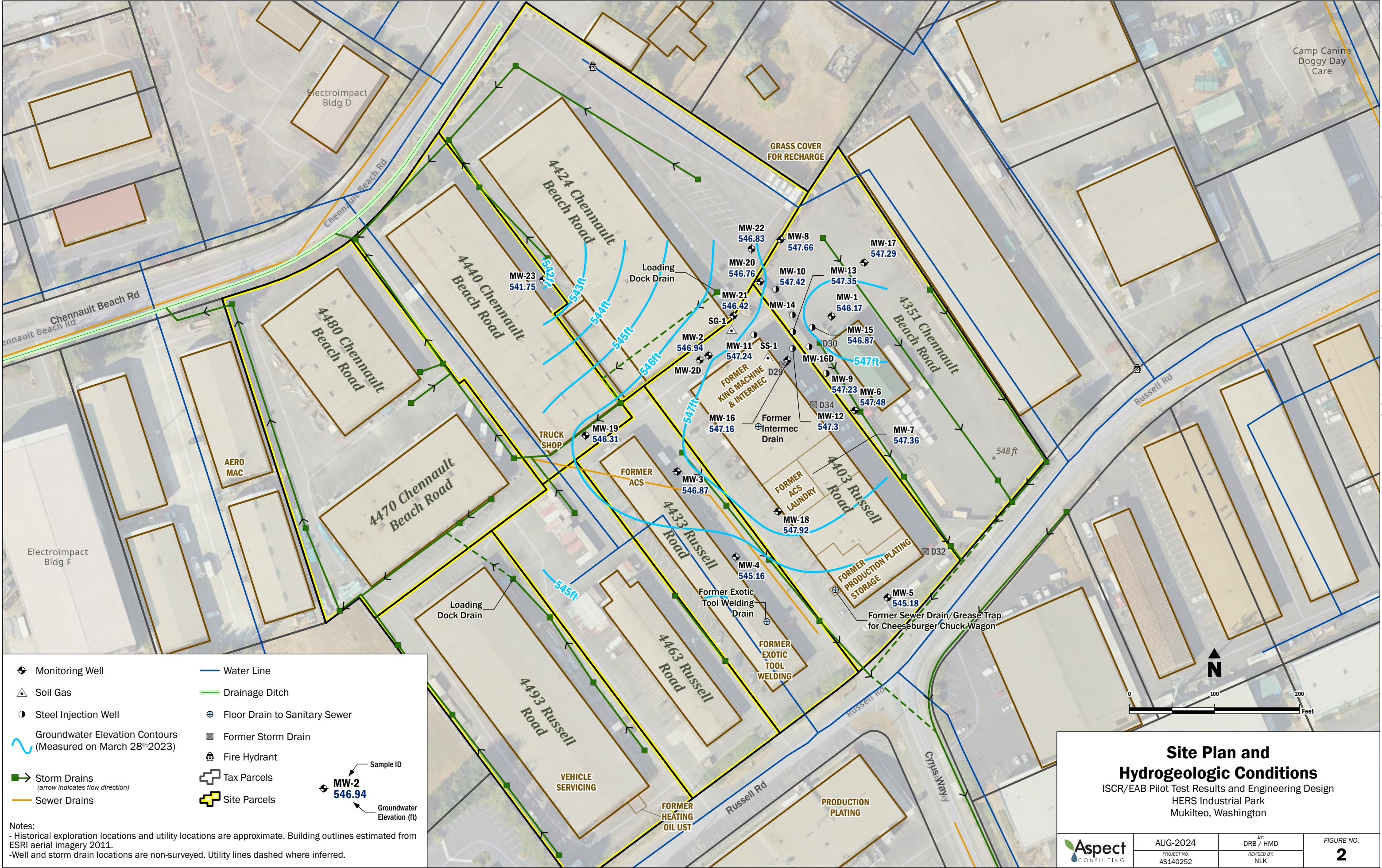


Vicinity Map

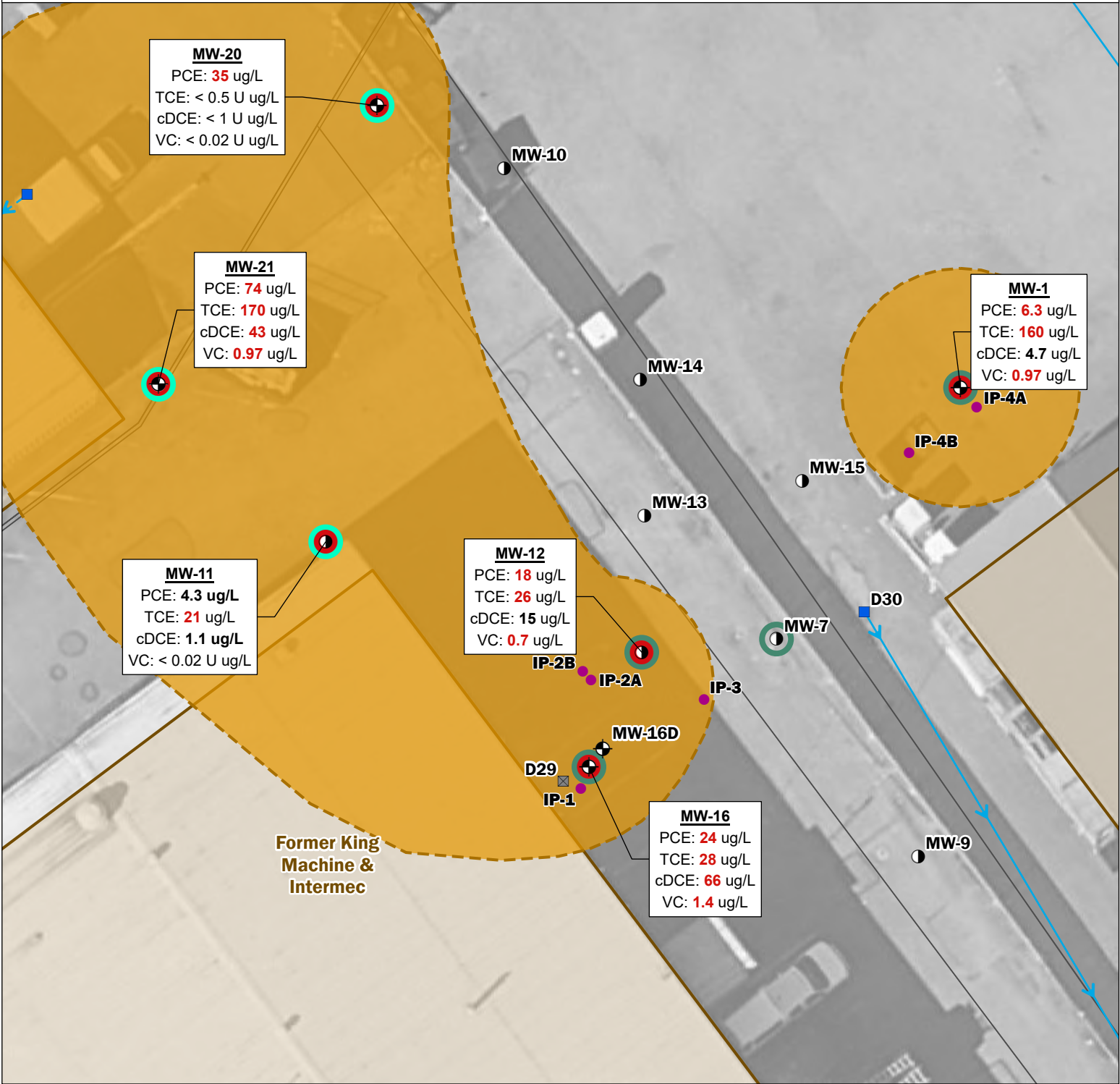
ISCR/EAB Pilot Test Results and Engineering Design
HERS Industrial Park
Mukilteo, Washington

	JUN-2024	BY: DRB / HMD	FIGURE NO. 1
	PROJECT No. 140252	REVISED BY: --- / ---	

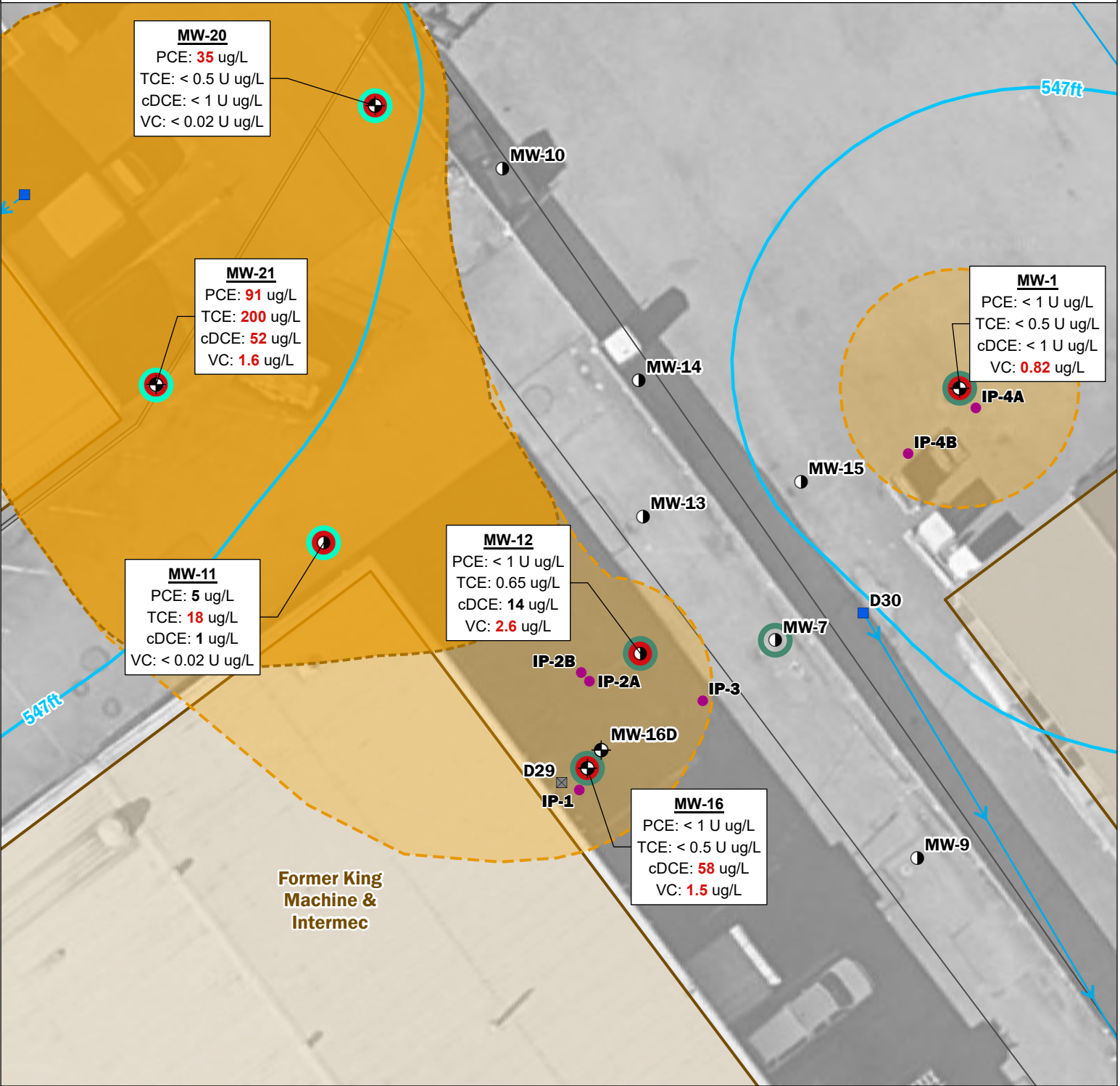
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BASELINE PERFORMANCE MONITORING



12 MONTH PERFORMANCE MONITORING



COCs was detected at a concentration greater than the MTCA Method A cleanup level.

Monitoring Well

Steel Injection Well

Completed Injection Point

Performance and Operational Monitoring Location

Performance Monitoring Location

Estimated Extent of TCE and/or PCE above the CUL

Estimated Extent of one or more CVOCs above CULs

Groundwater Elevation Contours (Measured on March 28th2023)

Storm Drain

Former Storm Drain

Storm Drain (arrow indicates flow direction)

Building

Tax Parcels

MTCA Cleanup Level (CUL)
PCE = 5 ug/L (Method A)
TCE = 5 ug/L (Method A)
cDCE = 16 ug/L (Method B)
VC = 0.2 ug/L (Method A)

Notes:
- PCE = Tetrachloroethene
- TCE = Trichloroethene
- cDCE = cis-1,2-Dichloroethene
- VC = vinyl chloride
- CVOC = chlorinated volatile organic compound
- CUL = Cleanup Level
- ft = feet
- ug/L = micrograms per liter

N

0

10

20

Feet

Injection Pilot Test Summary
ISCR/EAB Pilot Test Results and Engineering Design
HERS Industrial Park
Mukilteo, Washington

Aspect

CONSULTING

AUG-2024

PROJECT NO.
AS140252

DRB / HMD

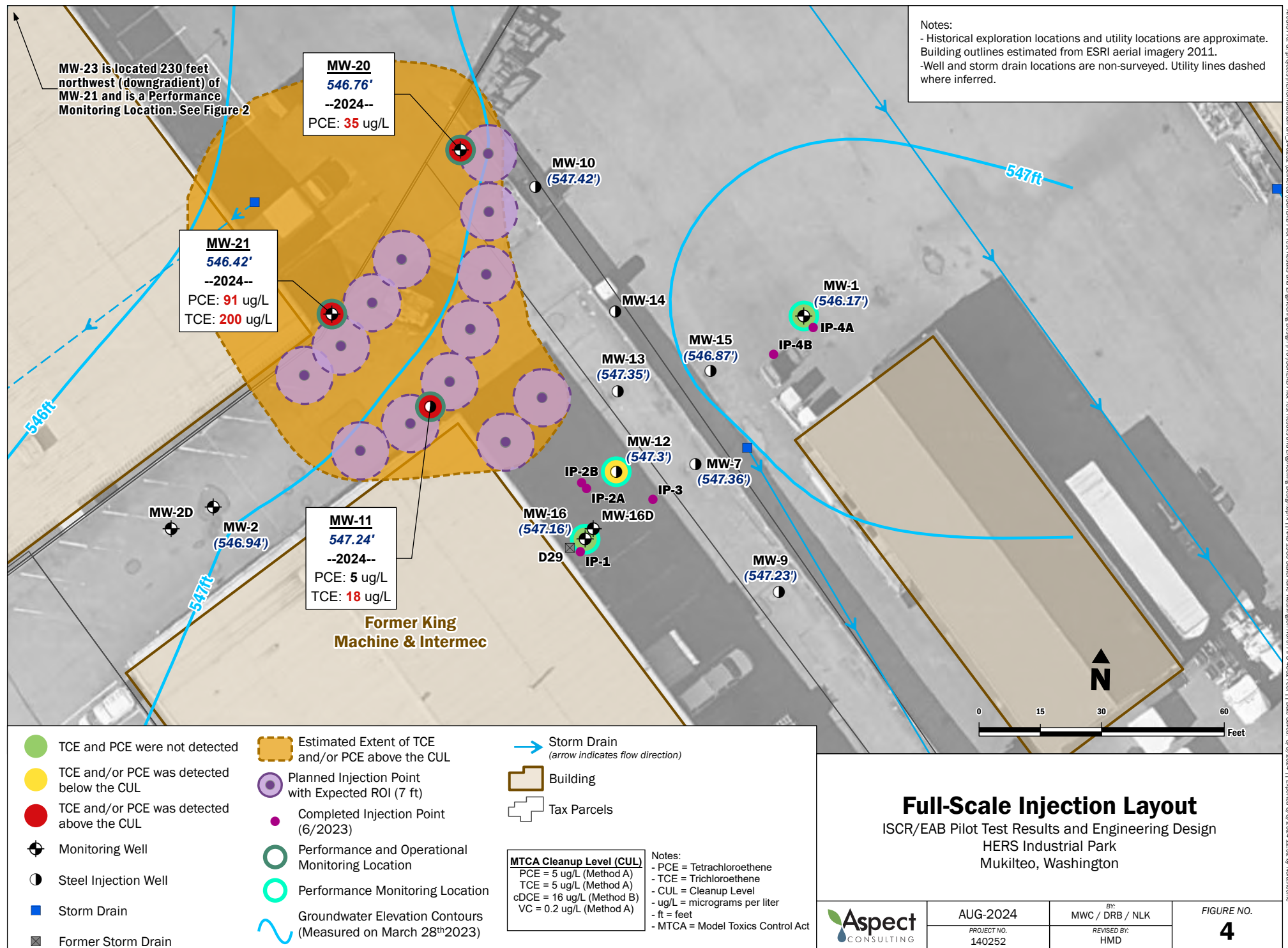
REVISED BY:
NLK

FIGURE NO.

3

Data source credits: None | | Basemap Service Layer Credits: © OpenStreetMap (and) contributors, CC-BY-SA

OS Path: G:\projects\HERS\IndustrialPark_140252\Delivered\ISCR/EAB Pilot Test Results and Engineering Design\Pro\ISCR/EAB Pilot Test Results and Engineering Design\Pro\Injection Pilot Test Summary\1\Isar_Norm_Koeder_11 Print Date: 8/8/2024



APPENDIX A

Laboratory Reports

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Vineta Mills, M.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

August 19, 2022

Daniel Babcock, Project Manager
Aspect Consulting, LLC
710 2nd Ave S, Suite 550
Seattle, WA 98104

Dear Mr Babcock:

Included are the results from the testing of material submitted on August 16, 2022 from the HERS Industrial 140252, F&BI 208234 project. There are 7 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Aspect Data
ASP0819R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on August 16, 2022 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC HERS Industrial 140252, F&BI 208234 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Aspect Consulting, LLC</u>
208234 -01	MW-16D-081622
208234 -02	MW-22-081622
208234 -03	MW-23-081622

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-16D-081622	Client:	Aspect Consulting, LLC
Date Received:	08/16/22	Project:	HERS Industrial 140252, F&BI 208234
Date Extracted:	08/17/22	Lab ID:	208234-01
Date Analyzed:	08/17/22	Data File:	081709.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	RF

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	106	78	126
Toluene-d8	102	84	115
4-Bromofluorobenzene	100	72	130

Compounds:	Concentration ug/L (ppb)
Trichloroethene	11
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-22-081622	Client:	Aspect Consulting, LLC
Date Received:	08/16/22	Project:	HERS Industrial 140252, F&BI 208234
Date Extracted:	08/17/22	Lab ID:	208234-02
Date Analyzed:	08/17/22	Data File:	081710.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	RF

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	96	78	126
Toluene-d8	101	84	115
4-Bromofluorobenzene	103	72	130

Compounds:	Concentration ug/L (ppb)
Trichloroethene	<0.5
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-23-081622	Client:	Aspect Consulting, LLC
Date Received:	08/16/22	Project:	HERS Industrial 140252, F&BI 208234
Date Extracted:	08/17/22	Lab ID:	208234-03
Date Analyzed:	08/17/22	Data File:	081711.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	RF

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	105	78	126
Toluene-d8	102	84	115
4-Bromofluorobenzene	101	72	130

Compounds:	Concentration ug/L (ppb)
Trichloroethene	<0.5
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	HERS Industrial 140252, F&BI 208234
Date Extracted:	08/17/22	Lab ID:	02-1929 mb
Date Analyzed:	08/17/22	Data File:	081707.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	RF

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	78	126
Toluene-d8	101	84	115
4-Bromofluorobenzene	102	72	130

Compounds:	Concentration ug/L (ppb)
Trichloroethene	<0.5
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 08/19/22

Date Received: 08/16/22

Project: HERS Industrial 140252, F&BI 208234

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR VOLATILES BY EPA METHOD 8260D**

Laboratory Code: 208234-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent	Acceptance Criteria
				Recovery MS	
Trichloroethene	ug/L (ppb)	10	11	104 b	50-150
Tetrachloroethene	ug/L (ppb)	10	<1	112	50-150

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent	Percent	Acceptance Criteria	RPD (Limit 20)
			Recovery LCS	Recovery LCSD		
Trichloroethene	ug/L (ppb)	10	105	105	70-130	0
Tetrachloroethene	ug/L (ppb)	10	108	111	70-130	3

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

8/16/22

1881

SAMPLERS (signature)
Paul Kesting

PROJECT NAME

HERS
~~140252~~
DTM
Industrial

REMARKS

Project specific RLS? - Yes / No

--

Default: Dispose after 30 days

☐ Other :☐ Archive samples

SAMPL'E DISPOSAL

27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 1041 1042 1043 1044 1045 1046 1047 1048 1049 1050 1051 1052 1053 1054

Bus charges authorized by _____

☒ Standard turnaround

LITERATURE

DATE _____ OF _____

TRIBAL BOARD TIME _____

Page # 1 of 1

11

[illegible]

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Vineta Mills, M.S.
Eric Young, B.S.

5500 4th Avenue South
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www.friedmanandbruya.com

April 5, 2023

Daniel Babcock, Project Manager
Aspect Consulting, LLC
710 2nd Ave S, Suite 550
Seattle, WA 98104

Dear Mr Babcock:

Included are the results from the testing of material submitted on March 29, 2023 from the HERS Industrial 140252, F&BI 303477 project. There are 7 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Aspect Data
ASP0405R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on March 29, 2023 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC HERS Industrial 140252, F&BI 303477 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Aspect Consulting, LLC</u>
303477 -01	MW-16D-032823
303477 -02	MW-22-032823
303477 -03	MW-23-032823

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-16D-032823	Client:	Aspect Consulting, LLC
Date Received:	03/29/23	Project:	HERS Industrial 140252
Date Extracted:	03/31/23	Lab ID:	303477-01
Date Analyzed:	03/31/23	Data File:	033108.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	78	126
Toluene-d8	97	84	115
4-Bromofluorobenzene	91	72	130

Compounds:	Concentration ug/L (ppb)
Trichloroethene	12
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-22-032823	Client:	Aspect Consulting, LLC
Date Received:	03/29/23	Project:	HERS Industrial 140252
Date Extracted:	03/31/23	Lab ID:	303477-02
Date Analyzed:	03/31/23	Data File:	033109.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	107	78	126
Toluene-d8	102	84	115
4-Bromofluorobenzene	92	72	130

Compounds:	Concentration ug/L (ppb)
Trichloroethene	<0.5
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-23-032823	Client:	Aspect Consulting, LLC
Date Received:	03/29/23	Project:	HERS Industrial 140252
Date Extracted:	03/31/23	Lab ID:	303477-03
Date Analyzed:	03/31/23	Data File:	033110.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	97	78	126
Toluene-d8	101	84	115
4-Bromofluorobenzene	95	72	130

Compounds:	Concentration ug/L (ppb)
Trichloroethene	<0.5
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	HERS Industrial 140252
Date Extracted:	03/31/23	Lab ID:	03-0699 mb
Date Analyzed:	03/31/23	Data File:	033127.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	78	126
Toluene-d8	95	84	115
4-Bromofluorobenzene	93	72	130

Compounds:	Concentration ug/L (ppb)
Trichloroethene	<0.5
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 04/05/23

Date Received: 03/29/23

Project: HERS Industrial 140252, F&BI 303477

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR VOLATILES BY EPA METHOD 8260D**

Laboratory Code: 303477-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent	Acceptance Criteria
				Recovery MS	
Trichloroethene	ug/L (ppb)	10	12	94 b	50-150
Tetrachloroethene	ug/L (ppb)	10	<1	111	50-150

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent	Percent	Acceptance Criteria	RPD (Limit 20)
			Recovery LCS	Recovery LCSD		
Trichloroethene	ug/L (ppb)	10	99	101	70-130	2
Tetrachloroethene	ug/L (ppb)	10	114	115	70-130	1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria, biased high; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the standard reporting limit. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

k - The calibration results for the analyte were outside of acceptance criteria, biased high, and the analyte was not detected in the sample.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

11111

1/2

TURNAROUND TIME

☒ Standard turnaround
☐ RUSH _____
 Rush charges authorized by: _____

SAMPLE DISPOSAL

☐ Archive samples
☐ Other _____
 Default: Dispose after 30 days

	Project specific RLS? - Yes / No
100m	

ANALYSES REQUESTED

[illegible]

TIME

18081

1866

1

1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Vineta Mills, M.S.
Eric Young, B.S.

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(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

June 13, 2023

Daniel Babcock, Project Manager
Aspect Consulting, LLC
710 2nd Ave S, Suite 550
Seattle, WA 98104

Dear Mr Babcock:

Included are the results from the testing of material submitted on June 1, 2023 from the HERS Industrial 140252, F&BI 306023 project. There are 15 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Aspect Data
ASP0613R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on June 1, 2023 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC HERS Industrial 140252, F&BI 306023 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Aspect Consulting, LLC</u>
306023 -01	MW-01-053023
306023 -02	MW-11-053023
306023 -03	MW-12-053023
306023 -04	MW-16-053023
306023 -05	MW-20-053023
306023 -06	MW-21-053023

Samples MW-01-053023, MW-12-053023, and MW-16-053023 were sent to Fremont Analytical for dissolved gases, anions, and total organic carbon analyses. The report is enclosed.

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 200.8

Client ID:	MW-01-053023	Client:	Aspect Consulting, LLC
Date Received:	06/01/23	Project:	HERS Industrial 140252
Date Extracted:	06/06/23	Lab ID:	306023-01
Date Analyzed:	06/06/23	Data File:	306023-01 D.098
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
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Iron	3,250
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 200.8

Client ID:	MW-12-053023	Client:	Aspect Consulting, LLC
Date Received:	06/01/23	Project:	HERS Industrial 140252
Date Extracted:	06/06/23	Lab ID:	306023-03
Date Analyzed:	06/06/23	Data File:	306023-03.100
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
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Iron	355
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 200.8

Client ID:	MW-16-053023	Client:	Aspect Consulting, LLC
Date Received:	06/01/23	Project:	HERS Industrial 140252
Date Extracted:	06/06/23	Lab ID:	306023-04
Date Analyzed:	06/06/23	Data File:	306023-04.101
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
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Iron	387
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 200.8

Client ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	HERS Industrial 140252
Date Extracted:	06/06/23	Lab ID:	I3-452 mb2
Date Analyzed:	06/06/23	Data File:	I3-452 mb2.097
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
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Iron	<50
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-01-053023	Client:	Aspect Consulting, LLC
Date Received:	06/01/23	Project:	HERS Industrial 140252
Date Extracted:	06/06/23	Lab ID:	306023-01
Date Analyzed:	06/07/23	Data File:	060643.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	71	132
Toluene-d8	93	68	139
4-Bromofluorobenzene	100	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	0.97
Chloroethane	<1
1,1-Dichloroethene	1.1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	4.7
1,2-Dichloroethane (EDC)	<0.2
1,1,1-Trichloroethane	2.5
Trichloroethene	160
Tetrachloroethene	6.3

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-11-053023	Client:	Aspect Consulting, LLC
Date Received:	06/01/23	Project:	HERS Industrial 140252
Date Extracted:	06/06/23	Lab ID:	306023-02
Date Analyzed:	06/07/23	Data File:	060644.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	71	132
Toluene-d8	99	68	139
4-Bromofluorobenzene	100	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.02
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	1.1
1,2-Dichloroethane (EDC)	<0.2
1,1,1-Trichloroethane	<1
Trichloroethene	21
Tetrachloroethene	4.3

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-12-053023	Client:	Aspect Consulting, LLC
Date Received:	06/01/23	Project:	HERS Industrial 140252
Date Extracted:	06/06/23	Lab ID:	306023-03
Date Analyzed:	06/07/23	Data File:	060645.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	71	132
Toluene-d8	100	68	139
4-Bromofluorobenzene	99	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	0.70
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	15
1,2-Dichloroethane (EDC)	<0.2
1,1,1-Trichloroethane	<1
Trichloroethene	26
Tetrachloroethene	18

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-16-053023	Client:	Aspect Consulting, LLC
Date Received:	06/01/23	Project:	HERS Industrial 140252
Date Extracted:	06/06/23	Lab ID:	306023-04
Date Analyzed:	06/07/23	Data File:	060646.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	71	132
Toluene-d8	102	68	139
4-Bromofluorobenzene	96	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	1.4
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	1.4
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	66
1,2-Dichloroethane (EDC)	<0.2
1,1,1-Trichloroethane	<1
Trichloroethene	28
Tetrachloroethene	24

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-20-053023	Client:	Aspect Consulting, LLC
Date Received:	06/01/23	Project:	HERS Industrial 140252
Date Extracted:	06/06/23	Lab ID:	306023-05
Date Analyzed:	06/07/23	Data File:	060647.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	71	132
Toluene-d8	98	68	139
4-Bromofluorobenzene	94	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.02
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<0.2
1,1,1-Trichloroethane	<1
Trichloroethene	<0.5
Tetrachloroethene	35

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-21-053023	Client:	Aspect Consulting, LLC
Date Received:	06/01/23	Project:	HERS Industrial 140252
Date Extracted:	06/06/23	Lab ID:	306023-06
Date Analyzed:	06/07/23	Data File:	060648.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	71	132
Toluene-d8	95	68	139
4-Bromofluorobenzene	99	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	0.97
Chloroethane	<1
1,1-Dichloroethene	1.9
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	43
1,2-Dichloroethane (EDC)	<0.2
1,1,1-Trichloroethane	1.2
Trichloroethene	170
Tetrachloroethene	74

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	HERS Industrial 140252
Date Extracted:	06/06/23	Lab ID:	03-1274 mb
Date Analyzed:	06/06/23	Data File:	060611.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	71	132
Toluene-d8	101	68	139
4-Bromofluorobenzene	96	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.02
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<0.2
1,1,1-Trichloroethane	<1
Trichloroethene	<0.5
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 06/13/23

Date Received: 06/01/23

Project: HERS Industrial 140252, F&BI 306023

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR DISSOLVED METALS USING EPA METHOD 200.8**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Iron	ug/L (ppb)	100	98	97	85-115	1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 06/13/23

Date Received: 06/01/23

Project: HERS Industrial 140252, F&BI 306023

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR VOLATILES BY EPA METHOD 8260D**

Laboratory Code: 306023-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent	Acceptance Criteria
				Recovery MS	
Vinyl chloride	ug/L (ppb)	10	0.97	73	16-176
Chloroethane	ug/L (ppb)	10	<1	88	50-150
1,1-Dichloroethene	ug/L (ppb)	10	1.1	94	50-150
Methylene chloride	ug/L (ppb)	10	<5	90	40-143
trans-1,2-Dichloroethene	ug/L (ppb)	10	<1	96	50-150
1,1-Dichloroethane	ug/L (ppb)	10	<1	96	50-150
cis-1,2-Dichloroethene	ug/L (ppb)	10	4.7	100 b	50-150
1,2-Dichloroethane (EDC)	ug/L (ppb)	10	<0.2	106	50-150
1,1,1-Trichloroethane	ug/L (ppb)	10	2.5	103 b	50-150
Trichloroethene	ug/L (ppb)	10	160	152 b	43-133
Tetrachloroethene	ug/L (ppb)	10	6.3	104 b	50-150

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent	Percent	Acceptance Criteria	RPD (Limit 20)
			Recovery LCS	Recovery LCSD		
Vinyl chloride	ug/L (ppb)	10	93	97	43-149	4
Chloroethane	ug/L (ppb)	10	104	108	59-157	4
1,1-Dichloroethene	ug/L (ppb)	10	105	107	67-138	2
Methylene chloride	ug/L (ppb)	10	96	98	29-192	2
trans-1,2-Dichloroethene	ug/L (ppb)	10	105	107	70-130	2
1,1-Dichloroethane	ug/L (ppb)	10	104	106	70-130	2
cis-1,2-Dichloroethene	ug/L (ppb)	10	108	111	70-130	3
1,2-Dichloroethane (EDC)	ug/L (ppb)	10	112	115	70-130	3
1,1,1-Trichloroethane	ug/L (ppb)	10	111	113	70-130	2
Trichloroethene	ug/L (ppb)	10	103	108	70-130	5
Tetrachloroethene	ug/L (ppb)	10	110	110	70-130	0

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria, biased low; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the standard reporting limit. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

k - The calibration results for the analyte were outside of acceptance criteria, biased high, and the analyte was not detected in the sample.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

$11/\sqrt{13}$ Page # 1 of 1

☐ Standard turnaround
☐ RUSH _____

☐ Archive samples
☐ Other _____
 Default: Dispose

Default: Dispose after 30 days

[illegible]

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: <i>David MacKay</i>	David MacKay	Aspet	6/1/23	1610
Received by: <i>Alicia</i>	Alicia	FRB	6/1/23	1610
Relinquished by:				
Received by:				

Samples received at 4 °C



Fremont
Analytical

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Friedman & Bruya
Michael Erdahl
5500 4th Ave S
Seattle, WA 98108

RE: 306023
Work Order Number: 2306044

June 12, 2023

Attention Michael Erdahl:

Fremont Analytical, Inc. received 3 sample(s) on 6/2/2023 for the analyses presented in the following report.

Dissolved Gases by RSK-175
Ion Chromatography by EPA Method 300.0
Total Organic Carbon by SM 5310C

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

DoD-ELAP Accreditation #79636 by PJLA, ISO/IEC 17025:2017 and QSM 5.3 for Environmental Testing
ORELAP Certification: WA 100009 (NELAP Recognized) for Environmental Testing
Washington State Department of Ecology Accredited for Environmental Testing, Lab ID C910

Original

www.fremontanalytical.com

CLIENT: Friedman & Bruya
Project: 306023
Work Order: 2306044

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2306044-001	MW-01-053023	05/30/2023 4:35 PM	06/02/2023 1:40 PM
2306044-002	MW-12-053023	05/30/2023 3:10 PM	06/02/2023 1:40 PM
2306044-003	MW-16-053023	05/30/2023 1:55 PM	06/02/2023 1:40 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

CLIENT: Friedman & Bruya**Project:** 306023

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- DUP - Sample Duplicate
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MCL - Maximum Contaminant Level
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- REP - Sample Replicate
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate

CLIENT: Friedman & Bruya

Project: 306023

Lab ID: 2306044-001

Collection Date: 5/30/2023 4:35:00 PM

Client Sample ID: MW-01-053023

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Gases by RSK-175

Batch ID: R84514 Analyst: AM

Methane	0.586	0.0270	D	mg/L	4	6/8/2023 1:39:00 AM
Ethene	ND	0.0146		mg/L	1	6/8/2023 1:16:00 AM
Ethane	ND	0.0151		mg/L	1	6/8/2023 1:16:00 AM

Ion Chromatography by EPA Method 300.0

Batch ID: 40550 Analyst: AT

Nitrite (as N)	ND	0.240	DH	mg/L	2	6/5/2023 3:13:00 PM
Nitrate (as N)	0.304	0.200	DH	mg/L	2	6/5/2023 3:13:00 PM
Sulfate	6.34	1.20	D	mg/L	2	6/5/2023 3:13:00 PM

NOTES:

Diluted due to high levels of non-target analytes.

Total Organic Carbon by SM 5310C

Batch ID: R84606 Analyst: AT

Total Organic Carbon	13.8	0.700	Q	mg/L	1	6/10/2023 3:32:00 AM
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NOTES:

Q - Associated calibration verification is above acceptance criteria (112%, nominal 90-110). Result may be high-biased.



Analytical Report

Work Order: 2306044

Date Reported: 6/12/2023

CLIENT: Friedman & Bruya

Project: 306023

Lab ID: 2306044-002

Collection Date: 5/30/2023 3:10:00 PM

Client Sample ID: MW-12-053023

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Gases by RSK-175

Batch ID: R84514 Analyst: AM

Methane	0.0370	0.00675		mg/L	1	6/8/2023 1:18:00 AM
Ethene	ND	0.0146		mg/L	1	6/8/2023 1:18:00 AM
Ethane	ND	0.0151		mg/L	1	6/8/2023 1:18:00 AM

Ion Chromatography by EPA Method 300.0

Batch ID: 40550 Analyst: AT

Nitrite (as N)	ND	0.240	DH	mg/L	2	6/5/2023 3:36:00 PM
Nitrate (as N)	ND	0.200	DH	mg/L	2	6/5/2023 3:36:00 PM
Sulfate	3.31	1.20	D	mg/L	2	6/5/2023 3:36:00 PM

NOTES:

Diluted due to high levels of non-target analytes.

Total Organic Carbon by SM 5310C

Batch ID: R84606 Analyst: AT

Total Organic Carbon	2.46	0.700	Q	mg/L	1	6/10/2023 3:53:00 AM
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NOTES:

Q - Associated calibration verification is above acceptance criteria (112%, nominal 90-110). Result may be high-biased.



Analytical Report

Work Order: 2306044

Date Reported: 6/12/2023

CLIENT: Friedman & Bruya

Project: 306023

Lab ID: 2306044-003

Collection Date: 5/30/2023 1:55:00 PM

Client Sample ID: MW-16-053023

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Gases by RSK-175

Batch ID: R84514 Analyst: AM

Methane	0.0900	0.00675		mg/L	1	6/8/2023 1:20:00 AM
Ethene	ND	0.0146		mg/L	1	6/8/2023 1:20:00 AM
Ethane	ND	0.0151		mg/L	1	6/8/2023 1:20:00 AM

Ion Chromatography by EPA Method 300.0

Batch ID: 40550 Analyst: AT

Nitrite (as N)	ND	0.240	DH	mg/L	2	6/5/2023 4:00:00 PM
Nitrate (as N)	ND	0.200	DH	mg/L	2	6/5/2023 4:00:00 PM
Sulfate	3.44	1.20	D	mg/L	2	6/5/2023 4:00:00 PM

NOTES:

Diluted due to high levels of non-target analytes.

Total Organic Carbon by SM 5310C

Batch ID: R84606 Analyst: AT

Total Organic Carbon	11.1	0.700	Q	mg/L	1	6/10/2023 4:16:00 AM
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NOTES:

Q - Associated calibration verification is above acceptance criteria (112%, nominal 90-110). Result may be high-biased.

Work Order: 2306044
CLIENT: Friedman & Bruya
Project: 306023

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: MB-40550	SampType: MBLK	Units: mg/L			Prep Date: 6/2/2023				RunNo: 84490		
Client ID: MBLKW	Batch ID: 40550	Analysis Date: 6/2/2023							SeqNo: 1763546		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrite (as N)	ND	0.120									
Nitrate (as N)	ND	0.100									
Sulfate	ND	0.600									

Sample ID: LCS-40550	SampType: LCS	Units: mg/L				Prep Date: 6/2/2023			RunNo: 84490		
Client ID: LCSW	Batch ID: 40550					Analysis Date: 6/2/2023			SeqNo: 1763547		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrite (as N)	0.734	0.120	0.7500	0	97.9	90	110				
Nitrate (as N)	0.738	0.100	0.7500	0	98.4	90	110				
Sulfate	3.64	0.600	3.750	0	97.0	90	110				

Sample ID: 2306028-005CDUP	SampType: DUP	Units: mg/L			Prep Date: 6/2/2023			RunNo: 84490			
Client ID: BATCH	Batch ID: 40550				Analysis Date: 6/2/2023			SeqNo: 1763553			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrite (as N)	ND	1.20						0		20	D
Nitrate (as N)	ND	1.00						0		20	D
Sulfate	ND	6.00						0		20	D

Sample ID: 2306028-005CMS		SampType: MS		Units: mg/L		Prep Date: 6/2/2023		RunNo: 84490			
Client ID: BATCH		Batch ID: 40550				Analysis Date: 6/2/2023		SeqNo: 1763556			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrite (as N)	7.12	1.20	7.500	0	94.9	80	120				D
Nitrate (as N)	7.13	1.00	7.500	0	95.1	80	120				D
Sulfate	35.7	6.00	37.50	5.510	80.5	80	120				D

Work Order: 2306044
CLIENT: Friedman & Bruya
Project: 306023

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: 2306028-005CMSD		SampType: MSD		Units: mg/L		Prep Date: 6/2/2023		RunNo: 84490			
Client ID: BATCH		Batch ID: 40550				Analysis Date: 6/2/2023		SeqNo: 1763557			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrite (as N)	6.94	1.20	7.500	0	92.5	80	120	7.120	2.56	20	D
Nitrate (as N)	6.94	1.00	7.500	0	92.5	80	120	7.130	2.70	20	D
Sulfate	35.0	6.00	37.50	5.510	78.7	80	120	35.71	1.95	20	DS

NOTES:

S - Outlying spike recovery(ies) observed. A duplicate analysis was performed and recovered within range.

Work Order: 2306044
CLIENT: Friedman & Bruya
Project: 306023

QC SUMMARY REPORT

Total Organic Carbon by SM 5310C

Sample ID: LCS-84606	SampType: LCS	Units: mg/L				Prep Date: 6/10/2023			RunNo: 84606		
Client ID: LCSW	Batch ID: R84606					Analysis Date: 6/10/2023			SeqNo: 1766130		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	46.8	0.700	44.50	0	105	88.1	112				

Sample ID: MB-84606	SampType: MBLK	Units: mg/L				Prep Date: 6/10/2023			RunNo: 84606		
Client ID: MBLKW	Batch ID: R84606					Analysis Date: 6/10/2023			SeqNo: 1766131		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	ND	0.700									

Sample ID: LCSD-84606	SampType: LCSD	Units: mg/L				Prep Date: 6/10/2023			RunNo: 84606		
Client ID: LCSW02	Batch ID: R84606					Analysis Date: 6/10/2023			SeqNo: 1766059		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	46.7	0.700	44.50	0	105	88.1	112	46.81	0.152	20	

Sample ID: 2306021-001GDUP	SampType: DUP	Units: mg/L				Prep Date: 6/10/2023			RunNo: 84606		
Client ID: BATCH	Batch ID: R84606					Analysis Date: 6/10/2023			SeqNo: 1766061		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	24.0	0.700						21.43	11.2	20	Q

Sample ID: 2306080-003FDUP	SampType: DUP	Units: mg/L				Prep Date: 6/10/2023			RunNo: 84606		
Client ID: BATCH	Batch ID: R84606					Analysis Date: 6/10/2023			SeqNo: 1766076		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Organic Carbon	ND	0.700						0		20	

Work Order: 2306044
CLIENT: Friedman & Bruya
Project: 306023

QC SUMMARY REPORT

Dissolved Gases by RSK-175

Sample ID: LCS-R84514		SampType: LCS			Units: ppmv		Prep Date: 6/8/2023			RunNo: 84514		
Client ID: LCSW		Batch ID: R84514			Analysis Date: 6/8/2023					SeqNo: 1764186		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Methane	1,020	0.00675	1,000	0	102	73.6	124				
Ethene	993	0.0146	1,000	0	99.3	76.3	122				
Ethane	981	0.0151	1,000	0	98.1	76.1	123				

Sample ID: MB-R84514		SampType: MBLK			Units: mg/L		Prep Date: 6/8/2023			RunNo: 84514		
Client ID: MBLKW		Batch ID: R84514			Analysis Date: 6/8/2023					SeqNo: 1764185		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Methane	ND	0.00675									
Ethene	ND	0.0146									
Ethane	ND	0.0151									

Sample ID: 2305578-001DREP		SampType: REP			Units: mg/L		Prep Date: 6/8/2023			RunNo: 84514		
Client ID: BATCH		Batch ID: R84514			Analysis Date: 6/8/2023					SeqNo: 1764165		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Methane	0.447	0.00675						0.3407	27.0	30	E
Ethene	ND	0.0146						0		30	
Ethane	ND	0.0151						0		30	

Client Name: FB
 Logged by: Clare Griggs

Work Order Number: 2306044
 Date Received: 6/2/2023 1:40:00 PM

Chain of Custody

1. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
 2. How was the sample delivered? Client

Log In

3. Custody Seals present on shipping container/cooler?
 (Refer to comments for Custody Seals not intact) Yes ☐ No ☐ Not Present ☒
 4. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐
 5. Were all items received at a temperature of >2°C to 6°C * Yes ☒ No ☐ NA ☐
 6. Sample(s) in proper container(s)? Yes ☒ No ☐
 7. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐
 8. Are samples properly preserved? Yes ☐ No ☒
 9. Was preservative added to bottles? Yes ☐ No ☒ NA ☐
 10. Is there headspace in the VOA vials? Yes ☐ No ☒ NA ☐
 11. Did all samples containers arrive in good condition(unbroken)? Yes ☒ No ☐
 12. Does paperwork match bottle labels? Yes ☒ No ☐
 13. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐
 14. Is it clear what analyses were requested? Yes ☒ No ☐
 15. Were all holding times able to be met? Yes ☐ No ☒

Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☒

Person Notified:		Date:	
By Whom:		Via:	☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:			
Client Instructions:			

17. Additional remarks:

Item Information

Item #	Temp °C
Sample	6.0

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

Page # 23 of 26

Phone # (206) 285-8282 Fax # (206) 283-5044

TURNAROUND TIME
☒ Standard (1 Week)
☐ RUSH
 Rush charges authorized by: _____

SAMPLE DISPOSAL
☐ Dispose after 30 days
☐ Return samples
☐ Will call with instructions

ANALYSES REQUESTED

[illegible]

Fax (206) 283-5044

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
	Ann Weber-Brya	Friedman & Brya	6/2/23	
Received by: 	Nathan Kotler		6/2/23	1340
Relinquished by:				
Received by:				

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Vineta Mills, M.S.
Eric Young, B.S.

5500 4th Avenue South
Seattle, WA 98108
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

October 5, 2023

Daniel Babcock, Project Manager
Aspect Consulting, LLC
350 Madison Ave. N.
Bainbridge Island, WA 98110-1810

Dear Mr Babcock:

Included are the results from the testing of material submitted on September 25, 2023 from the HERS Industrial 140252, F&BI 309377 project. There are 14 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures

c: Aspect Data, Marc Chalfant
ASP1005R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on September 25, 2023 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC HERS Industrial 140252, F&BI 309377 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Aspect Consulting, LLC</u>
309377 -01	MW-16-092523
309377 -02	MW-12-092523
309377 -03	MW-01-092523
309377 -04	TB-092523

Samples MW-16-092523, MW-12-092523, and MW-01-092523 were sent to Fremont Analytical for total organic carbon, sulfate, nitrate, nitrite, and RSK dissolved gases analyses. The report is enclosed.

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-16-092523	Client:	Aspect Consulting, LLC
Date Received:	09/25/23	Project:	HERS Industrial 140252
Date Extracted:	09/26/23	Lab ID:	309377-01 x200
Date Analyzed:	09/27/23	Data File:	309377-01 x200.084
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
----------	-----------------------------

Iron	315,000
------	---------

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-12-092523	Client:	Aspect Consulting, LLC
Date Received:	09/25/23	Project:	HERS Industrial 140252
Date Extracted:	09/26/23	Lab ID:	309377-02 x200
Date Analyzed:	09/27/23	Data File:	309377-02 x200.085
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
----------	-----------------------------

Iron	67,400
------	--------

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-01-092523	Client:	Aspect Consulting, LLC
Date Received:	09/25/23	Project:	HERS Industrial 140252
Date Extracted:	09/26/23	Lab ID:	309377-03 x200
Date Analyzed:	09/27/23	Data File:	309377-03 x200.086
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
----------	-----------------------------

Iron	68,600
------	--------

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	HERS Industrial 140252
Date Extracted:	09/26/23	Lab ID:	I3-740 mb2
Date Analyzed:	09/26/23	Data File:	I3-740 mb2.136
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
----------	-----------------------------

Iron	<50
------	-----

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-16-092523	Client:	Aspect Consulting, LLC
Date Received:	09/25/23	Project:	HERS Industrial 140252
Date Extracted:	09/26/23	Lab ID:	309377-01
Date Analyzed:	09/26/23	Data File:	092613.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	78	126
Toluene-d8	105	84	115
4-Bromofluorobenzene	101	72	130

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	0.65
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	29
1,2-Dichloroethane (EDC)	<0.2
1,1,1-Trichloroethane	<1
Trichloroethene	0.56
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-12-092523	Client:	Aspect Consulting, LLC
Date Received:	09/25/23	Project:	HERS Industrial 140252
Date Extracted:	09/26/23	Lab ID:	309377-02
Date Analyzed:	09/26/23	Data File:	092612.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	78	126
Toluene-d8	104	84	115
4-Bromofluorobenzene	104	72	130

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	2.6
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	72
1,2-Dichloroethane (EDC)	<0.2
1,1,1-Trichloroethane	<1
Trichloroethene	1.3
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-01-092523	Client:	Aspect Consulting, LLC
Date Received:	09/25/23	Project:	HERS Industrial 140252
Date Extracted:	09/26/23	Lab ID:	309377-03
Date Analyzed:	09/26/23	Data File:	092614.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	106	78	126
Toluene-d8	101	84	115
4-Bromofluorobenzene	98	72	130

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	36
Chloroethane	<1
1,1-Dichloroethene	2.4
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	2.2
cis-1,2-Dichloroethene	290 ve
1,2-Dichloroethane (EDC)	<0.2
1,1,1-Trichloroethane	1.7
Trichloroethene	67
Tetrachloroethene	1.0

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-01-092523	Client:	Aspect Consulting, LLC
Date Received:	09/25/23	Project:	HERS Industrial 140252
Date Extracted:	09/26/23	Lab ID:	309377-03 1/10
Date Analyzed:	09/27/23	Data File:	092718.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	97	71	132
Toluene-d8	99	68	139
4-Bromofluorobenzene	95	62	136

Compounds:	Concentration ug/L (ppb)
cis-1,2-Dichloroethene	260

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	TB-092523	Client:	Aspect Consulting, LLC
Date Received:	09/25/23	Project:	HERS Industrial 140252
Date Extracted:	09/26/23	Lab ID:	309377-04
Date Analyzed:	09/26/23	Data File:	092610.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	106	78	126
Toluene-d8	101	84	115
4-Bromofluorobenzene	102	72	130

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.02
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<0.2
1,1,1-Trichloroethane	<1
Trichloroethene	<0.5
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	HERS Industrial 140252
Date Extracted:	09/26/23	Lab ID:	03-2162 mb
Date Analyzed:	09/26/23	Data File:	092608.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	LM

	% Recovery:	Lower Limit:	Upper Limit:
Surrogates:			
1,2-Dichloroethane-d4	98	78	126
Toluene-d8	103	84	115
4-Bromofluorobenzene	101	72	130

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.02
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<0.2
1,1,1-Trichloroethane	<1
Trichloroethene	<0.5
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 10/05/23

Date Received: 09/25/23

Project: HERS Industrial 140252, F&BI 309377

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR TOTAL METALS USING EPA METHOD 6020B**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Iron	ug/L (ppb)	100	97	95	80-120	2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 10/05/23

Date Received: 09/25/23

Project: HERS Industrial 140252, F&BI 309377

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR VOLATILES BY EPA METHOD 8260D**

Laboratory Code: 309377-02 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent	Acceptance Criteria
				Recovery MS	
Vinyl chloride	ug/L (ppb)	10	2.6	122 b	50-150
Chloroethane	ug/L (ppb)	10	<1	118	50-150
1,1-Dichloroethene	ug/L (ppb)	10	<1	121	50-150
Methylene chloride	ug/L (ppb)	10	<5	123	50-150
trans-1,2-Dichloroethene	ug/L (ppb)	10	<1	116	50-150
1,1-Dichloroethane	ug/L (ppb)	10	<1	120	50-150
cis-1,2-Dichloroethene	ug/L (ppb)	10	72	127 b	10-211
1,2-Dichloroethane (EDC)	ug/L (ppb)	10	<0.2	118	50-150
1,1,1-Trichloroethane	ug/L (ppb)	10	<1	116	50-150
Trichloroethene	ug/L (ppb)	10	1.3	113	35-149
Tetrachloroethene	ug/L (ppb)	10	<1	111	50-150

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent	Percent	Acceptance Criteria	RPD (Limit 20)
			Recovery LCS	Recovery LCSD		
Vinyl chloride	ug/L (ppb)	10	116	108	64-142	7
Chloroethane	ug/L (ppb)	10	112	104	70-130	7
1,1-Dichloroethene	ug/L (ppb)	10	115	107	64-140	7
Methylene chloride	ug/L (ppb)	10	113	107	43-134	5
trans-1,2-Dichloroethene	ug/L (ppb)	10	111	104	70-130	7
1,1-Dichloroethane	ug/L (ppb)	10	114	108	70-130	5
cis-1,2-Dichloroethene	ug/L (ppb)	10	116	107	70-130	8
1,2-Dichloroethane (EDC)	ug/L (ppb)	10	120	117	70-130	3
1,1,1-Trichloroethane	ug/L (ppb)	10	112	106	70-130	6
Trichloroethene	ug/L (ppb)	10	113	111	70-130	2
Tetrachloroethene	ug/L (ppb)	10	112	108	70-130	4

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria, biased low; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the standard reporting limit. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

k - The calibration results for the analyte were outside of acceptance criteria, biased high, and the analyte was not detected in the sample.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

Page # 1 of 1

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH _____
 Rush charges authorized by: _____

SAMPLE DISPOSAL
☐ Archive samples
☐ Other _____
 Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED										Notes	
						NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260*	PAHs EPA 8270	PCBs EPA 8082	Total Organic Carbon EPA 415.1	Nitrate, Nitrite, Sulfate EPA 300.0	Dissolved From EPA 602.0 or 601.0B		Dissolved gases Ethane, Ethene, Methane RSK-1
MW-16-092523	01 A-F	9/25/23	1035	Gr	6					X			X	X	X	X	
MW-12-092523	02		1135	Gr	6					X			X	X	X	X	
MW-01-092523	03		1355	Gr	6					X			X	X	X	X	
TB-092523	04 A-B	-	-	-	2					X							Trip Bins
													</				

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Reinquished by: <i>Paul MacKay</i>	<i>David MacKay</i>	<i>ASPECT</i>	<i>9/25/23</i>	<i>1600</i>
Received by: <i>Paul</i>	<i>ANH PHAN</i>	<i>ESM</i>	<i>09/25/23</i>	<i>16:00</i>
Reinquished by:				
Received by:				



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Friedman & Bruya
Michael Erdahl
5500 4th Ave S
Seattle, WA 98108

RE: 309377
Work Order Number: 2309402

October 03, 2023

Attention Michael Erdahl:

Fremont Analytical, Inc. received 3 sample(s) on 9/26/2023 for the analyses presented in the following report.

Dissolved Gases by RSK-175
Ion Chromatography by EPA Method 300.0
Total Organic Carbon by SM 5310C

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

DoD-ELAP Accreditation #79636 by PJLA, ISO/IEC 17025:2017 and QSM 5.3 for Environmental Testing
ORELAP Certification: WA 100009 (NELAP Recognized) for Environmental Testing
Washington State Department of Ecology Accredited for Environmental Testing, Lab ID C910

Original

CLIENT: Friedman & Bruya
Project: 309377
Work Order: 2309402

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2309402-001	MW-16-092523	09/25/2023 10:35 AM	09/26/2023 8:35 AM
2309402-002	MW-12-092523	09/25/2023 11:35 AM	09/26/2023 8:35 AM
2309402-003	MW-01-092523	09/25/2023 1:55 PM	09/26/2023 8:35 AM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

CLIENT: Friedman & Bruya

Project: 309377

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- DUP - Sample Duplicate
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MCL - Maximum Contaminant Level
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- REP - Sample Replicate
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate

Work Order: **2309402**
Date Reported: **10/3/2023**

CLIENT: Friedman & Bruya
Project: 309377

Lab ID: 2309402-001

Collection Date: 9/25/2023 10:35:00 AM

Client Sample ID: MW-16-092523

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Gases by RSK-175

Batch ID: R86837 Analyst: AM

Methane	0.743	0.0270	D	mg/L	4	9/27/2023 4:41:00 PM
Ethene	0.0644	0.0146		mg/L	1	9/27/2023 4:32:00 PM
Ethane	0.128	0.0151		mg/L	1	9/27/2023 4:32:00 PM

Ion Chromatography by EPA Method 300.0

Batch ID: 41596 Analyst: SS

Nitrite (as N)	ND	2.40	D	mg/L	20	9/27/2023 12:55:00 AM
Nitrate (as N)	ND	2.00	D	mg/L	20	9/27/2023 12:55:00 AM
Sulfate	ND	6.00	D	mg/L	10	9/29/2023 2:39:00 AM

NOTES:

Diluted due to matrix.

Total Organic Carbon by SM 5310C

Batch ID: R86910 Analyst: SS

Total Organic Carbon	220	0.700		mg/L	1	10/3/2023 11:58:00 AM
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Lab ID: 2309402-002

Collection Date: 9/25/2023 11:35:00 AM

Client Sample ID: MW-12-092523

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Gases by RSK-175

Batch ID: R86837 Analyst: AM

Methane	2.32	0.135	D	mg/L	20	9/27/2023 4:44:00 PM
Ethene	ND	0.0146		mg/L	1	9/27/2023 4:36:00 PM
Ethane	0.0293	0.0151		mg/L	1	9/27/2023 4:36:00 PM

Ion Chromatography by EPA Method 300.0

Batch ID: 41596 Analyst: SS

Nitrite (as N)	0.900	0.600	D	mg/L	5	9/27/2023 1:18:00 AM
Nitrate (as N)	ND	0.500	D	mg/L	5	9/27/2023 1:18:00 AM
Sulfate	ND	1.20	D	mg/L	2	9/29/2023 3:02:00 AM

NOTES:

Diluted due to matrix.

Total Organic Carbon by SM 5310C

Batch ID: R86910 Analyst: SS

Total Organic Carbon	111	0.700		mg/L	1	10/3/2023 1:56:00 PM
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CLIENT: Friedman & Bruya

Project: 309377

Lab ID: 2309402-003

Collection Date: 9/25/2023 1:55:00 PM

Client Sample ID: MW-01-092523

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Gases by RSK-175

Batch ID: R86837 Analyst: AM

Methane	3.41	0.135	D	mg/L	20	9/27/2023 4:46:00 PM
Ethene	ND	0.0146		mg/L	1	9/27/2023 4:38:00 PM
Ethane	ND	0.0151		mg/L	1	9/27/2023 4:38:00 PM

Ion Chromatography by EPA Method 300.0

Batch ID: 41596 Analyst: SS

Nitrite (as N)	ND	0.600	D	mg/L	5	9/27/2023 1:42:00 AM
Nitrate (as N)	ND	0.500	D	mg/L	5	9/27/2023 1:42:00 AM
Sulfate	ND	0.600		mg/L	1	9/29/2023 3:25:00 AM

NOTES:

Diluted due to matrix.

Total Organic Carbon by SM 5310C

Batch ID: R86910 Analyst: SS

Total Organic Carbon	77.8	0.700		mg/L	1	10/3/2023 2:17:00 PM
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Work Order: 2309402
CLIENT: Friedman & Bruya
Project: 309377

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: LCS-41596		SampType: LCS			Units: mg/L		Prep Date: 9/26/2023			RunNo: 86794		
Client ID: LCSW		Batch ID: 41596			Analysis Date: 9/26/2023			SeqNo: 1811166				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Nitrite (as N)	0.718	0.120	0.7500	0	95.7	90	110				
Nitrate (as N)	0.736	0.100	0.7500	0	98.1	90	110				

Sample ID: MB-41596		SampType: MBLK			Units: mg/L		Prep Date: 9/26/2023			RunNo: 86794		
Client ID: MBLKW		Batch ID: 41596			Analysis Date: 9/26/2023					SeqNo: 1811168		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Nitrite (as N)	ND	0.120									
Nitrate (as N)	ND	0.100									

Sample ID: 2309406-001BDUP		SampType: DUP			Units: mg/L		Prep Date: 9/26/2023			RunNo: 86794		
Client ID: BATCH		Batch ID: 41596			Analysis Date: 9/27/2023					SeqNo: 1811181		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Nitrite (as N)	ND	0.120						0		20	
Nitrate (as N)	ND	0.100						0		20	

Sample ID: 2309406-001BMS		SampType: MS			Units: mg/L		Prep Date: 9/26/2023			RunNo: 86794		
Client ID: BATCH		Batch ID: 41596			Analysis Date: 9/27/2023			SeqNo: 1811182				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Nitrite (as N)	0.219	0.120	0.7500	0	29.2	80	120				S
Nitrate (as N)	ND	0.100	0.7500	0	0	80	120				S

NOTES:

S - Outlying spike recovery(ies) observed. A duplicate analysis was performed with similar results indicating a possible matrix effect.

Sample ID: 2309406-001BMSD		SampType: MSD			Units: mg/L		Prep Date: 9/26/2023			RunNo: 86794		
Client ID: BATCH		Batch ID: 41596			Analysis Date: 9/27/2023					SeqNo: 1811183		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Nitrite (as N)	0.126	0.120	0.7500	0	16.8	80	120	0.2190	53.9	20	S
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Work Order: 2309402
CLIENT: Friedman & Bruya
Project: 309377

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: 2309406-001BMSD		SampType: MSD			Units: mg/L		Prep Date: 9/26/2023			RunNo: 86794		
Client ID: BATCH		Batch ID: 41596			Analysis Date: 9/27/2023			SeqNo: 1811183				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Nitrate (as N)	ND	0.100	0.7500	0	0	80	120	0		20	S
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NOTES:

S - Outlying spike recovery(ies) observed. A duplicate analysis was performed with similar results indicating a possible matrix effect.

Sample ID: 2309413-002CDUP		SampType: DUP			Units: mg/L		Prep Date: 9/26/2023			RunNo: 86794		
Client ID: BATCH		Batch ID: 41596			Analysis Date: 9/27/2023			SeqNo: 1811189				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Nitrite (as N)	ND	0.120						0		20	
Nitrate (as N)	0.421	0.100						0.4330	2.81	20	

Sample ID: 2309413-002CMS		SampType: MS			Units: mg/L		Prep Date: 9/26/2023			RunNo: 86794		
Client ID: BATCH		Batch ID: 41596			Analysis Date: 9/27/2023			SeqNo: 1811190				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Nitrite (as N)	0.733	0.120	0.7500	0	97.7	80	120				
Nitrate (as N)	1.19	0.100	0.7500	0.4330	101	80	120				

Sample ID: LCS-41625		SampType: LCS			Units: mg/L		Prep Date: 9/28/2023			RunNo: 86853		
Client ID: LCSW		Batch ID: 41625			Analysis Date: 9/28/2023			SeqNo: 1812459				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Sulfate	3.63	0.600	3.750	0	96.8	90	110				
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Sample ID: MB-41625		SampType: MBLK			Units: mg/L		Prep Date: 9/28/2023			RunNo: 86853		
Client ID: MBLKW		Batch ID: 41625			Analysis Date: 9/28/2023			SeqNo: 1812461				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Sulfate	ND	0.600									
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Work Order: 2309402
CLIENT: Friedman & Bruya
Project: 309377

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: 2309484-001ADUP		SampType: DUP			Units: mg/L		Prep Date: 9/28/2023			RunNo: 86853		
Client ID: BATCH		Batch ID: 41625						Analysis Date: 9/28/2023			SeqNo: 1812468	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Sulfate	4.09	0.600						4.095	0.0977	20		

Sample ID: 2309484-001AMS		SampType: MS			Units: mg/L		Prep Date: 9/28/2023			RunNo: 86853		
Client ID: BATCH		Batch ID: 41625						Analysis Date: 9/28/2023			SeqNo: 1812469	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Sulfate	8.04	0.600	3.750	4.095	105	80	120					

Sample ID: 2309406-001BDUP		SampType: DUP			Units: mg/L		Prep Date: 9/28/2023			RunNo: 86853		
Client ID: BATCH		Batch ID: 41625						Analysis Date: 9/29/2023			SeqNo: 1812497	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Sulfate	8.61	0.600						8.529	0.899	20	H	

Sample ID: 2309406-001BMS		SampType: MS			Units: mg/L		Prep Date: 9/28/2023			RunNo: 86853		
Client ID: BATCH		Batch ID: 41625						Analysis Date: 9/29/2023			SeqNo: 1812498	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Sulfate	12.2	0.600	3.750	8.529	97.3	80	120				H	

Sample ID: 2309406-001BMSD		SampType: MSD			Units: mg/L		Prep Date: 9/28/2023			RunNo: 86853		
Client ID: BATCH		Batch ID: 41625						Analysis Date: 9/29/2023			SeqNo: 1812499	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Sulfate	12.2	0.600	3.750	8.529	99.1	80	120	12.18	0.540	20	H	

Work Order: 2309402
CLIENT: Friedman & Bruya
Project: 309377

QC SUMMARY REPORT

Total Organic Carbon by SM 5310C

Sample ID: MB-R86910		SampType: MBLK		Units: mg/L		Prep Date: 10/3/2023			RunNo: 86910			
Client ID: MBLKW		Batch ID: R86910					Analysis Date: 10/3/2023			SeqNo: 1813951		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Total Organic Carbon	ND	0.700									
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Sample ID: LCS-R86910		SampType: LCS			Units: mg/L		Prep Date: 10/3/2023			RunNo: 86910		
Client ID: LCSW		Batch ID: R86910			Analysis Date: 10/3/2023			SeqNo: 1813952				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Total Organic Carbon	5.02	0.700	5.000	0	100	90	116				
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Sample ID: 2309402-001BDUP		SampType: DUP			Units: mg/L		Prep Date: 10/3/2023			RunNo: 86910		
Client ID: MW-16-092523		Batch ID: R86910			Analysis Date: 10/3/2023					SeqNo: 1813954		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Total Organic Carbon	235	0.700						219.8	6.75	20	
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Sample ID: 2309402-001BMS		SampType: MS			Units: mg/L		Prep Date: 10/3/2023			RunNo: 86910		
Client ID: MW-16-092523		Batch ID: R86910			Analysis Date: 10/3/2023			SeqNo: 1813955				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Total Organic Carbon	228	0.700	5.000	219.8	170	62.4	130				S
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NOTES:

S - Spiked amount was low relative to sample concentration. Outlying spike recoveries may be expected.

Sample ID: 2309402-001BMSD		SampType: MSD			Units: mg/L		Prep Date: 10/3/2023			RunNo: 86910		
Client ID: MW-16-092523		Batch ID: R86910			Analysis Date: 10/3/2023			SeqNo: 1813956				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Total Organic Carbon	235	0.700	5.000	219.8	310	62.4	130	228.3	3.01	30	S
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NOTES:

S - Spiked amount was low relative to sample concentration. Outlying spike recoveries may be expected.

Work Order: 2309402
CLIENT: Friedman & Bruya
Project: 309377

QC SUMMARY REPORT

Dissolved Gases by RSK-175

Sample ID: LCS-R86837		SampType: LCS			Units: ppmv		Prep Date: 9/27/2023			RunNo: 86837		
Client ID: LCSW		Batch ID: R86837			Analysis Date: 9/27/2023			SeqNo: 1812140				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Methane	978	0.00675	1,000	0	97.8	73.6	124				
Ethene	1,010	0.0146	1,000	0	101	76.3	122				
Ethane	986	0.0151	1,000	0	98.6	76.1	123				

Sample ID: MB-R86837		SampType: MBLK			Units: mg/L		Prep Date: 9/27/2023			RunNo: 86837		
Client ID: MBLKW		Batch ID: R86837			Analysis Date: 9/27/2023			SeqNo: 1812139				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Methane	ND	0.00675									
Ethene	ND	0.0146									
Ethane	ND	0.0151									

Sample ID: 2309402-001CREP		SampType: REP			Units: mg/L		Prep Date: 9/27/2023			RunNo: 86837		
Client ID: MW-16-092523		Batch ID: R86837						Analysis Date: 9/27/2023			SeqNo: 1812158	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Methane	0.633	0.00675						0.6315	0.225	30	
Ethene	0.0639	0.0146						0.06441	0.722	30	
Ethane	0.134	0.0151						0.1283	4.28	30	

Sample Log-In Check List

Client Name: FB
 Logged by: Clare Griggs

Work Order Number: 2309402
 Date Received: 9/26/2023 8:35:00 AM

Chain of Custody

1. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
 2. How was the sample delivered? Client

Log In

3. Custody Seals present on shipping container/cooler?
 (Refer to comments for Custody Seals not intact) Yes ☐ No ☐ Not Present ☒
 4. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐
 5. Were all items received at a temperature of >2°C to 6°C * Yes ☒ No ☐ NA ☐
 6. Sample(s) in proper container(s)? Yes ☒ No ☐
 7. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐
 8. Are samples properly preserved? Yes ☒ No ☐
 9. Was preservative added to bottles? Yes ☐ No ☒ NA ☐
 10. Is there headspace in the VOA vials? Yes ☐ No ☒ NA ☐
 11. Did all samples containers arrive in good condition(unbroken)? Yes ☒ No ☐
 12. Does paperwork match bottle labels? Yes ☒ No ☐
 13. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐
 14. Is it clear what analyses were requested? Yes ☒ No ☐
 15. Were all holding times able to be met? Yes ☒ No ☐

Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☒

Person Notified:		Date:	
By Whom:		Via:	☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:			
Client Instructions:			

17. Additional remarks:

Item Information

Item #	Temp °C
Sample	4.1

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

Page # 1 of 1

Fremont

PO #

D-466

Aspect EDD

TURNABOUT TIME

☒ Standard TAT
RUSH 230940Z

Rush charges authorized by:

SAMPLE DISPOSAL

Dispose after 30 days

Return samples

Will call with instructions

SUBTRACTOR Fremont	
PROJECT NAME/NO. 309377	PO # D-466
REMARKS Aspect EDD	

TURNAROUND TIME

☒ Standard TAT
RUSH 230940Z

Rush charges authorized by:

SAMPLE DISPOSAL

Dispose after 30 days

Return samples

Will call with instructions

[illegible]

TIME

8:35

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Vineta Mills, M.S.
Eric Young, B.S.

5500 4th Avenue South
Seattle, WA 98108
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

January 9, 2024

Marc Chalfant, Project Manager
Aspect Consulting, LLC
350 Madison Ave. N.
Bainbridge Island, WA 98110-1810

Dear Mr Chalfant:

Included are the results from the testing of material submitted on December 28, 2023 from the HERS Industrial 140252, F&BI 312465 project. There are 13 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Aspect Data
ASP0109R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 28, 2023 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC HERS Industrial 140252, F&BI 312465 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Aspect Consulting, LLC</u>
312465 -01	MW-01-122823
312465 -02	MW-16-122823
312465 -03	MW-12-122823
312465 -04	MW-11-122823
312465 -05	Trip Blank

Samples MW-01-122823, MW-16-122823, and MW-12-122823 were sent to Fremont Analytical for TOC, nitrate, nitrite, sulfate, and dissolved gases analyses. The report is enclosed.

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-01-122823	Client:	Aspect Consulting, LLC
Date Received:	12/28/23	Project:	HERS Industrial 140252
Date Extracted:	01/02/24	Lab ID:	312465-01 x200
Date Analyzed:	01/03/24	Data File:	312465-01 x200.043
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
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Iron	262,000
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-16-122823	Client:	Aspect Consulting, LLC
Date Received:	12/28/23	Project:	HERS Industrial 140252
Date Extracted:	01/02/24	Lab ID:	312465-02 x200
Date Analyzed:	01/03/24	Data File:	312465-02 x200.044
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
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Iron	779,000
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-12-122823	Client:	Aspect Consulting, LLC
Date Received:	12/28/23	Project:	HERS Industrial 140252
Date Extracted:	01/02/24	Lab ID:	312465-03 x200
Date Analyzed:	01/03/24	Data File:	312465-03 x200.055
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
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Iron	174,000
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	HERS Industrial 140252
Date Extracted:	01/02/24	Lab ID:	I4-005 mb
Date Analyzed:	01/03/24	Data File:	I4-005 mb.036
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
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Iron	<50
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-01-122823	Client:	Aspect Consulting, LLC
Date Received:	12/28/23	Project:	HERS Industrial 140252
Date Extracted:	01/02/24	Lab ID:	312465-01
Date Analyzed:	01/03/24	Data File:	010336.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	78	126
Toluene-d8	95	84	115
4-Bromofluorobenzene	95	72	130

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	120
Chloroethane	1.3
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	100
1,2-Dichloroethane (EDC)	<0.2
1,1,1-Trichloroethane	<1
Trichloroethene	<0.5
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-16-122823	Client:	Aspect Consulting, LLC
Date Received:	12/28/23	Project:	HERS Industrial 140252
Date Extracted:	01/02/24	Lab ID:	312465-02
Date Analyzed:	01/02/24	Data File:	010229.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	97	78	126
Toluene-d8	95	84	115
4-Bromofluorobenzene	97	72	130

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	1.2
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	49
1,2-Dichloroethane (EDC)	<0.2
1,1,1-Trichloroethane	<1
Trichloroethene	<0.5
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-12-122823	Client:	Aspect Consulting, LLC
Date Received:	12/28/23	Project:	HERS Industrial 140252
Date Extracted:	01/02/24	Lab ID:	312465-03
Date Analyzed:	01/02/24	Data File:	010230.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	78	126
Toluene-d8	95	84	115
4-Bromofluorobenzene	91	72	130

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	8.1
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	43
1,2-Dichloroethane (EDC)	<0.2
1,1,1-Trichloroethane	<1
Trichloroethene	<0.5
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-11-122823	Client:	Aspect Consulting, LLC
Date Received:	12/28/23	Project:	HERS Industrial 140252
Date Extracted:	01/02/24	Lab ID:	312465-04
Date Analyzed:	01/05/24	Data File:	010510.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	78	126
Toluene-d8	102	84	115
4-Bromofluorobenzene	103	72	130

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	0.022
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	2.5
1,2-Dichloroethane (EDC)	<0.2
1,1,1-Trichloroethane	<1
Trichloroethene	23
Tetrachloroethene	5.8

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	HERS Industrial 140252
Date Extracted:	01/02/24	Lab ID:	04-0041 mb
Date Analyzed:	01/02/24	Data File:	010208.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	106	78	126
Toluene-d8	102	84	115
4-Bromofluorobenzene	100	72	130

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.02
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<0.2
1,1,1-Trichloroethane	<1
Trichloroethene	<0.5
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 01/09/24

Date Received: 12/28/23

Project: HERS Industrial 140252, F&BI 312465

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR DISSOLVED METALS USING EPA METHOD 6020B**

Laboratory Code: 312484-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Iron	ug/L (ppb)	100	311	102 b	91 b	75-125	11 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Iron	ug/L (ppb)	100	99	80-120

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 01/09/24

Date Received: 12/28/23

Project: HERS Industrial 140252, F&BI 312465

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR VOLATILES BY EPA METHOD 8260D**

Laboratory Code: 312484-02 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent	Acceptance Criteria
				Recovery MS	
Vinyl chloride	ug/L (ppb)	10	<0.02	110	50-150
Chloroethane	ug/L (ppb)	10	<1	106	50-150
1,1-Dichloroethene	ug/L (ppb)	10	<1	99	50-150
Methylene chloride	ug/L (ppb)	10	<5	97	50-150
trans-1,2-Dichloroethene	ug/L (ppb)	10	<1	101	50-150
1,1-Dichloroethane	ug/L (ppb)	10	<1	104	50-150
cis-1,2-Dichloroethene	ug/L (ppb)	10	<1	104	10-211
1,2-Dichloroethane (EDC)	ug/L (ppb)	10	<0.2	108	50-150
1,1,1-Trichloroethane	ug/L (ppb)	10	<1	106	50-150
Trichloroethene	ug/L (ppb)	10	<0.5	101	35-149
Tetrachloroethene	ug/L (ppb)	10	<1	103	50-150

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent	Percent	Acceptance Criteria	RPD (Limit 20)
			Recovery LCS	Recovery LCSD		
Vinyl chloride	ug/L (ppb)	10	109	108	64-142	1
Chloroethane	ug/L (ppb)	10	110	109	70-130	1
1,1-Dichloroethene	ug/L (ppb)	10	101	99	64-140	2
Methylene chloride	ug/L (ppb)	10	105	101	43-134	4
trans-1,2-Dichloroethene	ug/L (ppb)	10	102	101	70-130	1
1,1-Dichloroethane	ug/L (ppb)	10	105	104	70-130	1
cis-1,2-Dichloroethene	ug/L (ppb)	10	102	101	70-130	1
1,2-Dichloroethane (EDC)	ug/L (ppb)	10	104	104	70-130	0
1,1,1-Trichloroethane	ug/L (ppb)	10	106	106	70-130	0
Trichloroethene	ug/L (ppb)	10	98	98	70-130	0
Tetrachloroethene	ug/L (ppb)	10	95	94	70-130	1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria, biased low; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the standard reporting limit. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

k - The calibration results for the analyte were outside of acceptance criteria, biased high, and the analyte was not detected in the sample.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

SAMPLE CHAIN OF CUSTODY

12/28/23

vw3 / 23

Page # 1 of 1

312465

Report To Marc Chalfant

Company Aspect

Address

City, State, ZIP

Phone 435 714 4531 Email marc.chalfant@aspect.com

SAMPLERS (signature) Paul Kelly

PROJECT NAME

HERS Industrial

PO #

140252

REMARKS

0.50 inch Pan Samples
field filtered

INVOICE TO

Project specific RLS? - Yes / No

ANALYSES REQUESTED

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:
SAMPLE DISPOSAL
☐ Archive samples
☐ Other
Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Dissolved Iron (field filtered)	TOC (EPA 415.1)	Nitrate, Nitrite, Sulfate (EPA 300)	Ethane, Ethene, methane Risk-175 (D.32.144)	Notes
MW-01-122823	01 A-E	12/28/23	1020	Gr	9					X	X	X	X	X	X	X	Effectiveness with filling vials
MW-16-122823	02		1310		9				X	X	X	X	X	X	X	X	"
MW-12-122823	03		1415		9				X	X	X	X	X	X	X	X	"
MW-11-122823	04 A-C		1525		3				X								"
Trip Blank	05 A-B			water	2												Added at lab NP 12/28/23

Friedman & Bruya, Inc.
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Reinquished by: Paul Kelly	David Mackay	Aspect	12/28/23	1805
Received by:	JOE McHANEY	EBI	12/28/23	1805
Reinquished by:				
Received by:		Samples received at 3 °C		



Fremont
Analytical
An Alliance Technical Group Company

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Friedman & Bruya
Michael Erdahl
5500 4th Ave S
Seattle, WA 98108

RE: 312465
Work Order Number: 2312598

January 08, 2024

Attention Michael Erdahl:

Fremont Analytical, Inc. received 3 sample(s) on 12/29/2023 for the analyses presented in the following report.

Dissolved Gases by RSK-175
Ion Chromatography by EPA Method 300.0
Total Organic Carbon by SM 5310C

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

DoD-ELAP Accreditation #79636 by PJLA, ISO/IEC 17025:2017 and QSM 5.3 for Environmental Testing
ORELAP Certification: WA 100009 (NELAP Recognized) for Environmental Testing
Washington State Department of Ecology Accredited for Environmental Testing, Lab ID C910

Original

www.fremontanalytical.com

CLIENT: Friedman & Bruya
Project: 312465
Work Order: 2312598

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2312598-001	MW-01-122823	12/28/2023 10:20 AM	12/29/2023 9:41 AM
2312598-002	MW-16-122823	12/28/2023 1:10 PM	12/29/2023 9:41 AM
2312598-003	MW-12-122823	12/28/2023 2:15 PM	12/29/2023 9:41 AM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

CLIENT: Friedman & Bruya

Project: 312465

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- DUP - Sample Duplicate
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MCL - Maximum Contaminant Level
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- REP - Sample Replicate
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate

Work Order: **2312598**
Date Reported: **1/8/2024**

CLIENT: Friedman & Bruya
Project: 312465

Lab ID: 2312598-001

Collection Date: 12/28/2023 10:20:00 AM

Client Sample ID: MW-01-122823

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Gases by RSK-175

Batch ID: R88836 Analyst: LB

Methane	7.24	0.270	D	mg/L	40	1/7/2024 3:34:00 PM
Ethene	0.0271	0.0146		mg/L	1	1/7/2024 3:12:00 PM
Ethane	ND	0.0151		mg/L	1	1/7/2024 3:12:00 PM

Ion Chromatography by EPA Method 300.0

Batch ID: 42503 Analyst: FG

Nitrite (as N)	ND	1.20	DH	mg/L	10	1/2/2024 10:38:00 PM
Nitrate (as N)	ND	1.00	DH	mg/L	10	1/2/2024 10:38:00 PM
Sulfate	ND	6.00	D	mg/L	10	1/2/2024 10:38:00 PM

Total Organic Carbon by SM 5310C

Batch ID: R88742 Analyst: FG

Total Organic Carbon	221	0.700		mg/L	1	1/4/2024 7:09:00 AM
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Lab ID: 2312598-002

Collection Date: 12/28/2023 1:10:00 PM

Client Sample ID: MW-16-122823

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Gases by RSK-175

Batch ID: R88836 Analyst: LB

Methane	9.25	0.270	D	mg/L	40	1/7/2024 3:37:00 PM
Ethene	0.0907	0.0146		mg/L	1	1/7/2024 3:16:00 PM
Ethane	0.206	0.0151		mg/L	1	1/7/2024 3:16:00 PM

Ion Chromatography by EPA Method 300.0

Batch ID: 42503 Analyst: FG

Nitrite (as N)	ND	1.20	DH	mg/L	10	1/3/2024 12:11:00 AM
Nitrate (as N)	ND	1.00	DH	mg/L	10	1/3/2024 12:11:00 AM
Sulfate	ND	6.00	D	mg/L	10	1/3/2024 12:11:00 AM

Total Organic Carbon by SM 5310C

Batch ID: R88742 Analyst: FG

Total Organic Carbon	667	7.00	D	mg/L	10	1/5/2024 2:35:00 AM
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Work Order: **2312598**
Date Reported: **1/8/2024**

CLIENT: Friedman & Bruya
Project: 312465

Lab ID: 2312598-003

Collection Date: 12/28/2023 2:15:00 PM

Client Sample ID: MW-12-122823

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Gases by RSK-175

Batch ID: R88836 Analyst: LB

Methane	9.80	0.338	D	mg/L	50	1/7/2024 3:39:00 PM
Ethene	0.0233	0.0146		mg/L	1	1/7/2024 3:18:00 PM
Ethane	0.0262	0.0151		mg/L	1	1/7/2024 3:18:00 PM

Ion Chromatography by EPA Method 300.0

Batch ID: 42503 Analyst: FG

Nitrite (as N)	ND	1.20	DH	mg/L	10	1/3/2024 12:34:00 AM
Nitrate (as N)	ND	1.00	DH	mg/L	10	1/3/2024 12:34:00 AM
Sulfate	ND	6.00	D	mg/L	10	1/3/2024 12:34:00 AM

Total Organic Carbon by SM 5310C

Batch ID: R88742 Analyst: FG

Total Organic Carbon	83.5	0.700		mg/L	1	1/4/2024 8:14:00 AM
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Work Order: 2312598
CLIENT: Friedman & Bruya
Project: 312465

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: LCS-42503		SampType: LCS			Units: mg/L		Prep Date: 1/2/2024			RunNo: 88711		
Client ID: LCSW		Batch ID: 42503			Analysis Date: 1/2/2024					SeqNo: 1853361		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Nitrite (as N)	0.710	0.120	0.7500	0	94.7	90	110				
Nitrate (as N)	0.707	0.100	0.7500	0	94.3	90	110				
Sulfate	3.50	0.600	3.750	0	93.2	90	110				

Sample ID: MB-42503		SampType: MBLK			Units: mg/L		Prep Date: 1/2/2024			RunNo: 88711		
Client ID: MBLKW		Batch ID: 42503			Analysis Date: 1/2/2024					SeqNo: 1853363		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Nitrite (as N)	ND	0.120									
Nitrate (as N)	ND	0.100									
Sulfate	ND	0.600									

Sample ID: 2312598-001BDUP		SampType: DUP			Units: mg/L		Prep Date: 1/2/2024			RunNo: 88711		
Client ID: MW-01-122823		Batch ID: 42503			Analysis Date: 1/2/2024					SeqNo: 1853365		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Nitrite (as N)	ND	1.20						0		20	DH
Nitrate (as N)	ND	1.00						0		20	DH
Sulfate	ND	6.00						0		20	D

Sample ID: 2312598-001BMS		SampType: MS			Units: mg/L		Prep Date: 1/2/2024			RunNo: 88711		
Client ID: MW-01-122823		Batch ID: 42503			Analysis Date: 1/2/2024			SeqNo: 1853366				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Nitrite (as N)	6.84	1.20	7.500	0	91.2	80	120				DH
Nitrate (as N)	6.86	1.00	7.500	0	91.5	80	120				DH
Sulfate	34.2	6.00	37.50	0	91.3	80	120				D

Work Order: 2312598
CLIENT: Friedman & Bruya
Project: 312465

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: 2312598-001BMSD	SampType: MSD	Units: mg/L				Prep Date: 1/2/2024			RunNo: 88711		
Client ID: MW-01-122823	Batch ID: 42503	Analysis Date: 1/2/2024							SeqNo: 1853367		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrite (as N)	6.84	1.20	7.500	0	91.2	80	120	6.840	0	20	DH
Nitrate (as N)	6.81	1.00	7.500	0	90.8	80	120	6.860	0.732	20	DH
Sulfate	33.9	6.00	37.50	0	90.3	80	120	34.24	1.06	20	D

Sample ID: 2401015-001BDUP		SampType: DUP		Units: mg/L		Prep Date: 1/2/2024			RunNo: 88711		
Client ID: BATCH		Batch ID: 42503					Analysis Date: 1/3/2024			SeqNo: 1853383	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrite (as N)	ND	0.120						0		20	
Nitrate (as N)	ND	0.100						0		20	
Sulfate	2.51	0.600						2.495	0.599	20	

Sample ID: 2401015-001BMS		SampType: MS			Units: mg/L		Prep Date: 1/2/2024		RunNo: 88711		
Client ID: BATCH		Batch ID: 42503			Analysis Date: 1/3/2024				SeqNo: 1853384		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrite (as N)	0.688	0.120	0.7500	0	91.7	80	120				
Nitrate (as N)	0.697	0.100	0.7500	0.04100	87.5	80	120				
Sulfate	6.04	0.600	3.750	2.495	94.5	80	120				

Work Order: 2312598
CLIENT: Friedman & Bruya
Project: 312465

QC SUMMARY REPORT

Total Organic Carbon by SM 5310C

Sample ID: MB-R88742	SampType: MBLK	Units: mg/L	Prep Date: 1/4/2024	RunNo: 88742							
Client ID: MBLKW	Batch ID: R88742		Analysis Date: 1/4/2024	SeqNo: 1854729							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Total Organic Carbon	ND	0.700									
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Sample ID: LCS-R887242		SampType: LCS			Units: mg/L		Prep Date: 1/4/2024			RunNo: 88742		
Client ID: LCSW		Batch ID: R88742			Analysis Date: 1/4/2024			SeqNo: 1854730				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Total Organic Carbon	5.16	0.700	5.000	0	103	90	116				
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Sample ID: 2312579-001DDUP		SampType: DUP			Units: mg/L		Prep Date: 1/4/2024			RunNo: 88742		
Client ID: BATCH		Batch ID: R88742			Analysis Date: 1/4/2024				SeqNo: 1854732			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Total Organic Carbon	ND	0.700						0		20	
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Sample ID: 2312579-001DMS		SampType: MS		Units: mg/L		Prep Date: 1/4/2024			RunNo: 88742		
Client ID: BATCH		Batch ID: R88742					Analysis Date: 1/4/2024			SeqNo: 1854733	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Total Organic Carbon	10.0	0.700	10.00	0.4360	96.0	41.1	150				
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Sample ID: 2312579-001DMSD		SampType: MSD		Units: mg/L		Prep Date: 1/4/2024			RunNo: 88742		
Client ID: BATCH		Batch ID: R88742					Analysis Date: 1/4/2024			SeqNo: 1854734	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Total Organic Carbon	10.2	0.700	10.00	0.4360	97.3	41.1	150	10.04	1.30	30	
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Work Order: 2312598
CLIENT: Friedman & Bruya
Project: 312465

QC SUMMARY REPORT

Dissolved Gases by RSK-175

Sample ID: LCS-R88836		SampType: LCS		Units: ppmv		Prep Date: 1/7/2024			RunNo: 88836		
Client ID: LCSW		Batch ID: R88836					Analysis Date: 1/7/2024			SeqNo: 1855723	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Methane	1,010	0.00675	1,000	0	101	73.6	124				
Ethene	1,030	0.0146	1,000	0	103	76.3	122				
Ethane	1,020	0.0151	1,000	0	102	76.1	123				

Sample ID: MB-R88836		SampType: MBLK		Units: mg/L		Prep Date: 1/7/2024			RunNo: 88836		
Client ID: MBLKW		Batch ID: R88836					Analysis Date: 1/7/2024			SeqNo: 1855724	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Methane	ND	0.00675									
Ethene	ND	0.0146									
Ethane	ND	0.0151									

Sample ID: 2312598-001CREP		SampType: REP		Units: mg/L		Prep Date: 1/7/2024			RunNo: 88836		
Client ID: MW-01-122823		Batch ID: R88836					Analysis Date: 1/7/2024			SeqNo: 1855708	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Methane	8.48	0.00675						7.240	15.8	30	E
Ethene	0.0280	0.0146						0	200	30	
Ethane	ND	0.0151						0		30	

Sample Log-In Check List

Client Name: FB

Work Order Number: 2312598

Logged by: Morgan Wilson

Date Received: 12/29/2023 9:41:00 AM

Chain of Custody

1. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
2. How was the sample delivered? Client

Log In

3. Custody Seals present on shipping container/cooler?
(Refer to comments for Custody Seals not intact) Yes ☐ No ☐ Not Present ☒
4. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐
5. Were all items received at a temperature of >2°C to 6°C * Yes ☒ No ☐ NA ☐
6. Sample(s) in proper container(s)? Yes ☒ No ☐
7. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐
8. Are samples properly preserved? Yes ☒ No ☐
9. Was preservative added to bottles? Yes ☐ No ☒ NA ☐
10. Is there headspace in the VOA vials? Yes ☐ No ☒ NA ☐
11. Did all samples containers arrive in good condition(unbroken)? Yes ☒ No ☐
12. Does paperwork match bottle labels? Yes ☒ No ☐
13. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐
14. Is it clear what analyses were requested? Yes ☒ No ☐
15. Were all hold times (except field parameters, pH e.g.) able to be met? Yes ☒ No ☐

Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☒

Person Notified:		Date:	
By Whom:		Via:	☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:			
Client Instructions:			

17. Additional remarks:

Item Information

Item #	Temp °C
Sample	3.9

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

Send Report To Michael Erdahl
 Company Friedman and Bruya, Inc.
 Address 5500 4th Ave S
 City, State, ZIP Seattle, WA 98108
 Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTOR Fremont	
PROJECT NAME/NO. 312465	PO # D-602
REMARKS Aspect EDD	

Page # 1 of 1
 TURNAROUND TIME
☒ Standard TAT
RUSH 2312598
 Rush charges authorized by: _____

SAMPLE DISPOSAL Dispose after 30 days Return samples Will call with instructions

[illegible]

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: 	Michael Erdahl	Friedman & Bruya	12/29/25	0730 AM
Received by: 	All Miller	FCAI	12/29/25	0941
Relinquished by:				
Received by:				

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Vineta Mills, M.S.
Eric Young, B.S.

5500 4th Ave South
Seattle, WA 98108-2419
(206) 285-8282
office@friedmanandbruya.com
www.friedmanandbruya.com

May 30, 2024

Daniel Babcock, Project Manager
Aspect Consulting
710 2nd Ave S, Suite 550
Seattle, WA 98104

Dear Mr Babcock:

Included are the results from the testing of material submitted on May 16, 2024 from the HERS Industrial AS 140252, F&BI 405307 project. There are 18 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Aspect Data
ASP0530R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on May 16, 2024 by Friedman & Bruya, Inc. from the Aspect Consulting HERS Industrial AS 140252, F&BI 405307 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Aspect Consulting</u>
405307 -01	MW-1-051624
405307 -02	MW-16-051624
405307 -03	MW-12-051624
405307 -04	MW-11-051624
405307 -05	MW-20-051624
405307 -06	MW-21-051624
405307 -07	TB-051624

The samples were sent to Alliance Technical Group for TOC, nitrate, nitrite, sulfate, and RSK dissolved gases analyses. The report is enclosed.

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-1-051624	Client:	Aspect Consulting
Date Received:	05/16/24	Project:	HERS Industrial AS 140252
Date Extracted:	05/22/24	Lab ID:	405307-01
Date Analyzed:	05/23/24	Data File:	052336.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	95	71	132
Toluene-d8	93	68	139
4-Bromofluorobenzene	99	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	0.82
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<0.2
1,1,1-Trichloroethane	<1
Trichloroethene	<0.5
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-16-051624	Client:	Aspect Consulting
Date Received:	05/16/24	Project:	HERS Industrial AS 140252
Date Extracted:	05/22/24	Lab ID:	405307-02
Date Analyzed:	05/22/24	Data File:	052231.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	71	132
Toluene-d8	103	68	139
4-Bromofluorobenzene	100	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	1.5
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	58
1,2-Dichloroethane (EDC)	<0.2
1,1,1-Trichloroethane	<1
Trichloroethene	<0.5
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-12-051624	Client:	Aspect Consulting
Date Received:	05/16/24	Project:	HERS Industrial AS 140252
Date Extracted:	05/22/24	Lab ID:	405307-03
Date Analyzed:	05/23/24	Data File:	052337.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	91	71	132
Toluene-d8	97	68	139
4-Bromofluorobenzene	102	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	2.6
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	14
1,2-Dichloroethane (EDC)	<0.2
1,1,1-Trichloroethane	<1
Trichloroethene	0.65
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-11-051624	Client:	Aspect Consulting
Date Received:	05/16/24	Project:	HERS Industrial AS 140252
Date Extracted:	05/22/24	Lab ID:	405307-04
Date Analyzed:	05/22/24	Data File:	052229.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	96	71	132
Toluene-d8	94	68	139
4-Bromofluorobenzene	100	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.02
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	1.0
1,2-Dichloroethane (EDC)	<0.2
1,1,1-Trichloroethane	<1
Trichloroethene	18
Tetrachloroethene	5.0

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-20-051624	Client:	Aspect Consulting
Date Received:	05/16/24	Project:	HERS Industrial AS 140252
Date Extracted:	05/22/24	Lab ID:	405307-05
Date Analyzed:	05/22/24	Data File:	052227.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	93	71	132
Toluene-d8	95	68	139
4-Bromofluorobenzene	97	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.02
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<0.2
1,1,1-Trichloroethane	<1
Trichloroethene	<0.5
Tetrachloroethene	35

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-21-051624	Client:	Aspect Consulting
Date Received:	05/16/24	Project:	HERS Industrial AS 140252
Date Extracted:	05/22/24	Lab ID:	405307-06
Date Analyzed:	05/23/24	Data File:	052338.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	91	71	132
Toluene-d8	93	68	139
4-Bromofluorobenzene	97	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	1.6
Chloroethane	<1
1,1-Dichloroethene	2.5
Methylene chloride	<5
trans-1,2-Dichloroethene	1.3
1,1-Dichloroethane	1.0
cis-1,2-Dichloroethene	52
1,2-Dichloroethane (EDC)	<0.2
1,1,1-Trichloroethane	1.5
Trichloroethene	200
Tetrachloroethene	91

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	TB-051624	Client:	Aspect Consulting
Date Received:	05/16/24	Project:	HERS Industrial AS 140252
Date Extracted:	05/22/24	Lab ID:	405307-07
Date Analyzed:	05/22/24	Data File:	052211.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	92	71	132
Toluene-d8	96	68	139
4-Bromofluorobenzene	99	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.02
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<0.2
1,1,1-Trichloroethane	<1
Trichloroethene	<0.5
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	Method Blank	Client:	Aspect Consulting
Date Received:	Not Applicable	Project:	HERS Industrial AS 140252
Date Extracted:	05/22/24	Lab ID:	04-1108 mb
Date Analyzed:	05/22/24	Data File:	052208.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	71	132
Toluene-d8	102	68	139
4-Bromofluorobenzene	100	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.02
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<0.2
1,1,1-Trichloroethane	<1
Trichloroethene	<0.5
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	Method Blank	Client:	Aspect Consulting
Date Received:	Not Applicable	Project:	HERS Industrial AS 140252
Date Extracted:	05/23/24	Lab ID:	04-1116 mb
Date Analyzed:	05/23/24	Data File:	052308.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	92	71	132
Toluene-d8	93	68	139
4-Bromofluorobenzene	98	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.02
Chloroethane	<1
1,1-Dichloroethene	<1
Methylene chloride	<5
trans-1,2-Dichloroethene	<1
1,1-Dichloroethane	<1
cis-1,2-Dichloroethene	<1
1,2-Dichloroethane (EDC)	<0.2
1,1,1-Trichloroethane	<1
Trichloroethene	<0.5
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-1-051624	Client:	Aspect Consulting
Date Received:	05/16/24	Project:	HERS Industrial AS 140252
Date Extracted:	05/20/24	Lab ID:	405307-01 x50
Date Analyzed:	05/23/24	Data File:	405307-01 x50.131
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
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Iron	6,600
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-16-051624	Client:	Aspect Consulting
Date Received:	05/16/24	Project:	HERS Industrial AS 140252
Date Extracted:	05/20/24	Lab ID:	405307-02 x100
Date Analyzed:	05/21/24	Data File:	405307-02 x100.106
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
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Iron	97,000
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-12-051624	Client:	Aspect Consulting
Date Received:	05/16/24	Project:	HERS Industrial AS 140252
Date Extracted:	05/20/24	Lab ID:	405307-03 x100
Date Analyzed:	05/22/24	Data File:	405307-03 x100.166
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
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Iron	44,000
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Aspect Consulting
Date Received:	Not Applicable	Project:	HERS Industrial AS 140252
Date Extracted:	05/20/24	Lab ID:	I4-411 mb
Date Analyzed:	05/20/24	Data File:	I4-411 mb.088
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
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Iron	<50
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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 05/30/24

Date Received: 05/16/24

Project: HERS Industrial AS 140252

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR VOLATILES BY EPA METHOD 8260D**

Laboratory Code: 405318-16 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Acceptance Criteria
Vinyl chloride	ug/L (ppb)	10	0.79	114	16-176
Chloroethane	ug/L (ppb)	10	<1	118	50-150
1,1-Dichloroethene	ug/L (ppb)	10	<1	108	50-150
Methylene chloride	ug/L (ppb)	10	<5	104	40-143
trans-1,2-Dichloroethene	ug/L (ppb)	10	<1	118	50-150
1,1-Dichloroethane	ug/L (ppb)	10	<1	109	50-150
cis-1,2-Dichloroethene	ug/L (ppb)	10	2.8	111 b	50-150
1,2-Dichloroethane (EDC)	ug/L (ppb)	10	<0.2	121	50-150
1,1,1-Trichloroethane	ug/L (ppb)	10	<1	116	50-150
Trichloroethene	ug/L (ppb)	10	<0.5	103	43-133
Tetrachloroethene	ug/L (ppb)	10	<1	113	50-150

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Vinyl chloride	ug/L (ppb)	10	99	100	43-149	1
Chloroethane	ug/L (ppb)	10	101	104	59-157	3
1,1-Dichloroethene	ug/L (ppb)	10	93	94	67-138	1
Methylene chloride	ug/L (ppb)	10	89	90	29-192	1
trans-1,2-Dichloroethene	ug/L (ppb)	10	102	103	70-130	1
1,1-Dichloroethane	ug/L (ppb)	10	94	93	70-130	1
cis-1,2-Dichloroethene	ug/L (ppb)	10	92	94	70-130	2
1,2-Dichloroethane (EDC)	ug/L (ppb)	10	105	106	70-130	1
1,1,1-Trichloroethane	ug/L (ppb)	10	100	102	70-130	2
Trichloroethene	ug/L (ppb)	10	88	90	70-130	2
Tetrachloroethene	ug/L (ppb)	10	105	104	70-130	1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 05/30/24

Date Received: 05/16/24

Project: HERS Industrial AS 140252, F&BI 405307

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR VOLATILES BY EPA METHOD 8260D**

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Vinyl chloride	ug/L (ppb)	10	105	96	43-149	9
Chloroethane	ug/L (ppb)	10	109	99	59-157	10
1,1-Dichloroethene	ug/L (ppb)	10	102	92	67-138	10
Methylene chloride	ug/L (ppb)	10	99	90	29-192	10
trans-1,2-Dichloroethene	ug/L (ppb)	10	110	101	70-130	9
1,1-Dichloroethane	ug/L (ppb)	10	103	94	70-130	9
cis-1,2-Dichloroethene	ug/L (ppb)	10	101	92	70-130	9
1,2-Dichloroethane (EDC)	ug/L (ppb)	10	115	105	70-130	9
1,1,1-Trichloroethane	ug/L (ppb)	10	110	100	70-130	10
Trichloroethene	ug/L (ppb)	10	97	88	70-130	10
Tetrachloroethene	ug/L (ppb)	10	106	106	70-130	0

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 05/30/24

Date Received: 05/16/24

Project: HERS Industrial AS 140252, F&BI 405307

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF WATER SAMPLES
FOR DISSOLVED METALS USING EPA METHOD 6020B**

Laboratory Code: 405326-19 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Iron	ug/L (ppb)	100	6,460	59 b	0 b	75-125	200 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Iron	ug/L (ppb)	100	91	80-120

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria, biased low; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the standard reporting limit. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

k - The calibration results for the analyte were outside of acceptance criteria, biased high, and the analyte was not detected in the sample.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

405307

SAMPLE CHAIN OF CUSTODY

05/16/24 Page # 1 of 1

Report To Daniel BabcockCompany Aspect

Address _____

City, State, ZIP _____

Phone 435 714 4531 Email daniel.babcock@aspect.comSAMPLERS (signature) DM/MSPROJECT NAME HERS Indus trialPO # AS 140252REMARKS Dissolved Iron field filtered

INVOICE TO _____

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by: _____SAMPLE DISPOSAL
☐ Archive samples
☐ Other _____

Default: Dispose after 30 days

ANALYSES REQUESTED

Sample ID						Lab ID						Date Sampled						Time Sampled						Sample Type						# of Jars						ANALYSES REQUESTED										Notes																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
Sample ID						Lab ID						Date Sampled						Time Sampled						Sample Type						# of Jars						NWTPH-Dx										NWTPH-Gx										BTEX EPA 8021										NWTPH-HCID										VOCs EPA 8260c										PAHs EPA 8270										PCBs EPA 8082										Dissolved Iron (field filtered)										TOC (EPA 415.1)										Nitrate, Nitrite Sulfate (EPA 300)										Ethane, Ethene, methane										RSK-175 (Dissolved)										Notes																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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SIGNATURE

PRINT NAME

COMPANY

DATE TIME

Relinquished by: Daniel MackayDavid MackayAspect5/16/24 1730Received by: RTRISNATI LADDESFBI5/16/24 1730

Relinquished by: _____

Received by: _____

Samples received at 3Friedman & Bruja, Inc.
Ph. (206) 285-8282

SAMPLE CONDITION UPON RECEIPT CHECKLIST

PROJECT # 405307 CLIENT ASP

INITIALS/ DATE: 05/16/14

If custody seals are present on cooler, are they intact? ☒ YES ☐ NO

Cooler/Sample temperature

3 °C

Thermometer ID: Fluke 96312917

Were samples received on ice/cold packs? ☒ YES ☐ NO

How did samples arrive? ☒ Over the Counter ☐ Picked up by F&BI ☐ FedEx/UPS/GSO

Is there a Chain-of-Custody* (COC)? ☒ YES ☐ NO

*or other representative documents, letters, and/or shipping memos

Number of days samples have been sitting prior to receipt at laboratory 8 days

Are the samples clearly identified? (explain "no" answer below) ☒ YES ☐ NO

Were all sample containers received intact (i.e. not broken, leaking etc.)? (explain "no" answer below) ☒ YES ☐ NO

Were appropriate sample containers used? ☒ YES ☐ NO ☐ Unknown

If custody seals are present on samples, are they intact? ☒ YES ☐ NO

Are samples requiring no headspace, headspace free? ☒ YES ☐ NO

Is the following information provided on the COC, and does it match the sample label? (explain "no" answer below)

Sample IDs ☒ Yes ☐ No

Date Sampled ☒ Yes ☐ No

Time Sampled ☒ Yes ☐ No

of Containers ☒ Yes ☐ No

Relinquished ☒ Yes ☐ No

Requested analysis ☒ Yes ☐ On Hold

Other comments (use a separate page if needed)

Air Samples: Were any additional canisters/tubes received? ☒ YES ☐ NO

Number of unused TO15 canisters

Number of unused TO17 tubes



3600 Fremont Ave N
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Friedman & Bruya
Michael Erdahl
5500 4th Ave S
Seattle, WA 98108

RE: 405307, E-196
Work Order Number: 2405328

May 24, 2024

Attention Michael Erdahl:

Fremont Analytical, Inc, an Alliance Technical Group company, received 3 sample(s) on 5/17/2024 for the analyses presented in the following report.

Dissolved Gases by RSK-175
Ion Chromatography by EPA 300.0
Total Organic Carbon by SM 5310C

All analyses were performed according to our accredited Quality Assurance program. Please contact the laboratory if you should have any questions about the results.

Please note, while the appearance of our logo and branding will update, our commitment to accuracy, speed, and customer service remain values celebrated and shared by Alliance Technical Group. Thank you for the opportunity to serve you.

Sincerely,

A handwritten signature in blue ink, appearing to read "Brianna Barnes".

Brianna Barnes
Project Manager

DoD-ELAP Accreditation #79636 by PJLA, ISO/IEC 17025:2017 and QSM 5.4 for Environmental Testing
ORELAP Certification: WA 100009 (NELAP Recognized) for Environmental Testing
Washington State Department of Ecology Accredited for Environmental Testing, Lab ID C910

Original



www.fremontanalytical.com



Date: 05/24/2024

CLIENT: Friedman & Bruya
Project: 405307
Work Order: 2405328

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2405328-001	MW-1-051624	05/16/2024 10:40 AM	05/17/2024 3:40 PM
2405328-002	MW-16-051624	05/16/2024 11:50 AM	05/17/2024 3:40 PM
2405328-003	MW-12-051624	05/16/2024 1:15 PM	05/17/2024 3:40 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Original

CLIENT: Friedman & Bruya
Project: 405307

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- DUP - Sample Duplicate
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MCL - Maximum Contaminant Level
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- REP - Sample Replicate
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate

CLIENT: Friedman & Bruya
Project: 405307

Lab ID: 2405328-001

Client Sample ID: MW-1-051624

Collection Date: 5/16/2024 10:40:00 AM

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Gases by RSK-175

Batch ID: R91945 Analyst: CO

Methane	3.36	0.250	D	mg/L	50	5/22/2024 3:15:00 PM
Ethene	ND	0.0100		mg/L	1	5/22/2024 2:24:00 PM
Ethane	ND	0.0100		mg/L	1	5/22/2024 2:24:00 PM

Ion Chromatography by EPA 300.0

Batch ID: 43960 Analyst: SS

Nitrite (as N)	ND	2.00	D	mg/L	10	5/18/2024 1:25:00 AM
Nitrate (as N)	ND	2.00	D	mg/L	10	5/18/2024 1:25:00 AM
Sulfate	ND	1.00		mg/L	1	5/21/2024 1:35:00 PM

NOTES:

Diluted due to matrix.

Total Organic Carbon by SM 5310C

Batch ID: R91954 Analyst: FG

Total Organic Carbon	7.28	0.700		mg/L	1	5/24/2024 2:16:00 PM
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Lab ID: 2405328-002

Client Sample ID: MW-16-051624

Collection Date: 5/16/2024 11:50:00 AM

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Gases by RSK-175

Batch ID: R91945 Analyst: CO

Methane	5.07	0.500	D	mg/L	100	5/22/2024 4:09:00 PM
Ethene	0.0184	0.0100		mg/L	1	5/22/2024 2:40:00 PM
Ethane	0.0259	0.0100		mg/L	1	5/22/2024 2:40:00 PM

Ion Chromatography by EPA 300.0

Batch ID: 43960 Analyst: SS

Nitrite (as N)	ND	2.00	D	mg/L	10	5/18/2024 2:58:00 AM
Nitrate (as N)	ND	2.00	D	mg/L	10	5/18/2024 2:58:00 AM
Sulfate	ND	5.00	D	mg/L	5	5/21/2024 1:58:00 PM

Total Organic Carbon by SM 5310C

Batch ID: R91954 Analyst: FG

Total Organic Carbon	134	0.700		mg/L	1	5/24/2024 3:55:00 PM
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CLIENT: Friedman & Bruya
Project: 405307

Lab ID: 2405328-003

Collection Date: 5/16/2024 1:15:00 PM

Client Sample ID: MW-12-051624

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Gases by RSK-175

Batch ID: R91945 Analyst: CO

Methane	5.52	0.500	D	mg/L	100	5/22/2024 4:12:00 PM
Ethene	0.0178	0.0100		mg/L	1	5/22/2024 2:57:00 PM
Ethane	0.0165	0.0100		mg/L	1	5/22/2024 2:57:00 PM

Ion Chromatography by EPA 300.0

Batch ID: 43960 Analyst: SS

Nitrite (as N)	ND	2.00	D	mg/L	10	5/18/2024 1:48:00 AM
Nitrate (as N)	ND	2.00	D	mg/L	10	5/18/2024 1:48:00 AM
Sulfate	ND	5.00	D	mg/L	5	5/21/2024 2:21:00 PM

NOTES:

Diluted due to matrix.

Total Organic Carbon by SM 5310C

Batch ID: R91954 Analyst: FG

Total Organic Carbon	57.8	0.700		mg/L	1	5/24/2024 4:18:00 PM
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Work Order: 2405328
CLIENT: Friedman & Bruya
Project: 405307

QC SUMMARY REPORT

Ion Chromatography by EPA 300.0

Sample ID: LCS-43960	SampType: LCS	Units: mg/L			Prep Date: 5/17/2024			RunNo: 91816			
Client ID: LCSW	Batch ID: 43960				Analysis Date: 5/17/2024			SeqNo: 1915444			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrite (as N)	0.725	0.200	0.7500	0	96.7	90	110				
Nitrate (as N)	0.712	0.200	0.7500	0	94.9	90	110				

Sample ID: MB-43960	SampType: MBLK	Units: mg/L			Prep Date: 5/17/2024			RunNo: 91816			
Client ID: MBLKW	Batch ID: 43960				Analysis Date: 5/17/2024			SeqNo: 1915446			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrite (as N)	ND	0.200									
Nitrate (as N)	ND	0.200									

Sample ID: 2405287-006ADUP	SampType: DUP	Units: mg/L			Prep Date: 5/17/2024			RunNo: 91816			
Client ID: BATCH	Batch ID: 43960				Analysis Date: 5/17/2024			SeqNo: 1915460			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrite (as N)	ND	0.200						0		20	H
Nitrate (as N)	1.82	0.200						1.821	0.330	20	H

Sample ID: 2405287-006AMS	SampType: MS	Units: mg/L			Prep Date: 5/17/2024			RunNo: 91816			
Client ID: BATCH	Batch ID: 43960				Analysis Date: 5/17/2024			SeqNo: 1915461			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrite (as N)	0.710	0.200	0.7500	0	94.7	80	120				H
Nitrate (as N)	2.58	0.200	0.7500	1.821	101	80	120				H

Sample ID: 2405287-006AMSD	SampType: MSD	Units: mg/L			Prep Date: 5/17/2024			RunNo: 91816			
Client ID: BATCH	Batch ID: 43960				Analysis Date: 5/18/2024			SeqNo: 1915462			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrite (as N)	0.723	0.200	0.7500	0	96.4	80	120	0.7100	1.81	20	H
Nitrate (as N)	2.57	0.200	0.7500	1.821	100	80	120	2.582	0.427	20	H

Work Order: 2405328
CLIENT: Friedman & Bruya
Project: 405307

QC SUMMARY REPORT

Ion Chromatography by EPA 300.0

Sample ID: 2405287-006AMSD	SampType: MSD	Units: mg/L			Prep Date: 5/17/2024			RunNo: 91816			
Client ID: BATCH	Batch ID: 43960				Analysis Date: 5/18/2024			SeqNo: 1915462			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample ID: 2405328-003ADUP	SampType: DUP	Units: mg/L			Prep Date: 5/17/2024			RunNo: 91816			
Client ID: MW-12-051624	Batch ID: 43960				Analysis Date: 5/18/2024			SeqNo: 1915467			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrite (as N)	ND	2.00						0		20	D
Nitrate (as N)	ND	2.00						0		20	D

Sample ID: 2405328-003AMS	SampType: MS	Units: mg/L			Prep Date: 5/17/2024			RunNo: 91816			
Client ID: MW-12-051624	Batch ID: 43960				Analysis Date: 5/18/2024			SeqNo: 1915468			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrite (as N)	7.26	2.00	7.500	0	96.8	80	120				D
Nitrate (as N)	7.16	2.00	7.500	0	95.5	80	120				D

Sample ID: LCS-43971	SampType: LCS	Units: mg/L			Prep Date: 5/20/2024			RunNo: 91835			
Client ID: LCSW	Batch ID: 43971				Analysis Date: 5/20/2024			SeqNo: 1915956			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	3.60	1.00	3.750	0	96.1	90	110				

Sample ID: MB-43971	SampType: MBLK	Units: mg/L			Prep Date: 5/20/2024			RunNo: 91835			
Client ID: MBLKW	Batch ID: 43971				Analysis Date: 5/20/2024			SeqNo: 1915958			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	ND	1.00									

Work Order: 2405328
CLIENT: Friedman & Bruya
Project: 405307

QC SUMMARY REPORT

Ion Chromatography by EPA 300.0

Sample ID: 2405335-001ADUP		SampType: DUP			Units: mg/L		Prep Date: 5/20/2024			RunNo: 91835		
Client ID: BATCH		Batch ID: 43971						Analysis Date: 5/21/2024			SeqNo: 1916592	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Sulfate	20.0	1.00						19.88	0.577	20		

Sample ID: 2405335-001AMS		SampType: MS			Units: mg/L		Prep Date: 5/20/2024			RunNo: 91835		
Client ID: BATCH		Batch ID: 43971						Analysis Date: 5/21/2024			SeqNo: 1916593	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Sulfate	23.4	1.00	3.750	19.88	94.4	80	120					

Sample ID: 2405335-001AMSD		SampType: MSD			Units: mg/L		Prep Date: 5/20/2024			RunNo: 91835		
Client ID: BATCH		Batch ID: 43971						Analysis Date: 5/21/2024			SeqNo: 1916594	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Sulfate	23.4	1.00	3.750	19.88	94.3	80	120	23.42	0.0171	20		

Sample ID: 2405287-006ADUP		SampType: DUP			Units: mg/L		Prep Date: 5/20/2024			RunNo: 91835		
Client ID: BATCH		Batch ID: 43971						Analysis Date: 5/21/2024			SeqNo: 1916598	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Sulfate	9.66	1.00						10.08	4.27	20		

Sample ID: 2405287-006AMS		SampType: MS			Units: mg/L		Prep Date: 5/20/2024			RunNo: 91835		
Client ID: BATCH		Batch ID: 43971						Analysis Date: 5/21/2024			SeqNo: 1916599	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Sulfate	13.6	1.00	3.750	10.08	94.4	80	120					

Work Order: 2405328
CLIENT: Friedman & Bruya
Project: 405307

QC SUMMARY REPORT

Total Organic Carbon by SM 5310C

Sample ID: MB-R91954		SampType: MBLK			Units: mg/L		Prep Date: 5/24/2024			RunNo: 91954		
Client ID: MBLKW		Batch ID: R91954			Analysis Date: 5/24/2024					SeqNo: 1919612		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Total Organic Carbon	ND	0.700									
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Sample ID: LCS-R91954		SampType: LCS			Units: mg/L		Prep Date: 5/24/2024			RunNo: 91954		
Client ID: LCSW		Batch ID: R91954			Analysis Date: 5/24/2024					SeqNo: 1919613		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Total Organic Carbon	4.86	0.700	5.000	0	97.3	90.6	119				
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Sample ID: 2405328-001BDUP		SampType: DUP			Units: mg/L		Prep Date: 5/24/2024			RunNo: 91954		
Client ID: MW-1-051624		Batch ID: R91954			Analysis Date: 5/24/2024			SeqNo: 1919615				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Total Organic Carbon	7.42	0.700						7.279	1.88	20	
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Sample ID: 2405328-001BMS		SampType: MS			Units: mg/L		Prep Date: 5/24/2024			RunNo: 91954		
Client ID: MW-1-051624		Batch ID: R91954			Analysis Date: 5/24/2024			SeqNo: 1919616				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Total Organic Carbon	11.8	0.700	5.000	7.279	89.7	74.4	117				
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Sample ID: 2405328-001BMSD		SampType: MSD			Units: mg/L		Prep Date: 5/24/2024			RunNo: 91954		
Client ID: MW-1-051624		Batch ID: R91954			Analysis Date: 5/24/2024					SeqNo: 1919617		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Total Organic Carbon	11.7	0.700	5.000	7.279	88.2	74.4	117	11.76	0.640	30	
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Work Order: 2405328
 CLIENT: Friedman & Bruya
 Project: 405307

QC SUMMARY REPORT

Dissolved Gases by RSK-175

Sample ID: LCS-R91945		SampType: LCS			Units: ppmv		Prep Date: 5/22/2024			RunNo: 91945		
Client ID: LCSW		Batch ID: R91945			Analysis Date: 5/22/2024			SeqNo: 1918669				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Methane	918	0.00500	1,000	0	91.8	73.6	124				
Ethene	902	0.0100	1,000	0	90.2	76.3	122				
Ethane	927	0.0100	1,000	0	92.7	76.1	123				

Sample ID: MB-R91945		SampType: MBLK			Units: mg/L		Prep Date: 5/22/2024			RunNo: 91945		
Client ID: MBLKW		Batch ID: R91945			Analysis Date: 5/22/2024					SeqNo: 1918663		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Methane	ND	0.00500									
Ethene	ND	0.0100									
Ethane	ND	0.0100									

Sample ID: 2405328-001CREP		SampType: REP			Units: mg/L		Prep Date: 5/22/2024			RunNo: 91945		
Client ID: MW-1-051624		Batch ID: R91945			Analysis Date: 5/22/2024			SeqNo: 1918656				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Methane	2.91	0.00500						3.360	14.5	30	E
Ethene	ND	0.0100						0		30	
Ethane	ND	0.0100						0		30	

Client Name: FB

Work Order Number: 2405328

Logged by: Clare Griggs

Date Received: 5/17/2024 3:40:00 PM

Chain of Custody

1. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
2. How was the sample delivered? Client

Log In

3. Custody Seals present on shipping container/cooler?
(Refer to comments for Custody Seals not intact) Yes ☐ No ☐ Not Present ☒
4. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐
5. Were all items received at a temperature of >2°C to 6°C * Yes ☒ No ☐ NA ☐
6. Sample(s) in proper container(s)? Yes ☒ No ☐
7. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐
8. Are samples properly preserved? Yes ☒ No ☐
9. Was preservative added to bottles? Yes ☐ No ☒ NA ☐
10. Is there headspace in the VOA vials? Yes ☐ No ☒ NA ☐
11. Did all samples containers arrive in good condition(unbroken)? Yes ☒ No ☐
12. Does paperwork match bottle labels? Yes ☒ No ☐
13. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐
14. Is it clear what analyses were requested? Yes ☒ No ☐
15. Were all hold times (except field parameters, pH e.g.) able to be met? Yes ☒ No ☐

Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☒

Person Notified:

Date:

By Whom:

Via:

☐

eMail

☐

Phone

☐

Fax

☐

In Person

Regarding:

Client Instructions:

17. Additional remarks:

Item Information

Item #	Temp °C
Sample	5.5

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Vineta Mills, M.S.
Eric Young, B.S.

5500 4th Avenue South
Seattle, WA 98108
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

January 12, 2023

Daniel Babcock, Project Manager
Aspect Consulting, LLC
710 2nd Ave S, Suite 550
Seattle, WA 98104

Dear Mr Babcock:

Included are the results from the testing of material submitted on January 6, 2023 from the HERS Industrial 140252, F&BI 301062 project. There are 7 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Aspect Data
ASP0112R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on January 6, 2023 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC HERS Industrial 140252, F&BI 301062 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Aspect Consulting, LLC</u>
301062 -01	MW-16D-010523
301062 -02	MW-22-010523
301062 -03	MW-23-010523
301062 -04	Trip Blank

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-16D-010523	Client:	Aspect Consulting, LLC
Date Received:	01/06/23	Project:	HERS Industrial 140252
Date Extracted:	01/09/23	Lab ID:	301062-01
Date Analyzed:	01/09/23	Data File:	010908.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	104	78	126
Toluene-d8	99	84	115
4-Bromofluorobenzene	97	72	130

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.02
cis-1,2-Dichloroethene	<1
Trichloroethene	11
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-22-010523	Client:	Aspect Consulting, LLC
Date Received:	01/06/23	Project:	HERS Industrial 140252
Date Extracted:	01/09/23	Lab ID:	301062-02
Date Analyzed:	01/09/23	Data File:	010909.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	78	126
Toluene-d8	98	84	115
4-Bromofluorobenzene	100	72	130

Compounds:	Concentration ug/L (ppb)
Trichloroethene	<0.5
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-23-010523	Client:	Aspect Consulting, LLC
Date Received:	01/06/23	Project:	HERS Industrial 140252
Date Extracted:	01/09/23	Lab ID:	301062-03
Date Analyzed:	01/09/23	Data File:	010910.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	106	78	126
Toluene-d8	98	84	115
4-Bromofluorobenzene	96	72	130

Compounds:	Concentration ug/L (ppb)
Trichloroethene	<0.5
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	HERS Industrial 140252
Date Extracted:	01/09/23	Lab ID:	03-0057 mb
Date Analyzed:	01/09/23	Data File:	010916.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	71	132
Toluene-d8	100	68	139
4-Bromofluorobenzene	97	62	136

Compounds:	Concentration ug/L (ppb)
Vinyl chloride	<0.02
cis-1,2-Dichloroethene	<1
Trichloroethene	<0.5
Tetrachloroethene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 01/12/23

Date Received: 01/06/23

Project: HERS Industrial 140252, F&BI 301062

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER
SAMPLES FOR VOLATILES BY EPA METHOD 8260D**

Laboratory Code: 301070-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent	Acceptance Criteria
				Recovery MS	
Vinyl chloride	ug/L (ppb)	10	<0.02	76	16-176
cis-1,2-Dichloroethene	ug/L (ppb)	10	<1	73	50-150
Trichloroethene	ug/L (ppb)	10	0.78	69	43-133
Tetrachloroethene	ug/L (ppb)	10	16.2	84 b	50-150

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent	Percent	Acceptance Criteria	RPD (Limit 20)
			Recovery LCS	Recovery LCSD		
Vinyl chloride	ug/L (ppb)	10	114	105	70-130	8
cis-1,2-Dichloroethene	ug/L (ppb)	10	106	97	70-130	9
Trichloroethene	ug/L (ppb)	10	101	94	70-130	7
Tetrachloroethene	ug/L (ppb)	10	105	106	70-130	1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Vineta Mills, M.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

June 8, 2022

Daniel Babcock, Project Manager
Aspect Consulting, LLC
710 2nd Ave S, Suite 550
Seattle, WA 98104

Dear Mr Babcock:

Included are the results from the testing of material submitted on May 20, 2022 from the HERS Industrial Park 140252, F&BI 205372 project. There are 6 pages included in this report.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Aspect Data
ASP0608R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on May 20, 2022 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC HERS Industrial Park 140252, F&BI 205372 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Aspect Consulting, LLC</u>
205372 -01	SS-01-051922
205372 -02	SG-01-051922

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SS-01-051922	Client:	Aspect Consulting, LLC
Date Received:	05/20/22	Project:	HERS Industrial Park 140252
Date Collected:	05/19/22	Lab ID:	205372-01 1/4.6
Date Analyzed:	05/26/22	Data File:	052618.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

	%	Lower	Upper
Surrogates:	Recovery:	Limit:	Limit:
4-Bromofluorobenzene	94	70	130

Compounds:	Concentration	
	ug/m3	ppbv
Vinyl chloride	<1.2	<0.46
Chloroethane	<12	<4.6
1,1-Dichloroethene	<1.8	<0.46
trans-1,2-Dichloroethene	<1.8	<0.46
1,1-Dichloroethane	<1.9	<0.46
cis-1,2-Dichloroethene	<1.8	<0.46
1,2-Dichloroethane (EDC)	<0.19	<0.046
1,1,1-Trichloroethane	<2.5	<0.46
Trichloroethene	<0.49	<0.092
1,1,2-Trichloroethane	<0.25	<0.046
Tetrachloroethene	<31	<4.6

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SG-01-051922	Client:	Aspect Consulting, LLC
Date Received:	05/20/22	Project:	HERS Industrial Park 140252
Date Collected:	05/19/22	Lab ID:	205372-02 1/4.1
Date Analyzed:	05/26/22	Data File:	052619.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	93	70	130

Compounds:	Concentration	
	ug/m3	ppbv
Vinyl chloride	<1	<0.41
Chloroethane	<11	<4.1
1,1-Dichloroethene	<1.6	<0.41
trans-1,2-Dichloroethene	<1.6	<0.41
1,1-Dichloroethane	<1.7	<0.41
cis-1,2-Dichloroethene	<1.6	<0.41
1,2-Dichloroethane (EDC)	<0.17	<0.041
1,1,1-Trichloroethane	<2.2	<0.41
Trichloroethene	0.62	0.11
1,1,2-Trichloroethane	<0.22	<0.041
Tetrachloroethene	<28	<4.1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	HERS Industrial Park 140252
Date Collected:	Not Applicable	Lab ID:	02-1228 MB
Date Analyzed:	05/26/22	Data File:	052611.D
Matrix:	Air	Instrument:	GCMS8
Units:	ug/m3	Operator:	bat

	%	Lower	Upper
Surrogates:	Recovery:	Limit:	Limit:
4-Bromofluorobenzene	89	70	130

Compounds:	Concentration	
	ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
Chloroethane	<2.6	<1
1,1-Dichloroethene	<0.4	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
1,1-Dichloroethane	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
1,2-Dichloroethane (EDC)	<0.04	<0.01
1,1,1-Trichloroethane	<0.55	<0.1
Trichloroethene	<0.11	<0.02
1,1,2-Trichloroethane	<0.055	<0.01
Tetrachloroethene	<6.8	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 06/08/22

Date Received: 05/20/22

Project: HERS Industrial Park 140252, F&BI 205372

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES
FOR VOLATILES BY METHOD TO-15**

Laboratory Code: 205435-01 1/4.7 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Vinyl chloride	ug/m3	<1.2	<1.2	nm
Chloroethane	ug/m3	<12	<12	nm
1,1-Dichloroethene	ug/m3	<1.9	<1.9	nm
trans-1,2-Dichloroethene	ug/m3	<1.9	<1.9	nm
1,1-Dichloroethane	ug/m3	<1.9	<1.9	nm
cis-1,2-Dichloroethene	ug/m3	<1.9	<1.9	nm
1,2-Dichloroethane (EDC)	ug/m3	<0.19	<0.19	nm
1,1,1-Trichloroethane	ug/m3	<2.6	<2.6	nm
Trichloroethene	ug/m3	0.78	0.61	24
1,1,2-Trichloroethane	ug/m3	<0.26	<0.26	nm
Tetrachloroethene	ug/m3	1,100	1,000	10

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent	Acceptance Criteria
			Recovery LCS	
Vinyl chloride	ug/m3	35	96	70-130
Chloroethane	ug/m3	36	102	70-130
1,1-Dichloroethene	ug/m3	54	101	70-130
trans-1,2-Dichloroethene	ug/m3	54	104	70-130
1,1-Dichloroethane	ug/m3	55	104	70-130
cis-1,2-Dichloroethene	ug/m3	54	98	70-130
1,2-Dichloroethane (EDC)	ug/m3	55	101	70-130
1,1,1-Trichloroethane	ug/m3	74	111	70-130
Trichloroethene	ug/m3	73	104	70-130
1,1,2-Trichloroethane	ug/m3	74	107	70-130
Tetrachloroethene	ug/m3	92	116	70-130

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

APPENDIX B

Injection Logs

Appendix X. IP-1 from MW-16

Project No. 140252 , Seattle, Washington

Confidential Attorney Client Privilege

Date and Time	Elapsed Time (min)	Specific Conductivity (µS/cm)	pH	ORP (mV)	Turbidity (NTU)	RDO Concentration (mg/L)	Temperature (°C)	Depth to Water (ft)	Notes
6/26/23 11:00	16	614.10	6.00	216.55	10.33	2.57	16.15	5.6	Injections started at 10:44
6/26/23 11:01	17	619.10	6.17	213.18	4.47	0.41	15.57	5.6	
6/26/23 11:02	18	624.66	6.25	210.16	4.15	0.28	15.47	5.64	
6/26/23 11:03	19	623.36	6.35	200.89	4.11	0.24	15.60	5.64	
6/26/23 11:04	20	636.70	6.38	203.21	3.84	0.21	15.43	5.64	
6/26/23 11:05	21	636.63	6.47	198.99	3.41	0.18	15.42	5.64	
6/26/23 11:06	22	634.15	6.55	197.66	3.18	0.16	15.41	5.64	
6/26/23 11:07	23	627.37	6.57	193.21	3.69	0.15	15.47	5.64	
6/26/23 11:08	24	635.85	6.60	189.84	3.34	0.14	15.43	5.64	
6/26/23 11:09	25	639.97	6.65	188.85	2.93	0.13	15.41	5.64	
6/26/23 11:10	26	645.20	6.63	186.39	3.43	0.13	15.49	5.64	
6/26/23 11:11	27	638.75	6.66	182.46	3.35	0.14	15.60	5.64	
6/26/23 11:12	28	644.31	6.64	183.09	4.78	0.12	15.48	5.64	
6/26/23 11:13	29	648.96	6.64	178.99	5.06	0.13	15.60	5.73	
6/26/23 11:14	30	655.15	6.62	178.23	4.05	0.13	15.52	5.73	
6/26/23 11:15	31	658.40	6.60	176.48	5.18	0.13	15.67	5.73	
6/26/23 11:16	32	661.08	6.54	175.74	5.40	0.12	15.63	5.73	
6/26/23 11:17	33	659.12	6.50	174.09	7.08	0.13	15.79	5.73	
6/26/23 11:18	34	664.73	6.47	172.39	8.50	0.12	15.64	5.72	
6/26/23 11:19	35	695.12	6.44	171.57	14.25	0.12	15.67	5.72	
6/26/23 11:20	36	741.28	6.47	168.35	22.46	0.11	15.27	5.65	
6/26/23 11:21	37	751.24	6.52	165.22	29.41	0.11	15.31	5.58	
6/26/23 11:22	38	757.99	6.52	162.18	35.55	0.10	14.99	5.5	
6/26/23 11:23	39	758.06	6.50	160.25	36.78	0.11	15.15	5.45	
6/26/23 11:24	40	758.32	6.49	158.11	43.07	0.10	14.87	5.37	
6/26/23 11:25	41	757.40	6.49	157.14	46.93	0.11	15.01	5.3	
6/26/23 11:26	42	757.35	6.48	157.09	73.08	0.10	14.85	5.3	Significant WL change
6/26/23 11:27	43	753.23	6.51	155.81	465.23	0.12	14.94	4.92	Turbidity Breakthrough
6/26/23 11:28	44	752.18	6.44	161.27	1988.38	0.17	14.73	4.61	
6/26/23 11:29	45	752.81	6.44	162.08	1259.48	0.15	14.69	4.26	
6/26/23 11:30	46	752.87	6.42	160.67	921.42	0.17	14.79	3.98	
6/26/23 11:31	47	753.22	6.38	158.92	726.82	0.10	14.66	3.65	
6/26/23 11:32	48	753.60	6.37	157.58	660.58	0.11	14.69	3.23	
6/26/23 11:33	49	752.92	6.38	156.26	613.48	0.13	14.80	2.65	
6/26/23 11:34	50	753.79	6.31	155.96	638.96	0.12	14.64	2.48	
6/26/23 11:35	51	756.53	6.31	155.07	545.40	0.14	14.74	2.31	
6/26/23 11:36	52	778.05	6.22	151.93	308.69	0.03	14.67	2.15	Breakthrough
6/26/23 11:37	53	837.62	6.22	136.87	287.08	0.00	14.81	2.03	
6/26/23 11:38	54	992.54	6.25	102.33	456.75	0.00	14.81	1.94	
6/26/23 11:39	55	1035.08	6.29	71.35	507.29	0.00	14.86	1.8	
6/26/23 11:40	56	1109.72	6.30	52.12	564.63	0.00	14.91	1.69	
6/26/23 11:42	57	1254.04	6.43	10.33	716.08	0.00	14.96	1.5	
6/26/23 11:43	58	1326.58	6.52	-12.03	734.92	0.00	15.12	1.3	
6/26/23 11:44	59	1445.45	6.63	-31.08	752.53	0.00	15.25	1.07	
6/26/23 11:45	60	1451.14	6.67	-46.27	782.83	0.00	15.33	1.07	

Injection Monitoring Log

Injection Point ID	Start		End		Injection Lift (ft bgs)		Injection Pressure (PSI)		Average Flowrate (gpm)	Injection Mix				Injected Volume (gal)		Surfacing	Notes
	Date	Time	Date	Time	Top	Bottom	Initial	Sustained		SMZVI (gal)	3DME (gal)	Water (gal)	Injection Density ¹ (lbs/gal)	Solution	Cumulative		
IP-1	6/26/2023	10:44	6/26/2023	12:16	14	16	100	100	1 to 3	3.3	4.8	151.9	8.48	160	160	N	Spike of 170psi
	6/26/2023	12:16	6/26/2023	13:05	12	14	70	70	3.5	3.3	4.8	151.9	8.48	160	320	N	
	6/26/2023	13:05	6/26/2023	13:42	10	12	23	23	4	3.3	4.8	151.9	8.48	160	480	N	
	6/26/2023	13:46	6/26/2023	14:20	8	10	21	21	4.5	3.3	4.8	151.9	8.48	160	640	N	
	6/26/2023	14:20	6/26/2023	14:46	6	8	16	8 to 4	5.1 to 2.5	0.8	1.1	36.1	8.48	38	678	Y	Substantial surfacing. Reattempt at 15:30
	6/26/2023	15:25	6/26/2023	15:45	6	8	8	4	2 to 1.5	0.3	0.5	15.2	8.48	16	694	Y	
	6/27/2023	8:24	6/27/2023	8:54	6	8	10	10	1.5	0.9	1.4	42.7	8.48	45	739	Y	
	6/27/2023	9:05	6/27/2023	9:10	7	8	10	10	3	0.3	0.4	11.9	8.48	12.5	751.5	Y	
	Total				6	16	-			15.7	22.5	713.3	-	-		-	
IP-2a	6/27/2023	13:02	6/27/2023	13:32	14	16	90	50	4.4	3.1	4.5	104.4	8.53	112	112	Y	Slight surfacing
	6/27/2023	13:44	6/27/2023	14:02	14	16	75	50	4.3	2.0	2.9	68.0	8.53	73	185	Y	Slight surfacing
	6/27/2023	14:11	6/27/2023	14:16	12	14	70	70	2.4	0.4	0.6	13.1	8.53	14	199	Y	Increased surfacing
	6/27/2023	14:58	6/27/2023	15:00	12	14	60	60	2.1	0.1	0.2	4.7	8.53	5	204	Y	Reduced pressure
	6/27/2023	15:00	6/27/2023	15:12	11	13	50	30	2	0.6	0.9	20.5	8.53	22	226	Y	Raised lift to reduce daylighting
	6/28/2023	9:10	6/28/2023	9:58	11	13	60	45 to 30	2.1	3.2	4.6	106.3	8.53	114	340	Y	
	6/28/2023	10:11	6/28/2023	11:05	9	11	28	28	2.8	4.7	6.8	158.5	8.53	170	510	N	
	6/28/2023	11:05	6/28/2023	11:35	7	9	22	11	3	2.5	3.6	83.9	8.53	90	600	N	
	Total				7	16	-			16.7	24.0	559.3	-	-		-	
IP-2b	6/28/2023	12:20	6/28/2023	12:30	14.5	15	160	50	2.7 to 3.3	0.6	0.8	18.6	8.53	20	20	N	Switched to pressure activated tooling
	6/28/2023	12:30	6/28/2023	12:52	13	13.5	160	50	2.5	1.7	2.4	55.9	8.53	60	80	Y	13gal flush with water at 8ft following injection interval.
	Total				13	15	-			2.2	3.2	87.6	-	-		-	

Injection Point ID	Start		End		Injection Lift (ft bgs)		Injection Pressure (PSI)		Average Flowrate (gpm)	Injection Mix				Injected Volume (gal)		Surfacing	Notes
	Date	Time	Date	Time	Top	Bottom	Initial	Sustained		SMZVI (gal)	3DME (gal)	Water (gal)	Injection Density ¹ (lbs/gal)	Solution	Cumulative		
IP-3	6/26/2023	15:06	6/26/2023	15:15	14	16	110	95	3	0.3	0.4	11.4	8.48	12	12	Y	Surfacing from borehole
	6/27/2023	9:20	6/27/2023	9:24	14	16	110 to 115	115	4.5	0.5	0.7	20.8	8.48	21.9	21.9	Y	
	6/27/2023	9:31	6/27/2023	9:40	13	15	55	35	4 to 3.5	1.0	1.4	45.6	8.48	48	70	Y	MW-12 overflow
	6/27/2023	9:40	6/27/2023	10:28	13	15	55	35	4 to 3.5	3.9	5.6	130.5	8.53	140	210	Y	Switched to new mix
	6/27/2023	10:28	6/27/2023	11:32	11	13	60	40	3.5	4.2	6.0	139.8	8.53	150	360	N	Surfacing at borehole, stopped and restarted to reduce surfacing.
	6/27/2023	11:36	6/27/2023	12:12	9	11	16	8	3.6	3.9	5.6	130.5	8.53	140	500	N	MW-12 no longer pressurized, MW-7 overflowing.
	6/27/2023	12:12	6/27/2023	12:20	7	9	10	6	2.6	0.7	1.0	23.3	8.53	25	525	Y	
	6/27/2023	12:52	6/27/2023	12:54	7	9	6	6	2.1	0.1	0.1	2.8	8.53	3	528	Y	
	6/27/2023	14:29	6/27/2023	14:30	7	9	8	8	2.5	0.1	0.2	4.7	8.53	5	532.5	Y	
	6/28/2023	11:54	6/28/2023	11:56	7	9	10	10	2.4	0.1	0.2	3.7	8.53	4	536.5	Y	Will inject remainder in IP-2
Total					7	16	-			14.7	21.1	513.1	-	-		-	
IP-4a	6/27/2023	13:14	6/27/2023	14:27	7	9	70	40	2 to 1.9	3.3	4.8	151.9	8.48	160	160	Y	Slight surfacing
	6/27/2023	14:33	6/27/2023	15:55	9	11	30	30	3 to 2	3.3	4.8	151.9	8.48	160	320	Y	Slight surfacing
	6/27/2023	16:05	6/27/2023	16:07	10.5	12.5	45	30	2	0.1	0.2	4.7	8.48	5	325	Y	Slight surfacing
	6/27/2023	17:23	6/27/2023	18:03	11	13	120	60	3	2.5	3.6	132.9	8.46	119	464	Y	Step out 2 feet NW, 20 gal flush with water
	6/28/2023	9:32	6/28/2023	9:38	11	13	200+	200+	3.5	0.3	0.5	15.2	8.48	16	480	Y	Slight surfacing
	Total				7	13	-			9.6	13.8	456.6	-	-		-	
IP-4b	6/28/2023	10:13	6/28/2023	10:48	12.5	14.5	200+	60	4.3	3.3	4.8	151.9	8.48	160	160	Y	Step out 8 feet SW
	6/28/2023	10:54	6/28/2023	11:41	10.5	12.5	60	40	4.5 to 3.6	3.9	5.7	178.9	8.48	188.5	348.5	Y	Slight surfacing
	Total				10.5	14.5	-			7.3	10.5	330.8	-	-		-	

Notes
gpm - gallons per minute
psig - pounds per square inch, gage
gal - gallons
lbs - pounds
ft - feet
bgs - below ground surface
¹ - Assumes SMZVI density of 15 lbs/gal, 3DME density of 8.33 lbs/gal, water density of 8.36 lbs/gal

APPENDIX C

Groundwater Level Logs

WL Monitoring while Injecting IP-2 6/28/23

Time	MW-12	MW-16	Lift
1300	3.27	4.31	before start
1315	2.65	3.35	16-14 ft
1320	over flow 1318	2.56	16-14 ft
1325	—	2.25	16-14 ft
1330	—	1.88	16-14 ft
1337	—	0.91	16-14
1350	—	1.74	16-14
1355	—	1.19	16-14
1400	—	1.00	16-14

6/29/23 IP-2

Time	MW-12	MW-16	Lift
0910	3.97	4.76	13-11 ft
0916	3.75	4.74	13-11 ft
0925	3.46	4.70 4.20	13-11 ft
0935	3.17	4.63	13-11 ft
0945	2.73	4.52 4.52	13-11 ft
0958	2.52	4.48	13-11 ft
1007	2.04	4.28	13 ^{0.5m} 11-9 ft
1016	1.56	4.26	11-9 ft
1028	1.37	4.09	11-9 ft
1045	1.15	3.86	11-9 ft
1100 1100	0.96	3.69	11-9 ft
1105	0.87	3.65	9-7 ft
1120	0.63	3.45	9-7 ft
1135	0.45	3.37	9-7 ft

WL with pressure activated
trolling

Time	MW-12	MW-16	Lift
1225	0.49	3.26	15 ft
1228	over flow	3.15	15 ft
1233	—	3.15	13.5 ft
1241	—	3.26	13.5 ft

Water Level Monitoring Log

Project No. 140252, HERS Industrial Park

Field Staff: DTM

Injection Well	Date	Time	Previous Injection Location	Water Level (ft bTOC)	Comments
MW-16	6/26/23	0930	N/A	5.30	
MW-12			N/A	4.53	
MW-7			N/A	3.57	
MW-13			N/A	3.	
MW-12		1450	IP-1	3.41	
MW-7		1450	IP-1	2.79	
MW-13		1450	IP-1	3.42	
MW-16		1500	IP-1	0.96	
MW-16	↓	1705	IP-1	3.00	-filling
MW-16	6/27/23	0820	N/A	4.02	
MW-12			N/A	4.06	
MW-13			N/A	2.84	
MW-7			N/A	3.51	
MW-1	↓	↓	N/A	3.61	
MW-12	6/27/23	0940	IP-3 - current	over flow	-likely started casing
MW-7		0955	IP-3 - current	2.55	
MW-7			IP-3 - current	Over flow	
MW-16		1301	IP-3	3.32	
MW-12		12:58		2.41	
MW-13					Truck on top of it
MW-7		1257	↓	0.53	
MW-6		1754	IP-1	3.94	
MW-12		1753	IP-1	3.20	
MW-7		1805	IP-1	1.62	
MW-13		1830	IP-1	2.82	
MW-1	↓	1808	IP-1	Artesian	
MW-16	6/28/23	0900	Beginning dig	4.54	
MW-12		0901		3.83	
MW-7		0905		2.38	
MW-13	↓	0907	↓	3.26	

ft btoc = feet below top of casing

Field Staff: DTM

[illegible]

ft btoc = feet below top of casing

APPENDIX D

Breakthrough Monitoring Logs

Appendix X. IP-1 from MW-16

Project No. 140252 , Seattle, Washington

DRAFT

Confidential Attorney Client Privilege

Date and Time	Elapsed Time (min)	Specific Conductivity (µS/cm)	pH	ORP (mV)	Turbidity (NTU)	RDO Concentration (mg/L)	Temperature (°C)	Depth to Water (ft)	Notes
6/26/23 11:00	16	614.10	6.00	216.55	10.33	2.57	16.15	5.6	Injections started at 10:44
6/26/23 11:01	17	619.10	6.17	213.18	4.47	0.41	15.57	5.6	
6/26/23 11:02	18	624.66	6.25	210.16	4.15	0.28	15.47	5.64	
6/26/23 11:03	19	623.36	6.35	200.89	4.11	0.24	15.60	5.64	
6/26/23 11:04	20	636.70	6.38	203.21	3.84	0.21	15.43	5.64	
6/26/23 11:05	21	636.63	6.47	198.99	3.41	0.18	15.42	5.64	
6/26/23 11:06	22	634.15	6.55	197.66	3.18	0.16	15.41	5.64	
6/26/23 11:07	23	627.37	6.57	193.21	3.69	0.15	15.47	5.64	
6/26/23 11:08	24	635.85	6.60	189.84	3.34	0.14	15.43	5.64	
6/26/23 11:09	25	639.97	6.65	188.85	2.93	0.13	15.41	5.64	
6/26/23 11:10	26	645.20	6.63	186.39	3.43	0.13	15.49	5.64	
6/26/23 11:11	27	638.75	6.66	182.46	3.35	0.14	15.60	5.64	
6/26/23 11:12	28	644.31	6.64	183.09	4.78	0.12	15.48	5.64	
6/26/23 11:13	29	648.96	6.64	178.99	5.06	0.13	15.60	5.73	
6/26/23 11:14	30	655.15	6.62	178.23	4.05	0.13	15.52	5.73	
6/26/23 11:15	31	658.40	6.60	176.48	5.18	0.13	15.67	5.73	
6/26/23 11:16	32	661.08	6.54	175.74	5.40	0.12	15.63	5.73	
6/26/23 11:17	33	659.12	6.50	174.09	7.08	0.13	15.79	5.73	
6/26/23 11:18	34	664.73	6.47	172.39	8.50	0.12	15.64	5.72	
6/26/23 11:19	35	695.12	6.44	171.57	14.25	0.12	15.67	5.72	
6/26/23 11:20	36	741.28	6.47	168.35	22.46	0.11	15.27	5.65	
6/26/23 11:21	37	751.24	6.52	165.22	29.41	0.11	15.31	5.58	
6/26/23 11:22	38	757.99	6.52	162.18	35.55	0.10	14.99	5.5	
6/26/23 11:23	39	758.06	6.50	160.25	36.78	0.11	15.15	5.45	
6/26/23 11:24	40	758.32	6.49	158.11	43.07	0.10	14.87	5.37	
6/26/23 11:25	41	757.40	6.49	157.14	46.93	0.11	15.01	5.3	
6/26/23 11:26	42	757.35	6.48	157.09	73.08	0.10	14.85	5.3	Significant WL change
6/26/23 11:27	43	753.23	6.51	155.81	465.23	0.12	14.94	4.92	Turbidity Breakthrough
6/26/23 11:28	44	752.18	6.44	161.27	1988.38	0.17	14.73	4.61	
6/26/23 11:29	45	752.81	6.44	162.08	1259.48	0.15	14.69	4.26	
6/26/23 11:30	46	752.87	6.42	160.67	921.42	0.17	14.79	3.98	
6/26/23 11:31	47	753.22	6.38	158.92	726.82	0.10	14.66	3.65	
6/26/23 11:32	48	753.60	6.37	157.58	660.58	0.11	14.69	3.23	
6/26/23 11:33	49	752.92	6.38	156.26	613.48	0.13	14.80	2.65	
6/26/23 11:34	50	753.79	6.31	155.96	638.96	0.12	14.64	2.48	
6/26/23 11:35	51	756.53	6.31	155.07	545.40	0.14	14.74	2.31	
6/26/23 11:36	52	778.05	6.22	151.93	308.69	0.03	14.67	2.15	Breakthrough
6/26/23 11:37	53	837.62	6.22	136.87	287.08	0.00	14.81	2.03	
6/26/23 11:38	54	992.54	6.25	102.33	456.75	0.00	14.81	1.94	
6/26/23 11:39	55	1035.08	6.29	71.35	507.29	0.00	14.86	1.8	
6/26/23 11:40	56	1109.72	6.30	52.12	564.63	0.00	14.91	1.69	
6/26/23 11:42	57	1254.04	6.43	10.33	716.08	0.00	14.96	1.5	
6/26/23 11:43	58	1326.58	6.52	-12.03	734.92	0.00	15.12	1.3	
6/26/23 11:44	59	1445.45	6.63	-31.08	752.53	0.00	15.25	1.07	
6/26/23 11:45	60	1451.14	6.67	-46.27	782.83	0.00	15.33	1.07	

APPENDIX E

Report Limitations and Guidelines for Use

REPORT LIMITATIONS AND USE GUIDELINES

Reliance Conditions for Third Parties

This report was prepared for the exclusive use of the Client. No other party may rely on this report or the product of our services without the express written consent of Aspect Consulting (Aspect). This limitation is to provide our firm with reasonable protection against liability claims by third parties with whom there would otherwise be no contractual conditions or limitations and guidelines governing their use of the report. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and recognized standards of professionals in the same locality and involving similar conditions.

Services for Specific Purposes, Persons and Projects

Aspect has performed the services in general accordance with the scope and limitations of our Agreement. This report has been prepared for the exclusive use of the Client and their authorized third parties, approved in writing by Aspect. This report is not intended for use by others, and the information contained herein is not applicable to other properties.

This report is not, and should not, be construed as a warranty or guarantee regarding the presence or absence of hazardous substances or petroleum products that may affect the subject property. The report is not intended to make any representation concerning title or ownership to the subject property. If real property records were reviewed, they were reviewed for the sole purpose of determining the subject property's historical uses. All findings, conclusions, and recommendations stated in this report are based on the data and information provided to Aspect, current use of the subject property, and observations and conditions that existed on the date and time of the report.

Aspect structures its services to meet the specific needs of our clients. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and subject property. This report should not be applied for any purpose or project except the purpose described in the Agreement.

This Report Is Project-Specific

Aspect considered a number of unique, project-specific factors when establishing the Scope of Work for this project and report. You should not rely on this report if it was:

- Not prepared for you
- Not prepared for the specific purpose identified in the Agreement
- Not prepared for the specific real property assessed
- Completed before important changes occurred concerning the subject property, project or governmental regulatory actions

If changes are made to the project or subject property after the date of this report, Aspect should be retained to assess the impact of the changes with respect to the conclusions contained in the report.

Geoscience Interpretations

The geoscience practices (geotechnical engineering, geology, and environmental science) require interpretation of spatial information that can make them less exact than other engineering and natural science disciplines. It is important to recognize this limitation in evaluating the content of the report. If you are unclear how these "Report Limitations and Use Guidelines" apply to your project or site, you should contact Aspect.

Discipline-Specific Reports Are Not Interchangeable

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually address any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding the subject property.

Environmental Regulations Are Not Static

Some hazardous substances or petroleum products may be present near the subject property in quantities or under conditions that may have led, or may lead, to contamination of the subject property, but are not included in current local, state or federal regulatory definitions of hazardous substances or petroleum products or do not otherwise present potential liability. Changes may occur in the standards for appropriate inquiry or regulatory definitions of hazardous substance and petroleum products; therefore, this report has a limited useful life.

Property Conditions Change Over Time

This report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time (for example, Phase I ESA reports are applicable for 180 days), by events such as a change in property use or occupancy, or by natural events, such as floods, earthquakes, slope failure or groundwater fluctuations. If more than six months have passed since issuance of our report, or if any of the described events may have occurred following the issuance of the report, you should contact Aspect so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

Phase I ESAs – Uncertainty Remains After Completion

Aspect has performed the services in general accordance with the scope and limitations of our Agreement and the current version of the “Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process”, ASTM E1527, and U.S. Environmental Protection Agency (EPA)'s Federal Standard 40 CFR Part 312 "Innocent Landowners, Standards for Conducting All Appropriate Inquiries".

No ESA can wholly eliminate uncertainty regarding the potential for recognized environmental conditions in connection with subject property. Performance of an ESA study is intended to reduce, but not eliminate, uncertainty regarding the potential for environmental conditions affecting the subject property. There is always a potential that areas with contamination that were not identified during this ESA exist at the subject property or in the study area. Further evaluation of such potential would require additional research, subsurface exploration, sampling and/or testing.

Historical Information Provided by Others

Aspect has relied upon information provided by others in our description of historical conditions and in our review of regulatory databases and files. The available data does not provide definitive information with regard to all past uses, operations or incidents affecting the subject property or adjacent properties. Aspect makes no warranties or guarantees regarding the accuracy or completeness of information provided or compiled by others.

Exclusion of Mold, Fungus, Radon, Lead, and HBM

Aspect's services do not include the investigation, detection, prevention or assessment of the presence of molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts. Accordingly, this report does not include any interpretations, recommendations, findings, or conclusions regarding the detection, assessment, prevention or abatement of molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts. Aspect's services also do not include the investigation or assessment of hazardous building materials (HBM) such as asbestos, polychlorinated biphenyls (PCBs) in light ballasts, lead based paint, asbestos-containing building materials, urea-formaldehyde insulation in on-site structures or debris or any other HBMs. Aspect's services do not include an evaluation of radon or lead in drinking water, unless specifically requested.